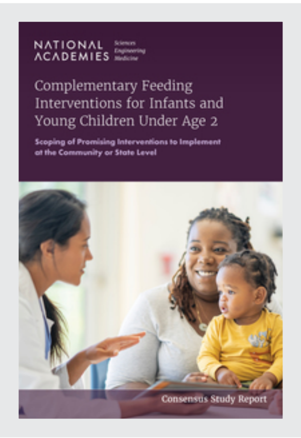

Complementary Feeding Interventions for Infants and Young Children Under Age 2: Scoping of Promising Interventions to Implement at the Community or State Level (2023)

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Scoping of Promising Interventions to Implement at the Community or State Level

David A. Savitz and Katherine M. Delaney, *Editors*

Committee on Complementary Feeding Interventions for Infants and Young Children Under Age 2

Food and Nutrition Board

Health and Medicine Division

Consensus Study Report

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This Consensus Study Report was reviewed in draft form by individuals chosen for their diverse perspectives and technical expertise. The purpose of this independent review is to provide candid and critical comments that will assist the National Academies of Sciences, Engineering, and Medicine in making each published report as sound as possible and to ensure that it meets the institutional standards for quality, objectivity, evidence, and responsiveness to the study charge. The review comments and draft manuscript remain confidential to protect the integrity of the deliberative process.

We thank the following individuals for their review of this report:

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Although the reviewers listed above provided many constructive comments and suggestions, they were not asked to endorse the conclusions or recommendations of this report nor did they see the final draft before its release. The review of this report was overseen by **RONALD KLEINMAN,** Harvard Medical School, and **CATHERINE E. WOTEKI,** Iowa State University. They were responsible for making certain that an independent examination of this report was carried out in accordance with the standards of the National Academies and that all review comments were carefully considered. Responsibility for the final content rests entirely with the authoring committee and the National Academies.

Foreword

The translation of research findings into policy is a challenging but essential step in the pathway by which scientific evidence advances societal goals, in this case, promoting the nutritional health of young children. The particular challenge for the Committee on Complementary Feeding Interventions for Infants and Young Children Under Age 2 (years) was to identify, describe, evaluate, and apply relevant research to future efforts to optimize complementary feeding in infants and children under 2 years of age. The committee was asked not just to assess the quality of the research, but just as importantly, offer our perspective on how the insights could be used to develop public health programs that could be scaled up for the entire population, and mitigate health disparities.

The committee members have an abundance of diverse disciplinary expertise, with an unusually wide range of professional homes but a shared desire to straddle the divide between academic research and programmatic interventions. There were considerable challenges in connecting a heterogeneous body of studies to promising strategies for implementation, but through the individual, and particularly the collective, insights of the committee, we believe we have identified a constructive way forward. The influences on complementary feeding are diverse and complex, involving caregivers, health care providers, educators, and a wide range of government agencies, and the committee believes that by working toward a complementary and coherent engagement of all these entities, there is an exciting opportunity for progress.

The conscientious efforts of the committee that made it possible to develop this report over a relatively brief period are remarkable. Despite many competing demands, all members contributed creative ideas combined with hard work to develop a harmonized document that provides a unified perspective. The same combination of innovative thinking and substantive contributions from the study director, Katie Delaney, and the talented colleagues at the Academies with whom she worked, Jen Stephenson, Melanie Arthur, and Anne Marie Houppert, as well as Melissa Maitin-Shepard (science writer), were essential at every step along the way from identifying the literature to refining the document and everything in between. It is always remarkable and highly gratifying to watch the process unfold, the way that each of the committee members and staff finds a rhythm for working together toward a common goal, each of us adding an instrument to the orchestra toward our shared goal of creating a symphony. Despite the seriousness of our purpose and demands in developing the report, the committee and staff made the process enjoyable as well as gratifying.

David A. Savitz, *Chair*
Committee on Complementary Feeding Interventions
for Infants and Young Children Under Age 2

Contents

Acronyms and Abbreviations

AAP	American Academy of Pediatrics
BFF	Brighter Future Family Center
BMI	body mass index
CACFP	Child and Adult Care Food Program
CDC	Centers for Disease Control and Prevention
CE	cooperative extension
CEBQ	Children's Eating Behaviour Questionnaire
CFQ	Child Feeding Questionnaire
COM-B	COM-B behavior model
ECE	early care and education
ECHO	Early Childhood Obesity Prevention Program
EFNEP	Expanded Food and Nutrition Education Program
EHS	Early Head Start
EPSDT	Early and Periodic Screening, Diagnostic and Treatment
FFQ	food frequency questionnaire
FPL	federal poverty level
HHS	Department of Health and Human Services
HomVEE	Home Visiting Evidence of Effectiveness

INFANT	Infant Feeding Activity and Nutrition (program)
IT	information technology
NFN	Nurturing Families Network
NIH	National Institutes of Health
PFSQ	Parental Feeding Style Questionnaire
RCT	randomized controlled trial
RE-AIM	Reach, Effectiveness, Adoption, Implementation, and Maintenance
SDOH	social determinants of health
SES	socioeconomic status
SMS	short messaging service
SNAP-Ed	Supplemental Nutrition Assistance Program–Education
SOP	standard operating procedure
SSB	sugar-sweetened beverage
TIDierR	Template for Intervention Description and Replication
USDA	U.S. Department of Agriculture
WHO	World Health Organization
WIC	Special Supplemental Nutrition Program for Women, Infants, and Children
WLZ	weight-for-length z-score

Summary[1]

Complementary feeding refers to the introduction of foods other than human milk or formula to the infant's diet that occurs once human milk or formula alone is insufficient to meet the nutritional needs of the infant. The World Health Organization and the American Academy of Pediatrics recommend that complementary feeding begins at about 6 months of age, and not before 4 months of age, with continued breastfeeding until 2 years of age or older. Around 6 months of age, the nutritional needs of the infant may no longer be met by human milk or formula alone, which is why introducing complementary foods at this time is recommended. Healthy complementary feeding behaviors for infants and young children under age 2 years are essential for age-appropriate growth and social, emotional, and cognitive development.

Existing guidance on *what* to feed infants and young children includes introducing nutrient-dense, developmentally appropriate foods, including foods rich in iron, zinc, and vitamin D, and avoiding foods high in added sugars and sodium. The existing research on *how* to feed infants and young children recognizes that complementary feeding ideally occurs through ongoing and reciprocal interactions between the caregiver and the developing child. Responsive feeding is an approach to feeding that is sensitive to the child's hunger and fullness cues, as well as to the child's emotional and developmental needs. A recent National Academies of Sciences, Engineering, and Medicine (the National Academies) consensus study report

[1] This summary does not include references. Citations for findings presented in the summary appear in the subsequent chapters of the report.

titled *Feeding Infants and Children from Birth to 24 Months* summarized existing recommendations on *what* and *how* to feed infants and young children.

A number of federal programs, such as the Special Supplemental Nutrition Program for Women, Infants, and Children (WIC) and the Child and Adult Care Food Program (CACFP), as well as other public health initiatives support healthy complementary feeding practices for families with low income. Opportunities exist to initiate new interventions or expand existing efforts by identifying new and complementary interventions to improve nutrition during this time. The existing literature contains many studies that have examined interventions aimed at improving nutrition for infants and young children. However, many were conducted in controlled clinical or research settings, and their effectiveness in and scalability to practical, real-life settings have not been assessed. Gaps in the existing literature include:

1. What interventions can potentially impact infant nutrition and feeding behaviors and/or outcomes outside of controlled clinical and research settings;
2. What interventions can be implemented at a community or state level; and
3. If/how interventions could complement existing federal-level programs

THE COMMITTEE'S TASK

The Centers for Disease Control and Prevention (CDC) requested that the National Academies conduct a scoping review to identify promising complementary feeding interventions. The National Academies' Health and Medicine Division convened the Committee on Complementary Feeding Interventions for Infants and Young Children Under Age 2 whose members had expertise in epidemiology, public health nutrition, dietetics/community nutrition, infant and child feeding practices and nutritional requirements, federal food and nutrition programs (along with equity and access to these programs), early childhood education, communications, and systematic reviews (see Appendix A for committee biographies). The committee was asked to conduct a scoping review and assessment of the peer-reviewed published literature and other publicly available information on interventions aimed at improving infant and young child feeding behaviors. CDC requested that the review be limited to developed countries or U.S.-specific contexts[2] and interventions occurring in the following three settings:

[2] For purposes of the scoping review at the request of the sponsor to limit the review to U.S.-specific contexts, the committee limited the scoping review to interventions that occurred in high-income countries as classified by the World Bank.

1. health care systems that influence feeding (e.g., health care centers, federally qualified health care centers, doctors' offices, health clinics)
2. early care and education (ECE) settings, and
3. university cooperative extension (CE) programs that include nutrition and feeding for young children

The committee was asked to produce a report that summarizes the available evidence and provides information on possible interventions that could be scaled up or implemented at a community or state level. CDC requested that the report be limited to research addressing: (1) *what* to feed (e.g., avoiding foods and beverages with added sugars; offering a variety of foods, textures, and flavors; consuming nutrient-dense foods) and (2) *how* to feed (e.g., using hunger and satiation cues to guide feeding; repeated exposures to foods; other responsive feeding practices). CDC also requested that the committee map the existing interventions by setting and describe factors that may be needed to scale the interventions (e.g., financial or human resources, barriers and facilitators, measurable and standardized indicators), reach underserved populations, and complement federal-level programs. As requested by the sponsor, interventions aimed at influencing breastfeeding and timing of introduction of complementary foods are outside the scope of this report.

THE COMMITTEE'S APPROACH

The committee interpreted its task as a request to scope the literature and use expert judgment to identify promising interventions, or aspects of interventions, that positively impact infant and young child feeding behaviors and practices related to what and how to feed infants and young children between 6 and 24 months of age. The committee acknowledged that scoping reviews provide an overview of evidence and differ from systematic reviews, which involve in-depth analysis of the strength of evidence. The scoping review targeted interventions conducted in U.S.-specific contexts (defined by the committee as high-income settings) in health care settings, ECE settings, and CE settings. At the direction of the study sponsor, the committee also included interventions that complemented existing federal programs targeting at-risk children under 2 years and their caregivers that may influence infant and young child feeding behaviors (e.g., WIC and home visiting programs) and interventions conducted in other settings that otherwise met the criteria for inclusion.

The committee developed a literature search strategy, screening protocol, and pre-determined extraction criteria. The committee described factors considered when reviewing the evidence, commented on the strengths and weaknesses of each individual article, noted the potential for scalability of the intervention, and use its collective expert judgment when identifying potentially informative studies.

The committee identified a small number of interventions that are the most broadly informative for developing new initiatives. While none are without methodologic limitations or universally effective in improving all outcome measures, they provide valuable models that may serve as a framework for future scaled interventions. These designated "informative studies" were chosen based on consideration of three key characteristics:

1. The quality of methods, considering the design, quality of measurement, study size, and other features;
2. Evidence of effectiveness, namely evidence that at least some key outcomes were influenced by the intervention;
3. The potential for scalability, including whether the program could be widely implemented in the United States, considering such features as acceptability to recipients, suitability for diverse populations, feasibility within existing U.S. systems, and financial cost.

The committee used its expert judgment to identify informative studies and did not quantify the extent to which each study met each characteristic. In addition, other studies offered "informative intervention elements," defined as clear suggestions of features that should be considered for incorporation into any effective and scalable infant and young child feeding program. For each of the informative study and informative intervention elements, the committee provided a brief description of the study and the insights that the study contributed toward the committee's conclusions. The committee also described factors needed to scale interventions to the community or state levels and noted the ability of the intervention to reach underserved populations[3] reduce inequities, and complement federal-level programs such as WIC and home visiting programs.

[3] At the request of the sponsor, the committee was asked to note the ability of the intervention to reach higher risk populations. Throughout the report, the committee will use the term "underserved populations" to refer to populations that have been systematically denied a full opportunity to participate in aspects of economic, social, and civil life. Specifically, in the U.S. context, this may include families that are Asian, Black, Hispanic/Latino, Indigenous, and/or Native Hawaiian or Pacific Islander; have low incomes; are located in rural or urban areas with limited access to healthy foods; speak languages other than English in the home; or experience other systematic discrimination or disadvantage. When possible, specific language about the characteristics of study populations has been used in sections of the report describing study findings, and additional details about characteristics of study populations are available in Appendix E.

SCOPING REVIEW FINDINGS

The committee identified 83 publications from 58 studies that met the criteria for inclusion in the scoping review. The number of studies varied across settings, with 16 in health care settings (27 publications), 5 in ECE (5 publications), 1 study (1 publication) in CE systems, 2 in WIC settings (4 publications), 12 in home-visiting programs (18 publications), and 23 studies (28 publications) in other settings.

A noteworthy feature of the literature is that only about one-third of the publications were from studies based in the United States (29 publications). Given that the scoping review was limited to higher-income countries, most of the studies occurring outside the United States took place in Europe (29 publications), with a sizable number in Australia (15 publications), and smaller numbers in New Zealand, Canada, Israel, and South Korea.

The studies used one or more of the following modalities:

1. Live (e.g., in-person sessions [group and individual])
2. Remote-live interactive (e.g., via telephone [human to human])
3. Remote-tech interactive (e.g., interactive apps or websites, two-way texting)
4. Remote-tech non-interactive (e.g., video, books, non-interactive websites, one-way texting)

Most studies used live (69 publications) and/or remote-tech non-interactive modalities (66 publications).

The scoping review focused on outcomes related to "*what* to feed" and "*how* to feed" in infants and young children. Tables S-1 and S-2 describe intervention targets related to, respectively, what to feed and how to feed infants and young children.

Health Care

The committee identified 16 studies (27 publications) occurring within the health care setting that met the inclusion criteria. Included studies were conducted at hospitals, clinics, or medical offices; by health care setting personnel conducting home visits; or in a structure considered to be a medical model. The 27 publications within the health care setting were from 10 countries. These studies were intended to take advantage of the family's connection with their health care provider to alter caregiver knowledge and behavior, which subsequently alters the child's eating behavior and improves nutritional intake. All 16 studies delivered the intervention through some form of counseling with anticipatory guidance (i.e., guidance to assist caregivers in understanding the expected growth and development of their children). The approaches to counseling varied

TABLE S-1 Number of Publications Targeting *What* to Feed by Outcome and Setting

	Caregiver			Child
What to Feed Outcomes	Increasing provision of nutrient-dense foods and beverages	Increasing variety of foods (types, textures, flavors)	Reducing provision of foods and beverages with added sugars, salt, saturated and trans fats	Consuming a high-quality diet with appropriate amounts and an increased variety of nutrient-dense foods and beverages
Health care	12	7	7	14
ECE	2	0	0	4
CE	0	1	0	0
WIC	0	0	3	0
Home visit	10	0	3	11
Other	0	4	3	19
TOTAL	24	12	16	48

among studies, with the most common intervention including individual counseling by health professionals (e.g., physicians, midwives, nurses, or dietitians) in the context of routine preventive obstetric or pediatric visits.

Key Findings

Overall, the heterogeneity of the intervention and assessment tools resulted in a variety of study outcomes and few consistent findings. Within the health care setting, counseling interventions generally led to parents reporting healthier diets and improved responsive feeding behaviors. One key finding is that the more intensive interventions (e.g., multi-week interventions involving multiple in-person education sessions) were not shown to be more effective than less-intensive interventions (e.g., participation in a Facebook group, week-long interventions).

Early Care and Education

The committee reviewed five studies (five publications) conducted in ECE settings that met the inclusion criteria. One of the five studies was conducted within the United States; the others were in the United Kingdom, Spain, and Belgium. All five studies involved child care centers or nurseries, ECE settings that typically involve multiple child care providers caring for multiple children in "classroom"-type settings. None

TABLE S-2 Number of Publications Targeting *How* to Feed by Outcome and Setting

How to Feed Out-comes	Caregiver						Child		
	Using responsive feeding practices	Providing appropriate portion sizes	Offering repeated exposures to unfamiliar foods and flavors	Appropriately providing bottle and cup	Modeling healthy eating behavior	Providing regular meals and snacks	Accepting a variety of nutrient-dense foods and beverages	Timely transition to self-feeding	Using a cup
Health care	14	2	5	4	5	12	5	3	1
ECE	1	0	2	0	0	1	0	0	0
CE	0	0	0	0	1	0	0	0	0
Home visit	14	6	8	3	6	0	1	5	0
WIC	3	0	0	0	0	0	0	0	0
Other	7	1	6	1	0	1	12	5	0
TOTAL	39	9	21	8	12	14	18	13	1

occurred in family child care homes, where typically a single provider cares for a relatively small number of children. The mode of intervention varied between the five studies, four of which were education interventions, with three delivered in person and one via a website. The fifth was an in-person tasting experience for the infant.

Key Findings

Repeated exposure to novel vegetables while at child care can be effective in helping young children like to eat vegetables, at least over a relatively short period of time (e.g., several months) in this age group; however, the long-term impacts on dietary intakes—including outside of child care—are not known. Providing training to child care providers may influence what young children eat in child care, but the only study that had this intervention focus has limited utility because it focused primarily on breastfeeding and the timing of introduction of complementary foods, issues that are outside the scope of this report. Both educational interventions that aimed to reach parents through child care centers achieved positive outcomes.

University Cooperative Extension

The committee reviewed one study (one publication) that described an intervention done within the U.S. CE system. This study examined the effects of four nutrition education lessons followed by structured reinforcements and is unique in that the children remained in Early Head Start (a federally funded type of ECE), while parents took lessons in groups to increase feeding knowledge and self-efficacy. The parents also received structured reinforcement via home visits.

Key Findings

The intervention increased both parental knowledge and self-efficacy, although there was no impact on toddler self-regulation. Both parental knowledge and self-efficacy are potential mediators of feeding behaviors. Furthermore, the participants stated that they learned something new and changed their behavior based on the classes and home lessons.

SPECIAL SUPPLEMENTAL NUTRITION PROGRAM FOR WOMEN, INFANTS, AND CHILDREN

The committee reviewed two studies (four publications) in the WIC setting that met the inclusion criteria, and all were conducted in the United States. The studies are important in that their primary focus was on modalities that may be instrumental in supportive behavior change related to complementary feeding, namely interactive texting and the distribution of video content to be viewed in the home.

Key Findings

An interactive texting study demonstrated that messaging was a highly accepted method of receiving education among women with low incomes served by WIC (English and Spanish speakers). While most participants receiving the intervention reported that the text messages were useful and led them to make changes in the way they fed their infants, the impacts on measured behavior changes were mixed. The video intervention led to a greater increase in knowledge and behavior, which suggests that short, culturally relevant videos have the potential to affect both knowledge and behavior change among WIC participants.

Home Visiting

For the home visiting setting, the committee reviewed 12 studies (18 publications) that met the inclusion criteria. Six of the identified studies were conducted in the United States. Three of the U.S. studies were conducted in the context of home visiting models meeting the Department of Health and Human Services (HHS) criteria to be designated as evidence-based. Outside of the United States, two studies were completed in New Zealand, and the remaining four studies were done in the Netherlands, France, the United Kingdom, and Australia. Most of the home-visiting studies (10 studies) tested interventions in which nutrition-focused education, counseling, and/or skill-building and goal setting activities and resources (e.g., recipes) were delivered to caregivers one on one in the home setting. Studies differed based on who delivered the education or counseling and the frequency and duration of the visits.

Key Findings

The home visiting interventions had consistent significant impact on increasing caregivers' use of responsive feeding practices, especially related to reducing pressure on the child to eat.

Other

The committee reviewed 23 studies (28 publications) that met the inclusion criteria and focused on *what* or *how* to feed but did not take place in the context of the settings mentioned above (i.e., health care, ECE, CE, WIC, or home visiting). These publications spanned 11 countries, with the most prevalent being within the United States (9 publications). Six were from Norway, three were from the United Kingdom, and the rest were from Australia, Canada, France, Germany, the Netherlands, New Zealand, Sweden, and South Korea. Fifteen studies investigated the impacts of early (e.g., when introducing complementary foods or through human milk) and repeated exposures to new foods, with the aim of increasing child intake of the novel foods. One study tested counter-marketing messages about unhealthy beverages with parents of young children. Seven studies tested more comprehensive interventions delivered to parents virtually.

Key Findings

Repeated exposure to vegetables when introducing solids may be effective in helping young children eat vegetables, at least over a relatively short time period (e.g., several months); however, the impacts on dietary intake diminish over longer periods of time. Findings from one study suggest that reinforcing feeding exposure with an educational component (e.g., reading children's books about vegetables) may also improve intake among young children. A single viewing of a video on unhealthy beverages can change parent attitudes over the short term, but the degree of counter-marketing required for the change in attitudes to persist and translate into changes in parental behavior and child dietary intake is unknown. Findings from the more comprehensive interventions suggest that technology-based interventions, including the use of phone calls, texting, and websites, show promise in being potentially scalable and having positive impacts on *what* and *how* to feed young children, at least over the short-term in the first year of life and with relatively well-educated mothers.

INFORMATIVE EXAMPLES

The committee identified three informative studies and six informative intervention elements based on its expert judgment on the quality of methods, evidence of effectiveness, and potential for scalability.

Informative Studies

Among the informative studies, one was conducted in the health care setting, and two involved home visiting (see Box S-1). One informative study was the INfant Feeding, Activity, and Nutrition Trial (INFANT),

BOX S-1
Overview of Intervention Procedure and Findings for Informative Studies

INfant Feeding Activity and Nutrition Trial (INFANT)—Community-based cluster RCT of an early intervention promoting healthy eating and active play, and in turn, healthy growth from the start of life. The target was first-time parents, and the intervention involved six 2-hour sessions led by a research dietitian. The sessions included facilitated group discussions, peer support, interactive activities, take-home materials, exploration of barriers, and repeated text messages with educational materials. Intervention sessions occurred in existing first-time parent groups. INFANT had a modest positive impact on maternal dietary knowledge, maternal self-efficacy, and self-reported maternal and child diet quality with some benefits noted through 3.5 years of age.

Intervention Nurses Start Infants Growing on Healthy Trajectories (INSIGHT)—RCT of an early life responsive parenting intervention to prevent rapid infant weight gain and childhood obesity. The target was first-time parents, and the intervention involved four home visit sessions led by research nurses. The sessions included education and discussions on responsive parenting. INSIGHT had a positive impact on self-reported maternal feeding behavior, such as consistent feeding routines, setting limits, and being less likely to use food to soothe.

Family Spirit Nurture—RCT of a brief home visiting intervention to reduce childhood obesity in Navajo Children. The target was Navajo mothers, and the intervention involved six 45-minute lessons delivered via home visits led by Navajo paraprofessionals. The lessons incorporated cultural teachings, hands-on activities, and exercises focused on goal setting and self-esteem. Family Spirit Nurture demonstrated positive impacts on all targeted outcomes at some study time points, with increased maternal report of responsive feeding behaviors, reduced child consumption of sugar-sweetened beverages, and lower body mass index (BMI) z-scores in the intervention versus the control group.

a randomized controlled trial (RCT) conducted in health care settings in Australia. INFANT noted for its rigorous design. It assessed some implementation metrics during the efficacy trial, and showed benefits, at least through parent self-report. Based on the promising results from this initial efficacy work, a translational trial (scale-up) informed by estimates from the published efficacy work is being conducted. Another informative study was the Intervention Nurses Start Infants Growing on Healthy Trajectories (INSIGHT) RCT, which involved a home visiting model. With a strong theoretical framework and description of visit fidelity, this trial provides important insights for future implementation of home visiting models. The final informative study was the Family Spirit Nurture RCT, which had a rigorous design, strong theoretical framework, attention to community co-design and cultural sensitivity, positive impact on *what* to feed and *how* to feed outcomes for a Navajo community, and the potential for scalability within the existing Family Spirit home visiting program network.

Informative Intervention Elements

Among the six studies with informative elements, or features, to be considered in the design of an effective and scalable program, two were in the ECE setting, one was in a health care setting, one in a WIC setting, one in home visiting, and one in an "other" setting (web-based) (see Table S-3).

TABLE S-3 Informative Intervention Element Studies and Takeaways

Study (Trial) Name	Informative Intervention Element	Takeaway
Repetition Counts	Repeated exposure to increase vegetable consumption	Use of cycle menus in child care can easily be incorporated into existing program guidelines.
EniM	Educational program for caregivers of infants in early care programs	Providing educational programs to parents of infants in ECE programs while providing infant care is scalable.
Grow2Gether	Social media intervention to improve caregiver feeding behavior	Providing peer support and educational materials via social media is feasible and acceptable to U.S. participants in at-risk populations.
Early Childhood Obesity Prevention Program	Educational program delivered in 10- to 20-minute intervals over multiple home visits	Conducting an ecological intervention in an existing home-visiting program is feasible, sustainable, and capable of wide dissemination.
Early Food for Future Health	Web-based intervention (videos and recipes)	Web-based interventions have the potential for scalability; using a life-course approach with ongoing "boosters" increases effectiveness.
SMS WIC Study	Interactive educational texting campaign within WIC population	Texting campaigns are highly implementable and acceptable interventions with low dose and low cost.

NOTE: See Chapter 5 for citations and further description of the informative intervention element studies.

BOX S-2
Factors to Consider in Scaling Infant and Young Child Complementary Feeding Programs

Based on the findings from the scoping review and identified informative examples, the committee has identified the following factors for consideration when developing and/or scaling up and sustaining programs.

Program Development

1. Base programs on family-centered interventions that have already been shown to be efficacious under "real world" conditions and address the parent/family diet, eating habits, and role modeling.
2. Maintain a central focus on equity and inclusion of marginalized and/or disadvantaged populations.
3. Use a life course approach and provide consistent information through multiple touchpoints over the course of the lifespan. This includes addressing family eating habits given the infant transitions to family foods.
4. Engage all family members/individuals who care for the child.
5. Limit the burden on the caregiver to complete the program or intervention
6. Use a hybrid model (both live and technology-based) to reduce costs and ensure accessibility and convenience for families
7. Include key stakeholders (e.g., community leaders, caregivers, personnel that will deliver the intervention) from the beginning and throughout the scale-up process, including formative research, translation trials, and sustainability phases.
8. Use standard operation procedure (SOP) manuals for proper implementation, including workforce training and operational implementation of all activities and processes.

Monitoring

9. Develop and apply a cost-effective rapid response monitoring and evaluation system to continuously assess implementation fidelity and identify and address bottlenecks and issues with quality in a timely manner and with input from key stakeholders.
10. Develop and implement a rigorous assessment of the effectiveness of the intervention with respect to patient-important outcomes. Rigorous assessment should include one or more objective measures of effectiveness, alone or in combination with subjective measures.
11. Carefully monitor the coverage and quality of implementation, including client satisfaction, for all groups, including individuals with low incomes and members of minority groups, to ensure equity.
12. Advocate for and monitor policy changes to ensure program sustainability following successful scale up.

Adaptions

13. Identify adaptations to improve the cultural and linguistic fit of the intervention and additional family-level and structural supports that may be needed for families experiencing racism, discrimination, and other social and economic hardships.

continued

BOX S-2 Continued

14. Develop reports, manuscripts, and SOP to support dissemination to other contexts within and across countries.
15. Document all adaptations made during scale up and clearly explain the contextual factors driving them.

Funding

16. Ensure that systems in charge (e.g., health care, ECE, CE, WIC, home visiting) are ready to support and sustain the program, building from existing structures.
17. Ensure that funding streams are in place for the development, scale-up, and maintenance phases.

CONSIDERATIONS FOR SCALING INFANT AND YOUNG CHILD FEEDING INTERVENTIONS

The committee identified several interventions that improved self-reported outcomes regarding what and how to feed infants and young children, but their scalability and generalizability to diverse populations is unknown. When designing an intervention that offers promise to be viable and effective for wide dissemination, considering the following factors are important for scaling facilitates broader implementation in large or diverse populations (see Box S-2). Factors related to developing programs, monitoring progress, making adaptions, and obtaining funding that are important when scaling infant and young child feeding interventions were identified by the committee.

COMMITTEE CONCLUSIONS ON EFFECTIVE AND SCALABLE INTERVENTIONS

Building on Existing Infrastructure and Ecosystems

The committee concluded that the expansion and harmonization of existing supports for complementary feeding in the United States across settings would facilitate families with young children receiving consistent messages about complementary feeding and responsive feeding. Across health care, ECE, CE, WIC, and home visiting settings, there are distinct opportunities—and challenges—to harnessing existing programs and harmonizing strategies across these settings (see Box S-3).

Collection and Application of Standardized Indicators

The committee concludes that the development of consensus complementary feeding impact outcomes and measurement tools and the integration of these tools into the everyday operations of the settings discussed in the report will support systemwide changes to improve complementary feeding and infant and early childhood nutrition in the United States. At least some of these outcomes and tools should be objective measures of effectiveness. Improved interagency collaboration within and across the settings described in this report and across states to capture, share, and report the same key impact outcomes would allow for more effective evaluation and improve U.S. complementary feeding efforts. Improved harmonization of process outcomes documenting service implementation could also strengthen implementation and improvement efforts. Efforts to develop innovative data strategies to facilitate data sharing across settings and minimize administrative burden would be well placed. Monitoring and evaluation efforts that include identifying disparities in access to services, program impact, and outcomes measures by race/ethnicity, parental education level, and socioeconomic status could be used to drive program refinements that improve health equity.

BOX S-3
Committee Conclusions on Existing Ecosystems and Infrastructure for Complementary Feeding Interventions

Health Care—Interventions involving the U.S. health care system are of particular interest, given the potential to reach nearly all young children and their parent/caretaker through regular visits. Expanding state Medicaid and Children's Health Insurance Program (CHIP) coverage of counseling interventions by registered dietitians, psychologists, or social workers, augmented by community health workers or peer counselors, could reduce physician burden and improve intervention adherence, since these professionals and paraprofessionals may be able to operate more flexibly and spend more time with families than physicians.

Early Care and Education (ECE)—Both the CACFP and Early Head Start could be enhanced to translate interventions into ECE settings. Strategies that fund and support ECE providers of all types to adopt CACFP meal patterns, routinize the introduction of new healthy foods into the diets of children under 2 years, and incorporate parents into menu planning in a way that similar healthy foods are included in family meals would be well-positioned to affect complementary feeding outcomes.

University Cooperative Extension (CE)—CE is ideally positioned to integrate messaging across all settings. Intentional partnerships across settings could improve nutrition education and training options for caregivers, early childhood educators, and paraprofessionals such as community health workers.

Special Supplemental Nutrition Program for Women, Infants, and Children (WIC)—Given the positive impact and broad reach of WIC to the low-income population across the United States, a promising strategy to consider is expanding access to WIC's nutrition education and nutrition support to those of all income levels.

continued

BOX S-3 Continued

While the diversity of locations where WIC services are provided has allowed the program to serve a broad range of eligible participants, in some situations locating WIC services in health care settings would allow for optimal co-location of services and enhanced staffing of registered dietitians, social workers, or psychologists in clinical settings.

Home Visiting—The opportunity exists for other U.S. systems to collaborate to develop, distribute, and provide training on interactive what to feed and how to feed modules for U.S. home visiting programs, and for home visitors to effectively deliver complementary feeding interventions to families, as demonstrated by INSIGHT and Family Spirit Nurture. Expanding referrals to home visiting programs from multiple sectors (including the medical, ECE, and WIC settings) could increase the proportion of families that engage with home visiting services, improving the program's reach and potential impact on child health outcomes.

Reaching Underserved Populations

The committee concludes that the successful implementation of complementary feeding interventions in underserved populations will require partnership, collaboration, and community engagement with the target populations throughout the research, implementation, and scale-up processes. The most effective interventions will flexibly adapt to the needs and input of the target communities, while adhering to the evidence base.

Additional Considerations

Food Insecurity

The committee concludes that for the anticipatory guidance (i.e., information provided with the intent to prevent poor health outcomes), nutrition education, and brief targeted feeding interventions reviewed in this report to be most effective, they should also assess and address food insecurity.

Food Marketing

The committee concludes that counter-marketing and mass media communications strategies directed at families with young children is a promising intervention deserving of evaluation over longer time periods.

Nutrition Literacy

The committee concludes that the nutrition literacy of caregivers and professionals should be considered in the design of interventions aimed at improving child feeding practices behaviors. Nutrition literacy for caregivers of young children includes understanding the developmentally appropriate nutrition needs of and what and how to feed young children 6–24 months old, as well as skills to identify credible sources to combat misinformation. In addition, the age-appropriate feeding practices and eating behaviors of young children and the dietary habits of families should be addressed to sustainably improve the dietary intakes of young children.

GOING FORWARD: FINAL CONSIDERATIONS

Based on this scoping review, the committee did not identify one specific intervention that could be immediately scaled in the United States. Collectively, the evidence-based interventions identified were based on messaging that is highly consistent with the "*what* to feed" aspects of the *2020–2025 Dietary Guidelines for Americans* focusing on children under 2 years of age and with the "*how* to feed" aspects of the responsive feeding framework.

The strongest model for translating findings from an RCT to widespread implementation of an intervention in the community was provided by the INFANT study. The intervention was family-centered and relied on group sessions of parents, taking advantage of existing programs and contact opportunities through the health care system and diverse health professionals, including dietitians, nurses, and parenting skills instructors. It is possible to envision an INFANT-like program in the United States delivered through WIC, CE, ECE (including Early Head Start), home visiting, or well-child visits, and it could be particularly effective if these systems were empowered to coordinate this effort with each other through a multi-agency coordinating body that included agencies such as CDC, the U.S. Department of Agriculture, HHS, and the Administration for Children and Families. The Family Spirit Nurture home visiting intervention also holds promise as an intervention that could be readily scaled in the United States, pending the findings from the second RCT.

Families with infants and young children can benefit from access to credible information on best feeding practices. Since healthy eating behaviors are established early in the life course, widespread implementation of best practices for feeding infants and young children can establish an important strong foundation for U.S. population health in the long term, in concert with continued efforts later in the life course. The implementation and sustainment of large-scale, effective, population-wide infant and young child feeding programs across the settings identified in this report would represent progress toward this goal. Intergovernmental agency collaboration on workforce development, internet and technology infrastructure, evaluation and program improvement, and efforts to increase funding levels and options and reimbursement for this work will be essential. It will also be important for both public and private health insurance actors to be engaged with this effort.

The committee concludes that there were several interventions with promising elements that could be part of a multi-component constellation of interventions delivered across settings and systems to address what and how to feed infants and young children. It is critically important that the settings and corresponding systems that were examined—health care, ECE, CE, home visiting, and WIC—be included in such an effort. No one system is currently equipped or adequately funded to reach all children up to age 24 months in the United States, but the existing complementary feeding supports available for some families in the United States could be expanded and harmonized so that all families with young children receive consistent messages about complementary feeding and responsive feeding across multiple settings. The effective scaling of any intervention requires consideration of implementation science and equity principles. Securing permanent funding for program implementation; supporting personnel recruitment, training, and retention; and considering integration of virtual options across the settings highlighted in this report will be key for sustainability.

1

Introduction

COMPLEMENTARY FEEDING OF INFANTS AND CHILDREN

Complementary feeding is the introduction of foods to an infant's diet in addition to human milk or formula. The period when complementary food is introduced marks the transition of the infant from a liquid milk diet to one that incorporates new foods with variations in textures and flavors and occurs consonant with the development of gross, fine motor, and verbal and non-verbal communication skills. The World Health Organization (WHO) recommends that complementary feeding begins at about 6 months of age, and not before 4 months of age, with continued breastfeeding until 2 years of age or older (Pérez-Escamilla et al., 2017; WHO, n.d., 2003). The American Academy of Pediatrics also recommends the introduction of complementary foods at about 6 months, and not before 4 months, with continued breastfeeding for as long as mutually desired by the mother and child for 2 years or beyond (Meek and Noble, 2022). For infants who are not breastfed at 6 months of age, it is recommended that they be fed commercially prepared infant formulas in conjunction with complementary foods until 1 year of age (NASEM, 2020). During the period from 6 months to 2 years of age, the infant diet often follows a progression from specially prepared pureed and mashed foods, to easily chewed foods, to solids (e.g., chopped/diced), and finally to the family diet, meaning the types of foods and beverages that caregivers and other household members eat (Black et al., 2017; Dewey et al., 2021).

The social and ecological systems in which complementary feeding takes place shapes the child's dietary intake and eating behaviors. The family and caregivers' feeding decisions and practices are influenced by their knowledge, perceptions, cultural values, and intergenerational experience with parenting, eating, nutrition, and child development, as well as by family finances and stressors and access to nutritious foods (Berge et al., 2018; Rhodes et al., 2016). Knowledge and perceptions are developed through broader cultural and other environmental contexts such as input from health care providers (Kleinman et al., 2020); programs such as the Special Supplemental Nutrition Program for Women, Infants, and Children (WIC) (USDA, 2019); other information sources such as books, social media and food and beverage marketing; the family's social network (Majee et al., 2017; UNICEF, 2020); and mediators such as food and water availability, maternal stress, and limited physical activity opportunities, among others (Ingalls et al., 2019). These relationships have been characterized by different research groups and applied in multiple contexts (Pérez-Escamilla et al., 2017). The nutrition ecology, which is the social and environmental factors that impact choices of both what to feed and how to feed, includes factors extending from the home through communities, systems, and local and national policies (Raiten and Bremer, 2023).

For infants and young children under age 2 years healthy complementary feeding behaviors are essential for age-appropriate growth and social, emotional, and cognitive development (Birch and Doub, 2014; Fisher and Dwyer, 2016). Indeed, adequate complementary feeding is a key component of the evidence-based Global Nurturing Care Framework for Early Childhood Development (Britto et al., 2017; WHO et al., 2018) and as such is part of the foundation for supporting healthy growth and development of children since gestation (Pérez-Escamilla et al., 2017). Parents and caregivers need appropriate guidance on both (1) infant and young child energy, nutrient, and dietary pattern requirements; and (2) the behavioral aspects of feeding and eating. The recent National Academies of Sciences, Engineering, and Medicine (the National Academies) consensus study report titled *Feeding Infants and Children from Birth to 24 Months* (NASEM, 2020) summarized existing recommendations on *what* and *how* to feed infants and young children and noted that the preponderance of guideline documents reviewed provide guidance on what to feed, with about one-third of these guidelines also providing recommendations on how to feed. Furthermore, the *Dietary Guidelines for Americans, 2020–2025* addressed, for the first time, feeding recommendations for infants and young children (USDA and HHS, 2020); these guidelines also had a stronger focus on *what* to feed than on *how* to feed, while endorsing responsive feeding approaches.

Existing Evidence on What to Feed Infants and Children Ages 6–24 Months

At around 6 months of age, the nutritional needs of the infant may no longer be met by human milk or formula alone, which is why introducing complementary foods at this time is recommended (NASEM, 2020; Pérez-Escamilla et al., 2017; WHO, n.d., 2001). Based on the results of systematic reviews conducted by the U.S. Department of Agriculture's Nutrition Evidence Systematic Review (Stoody et al., 2019), the *Dietary Guidelines for Americans, 2020–2025* recommends introducing nutrient-dense, developmentally appropriate foods at around 6 months of age (USDA and HHS, 2020). These guidelines, and others, recommend introducing iron, zinc, and vitamin D–rich foods and avoiding added sugars and high-sodium foods (NASEM, 2020; USDA and HHS, 2020). In addition, it is recommended that a healthy beverage pattern be established, in which small amounts of water can be given after 6 months of age; cow's milk, plant-based milk alternatives, and juice should not be introduced before 12 months of age; and sugar-sweetened beverages such as toddler milks, and beverages with caffeine should be avoided in children under 24 months of age (NASEM, 2020; USDA and HHS, 2020).

Existing Evidence on How to Feed Infants and Children Ages 6–24 Months

The existing research on complementary feeding practices recognizes that complementary feeding ideally occurs through ongoing and reciprocal interactions between the caregiver and the developing child (Birch and Doub, 2014; Black and Hurley, 2007; Jansen et al., 2018; Pérez-Escamilla et al., 2017, 2021). In this evolving relationship, the caregiver determines the pattern and progression of the foods and beverages that are offered and how they are offered, with considerations for factors such as the child's appetite and developing tastes and preferences. The child responds to the foods or feeding style through facial expressions, gestures, motor movements, or vocalizations (CDC, 2021). Caregivers may adjust what is fed and/or the manner of feeding in response to the child's reactions, and over time, eating behaviors are established in the young child (Wood et al., 2020).

Responsive feeding is part of a broader domain of responsive parenting, in which feeding, soothing, sleep, and physical activity are all influenced through the dyadic interactions between caregivers and infants (Black and Aboud, 2011; Landry et al., 2006; Pérez-Escamilla et al., 2021). Responsive feeding is an approach to feeding that is sensitive to the

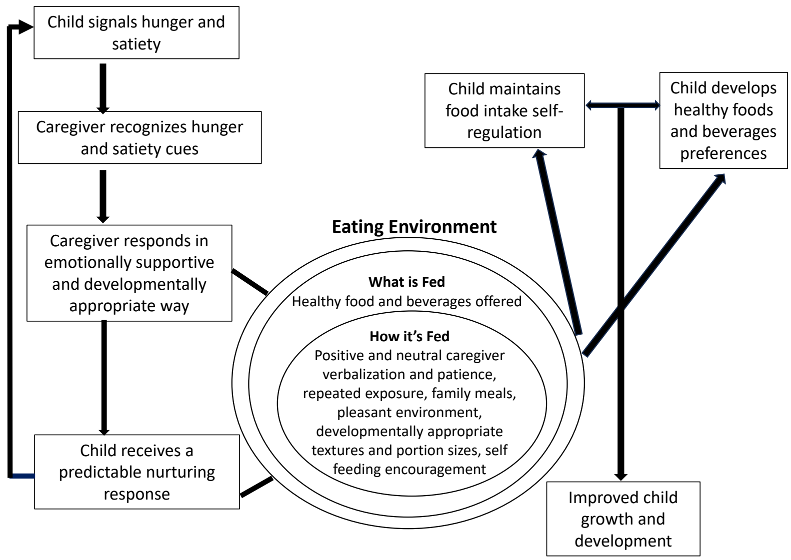

FIGURE 1-1 Responsive feeding framework.
SOURCE: Modified from Pérez-Escamilla et al., 2021

child's hunger and fullness cues, as well as the child's emotional and developmental needs (Birch, 2016; Pérez-Escamilla et al., 2017) (see Figure 1-1). Key principles of responsive feeding include recognizing hunger and fullness cues, offering a variety of foods, encouraging self-feeding, and creating a positive feeding environment (Black and Aboud, 2011). As described by Pérez-Escamilla, et al (2017):

> A responsive parenting approach aims for proper interpretation of the infant's signals and emphasizes positive affection and responding with high levels of warmth and nurturance through rich verbal acknowledgment.

BACKGROUND FOR THE STUDY

As noted, adequate nutrition during an infant's first 1,000 days, beginning in pregnancy and extending to 2 years of age, supports optimal growth and development of children (Marshall et al., 2022; Pérez-Escamilla et al., 2023; Schwarzenberg and Georgieff, 2018). Government officials recently highlighted gaps and opportunities to strengthen federal research, surveillance, programs, and communication and dissemination efforts to improve nutrition during this time period (Hamner et al., 2022). There are federal government programs and programmatic initiatives aimed at supporting nutrition during the first 1,000 days, such as WIC[1] and the Child and Adult Care Food Program (CACFP)[2] for families with low income. Opportunities exist to expand efforts by identifying new and/or supplementary interventions or expanding the reach of existing programs to broader target populations to improve nutrition.

Research studies have examined interventions aimed at improving nutrition for infants and young children, but many of these interventions were conducted in controlled settings and their effectiveness and scalability to practical, real-life settings remains unknown. Gaps in understanding include:

1. What interventions can potentially affect infant nutrition and feeding behaviors and/or outcomes outside of controlled clinical and research settings;
2. What interventions can be implemented at a community or state level; and
3. If and how interventions could complement existing federal-level programs and reach underserved populations.[3]

THE COMMITTEE'S TASK AND APPROACH

The Centers for Disease Control and Prevention requested that the National Academies conduct a scoping review to identify promising complementary feeding interventions (see Box 1-1). Specifically, the committee was asked to identify information on interventions aimed at improving infant feeding behaviors in health care systems, early care and education settings, and university cooperative extension programs. Biographical sketches of the committee members are included in Appendix A.

As directed by the Statement of Task (see Box 1-1), the committee gathered evidence from several sources, including published peer-reviewed and gray literature and an open session with the sponsor (see Appendix

[1] See https://www.fns.usda.gov/wic (accessed August 21, 2023).

[2] See https://www.fns.usda.gov/cacfp (accessed August 21, 2023).

[3] At the request of the sponsor, the committee was asked to note the ability of the intervention to reach higher risk populations. Throughout the report, the committee will use the term "underserved populations" to refer to populations that have been systematically denied a full opportunity to participate in aspects of economic, social, and civil life (White House, 2021). Specifically, in the U.S. context, this may include families that: are Asian, Black, Hispanic/Latino, Indigenous, and/or Native Hawaiian or Pacific Islander; have low incomes; are located in rural or urban areas with limited access to healthy foods; speak languages other than English in the home; or experience other systematic discrimination or disadvantage. When possible, specific language about the characteristics of study populations has been used in sections of the report describing study findings, and additional details about characteristics of study populations are available in Appendix E.

BOX 1-1
Statement of Task

An ad hoc committee under the auspices of the National Academies of Sciences, Engineering, and Medicine shall be convened to conduct a scoping review and assessment of the peer-reviewed published literature as well as publicly available information on interventions aimed at improving infant and young child feeding behaviors.

The review must be limited to developed countries or U.S.-specific contexts and interventions occurring in the following three settings:

1. health care systems that influence feeding (e.g., health care centers, federally qualified health care centers, doctor's offices, health clinics)
2. early care and education settings, and
3. university cooperative extension programs that include nutrition and feeding for young children

The committee shall produce a report that summarizes the available evidence, includes a comparison of the documents reviewed with comments on the type and strength of evidence underpinning each document, and provides information on possible interventions that could be scaled up or implemented at a community or state level.

B). The committee identified and collected information on interventions related to complementary feeding. Details on the committee's methodological approach are included in Chapter 2.

Scope of the Report

The aim of this report is to scope the evidence on interventions aimed at improving feeding behaviors of infants and young children (see Box 1-1). The committee interpreted the task by acknowledging the difference between a scoping review and a systematic review. While scoping reviews typically follow a systematic approach, they are intended to map and summarize evidence on a topic and identify themes, concepts, and knowledge gaps (Tricco et al., 2018). Systematic reviews are useful for answering clearly defined questions by synthesizing the results or outcomes of included articles via meta-analysis or qualitative analysis (Aromataris, 2020). Scoping reviews are often used to determine if there is sufficient high-quality evidence available to undertake a systematic review (Munn et al., 2018).

The scoping review that was conducted in developing this report is limited to complementary feeding interventions. Based on the Statement of Task (see Box 1-1) and conversations with the sponsor during the open session, the committee determined that interventions solely focused on breastfeeding or the timing of the introduction of complementary foods were out of scope. At the direction of the study sponsor, the committee also included interventions that complemented existing federal programs targeting at-risk children under 2 years and their caregivers that may influence infant and young child feeding behaviors and practices (e.g., WIC and home visiting programs).

ORGANIZATION OF THE REPORT

This report is organized into six chapters. The current chapter describes the background for the study and the Statement of Task. Chapter 2 describes the committee's methodological approach to its task and Chapter 3 provides the context and considerations that were taken into account while reviewing the literature and developing the report. Chapter 4 presents the findings from the scoping review and the committee's assessment of relevant evidence. Chapter 5 further discusses the committee's assessment of the evidence, specifically interventions identified that were particularly informative. Then, Chapter 6 discusses the potential for scalability, and, finally, Chapter 7 presents the committee's identified considerations and implications for designing future infant feeding interventions.

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2

Methodological Approach

The committee held closed and open session meetings to discuss and develop an approach to perform the scoping review to identify and summarize relevant publications on complementary feeding interventions. These interventions were categorized as occurring in health care settings, early care and education (ECE) settings, and university cooperative extension (CE) settings, as noted within its Statement of Task (see Chapter 1), as well as interventions that complemented existing federal programs (e.g., Special Supplemental Nutrition Program for Women, Infants, and Children [WIC] and home visiting programs). This chapter provides the committee's interpretation of its task and approach to gathering and assessing relevant evidence to inform and support its findings and conclusions.

COMMITTEE'S INTERPRETATION OF THE TASK

The committee interpreted the Statement of Task as a request to scope the literature and use expert judgment to identify promising interventions, or aspects of interventions, that positively impact infant and young child feeding related to what and how to feed infants and young children between 6 and 24 months of age. As noted in Chapter 1, the committee interpreted the Statement of Task to request a scoping review (i.e., provide an overview of the evidence [Munn et al., 2018]) rather than a systematic review (i.e., involving specific questions and in-depth analysis of the strength of evidence using methods such as Grading of Recommendations, Assessment, Development and Evaluations [GRADE] [Guyatt et al., 2008]), as the request was to provide an overview of the evidence and not to grade the evidence. The committee commented on strengths and weaknesses of each included article.

The committee reviewed interventions aimed at addressing both *what* to feed infants and young children (e.g., avoiding foods and beverages with added sugars; offering a variety of foods, textures, and flavors; consuming nutrient-dense foods) and *how* to feed infants and young children (e.g., using hunger and satiation cues to guide feeding; providing repeated exposures to foods; utilizing other responsive feeding practices). As noted in the Statement of Task, the scoping review targeted interventions conducted in health care settings, ECE settings, and CE settings. At the direction of the study sponsor, the committee also included interventions that complemented existing federal programs targeting at-risk children under two years and their caregivers that may influence infant and young child feeding behaviors (e.g., the WIC and home visiting programs) and interventions conducted in other settings that otherwise met the criteria for inclusion. Also, at the direction of the study sponsor, the committee interpreted the Statement of Task to include only interventions aimed at improving complementary feeding behaviors, excluding studies aimed at impacting the timing of introducing complementary foods or the duration of human milk feeding.

SEARCH APPROACH

The committee approached its task by designing a literature search strategy to capture public-facing documents, reviews, and resources on interventions aimed at improving infant and young child feeding behaviors in healthy children (see Appendix C) for details on the literature search. The approach for the scoping review was developed and refined by the committee during multiple open and closed session meetings.

Search Strategy

The committee used the National Academies of Sciences, Engineering, and Medicine's (the National Academies') Research Center as a resource for carrying out the literature search. Guided by the Statement of Task (see Chapter 1, Box 1-1), the Research Center staff created a list of keywords, including all the assigned MeSH and Emtree terms. The committee reviewed the list of terms and provided feedback on the keywords and natural language terms. The research center staff then compiled a literature search strategy based on the Statement of Task and identified keywords. The search strategy was used to search online databases (Medline, Embase, and Scopus) to identify peer-reviewed published literature and gray literature. Only English-language articles published between January 2002–January 2023 were searched. Appendix C provides further details of the search strategy.

Internal Assessment

The committee used an internal assessment to determine whether the search strategy was too narrow. Committee members suggested five to six key articles that they expected to find in the search results. Staff checked whether the search had identified the submitted articles. The search strategy was refined after the internal check through the removal of the "NOT" group of disease terms, therefore broadening the search (see Appendix C). After a new search was conducted, the internal check was redone, and as the audit results were consistent with the expected outcomes, no further refinements were made.

SCREENING AND DATA EXTRACTION

Prior to screening the identified literature, the committee developed a draft set of prespecified criteria for assessing the relevance of identified evidence, which was refined after the initial title/abstract screening. The criteria were organized using the population, interventions, comparators, outcomes, and study designs (PICOD) framework; Table 2-1 shows the final criteria. As a note, the committee excluded interventions done in populations extending beyond 2 years of age when the data analysis was not stratified by ages 0–2 years. In addition, while screening the literature the committee collected any interventions or protocols of ongoing interventions that were under way (i.e., no results are published).

Screening

The search results were uploaded into a web-based systematic review platform (PICO Portal[1]) for screening. Of the 63,844 articles identified, 16,520 articles were identified as duplicates, leaving 47,324 articles to undergo title and abstract screening. A title and abstract screening of each retrieved record was performed by two individuals (trained staff from the Health and Medicine Division and PICO Portal) using the pre-specified criteria in Table 2-1. PICO Portal uses machine learning to sort and present first the citations most likely to meet the pre-specified criteria, and, thus, be eligible for further screening (see Appendix B).

[1] See PICO Portal website for further information: https://picoportal.org (accessed July 12, 2023).

As screening progresses, the machine learning and artificial intelligence system is trained. Once the artificial intelligence obtained a 99 percent recall rate of citations eligible for full-text screening, screening stopped under the assumption that all eligible articles had been captured by machine learning sorting, and if any were missed, they would be less related to the task. Following title and abstract screening, using Table 2-1 criteria, two Health and Medicine staff members screened 185 full-text articles.

Internal Assessment

To verify that the process was working as intended, all members of the committee reviewed the same 30 articles that had not yet been abstract

TABLE 2-1 Prespecified Criteria for Assessing the Relevance of Identified Evidence for Interventions That Improve Complementary Feeding Behaviors in Infants and Young Children

Component	Criteria
Populations	Include: Healthy infants/children ages 0–2 years of age living in high-income countries at the time of study[a] Exclude: Studies in countries other than those classified as high-income[a] Studies in which infants are receiving ONLY human milk or formula Studies that only included infants/children with one or more existing chronic disease or health condition[b]
Interventions	Any intervention for complementary feeding (e.g., behavioral/motivational, informational/educational, social media/mass communication, food distribution/allocation/access).
Comparators	Different approaches to complementary feeding compared within the same study (e.g., non-receipt of the intervention in the same population, standard of care).
Study Designs	Include: Randomized controlled trials (individually randomized and cluster-randomized) Quasi-experimental studies (e.g., before/after studies) Pragmatic trials (clinical trials conducted in real-world settings) Implementation science studies Comparative effectiveness trials Exclude: Non-English language articles Publications from before 2002

[a] Countries are classified according to definitions from the World Bank: https://data.worldbank.org/income-level/high-income.
[b] This included studies that included only infants/children with developmental delays.

screened based on machine learning reorganization and confirmed that none of the articles were relevant to the current study. In addition, as a secondary check, a different, randomly selected subset of 30 articles from the pool of articles that were not yet abstract screened were selected and abstract screened by the National Academies staff. None of these articles met the criteria set by the committee (see Table 2-1) either.

Data Extraction

Data extraction was conducted using an Excel spreadsheet and predetermined extraction criteria (see Appendix D). Each article was examined by two individuals: one staff member as a primary data extractor and one committee member as a validator who verified the extracted data. The committee extracted elements needed to map the existing interventions by setting (e.g., setting, population, intervention description, outcomes assessed) and to assess the validity, scalability, and strength of the evidence. The committee focused on outcomes related to infant and young child feeding behaviors and categorized these by *what* to feed (e.g., avoiding foods/beverages with added sugars; offering a variety of foods, textures, and flavors; consuming nutrient-dense foods) and *how* to feed (e.g., repeated exposures to foods; using hunger and satiation cues to guide feeding; utilizing other responsive feeding practices). The committee also collected information on additional health outcomes related to feeding behavior, such as anthropometric measurements.

ASSESSMENT OF THE EVIDENCE

The included articles were sub-divided by the setting of the study. Settings for the study included the following categories:

1. Health care settings that influence feeding (e.g., health care centers, federally qualified health centers, doctors' offices)
2. ECE settings
3. CE programs that include nutrition and feeding for young children
4. WIC settings
5. Home visiting programs
6. Other settings (e.g., website, video, short message, distribution of written materials, or intervention conducted by a researcher unaffiliated with any of the settings listed above)

More detail about each of these settings is included in Chapter 3. While some studies included more than one setting, interventions were categorized by the main location of the intervention. For example, if an intervention involved both a health care setting and a home visit, it was classified based on the model it followed (medical model or home visiting model).

In response to the Statement of Task (see Box 1-1), the articles were further subdivided by committee expertise, and one committee member individually reviewed each article to further examine and assess the relevance and strength of the study. Basic information about each intervention (e.g., setting, population reached, description of the intervention, infant and young child feeding outcomes assessed) and its impact on the outcomes assessed were documented. The committee described considerations that were taken into account when reviewing the evidence (see Chapter 3), commented on the strengths and weaknesses of each individual article and the potential for scalability of the intervention (see Appendix E), and used its collective expert judgment when identifying potentially informative studies. As described above, the committee interpreted the task as a request to undertake a scoping review to map interventions aimed at improving complementary feeding behaviors. Thus, in-depth grading of the evidence was beyond the scope of this report.

After finishing the comprehensive identification of potentially informative studies, and a description of their characteristics, the committee proceeded to assess the studies' contributions to addressing the Statement of Task. First, the committee determined that there is not any individual program that has all the desired features of an intervention that could simply be adopted as is and scaled to address the challenges of encouraging appropriate infant and young child feeding. Nonetheless, there were important insights to be gained from the body of research that provide a solid empirical foundation for the committee to make informed judgments regarding the key features of effective, scalable programs across settings and systems.

The committee first identified a small number of interventions that are the most broadly informative for developing new initiatives. Although none are without methodologic limitations or universally effective in improving all outcome measures, they provide valuable models to be built on. These designated "Informative Studies" were chosen based on consideration of three key characteristics:

1. Quality of methods, considering the design, quality of measurement, study size, and other features as reviewed in Chapter 3;
2. Evidence of effectiveness, namely the evidence that at least some of the key outcomes were influenced by the intervention;
3. Potential for scalability (i.e., whether the program lends itself to being widely implemented in the United States), considering such

features as acceptability to recipients, suitability for diverse populations, feasibility within existing U.S. systems, and financial cost.

These considerations could not be quantified and required the committee's expert judgment, but there were three such programs that provided important information to be considered in reaching its conclusions.

Studies other than those included as Informative Studies also contributed important ideas and insights, on a selective rather than comprehensive basis. Specific findings from those studies offer clear suggestions of features that should be considered for incorporation into a program that is effective and scalable, and those are noted as "Informative Intervention Elements." For both valuable sources of insight, we provide a brief description of the study (with more detailed information in Appendix E) and focus on the insights that the study contributes toward the committee's conclusions.

The committee described factors needed to scale interventions to the community or state levels and noted the ability of the interventions to reach underserved populations, reduce inequities, and complement federal-level programs such as WIC and home visiting programs.

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3

Considerations

This chapter provides context and considerations for the current report and background information that informed interpretation and approach to the Statement of Task taken by the committee (see Chapter 1, Box 1-1). The chapter begins with a discussion of settings, interventions, and outcomes considered across all identified studies. The subsequent section describes methodological considerations and scalability aspects considered for the informative examples.

FACTORS CONSIDERED IN MAPPING ALL INTERVENTIONS

The committee reviewed all trials testing interventions aimed at improving infant and young child feeding behavior and extracted information from each related to the study setting, intervention, and outcomes. The following section describes the factors considered for each of these three domains.

Setting

The Statement of Task (see Chapter 1, Box 1-1) specifies that the current scoping review should include only interventions occurring in U.S.-specific contexts (the committee limited the search to high-income countries as defined by the World Bank) and focused on *what* to feed and/or *how* to feed infants and young children under age 2 years. Three settings were pre-specified including (1) health care systems that influence feeding, (2) early care and education (ECE) settings, and (3) university cooperative extension (CE) programs that include nutrition and feeding for young children. In addition, the committee included in its review interventions that occurred in two aligned settings (Special Supplemental Nutrition Program for Women, Infants, and Children [WIC] and home-visiting programs) because the Statement of Task sought to identify characteristics of interventions conducted in the three pre-specified settings that would complement activities in the two aligned settings. In addition, the two aligned settings have existing infrastructure nation-wide that could facilitate scaling up and their staff have frequent contact with families who have children from birth to 2 years of age. The WIC interventions that were examined expanded on standard WIC counseling and education practice. For completeness, because CE programs can operate in any setting that reaches high-need populations, and it may not always be obvious that a study included a researcher affiliated with CE, interventions that directly addressed *what* to feed and/or *how* to feed children under age 2 years but did not occur in any of three pre-specified settings or the two aligned settings were also described and categorized as occurring in other settings. Box 3-1 describes considerations related to mapping of interventions to settings. In addition to mapping interventions to these settings, the committee sought to describe each intervention's potential ability to reach underserved populations to reduce inequities, and to complement existing federal-level programs, including WIC and home visiting models. A brief description of each setting as it manifests in the United States is below.

Health Care Systems

The U.S. health care system consists of varied health care delivery systems and both public and private payers. A recent study reported that the United States has 580 unique health care systems, which vary widely with respect to performance and quality of care; a number of hospitals and practicing physicians function independently of a health care system, and thus there is likely even wider variation in performance and quality (Beaulieu et al., 2023). U.S. health insurance coverage also varies widely by geographic location, as well as patientage and socioeconomic status. While most U.S. children (61.9 percent) are covered by private health insurance, primarily through employer-based coverage, 36.4 percent have public insurance coverage, primarily through Medicaid (35.9 percent), and 5.0 percent are uninsured. There is substantial state-by-state variation in patterns of coverage (Keisler-Starkey and Bunch, 2022).

U.S. children receive preventive care from pediatricians, family medical doctors, physician assistants, and nurse practitioners. Unlike in many

European countries, general practitioners and midwives are not a common source of preventive care for children in the United States (AAP, 2022; Wolfe et al., 2013). For pediatric office or clinic visits in the United States, the Bright Futures Guidelines for Health Supervision of Infants Children and Adolescents Counseling[1] play a critically important role. As a national health promotion and prevention initiative led by the independent American Academy of Pediatrics (AAP), Bright Futures is supported by the Department of Health and Human Services (HHS), the Health Resources and Services Administration (HRSA), and the Maternal and Child Health Bureau (MCHB) to provide guidance on which preventive services are recommended for pediatric well-child checkups (AAP, 2023). When a preventive service is recommended by Bright Futures, U.S. law mandates that most public and private insurers provide coverage for that service without cost sharing.

Currently, Bright Futures recommends a well-child visit shortly after birth and nine subsequent well-child visits in the child's first 24 months of life (at 1, 2, 4, 6, 9, 12, 15, 18 and 24 months of age), as well as anticipatory guidance related to healthy nutrition (NCEMCH, 2002). For U.S. children who are publicly insured, preventive health care is also determined by the Early and Periodic Screening, Diagnostic, and Treatment (EPSDT) benefit of Medicaid, which specifies the components of clinical care during routine well-child visits. Enacted in 1967 and periodically updated, EPSDT requires that children receive a comprehensive health and developmental history, a comprehensive unclothed exam, anticipatory guidance regarding accident prevention, child development and healthy lifestyles, and diagnosis and treatment of any diseases identified (Commonwealth Fund, 2005). EPSDT requires that all services be provided according to a periodicity schedule that meets reasonable medical standards, such as Bright Futures, which is used by all states as of July 2023 (CMS, n.d.). In the United States, the availability of home visiting nurse services varies widely by geographic location as do the criteria for eligibility for such services; the majority of preventive care for U.S. children is delivered in a provider's office or clinic (HRSA, 2023).

Early Care and Education Systems

ECE systems includes settings in which multiple children are cared for and taught by individuals other than their parents or the primary caregivers they reside with (Morrissey, 2019). While definitions vary by

[1] See https://downloads.aap.org/AAP/PDF/Bright%20Futures/BF4_Introduction.pdf (accessed July 21, 2023).

state, the National Resource Center for Health and Safety in Child Care and Early Education describes ECE facilities or settings as:

1. Small family child care home: provides care and education of 1 to 6 children, including the caregiver's/teacher's own children in the home of the caregiver/teacher. Family members or other helpers may be involved in assisting the caregiver/teacher, but often there is only one caregiver/teacher present at any one time;
2. Large family child care home: provides care and education of 7 to 12 children, including the caregiver's/teacher's own children in the home of the caregiver/teacher, with one or more qualified adult assistants to meet child:staff ratio requirements; and
3. Center: provides care and education of any number of children in a nonresidential setting, or 13 or more children in any setting if the facility is open on a regular basis (NRC, n.d.).

Morrissey (2019) noted that there are three main public programs for ECE in the United States: Head Start and Early Head Start, public preschools, and child care subsidies.

In 2019, a study based on parental report found that nearly 55 percent of children aged 1–2 years were in at least one weekly nonparental care arrangement. Among children in a weekly nonparental care arrangement, 62 percent were attending center-based care (e.g., child care center, preschool), 38 percent were cared for by a relative, and 20 percent were in a nonrelative care or family child care home (NCES, n.d.). These child care arrangements offer developmentally appropriate care and education for young children, as outlined below.

According to the Centers for Disease Control and Prevention (CDC), ECE settings can help young children build a foundation for healthy living (CDC, 2023b). Children who attend ECE programs often have much of their daily food and drink intake and many of their opportunities for physical activity and outdoor time while in care, making ECE programs key settings for the development of healthy habits (CDC, 2023a). ECE programs can provide nutritious foods, promote physical activity, limit screen time, support human milk feeding, create opportunities for outdoor learning, and participate in the Child and Adult Care Food Program (CACFP). Analogous to the National School Lunch and School Breakfast Programs, CACFP is a federal program that provides reimbursements for nutritious meals and snacks served to eligible children at participating ECE centers and family child care homes (USDA, n.d.-a).

Early Head Start (EHS) serves children ages 0–3 years of age and is a center- or home-based program administered by the HHS to promote school readiness for children in families with low income. In 2020–2021, EHS served approximately 120,000 children in the United States (ACF, 2022). Participation in EHS has been shown to result in long-term cognitive, language and emotional development outcomes (HHS, n.d.), but there has been no assessment of its impacts on dietary outcomes. EHS sites are required to participate in CACFP and Head Start sites have been found to provide healthier meals and snacks than most other types of child care (Ritchie et al., 2012). By supporting healthy eating and physical activity, ECE programs can support healthy growth and development, obesity prevention, and lifelong health (CDC, 2023b).

Finally, CDC indicates that ECE providers (such as a childcare provider, Head Start teacher, or other educators in the childcare setting) are pivotal to providing support for children's development by helping them learn, explore, get along with others, and build other needed skills (CDC, 2023a). In the context of the current report, Morrissey (2019) states that:

> While ECE programs are not necessarily designed to improve child health, a growing body of research indicates that they may lead to short- and long-term improvements in health-related outcomes.

University Cooperative Extension Programs

CE is a nationally funded system overseen by the U.S. Department of Agriculture's (USDA's) National Institute of Food and Agriculture and implemented by a land-grant university in each state with local offices in nearly every county of the United States (see Figure 3-1) (NIFA, n.d.). Initiated more than 100 years ago to support and improve agriculture, CE services have expanded to include the conduct and translation of research to protect natural resources, address climate change, and improve community economic development, youth development, food safety, nutrition, and health (Buys and Rennekamp, 2020; NIFA, n.d.). University faculty and county-based academics and educators collaborate as trusted partners with local communities to determine needs, identify assets and issues, evaluate interventions, and prioritize future research.

The Expanded Food and Nutrition Education Program (EFNEP) is an example of a program administered by the CE system in all 50 states and 6 territories (NIFA, n.d.). Focusing on youth, adults, and families with low-income, through nutrition education classes and outreach, EFNEP is intended to improve nutrition behaviors and food safety practices, increase diet quality, stretch food dollars, and promote physical activity (NIFA, 2023). EFNEP uses a peer educator model wherein members of the communities being served are trained and supervised by CE professionals with nutrition expertise to deliver evidence-based nutrition education. There are more than 1,200 EFNEP nutrition educators nationwide (NIFA,

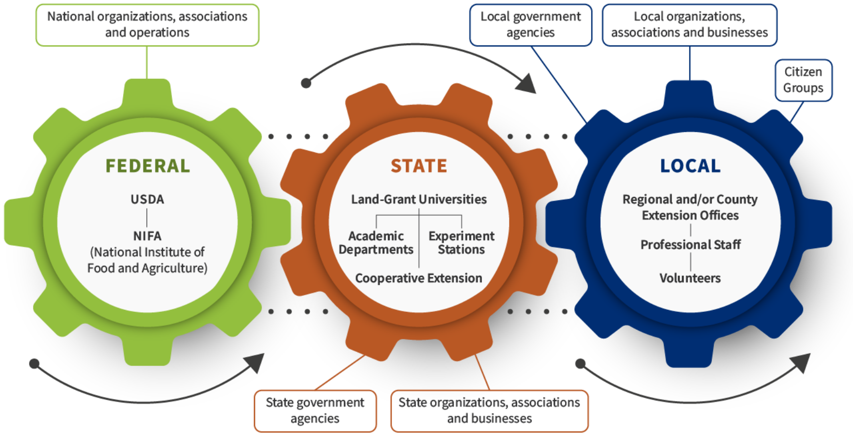

FIGURE 3-1 Cooperative extension system.
SOURCE: NIFA, n.d.

2023). EFNEP peer-educators deliver a series of lessons in groups or one-on-one settings. The focus of the classes is on families with low incomes and caregivers of young children, pregnant women and teens, and school-age youth. Coordination and collaboration with community partners and volunteer strengthen participants' support system for enhancing and sustaining healthy eating and food security and address social and health disparities (NIFA, 2021). Program evaluation data are collected annually using an integrated local, state/territory, and federal reporting system to assess program reach and outcomes/impacts. EFNEP funding, which totaled $69.4 million in fiscal year 2022, pays for the peer educators and their support (NIFA, 2023). In 2022, EFNEP educators worked directly with 45,421 adults and 187,663 youths, the majority of whom were from historically marginalized populations (NIFA, 2023). EFNEP has been shown to be effective in improving participant nutrition. For example, based on pre-post class surveys, nearly all (>90 percent) adults exposed to ENFEP direct education improved their diet and food resource management practices (NIFA, 2023).

The Supplemental Nutrition Assistance Program–Education (SNAP-Ed) is another program implemented by CE in most states as well as by public health departments and other community organizations. SNAP-Ed is designed to provide evidence-based education, social marketing and policy, and systems and environmental change to support the nutrition and health of populations with low incomes (USDA, n.d.-b). Much as in the case with EFNEP, CE professionals oversee and supervise community educators to deliver evidence-based SNAP–Ed activities focused on promoting healthy eating, increasing physical activity, reducing sedentary behavior, and improving food safety and food security (Yetter and Tripp, 2020). SNAP–Ed funding totaled $433 million in fiscal year 2019, 98 percent of which went to CE (Yetter and Tripp, 2020). On average each land-grant university employed 57 full-time equivalent (FTE) personnel and an additional 31 FTE in volunteers to implement SNAP-Ed programming. This programming reached an average of over 47,000 individuals per state (Yetter and Tripp, 2020).

CE professionals and paraprofessionals work in a variety of settings, including ECE, schools, neighborhoods, and households to achieve impacts at levels ranging from local to the state and national (NIFA, 2023). For example, EFNEP has been delivered through partnerships with health care providers (Shilts et al., 2021), SNAP-Ed interventions have been implemented in childcare settings (Molitor and Doerr, 2020), and CE faculty have been involved in developing and evaluating nutrition education interventions with WIC participants (Au et al., 2016).

Special Supplemental Nutrition Program for Women, Infants, and Children

WIC, a USDA nutrition assistance program, serves pregnant and postpartum women, infants, and children under age 5 years living in households with low incomes and who are at nutrition risk (USDA, 2020). WIC participants receive benefits redeemable for supplemental foods and beverages designed to meet their special nutritional needs (referred to as the WIC food package), nutrition education and counseling, human milk feeding support, and referrals to other health and social services (Oliveira and Frazão, 2015). In 2020, 43 percent of U.S. infants and 30 percent of U.S. toddlers participated in WIC, and the participation rates among those eligible for services are high, with 81.9 percent of eligible infants less than 12 months of age and 56.9 percent of eligible toddlers 12 through 23 months participating in the program (USDA, 2023; USDA and FNS, 2020).

WIC food benefits can be used only for specific foods, including fruits and vegetables, whole grains, cereal, eggs, milk, cheese, yogurt, peanut butter, beans, and 100 percent juice (USDA, 2022). Infants who are not fully human milk fed also receive infant formula (USDA, 2022). Unlike with other federal nutrition assistance programs available to families with young children, such as SNAP-Ed, nutrition education is a requirement of WIC program participation. Caregivers, individually and/or in groups, meet with a nutritionist, registered dietitian, or trained paraprofessional to learn about important relationships between nutrition and feeding and early childhood growth and health (USDA, 2019). Using anticipatory guidance techniques formalized through the Value Enhanced Nutrition Assessment counseling guidance (USDA and FNS, n.d.), WIC staff and participants discuss issues such as developing healthy eating habits in infants and young children, responsive feeding strategies, reading food labels when shopping, and preparing healthy meals.

There is an expansive published literature on WIC and its impacts, including a recent systematic review of maternal and child health outcomes associated with program participation (Caulfield et al., 2022). However, WIC's broad availability to families with low-income and the high participation rates among eligible children less than 24 months of age make randomized clinical trials on WIC's impact on complementary feeding difficult to conduct. The available evidence shows that WIC participation is associated with numerous benefits, including improving the diet quality of infants and young children (Anderson et al., 2022; Au et al., 2019; Caulfield et al., 2022; Weinfield et al., 2020).

Home Visiting Programs

In the United States, early childhood home visiting programs provide services to some families with pregnant individuals and/or children under 5 years old (NHVRC, 2018, n.d.-b). Exactly which services are provided varies by geographic location and program. The services may include facilitating access to obstetric and pediatric health care services, parental education and coaching, emotional support, developmental and behavioral health screening and referrals, advice on selecting high quality child care and preschools, referrals to other community services, and education and support around human milk feeding, complementary feeding (both *what* and *how* to feed), and mitigating food insecurity (Kåks and Målqvist, 2020; NHVRC, 2018; Salvy et al., 2017). Home visiting services are delivered in the family's home, other private meeting place, or virtually by individuals with relevant professional training (e.g., a nurse or social worker) or trained paraprofessional staff (NHVRC, 2018). In 2022 a large majority (75 percent) of home visits were virtual (NHVRC, n.d.-c). Eligible families can be connected with home visiting through a variety of sources, including medical providers, managed care organizations, early childhood services and schools, child protective services, law enforcement, the court system, public health services, community members, outreach events, or self-referral. Participation is voluntary and services are provided at no cost to families through a variety of funding streams (NHVRC, 2018). Federal sources of funding for home visiting include the Maternal, Infant, and Early Childhood Home Visiting Program, Title V of the Maternal and Child Health Block Grant Program, Temporary Assistance for Needy Families, Medicaid, Healthy Start, and the Community-Based Child Abuse Prevention Program (NHVRC, 2018). In addition, states use other funding sources (e.g., tobacco settlement funds, taxes, lotteries, and budget line items) and philanthropic funding to supplement federal dollars in paying for these programs (NHVRC, 2018).

Home visiting programs in the United States conduct activities using a wide range of models which vary in their target audience, prioritized outcomes, and the duration and frequency of the home visits they offer. To promote high quality home visiting services HHS conducts a rigorous review of the evidence base on the impact of home visiting models through the Home Visiting Evidence of Effectiveness (HomVEE) project (NHVRC, 2018). The HomVEE project uses a systematic review of the literature to determine whether models have enough high- or moderate-quality impact studies providing evidence of favorable, statistically significant impact on at least one of the following domains: child development and school readiness; child health; family economic self-sufficiency; linkages and referrals; maternal health; positive parenting practices; reductions in child maltreatment; and reductions in juvenile delinquency, family violence, and crime (ACF, 2022; Sama-Miller et al., 2021). As of November 2022, about half (24 of 53) of the U.S. home visiting models that have been reviewed met the HHS criteria to be designated as an evidence-based early childhood home visiting service delivery model (ACF, 2022). Of those 24 home visiting models, 17 had impact studies examining the domain of child health, which could include diet and feeding measures. Fourteen of 17 models (82 percent) had at least one favorable outcome related to child health (HHS, n.d.), demonstrating the potential for home visiting programs to play an important role in promoting recommended infant feeding practices and behaviors. Of the home visiting models that have had impact studies conducted to examine their effectiveness specifically with Tribal populations, one home visiting model (Family Spirit) met HHS criteria to be designated as evidence-based (Bleiweiss-Sande et al., 2022). Evidence-based home visiting programs are available in all 50 U.S. states plus Washington, DC, more than 130 Tribal communities, and 5 U.S. territories (Ingalls et al., 2019; NHVRC, n.d.-a; Rosenstock et al., 2021). It is estimated that there is access to evidence-based home visiting programs within about 62 percent of zip codes across the United States (NHVRC, n.d.-c).

Other Settings

Interventions that met the criteria of taking place in high-income countries and focusing on *what* or *how* to feed but that did not take place in the context of any of the settings or programs noted above were included in the review and categorized as "other." Interventions in this category include those that were entirely electronic (website, video, or short message/messaging service) or that involved an in-person or telephone intervention conducted by a researcher unaffiliated with any of the pre-specified or aligned settings. The committee decided to include these additional studies both because of the complexity in defining the setting for some interventions (e.g., recruitment occurred in clinical as well as non-clinical locations) and because the Statement of Task specified that the committee provide information on interventions that could be scaled up for community or statewide implementation, which would include those conducted in other settings. In addition, there is potential for these interventions in the "other" setting to be conducted in many of the settings, such as through the CE system.

Setting Considerations

In view of these factors, while scoping the literature, the committee included and mapped each identified intervention to health care, ECE, CE, WIC, home visiting, and other settings provided they took place in U.S.-specific contexts (i.e., high-income as defined by the World Bank) and focused on *what* to feed and/or *how* to feed children under age 2 years (see Box 3-1).

Country

The Statement of Task requested that the committee reviews interventions conducted in U.S.-specific contexts. The committee interpreted this to exclude interventions that took place in any country not classified as high-income by the World Bank.[2] Since the infrastructure (e.g., health care system, ECE programs) in other high-income countries may differ from that of the United States, the committee described potential considerations for the interpretation of results obtained outside of the United States in each relevant section as applicable.

Interventions

In reviewing interventions aimed at improving infant and young child feeding behavior required the committee considered each intervention's type, mode, duration, location, and theoretical frameworks, as well as the rigor of the study design evaluating it.

Type of Intervention

While scoping the literature, the committee reviewed interventions aimed at improving *what* to feed and/or *how* to feed infants and young

[2] See https://data.worldbank.org/income-level/high-income.

BOX 3-1
Considerations for Mapping Identified Interventions by Setting

Health Care: Interventions were categorized as occurring in a health care system that influences feeding if they occurred at a hospital, medical center, health care center, federally qualified health center, doctor's office, nutrition clinic, health clinic and/or any facility in which a mother or child would ordinarily receive health care or if they were implemented by a physician, nurse, or other medical professional but not in the course of an in-person home visit.

Early Care and Education (ECE): Interventions were categorized as occurring in an ECE setting if they occurred in an early learning and development setting in which children are cared for and taught by people other than their parents or primary caregivers with whom they live. Examples include Early Head Start, child care centers, and family child care homes (Morrissey, 2019).

University Cooperative Extension (CE): Interventions were categorized as being part of CE, the nationwide system operated through land-grant universities in partnership with federal, state, and local governments, if they were implemented or delivered by CE academics or other staff.

Special Supplemental Nutrition Program for Women, Infants, and Children (WIC): Interventions were categorized as occurring in WIC if they took place at a WIC location, were implemented by WIC personnel, or were delivered only to WIC participants (USDA and FNS, n.d.).

Home Visiting: Interventions were categorized as home visiting if they were described as occurring during home visiting services or if the intervention was implemented through an in-person visit to the participant's home.

Other Settings: Interventions that met the criteria of taking place in high-income countries and focusing on what or how to feed and that did not take place in the context of any of the settings or programs noted above were included in the review and categorized as "other."

children after the initiation of complementary feeding. Many interventions on this topic provided counseling or education to parents regarding *what* to feed (e.g., increase variety, recommended food groups) and/or *how* to feed (e.g., responsive feeding, food preparation) infants and young children. Counseling or education interventions might provide information on these topics independently or as reinforcement of information given by another program (e.g., WIC). Information might be provided by one-way educational courses, sessions, or electronic distribution of information or through interactive sessions involving discussion and feedback.

In addition to the counseling interventions identified, the committee also identified behavioral interventions intended to influence complementary feeding behaviors, mostly related to *how* to feed (including observations of an infant's or child's acceptance of foods, repeated exposure to target foods, and associative conditioning).

Mode of Delivery

Another characteristic the committee considered when reviewing the interventions aimed at improving complementary feeding was the mode of delivery of counseling or education. The committee identified four categories of intervention delivery modes for influencing complementary feeding:

1. Live (e.g., in-person sessions, either group or individual)
2. Remote-live interactive (e.g., via telephone [human to human])
3. Remote-tech interactive (e.g., interactive apps or websites, two-way texting)
4. Remote-tech non-interactive (e.g., video, books, non-interactive websites, one-way texting)

Duration of the Intervention

Interventions ranged in duration from a single, brief interaction to an intervention that lasted 2 years; some interventions included contact with a single individual and others included multiple study staff, medical professionals, nutrition educators, community workers, or other professionals or paraprofessionals. Interventions influencing infant and young child feeding behaviors occurred at a variety of time points prenatally and throughout the first 2 years of life. Outcome assessments beyond 2 years of age, if any, typically occurred before 5 years of age.

Place and Delivery of the Intervention

Within each of the setting categories described previously, the committee considered the various physical locations where the interventions took place (e.g., doctor's office, ECE center, home). Multifaceted interventions often included more than one place of delivery (e.g., doctor's office and home). In addition to the physical location of the intervention, the committee considered the staff needed to deliver each intervention (e.g., doctors, nurses, registered dietitians, nutrition educators, community health workers or home visitors).

Theoretical Frameworks

The studies in the scoping review identified a variety of theoretical frameworks and models (see Box 3-2), which can be useful for informing an intervention's design by guiding the selection of targets to address and of strategies to use to achieve behavior change (NCI, 2018). Some studies included one or more theoretical frameworks or models, while others identified none.

Study Design

The studies reviewed in the current report used a variety of designs, with varying strengths and limitations, to assess the impact of interventions on infant outcomes. These are listed in Box 3-3 in order of the strength of the evidence provided.

Comparator

An important aspect the committee considered while reviewing the interventions was the type of comparator used within the interventions. Comparators included no intervention, usual care, a similar intervention(s) on a different topic or using different feeding or parenting strategies, or interventions with and without additional components.

Outcomes

Complementary feeding intervention studies focusing on infants and young children under age 2 years have evaluated a variety of outcomes. The outcomes examined in this scoping review include any nutrition-related measure of the impact of the intervention on the target population. Because young children are dependent on their caregivers for nutrition, caregivers are often the targets of interventions, and caregiver knowledge, attitudes,[3] and behaviors relating to child nutrition are common outcomes. Outcomes related to the child are also commonly evaluated.

Within each of these populations (caregiver and child), outcomes were further stratified into measures of *what* to feed or eat and *how* to feed or eat (feeding practices and behaviors) (see Table 3-1). Discrete outcomes regarding what to feed or how to feed can further be classified by how the data are obtained: self-report by caregiver or observed or measured by a trained researcher or other professional.

[3] Knowledge and attitude changes, while often precursors to behavior change, do not necessarily result in behavior change. Knowledge and attitude changes were only outcomes of interest in this scoping review if the study also examined other outcomes, such as changes in behavior.

BOX 3-2
Theories, Models, and Frameworks Cited in the Development of Interventions to Impact Infant and Young Child Feeding Behavior

Cognitive behavioral theory: Activating events lead to behaviors which lead to consequences; this theory influences the way people appraise and reach to the activating events to bring forth healthier outcomes (Beck, 1964).

Social learning theory: Environmental and cognitive factors interact to effect human learning/behavior. The theory emphasizes the importance of observing and modeling the behaviors of others (Bandura, 1977).

Social cognitive theory: Learning occurs in a social context including the person, environment, and behavior. The theory emphasizes social influence and external and internal social reinforcement (Bandura, 1977).

McGuire communication model: Effective communication requires attention, comprehension, acceptance of arguments, attitude change as well as the persistence of changed attitudes, and overt behavior in agreement with said new attitude (McGuire, 1984).

Elaboration likelihood model: Attitude changes are influenced by the content of persuasive communication and the strength of judgments (DiClemente et al., 2002).

Theory of planned behavior: Intentions predict an individual's behaviors through the influence of three factors: (1) attitudes, (2) subjective norms, and (3) perceived behavioral control (Ajzen, 1977).

Parenting support theory: Parents adopt better parenting skills when they encourage, engage with, and support children's psychological and behavioral goals (Mullis, 1999).

Social support theory: Individuals with more social support have better health (fewer physical and mental health issues) than individuals with less social support (Cohen and McKay, 1985).

Associative learning theory: Behavioral knowledge and capabilities affect an individual's ability to anticipate expected outcomes, and reinforcement is an important factor for self-motivation (Baranowski, 2008).

Self-efficacy theory: Individuals' beliefs in their capacity to execute behaviors influences their ability to behave in a way that results in their desired outcomes (Bandura, 1997).

Attachment theory: An evolutionary theory concerning human relationships, it posits that attachment bonds are innate (Bowlby, 1969).

Health belief model: A person's belief in a threat of illness/disease and a person's belief in the recommended behaviors/actions effectiveness will predict the chances of the person adopting the behavior. Six factors affect an individual's belief in adopting new behaviors: (1) perceived susceptibility, (2) perceived severity, (3) perceived benefits, (4) perceived barriers, (5) cue to action, and (6) self-efficacy (Janz and Becker, 1984).

Social-ecological model: Behaviors both shape and are shaped by the social environment, with multiple levels of influence (e.g., individual, organizational, and public policy) (Bronfenbrenner, 1974).

Transtheoretical model/stages of change: Health behavior change involves precontemplation, contemplation, preparation, action, maintenance, and termination (Prochaska and Velicer, 1997).

Chronic care model: The model includes elements of a health care system, including community, health system, self-management support, delivery system design, decision support, and clinical information systems (Bodenheimer et al., 2002).

Precaution-adoption process model: Behaviors related to protection of the self involve three stages of preventative behavior: (1) the qualitatively different ways of how people learn about a hazard, (2) how the hazard affects other people, and (3) how a hazard affects the individual (perceived threat) (Weinstein, 1988).

Family systems ecological development theory: Parent behaviors during child development influence the development of deviant behaviors of the child (Patterson, 1989).

Responsive parenting: A parenting style characterized by the high sensitivity of the parents to children's needs. This parenting style encompasses responsive feeding (Baumrind, 1991; McCoby, 1983).

"You provide, they decide" model: Providing children with choices without deciding for them increases the autonomy of children to make their own decisions (Satter, 2015).

Mere exposure theory: Repeated exposure to a particular stimulus object can enhance a positive effect, and the individual can become attached to not only that stimuli but also similar stimuli (Zajonc, 2001).

BOX 3-3
Study Designs of Interventions Examined in Scoping Review

Randomized controlled trials: These studies seek to randomly allocate individuals or clusters (e.g., clinics, child care centers) to one or more interventions. When interventions are randomly assigned at the cluster level, the trial is considered "cluster-randomized." Generally, the strength of a randomized controlled trials is the high likelihood of baseline comparability of the randomized groups (approximately equal distribution of known and unknown confounders) so that differences are likely attributable to an effect of the intervention or a result of random error, which can be quantified. Cluster-randomized trials that include a small number of clusters, however, may not have comparable groups at the cluster or participant levels.

Observational studies (e.g., quasi-experimental or cohort studies): Rather than randomly allocating individuals or groups to an intervention, observational studies estimate relationships by examining variations in outcomes for groups with differences in the exposure of interest which are not randomly assigned. The receipt of the intervention may be determined by the researcher in a nonrandom fashion or may result from factors such as individual choice, recommendations of a health care provider, or policies or availability of services at the community level (i.e., a natural experiment), and it is not randomly assigned. Observational designs may be used in situations where it is not practical or ethically sound or acceptable to the participating communities or groups to withhold the intervention or to randomly assign the intervention to some children or sites. However, the nonrandom nature of such studies leaves them vulnerable to confounding (i.e., the effect of attributes that are associated with the receipt of the intervention are mixed with the observed effect of the intervention) and can reduce their internal validity. Known confounders can be adjusted for during statistical analyses, but adjustment may be imperfect, and nothing can be done to address unknown confounders in observational studies.

SOURCES: Anderson-Cook, 2005; White et al., 2014.

An objective assessment by a trained professional who is blind to the intervention group is typically preferred to avoid reporting bias, but for many outcomes this may not be feasible or else may be difficult to implement.

In addition to dietary measures, the nutrition-related outcomes considered by the committee included child growth and development. Common measures of child growth are weight and length[4] which can be compared to World Health Organization (WHO) child growth standards to assess a child's weight or length or weight-for-length in relation to healthy children of the same age and gender (WHO, n.d.-a). For children under the age of 24 months, weight-for-length can be categorized as low, normal, or high

[4] Standing height is not used until a child is 2 years old.

TABLE 3-1 Examples of Nutrition Intervention Outcomes

Outcomes	Caregiver-Focused	Child-Focused
What to feed/eat	• Avoidance/reduction in provision of unhealthy foods/beverages (e.g., foods with added sugars, salt, saturated and trans fats) • Offering age-appropriate foods and beverages • Provision of a variety of nutrient dense foods (e.g., fruits, vegetables, whole grains) from one or more food groups • Provision of foods with a variety of textures and flavors	• Frequency or amount of foods/beverages consumed, by types and in relation to recommendations • Amount of nutrients consumed in comparison to recommendations- • Overall diet quality
How to feed/eat	• Use of responsive feeding practices[a] • Providing appropriate portion sizes • Repeated exposure to new foods or flavors • Weaning from the bottle and other bottle-feeding practices • Family meals • Eating without TV or other screens • Caregiver/family modeling of healthy eating • Mealtime conversations about healthy eating • Meal and snack frequency and regularity • Involving child in meal preparation	• Timely transitions to self-feeding (e.g., self-feeding finger foods, using utensils and plates/bowls at meals, drinking from a cup)[b] • Eating same foods at the table with family • Food responsiveness/emotional overeating • Enjoyment of food • Desire to drink • Satiation responsiveness, slowness in eating • Emotional undereating • Food fussiness

[a] Responsive feeding describes a feeding process with reciprocity between parent and child in order to encourage the child to develop the skills needed to maintain a healthy dietary intake independently. Responsive feeding anticipatory guidance may include counseling parents to follow hunger/ satiation cues and encourage self-directed feeding while avoiding using food as a reward or pressuring a child to eat. SOURCE: Pérez-Escamilla et al., 2017. Additional examples of responsive feeding behaviors can be found in the NASEM (2020) report.

[b] Timely transition to self-feeding involves the parent role being reduced and the baby taking more of a direct role in feeding. Examples of the transition to self-feeding would be "baby puts food in mouth with hands," "baby holds spoon to put food in her mouth," and "parent allows baby to grab spoon away from parent while feeding."

(WHO, n.d.-b). Although body mass index (BMI) relative to age and gender-based standards is used to interpret growth at older ages and was used in some included studies, it is not a recommended metric for assessing children under 24 months (CDC, 2015). Developmental observations and tests can also be used to assess the impacts of nutrition interventions on young children's cognitive and social development relative to norm-referenced peers.

For the purposes of this scoping review, the committee did not consider interventions related to some important outcomes including human milk feeding, formula feeding, the timing of introduction of complementary foods or beverages, food allergies and safety, sleep, physical activity, or screen use behaviors because these topics have been covered in other reviews (Eichner-Seitz et al., 2023; Fenton et al., 2020; Field, 2017; Foisy et al., 2011; Pérez-Escamilla et al., 2023; Renfrew et al., 2012; Webb Girard et al., 2020) and are outside the scope of the Statement of Task.

FACTORS CONSIDERED IN ASSESSING INFORMATIVE EXAMPLES

The committee reviewed each identified intervention aimed at improving infant and young child feeding behavior, assessed the strengths and weaknesses of the studies evaluating these interventions, and considered the aspects important for effectiveness and scalability.

Intervention Methodology

This section describes the committee's approach to the evaluation of study methods for the purpose of assessing internal validity, defined as the extent to which the design, implementation, and analysis of the study results provides an accurate indication of the impact of the intervention on the outcomes considered. This evaluation is distinct from the committee's evaluation of the factors influencing the generalizability or external validity of the study's findings, defined as whether the knowledge that has been gained is applicable beyond the specific population and setting in which the study was conducted. Although there are distinctive features of any study that may affect its internal validity, a few specific features described below, were examined and summarized across all studies identified in this report (see Appendix E).

Comparator

For ethical and practical reasons, it is frequently not possible to include a "true control" or placebo group in nutrition studies (Lichtenstein et al., 2021). Thus, any interventions received by the comparison group need to be adequately described. For example, if the comparison group receives "usual care," it is useful to understand the "usual care" in the population studied, especially if the usual care may reasonably be thought to influence study outcomes and potentially reduce differences observed between study groups. Thus, the content and contact time of any education or counseling received by the comparison group should be noted. If the level of participant contact with the study team or other personnel involved in delivering the intervention is very different between study groups, this has the potential to influence the findings. Specifically, there is the potential that attention from researchers and other personnel and the questions asked of participants can influence behavior, rather than the content of the study intervention (i.e., the Hawthorne effect) (McCarthy et al., 2022; Sedgwick and Greenwood, 2015). Finally, it is important to understand the potential for contamination between study groups. Depending on how much contact exists between individuals assigned to different groups, individuals in the comparison group may be exposed to intervention content during the study. Any interactions between individuals in different groups should be assessed and reported, if possible. Generally, the potential for contamination is greater in individually randomized trials than in cluster-randomized trials (Hahn et al., 2005; Torgerson, 2001).

Quality of Outcome Assessment Instruments

If valid conclusions are to be drawn from a study, the instruments used to measure the outcomes (e.g., feeding behaviors, child development) should assess them as accurately and precisely as possible. Ideally, the instruments used should have been evaluated for validity in populations like the study population, with respect to the child's age, the family's education, and cultural and linguistic background. The dietary intake assessment methods selected should be appropriate to the study question. Staff training, standardization, and supervision should be reported when anthropometric measurements or other observations are conducted. When possible, data collectors should be blinded to the study group to avoid influencing the way they ask questions, collect measurements, and record the data. Similarly, participants should be blinded to which group they are in so that their knowledge of that does not affect how they respond to questions. However, blinding of participants is often difficult to achieve with education or counseling-focused interventions.

Fidelity of Intervention Delivery

To properly interpret the impact and scalability of an intervention, it is necessary to understand if the intervention was delivered as intended during the trial. The reporting of measures such as participant adherence to the intervention protocol, attendance at educational or counseling sessions, and whether staff were able to deliver the intervention with a high level of fidelity can indicate whether participants received the intended content and dose of the intervention. These measures can also provide information about the feasibility of completing the intervention for both staff delivering it and participants receiving it.

Validity and Generalizability

There are two aspects of the study size that are of concern regarding validity. First, the number of enrolled participants is a key determinant of precision, with larger studies being less subject to random error and statistical uncertainty than smaller studies. For cluster-randomized trials, a larger number of clusters increases internal validity.

Second, validity can be influenced by the proportion of participants completing follow-up. Selection bias can occur when the intervention or assessment of the outcome, or both, is influenced by self-selection (at the individual or cluster level) among those who enroll and complete the study (Bauer et al., 2010). Outcomes assessed among participants who provide data at the end of the study may generate a different result than would have been found had there been more complete participation. Therefore, for a given study the committee took into account the number of individuals at each stage, specifically:

- The number of participants approached about participating in the study
- The number of participants who enrolled in the study
- The number of participants who contributed to the final results, including both the number who received the intervention and the number in the control group
- The proportion of those who were enrolled who completed the study in both the intervention and control group

The committee also considered differences in characteristics between individuals who chose to participate versus those who did not and also between individuals who contributed to the results and those who did not.

The study population can affect the study's generalizability. The key features of a study population include:

- Geographic setting: country
- Socioeconomic features: education level, income, occupation (of parents or caregivers)

- Cultural and linguistic characteristics: Race, ethnicity, geographic origins, primary language
- Family structure: birth order, primary caregiver

If interventions are conducted in the context of an institution, factors such as the size or number of people that the institution serves, its experience with research or program evaluation, and rural-versus-urban setting may affect generalizability. For interventions implemented at a cluster level, such factors may also affect internal validity.

Susceptibility to Biases

There are several types of bias that are common concerns for studies evaluating counseling and education interventions. Among such studies, for example, outcomes assessed by participant report may be vulnerable to reporting bias motivated by social desirability (Nederhof, 1985). Those who receive an intervention that encourages specific behaviors may be inclined to report engaging in the desirable behaviors more than they actually do so because they know the "right thing" to do and want to be perceived as doing the "right thing" (Nederhof, 1985). Recall bias is also an important consideration. When caregivers are asked to remember and report child behaviors or dietary intake over an extended timeframe, as their recall of the information may be imperfect (Coughlin, 1990; Paulhus, 1984). Outcome misclassification bias may occur when the instruments used have either systematic or random error (Willett, 2012). In this case, an outcome may be reported as having changed or not changed when the opposite is true, potentially exaggerating or obscuring the impact of the intervention on the outcome. Finally, an important consideration is that researchers may pay undue attention to results that support their hypothesis and ignore results that do not support their hypothesis (i.e., confirmation bias) (Wason, 1968). Some outcomes are more vulnerable than others to various biases, and for each of the major outcomes included in a study it is useful to provide an indication of susceptibility to help in assessing the validity of the results.

Adequacy of Statistical Methods

Good statistical practices can address some factors that can influence the interpretation of the study results. For instance, blinding the study statistician, use of a pre-specified analytic protocol with comprehensive reporting of the results, and application of Bonferroni or other corrections for multiple hypothesis testing can help to address confirmation bias (Wason, 1968). Completing a sample size calculation before conducting the study can help to ensure that a study is large enough to detect a treatment effect of clinical or public health significance (Faber and Fonseca, 2014). Intention-to-treat analysis should be reported, including all randomized participants in the analysis, whether they completed the study or not (Gupta, 2011). Per protocol analyses may be helpful at approximating efficacy under ideal conditions but are not a valid substitute for intention-to-treat analyses because per protocol analysis increases the risk of confirmation bias, since investigators decide who will be excluded (Gupta, 2011). When interpreting per protocol analyses, it is important to keep in mind that the comparability of the groups that have been randomized may no longer be valid when individuals not completing the protocol are excluded from the analysis.

Analytic methods should also be appropriate for the study design and for the instruments used to measure outcomes. Cluster-randomized trials should use multilevel models to ensure that correct inferences are made from the data (Wears, 2002). If the structure of the data (e.g., participants clustered within clinics or child care sites) is not accounted for with the statistical approach used, one may overestimate the impact of an intervention. For studies that use a few days of 24-hour recalls to estimate impact on dietary intake, statistical methods should be used to estimate the usual intake of episodically consumed foods (Dodd et al., 2006; Tooze et al., 2006).

Assessment of Intervention Scalability

An important consideration for translating research into practice is scalability, the ability of an intervention shown to be effective in a controlled research study to remain effective when expanded to a larger population under "real-world" conditions. The committee assessed the potential for scalability of each intervention through information extracted from each article using items from the RE-AIM (Reach, Effectiveness, Adoption, Implementation, and Maintenance) framework parameters (RE-AIM, n.d.). In addition, the committee used the Template for Intervention Description and Replication (TIDieR) checklist (Hoffmann et al., 2014) and the WHO ExpandNet checklist (WHO, 2011) to examine how easy or difficult scaling up a project would be (see Appendix F). Of note, a limitation with the assessment of scalability, especially with the WHO ExpandNet checklist, is the requirement of expert judgment, because most studies do not report on these outcomes/items.

Reach

Reach considers whether people participate in the intervention, and whether the people who participate are representative of those for whom the intervention is intended (RE-AIM, n.d.).

Effectiveness

Effectiveness evaluates the impact of the intervention on outcomes (i.e., effectiveness or efficacy) (RE-AIM, n.d.).

Adoption

Adoption is focused at the systems and institutional levels, examining whether staff, sites, and communities are willing to participate in the intervention and whether those who choose to participate are representative of staff, sites, and communities for whom the intervention is intended (RE-AIM, n.d.).

Implementation

Implementation assesses whether the intervention was delivered as intended, whether adaptations had to be made, and the cost to deliver the intervention (RE-AIM, n.d.). Key measures that the committee evaluated for implementation included the methods of intervention delivery, type of staff needed to deliver the intervention, research staff fidelity in delivering the intervention, participant adherence or attendance, intervention modifications, and the cost of delivering the intervention.

Maintenance

Maintenance examines whether an intervention has lasting effects on individuals or sites after a study or program ends (RE-AIM, n.d.). The key measures that the committee assessed for maintenance include reported post-study intervention effects at the individual or site level (e.g., impacts on individual or site level outcomes 6 months post-study) and adaptations of the intervention at the site level post-study.

Engagement of Stakeholders

Engagement of stakeholders—includes involving them in design and implementation of the intervention and eliciting input from a range of stakeholders—is another factor the committee considered (WHO, 2011).

Cultural Appropriateness and Equity Considerations

Cultural appropriateness and equity are important considerations when assessing the scalability of interventions in the United States. U.S. families have a wide variety of geographic origins, cultural backgrounds, and linguistic preferences, and there are significant variations in food security, income and education, transportation access, and housing stability across the population. Therefore, interventions should be designed or adapted with cultural, linguistic, and other social determinants of health considerations in mind. For example, families with low incomes, that have caregivers with low education levels, or who live in rural areas may require additional support to access interventions. Racism and discrimination are deeply rooted in many U.S. institutions, potentially negatively affecting outcomes for Black, Hispanic, and Indigenous families if systemic issues are not specifically addressed when the interventions are designed, implemented, and scaled.

The study's RE-AIM, TIDieR, and ExpandNet parameters were examined to determine whether interventions reached, engaged, and equitably affected marginalized U.S. populations or similar populations in countries outside the United States. In addition, the studies were examined for the use of any adaptive or responsive design elements, including co-design with community members, assessment of participant or client satisfaction or acceptability, or implementation sciences, quality improvement, or process evaluation methodology.

Scalability Based on Existing Infrastructure in the United States

Finally, the intervention designs were compared with the existing health care, ECE, and CE infrastructure in the United States to further assess scalability. To determine whether the existing U.S. infrastructure could adequately support scaling of an intervention, the typical intensity of care, available staff, and reach within the population of U.S. institutions were considered and compared with the study intervention requirements. Expert opinion from committee members was used to make final decisions about scalability based on these comparisons.

SUMMARY

In this chapter, the committee discussed the key characteristics of the research that bear on their contributions to addressing the statement of task. These key characteristics include the setting in which the intervention was applied, the specific intervention and outcomes, internal validity, and scalability. There are several clear implications for drawing on this heterogeneous body of research to inform recommendations going forward.

First, the studies considered were notably diverse, covering a wide range of settings, methods, and quality. The very nature of the key questions regarding *what* to feed and *how* to feed means that the scope of potentially contributory information needs to be broad. Second, the value of a given study is dependent on a wide range of factors, and different studies contribute to scientific knowledge in different ways. Nonetheless, as discussed in the following chapters, some studies are more informative than others for addressing the statement of task. Third, because of the heterogeneity in methods, the studies generally do not build directly on one another but rather address their theoretical framework with their own methods of intervention and choices of outcomes. The considerations summarized in this chapter form the lens through which the research was evaluated.

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4

Overview of Interventions Identified in the Scoping Review

The committee conducted a scoping review with the objective of identifying interventions aimed at improving infant and young child feeding behaviors. At the request of the sponsors, and consistent with the Statement of Task (see Chapter 1), the scoping review was limited to U.S.-specific contexts and interventions occurring within health care systems, early care and education (ECE) settings, and university cooperative extension (CE) programs that include nutrition and feeding for young children. The committee also identified and included interventions occurring in the two associated settings (Special, Supplemental Nutrition Program for Women, Infants, and Children [WIC] and home visiting) as well as other settings (see Chapters 2 and 3). This chapter describes the results of the scoping review.

OVERALL DESCRIPTION OF IDENTIFIED STUDIES

In total, the scoping review included 83 publications covering 58 studies (see Table 4-1). Several studies resulted in multiple publications. In this section, the committee describes each included publication by geographic location, intervention mode, and outcomes of interest.

Geographic Location

A noteworthy feature of the literature is that 35 percent of the publications were based in the United States (29 publications). Given that the statement of task requested the review be limited to U.S.-specific contexts, the committee limited the review to higher-income countries as

TABLE 4-1 Number of Studies and Publications Identified by Setting

Setting	Number of Studies	Number of Publications
Health Care	16	27
Early Care and Education	5	5
University Cooperative Extension	1	1
Home Visit	12	18
WIC	2	4
Other	23	28
TOTAL	58	83

NOTE: WIC = Special Supplemental Nutrition Program for Women, Infants, and Children.

defined by the World Bank. Most of the studies identified in the scoping review had been done outside of the United States and had taken place in Europe (29 publications) or Australia (15 publications) with a smaller number of studies in New Zealand, Canada, Israel, and South Korea. This geographic diversity may affect the applicability of the findings to the U.S. population, based on demographic or cultural differences, complementary feeding recommendations, or distinctive features of the health care or social support systems in the country where the program was conducted.

Intervention Modality

The committee determined that the studies used one or more of the following four modalities:

1. Live (e.g., in-person sessions, either group and individual)
2. Remote-live interactive (e.g., via telephone [human to human])
3. Remote-tech interactive (e.g., interactive apps or websites, two-way texting)
4. Remote-tech non-interactive (e.g., video, books, non-interactive websites, one-way texting)

As shown in Table 4-2, most studies used live and/or remote-tech non-interactive modalities.

Outcomes of Interest

The scoping review focused on outcomes related to *what* to feed, *how* to feed, and related health outcomes, such as obesity prevention, in infants and young children. Table 4-3 describes intervention outcomes related to *what* to feed infants and young children. Many of the outcomes targeted by each study regarding what to feed were focused on the care-

TABLE 4-2 Number of Publications by Mode of Intervention

Intervention Mode	Live	Remote-Live	Remote-Tech Interactive	Remote-Tech Non-Interactive
Health Care	26[a]	4[b]	6[c]	25[d]
Early Care and Education	4[e]	0	0	2[f]
University Cooperative Extension	1[g]	0	0	1[g]
Home Visit	18[h]	2[i]	0	14[j]
WIC	0	0	3[k]	1[l]
Other	19[m]	4[n]	0	19[o]
TOTAL	68	10	9	61

SOURCES:

[a] Cameron et al., 2014; Campbell et al., 2013; Daniels et al., 2012, 2013, 2014, 2015; de Franchis et al., 2022; Dodd et al., 2014, 2018; Fiks et al., 2017; Fildes et al., 2015; French et al., 2012; Globus et al., 2019; Hesketh et al., 2020; Hoffmann et al., 2021; Magarey et al., 2016; Maguire et al., 2010; Messito et al., 2020; Morandi et al., 2019; Schroeder et al., 2015; Spence et al., 2013, 2014; Taveras et al., 2011; van Grieken et al., 2017; Vlasblom et al., 2020; Zheng et al., 2022.

[b] de Franchis et al., 2022; Dodd et al., 2018; Hesketh et al., 2020; Hoffmann et al., 2021.

[c] Cameron et al., 2014; Campbell et al., 2013; Daniels et al., 2012, 2013, 2014, 2015.

[d] Cameron et al., 2014; Campbell et al., 2013; Daniels et al., 2012, 2013, 2014, 2015; Dodd et al., 2014; Fiks et al., 2017; Fildes et al., 2015; French et al., 2012; Globus et al., 2019; Hesketh et al., 2020; Hoffmann et al., 2021; Magarey et al., 2016; Maguire et al., 2010; Messito et al., 2020; Morandi et al., 2019; Sanghavi, 2005; Schroeder et al., 2015; Spence et al., 2013, 2014; Taveras et al., 2011; van Grieken et al., 2017; Vlasblom et al., 2020; Zheng et al., 2022.

[e] Ahern et al., 2014; Caton et al., 2013; Roset-Salla et al., 2016; Verbestel et al., 2014.

[f] Clark et al., 2009; Verbestel et al., 2014.

[g] Horodynski and Stommel, 2005.

[h] Cloutier et al., 2018; Fangupo et al., 2015; Harris et al., 2020; Hernandez et al., 2022; Hohman et al., 2017, 2020; LoRe et al., 2019; Morison et al., 2018; Remy et al., 2013; Rosenstock et al., 2021; Savage et al., 2016, 2018; Taylor et al., 2017; Tussing-Humphreys et al., 2019; Van Vliet et al., 2022; Watt et al., 2009; Wen et al., 2011; Williams Erickson et al., 2018.

[i] Cloutier et al., 2018; Taylor et al., 2017.

[j] Cloutier et al., 2018; Fangupo et al., 2015; Hernandez et al., 2022; Hohman et al., 2017, 2020; LoRe et al., 2019; Morison et al., 2018; Rosenstock et al., 2021; Savage et al., 2018; Tussing-Humphreys et al., 2019; Van Vliet et al., 2022; Watt et al., 2009; Wen et al., 2011; Williams Erickson et al., 2018.

[k] Gibby et al., 2019; Macchi et al., 2022; Palacios et al., 2018.

[l] Scheinmann et al., 2010.

[m] Barends et al., 2013, 2014; Beinert et al., 2017; Coulthard et al., 2018; Forestell and Mennella, 2007; Hetherington et al., 2015; Johansson et al., 2019; Johnson et al., 2021; Kalhoff et al., 2021; Koehler et al., 2007; Krebs et al., 2006; Maier et al., 2008; Mennella et al., 2008, 2017; Øverby et al., 2017; Rapson et al., 2022; Røed et al., 2020, 2021; Tournier et al., 2021.

[n] Cauble et al., 2021; Rapson et al., 2022; Røed et al., 2020; Wen et al., 2020.

[o] Barends et al., 2014; Beinert et al., 2017; Cauble et al., 2021; Coulthard et al., 2018; Forestell and Mennella, 2007; Harris et al., 2022; Helle et al., 2019a,b; Hetherington et al., 2015; Maier et al., 2008; Mennella et al., 2008, 2017; Owen et al., 2018; Ra, 2021; Røed et al., 2020, 2021; Verrall and Gray-Donald, 2005; Verrall et al., 2006; Wen et al., 2020.

NOTE: WIC = Special, Supplemental Nutrition Program for Women, Infants, and Children.

giver (any individual caring for the child (e.g., parent, guardian, child care provider). Caregiver-focused outcomes included increasing the provision of nutrient-dense foods, increasing the variety of foods, and reducing the provision of foods with added sugars, salt, and saturated and trans fats. Most child-focused interventions were aimed at getting the infant or young child to consume a high-quality diet.

Table 4-4 describes infant and young child intervention outcomes related to *how* to feed. The most frequent behavior change outcome targeting caregivers was responsive feeding, which was examined in nearly all settings. Caregiver-targeted interventions occurred mostly in the health care and home visiting settings and included repeated exposure and increasing infant/young child acceptance of nutrient-dense foods. There were no child-focused behavior change interventions conducted in ECE, WIC, or CE settings. Only a few interventions focused on the appropriate use of bottles/cups.

Although all publications identified in the scoping review targeted *what* to feed and/or *how* to feed outcomes, many also examined other outcomes, such as obesity-related outcomes. Approximately 37 percent of included publications' objectives stated obesity prevention. This outcome was the most prevalent in the health care and WIC settings. About half of the included publications in the home visiting setting were focused on obesity prevention, whereas the ECE setting studies were mainly focused on improving infant feeding behaviors (only one of five was focused on obesity prevention).

DESCRIPTION OF IDENTIFIED STUDIES BY SETTING

The committee mapped each included publication to the following settings: health care, ECE, CE, WIC, home visiting, and other, as described in Chapters 2 and 3. The information extracted from each included publication can be found in Appendix E. This section of the report describes the key characteristics of each study and associated publication included in the scoping review for each setting.

Health Care

The committee reviewed interventions occurring within the health care setting that met the inclusion criteria, which includes studies at large medical centers, individual hospitals, clinics, private medical office practices, or consortiums of these locations. It also includes home visiting if interventions were conducted by health care setting personnel or considered a medical model. These studies leverage the family's connection with their health care provider to alter caregiver knowledge and behavior, which subsequently alters the child's eating behavior and improves nutritional intake. The committee identified 27 publications from 16 studies (see Table 4-5) that occurred in a health care setting.

TABLE 4-3 Number of Publications Targeting What to Feed by Outcome and Setting

	Caregiver			Child
What to Feed Outcomes	Increasing provision of nutrient-dense foods and beverages	Increasing variety of foods (types, textures, flavors)	Reducing provision of foods and beverages with added sugars, salt, saturated and trans fats	Consuming a high-quality diet with appropriate amounts and an increased variety of nutrient-dense foods and beverages
Health Care	12[a]	7[b]	7[c]	14[d]
Early Care Education	2[e]	0	0	4[f]
University Cooperative Extension	0	1[g]	0	0
Home Visit	10[h]	0	3[i]	11[j]
WIC	0	0	3[k]	0
Other	0	4[l]	3[m]	19[n]
TOTAL	24	12	16	48

SOURCES:

[a] Daniels et al., 2015; Dodd et al., 2014; Fiks et al., 2017; French et al., 2012; Hesketh et al., 2020; Hoffmann et al., 2021; Morandi et al., 2019; Spence et al., 2013; Taveras et al., 2011; van Grieken et al., 2017; Vlasblom et al., 2020; Zheng et al., 2022.

[b] Dodd et al., 2014; Schroeder et al., 2015; Spence et al., 2013; Taveras et al., 2011; van Grieken et al., 2017; Vlasblom et al., 2020; Zheng et al., 2022.

[c] Fildes et al., 2015; French et al., 2012; Hesketh et al., 2020; Magarey et al., 2016; Messito et al., 2020; Sanghavi, 2005; Schroeder et al., 2015.

[d] Cameron et al., 2014; Campbell et al., 2013; Daniels et al., 2012, 2013, 2014; de Franchis et al., 2022; Dodd et al., 2014, 2018; Spence et al., 2013, 2014; Taveras et al., 2011; van Grieken et al., 2017; Vlasblom et al., 2020; Zheng et al., 2022.

[e] Clark et al., 2009; Roset-Salla et al., 2016.

[f] Ahern et al., 2014; Caton et al., 2013; Roset-Salla et al., 2016; Verbestel et al., 2014.

[g] Horodynski and Stommel, 2005.

[h] Hernandez et al., 2022; Hohman et al., 2017, 2020; LoRe et al., 2019; Morison et al., 2018; Savage et al., 2016, 2018; Taylor et al., 2017; Wen et al., 2011; Williams Erickson et al., 2018.

[i] Fangupo et al., 2015; Rosenstock et al., 2021; Savage et al., 2018.

[j] Cloutier et al., 2018; Fangupo et al., 2015; Hernandez et al., 2022; Hohman et al., 2017, 2020; LoRe et al., 2019; Morison et al., 2018; Remy et al., 2013; Rosenstock et al., 2021; Savage et al., 2016; Van Vliet et al., 2022.

[k] Gibby et al., 2019; Macchi et al., 2022; Palacios et al., 2018.

[l] Barends et al., 2013; Helle et al., 2019a,b; Tussing-Humphreys et al., 2019.

[m] Harris et al., 2022; Mennella et al., 2017; Tussing-Humphreys et al., 2019.

[n] Barends et al., 2013, 2014; Beinert et al., 2017; Coulthard et al., 2018; Forestell and Mennella, 2007; Hetherington et al., 2015; Johansson et al., 2019; Johnson et al., 2021; Koehler et al., 2007; Krebs et al., 2006; Maier et al., 2008; Mennella et al., 2008; Øverby et al 2017; Owen et al., 2018; Rapson et al., 2022; Røed et al., 2020, 2021; Verrall and Gray-Donald, 2005; Verrall et al., 2006.

NOTE: WIC = Special, Supplemental Nutrition Program for Women, Infants, and Children.

TABLE 4-4 Number of Publications Targeting *How* to Feed by Outcome and Setting

	Caregiver		
	Using responsive feeding practices	Providing appropriate portion sizes	Offering repeated exposures to unfamiliar foods and flavors
Health Care	14[a]	2[b]	5[c]
Early Care and Education	1[j]	0	2[k]
University Co-operative Extension	0	0	0
Home Visit	14[n]	6[o]	8[p]
WIC	3[u]	0	0
Other	7[v]	1[w]	6[x]
TOTAL	39	9	21

SOURCES:

[a] Dodd et al., 2014; Fiks et al., 2017; French et al., 2012; Globus et al., 2019; Hoffmann et al., 2021; Maguire et al., 2010; Messito et al., 2020; Morandi et al., 2019; Schroeder et al., 2015; Spence et al., 2013; Taveras et al., 2011; van Grieken et al., 2017; Vlasblom et al., 2020; Zheng et al., 2022.

[b] Hoffmann et al., 2021; Schroeder et al., 2015.

[c] Spence et al., 2013; Taveras et al., 2011; van Grieken et al., 2017; Vlasblom et al., 2020; Zheng et al., 2022.

[d] de Franchis et al., 2022; Dodd et al., 2018; Hoffmann et al., 2021; Sanghavi, 2005.

[e] Spence et al., 2013; Taveras et al., 2011; van Grieken et al., 2017; Vlasblom et al., 2020; Zheng et al., 2022.

[f] Cameron et al., 2014; Campbell et al., 2013; Daniels et al., 2012, 2013, 2014, 2015; de Franchis et al., 2022; Dodd et al., 2018; Fiks et al., 2017; Fildes et al., 2015; Hoffmann et al., 2021; Messito et al., 2020.

[g] Spence et al., 2013; Taveras et al., 2011; van Grieken et al., 2017; Vlasblom et al., 2020; Zheng et al., 2022.

[h] Hoffmann et al., 2021; Magarey et al., 2016; Sanghavi, 2005.

[j] Clark et al., 2009.

[k] Ahern et al., 2014; Caton et al., 2013.

[l] Verbestel et al., 2014.

[m] Horodynski and Stommel, 2005.

[n] Cloutier et al., 2018; Fangupo et al., 2015; Harris et al., 2020; Hernandez et al., 2022; Hohman et al., 2017, 2020; LoRe et al., 2019; Morison et al., 2018; Rosenstock et al., 2021; Taylor et al., 2017; Van Vliet et al., 2022; Watt et al., 2009; Wen et al., 2011; Williams Erickson et al., 2018.

Appropriately providing bottle and cup	Modeling healthy eating behavior	Providing regular meals and snacks	Accepting a variety of nutrient-dense foods and beverages	Timely transition to self-feeding
4[d]	5[e]	12[f]	5[g]	4[h]
0	0	1[l]	0	0
0	1[m]	0	0	0
3[q]	6[r]		1[s]	5[t]
0	0	0	0	0
1[y]		1[z]	12[aa]	5[bb]
8	12	14	18	14

[o] Hernandez et al., 2022; Hohman et al., 2017, 2020; LoRe et al., 2019; Morison et al., 2018; Van Vliet et al., 2022.

[p] Cloutier et al., 2018; Hernandez et al., 2022; Hohman et al., 2017, 2020; LoRe et al., 2019; Morison et al., 2018; Remy et al., 2013; Van Vliet et al., 2022.

[q] Savage et al., 2016, 2018; Taylor et al., 2017.

[r] Hernandez et al., 2022; Hohman et al., 2017, 2020; LoRe et al., 2019; Morison et al., 2018; Rosenstock et al., 2021.

[s] Cloutier et al., 2018.

[t] Koehler et al., 2007; Taylor et al., 2017; Watt et al., 2009; Wen et al., 2011; Williams Erickson et al., 2018.

[u] Gibby et al., 2019; Macchi et al., 2022; Palacios et al., 2018.

[v] Forestell and Mennella, 2007; Helle et al., 2019a,b; Hetherington et al., 2015; Maier et al., 2008; Ra, 2021; Røed et al., 2020.

[w] Cauble et al., 2021.

[x] Forestell and Mennella, 2007; Hetherington et al., 2015; Krebs et al., 2006; Mennella et al., 2008; Owen et al., 2018; Rapson et al., 2022.

[y] Wen et al., 2020.

[z] Coulthard et al., 2018.

[aa] Johansson et al., 2019; Johnson et al., 2021; Kalhoff et al., 2021; Koehler et al., 2007; Krebs et al., 2006; Mennella et al., 2008, 2017; Øverby et al., 2017; Owen et al., 2018; Rapson et al., 2022; Røed et al., 2020, 2021.

[bb] Forestell and Mennella, 2007; Hetherington et al., 2015; Maier et al., 2008; Mennella et al., 2017; Øverby et al., 2017.

NOTE: WIC = Special, Supplemental Nutrition Program for Women, Infants, and Children.

TABLE 4-5 Included Studies and Publications Within the Health Care Setting

Study Name	Publications	Publication Title
INFANT (Infant Feeding, Activity, and Nutrition Trial)	Zheng et al. (2022)	Quantifying the overall impact of an early childhood multi-behavioral lifestyle intervention
	Hesketh et al. (2020)	Long-term outcomes (2 and 3.5 years postintervention) of the INFANT early childhood intervention to improve health behaviors and reduce obesity: cluster-randomized controlled trial follow-up
	Spence et al. (2014)	Mediators of improved child diet quality following a health promotion intervention: the Melbourne InFANT Program
	Cameron et al. (2014)	Variation in outcomes of the Melbourne Infant Feeding, Activity, and Nutrition Trial (InFANT) Program according to maternal education and age
	Spence et al. (2013)	A health promotion intervention can affect diet quality in early childhood
	Campbell et al. (2013)	A parent-focused intervention to reduce infant obesity risk behaviors: A randomized trial
	de Franchis et al. (2022)	The effect of weaning with adult food typical of the Mediterranean diet on taste development and eating habits of children: A randomized trial
GeliS	Hoffman et al. (2021)	Infant growth during the first year of life following a pregnancy lifestyle intervention in routine care—Findings from the cluster-randomized GeliS trial
BBOFT	Vlasblom et al. (2020)	Parenting support to prevent overweight during regular well-child visits in 0–3-year-old children (BBOFT+ program), a cluster randomized trial on the effectiveness on child BMI and health behaviors and parenting
	van Grieken et al. (2017)	Personalized web-based advice in combination with well-child visits to prevent overweight in young children: Cluster randomized controlled trial
Starting Early Program	Messito et al. (2020)	Starting early program impacts on feeding at infant 10 months age: A randomized controlled trial
	Globus et al. (2019)	Effects of early parent training on mother–infant feeding interactions
PROBIT (Preventing Obesity in Toddlers)	Morandi et al. (2019)	Prevention of obesity in toddlers (PROBIT): A randomized clinical trial of responsive feeding promotion from birth to 24 months

TABLE 4-5 Continued

Study Name	Publications	Publication Title
LIMIT	Dodd et al. (2014)	Antenatal lifestyle advice for women who are overweight or obese: LIMIT randomized trial
	Dodd et al. (2018)	Prenatal diet and child growth at 18 months
Grow2Gether	Fiks et al. (2017)	A social media peer group for mothers to prevent obesity from infancy: The Grow2Gether randomized trial
NOURISH	Magarey et al. (2016)	Child dietary and eating behavior outcomes up to 3.5 years after an early feeding intervention: The NOURISH RCT
	Daniels et al. (2015)	An early feeding practices intervention for obesity prevention
	Daniels et al. (2014)	Child eating behavior outcomes of an early feeding intervention to reduce risk indicators for child obesity: The NOURISH RCT
	Daniels et al. (2013)	Outcomes of an early feeding practices intervention to prevent childhood obesity
	Daniels et al. (2012)	Evaluation of an intervention to promote protective infant feeding practices to prevent childhood obesity: Outcomes of the NOURISH RCT at 14 months of age and 6 months post the first of two intervention modules
Growing Leaps and Bounds	Schroeder et al. (2015)	Early obesity prevention: A randomized trial of a practice-based intervention in 0–24-month infants
	Fildes et al. (2015)	An exploratory trial of parental advice for increasing vegetable acceptance in infancy
	French et al. (2012)	An evaluation of mother-ventered anticipatory guidance to reduce obesogenic infant feeding behaviors
First Steps for Mommy and Me	Taveras et al. (2011)	First steps for mommy and me: A pilot intervention to improve nutrition and physical activity behaviors of postpartum mothers and their infants
TARGet Kids!	Maguire et al. (2010)	Office-based intervention to reduce bottle use among toddlers: TARget kids! Pragmatic, randomized trial
	Sanghavi (2005)	Taking well-child care into the 21st century

NOTE: Appendix E has further information on studies in the health care setting.

The included publications within the health care setting were from 10 countries (see Table 4-6). These publications contained the results from 16 studies, all but three of which were randomized controlled trials (RCTs) (Globus et al., 2019; Sanghavi, 2005; Taveras et al., 2011). Nineteen of the publications were from two countries: Australia and the United States. Three countries (United Kingdom, Greece, and Portugal) participated in a single-group study with one publication (Fildes et al., 2015).

Study Population[1]

The study populations included parents and their infants and toddlers up to 24 months of age (parent-infant dyads). Studies were generally limited to healthy mothers and healthy term or near-term infants, although not every study clearly stated this requirement in its inclusion criteria. Three studies enrolled pregnant people (LIMIT; Grow2Gether; GeliS), and two of these studies limited their enrollment to people with overweight or obesity during their pregnancy (LIMIT; Grow2Gether). One study (LIMIT) completed all interventions during pregnancy, although infant outcomes were assessed at 18 months, and two studies were limited to first-time parents (LIMIT; NOURISH).

Socioeconomic status (SES) was reported by income level in two trials (Grow2Gether; First Steps for Mommy and Me). Eleven studies used maternal education level as a proxy for SES (INFANT; NOURISH; Starting Early Program; BBOFT; GeliS; de Franchis et al., 2022; Fildes et al., 2015; French et al., 2012; Globus et al., 2019; Sanghavi, 2005; van Grieken et al., 2017). Among studies reporting maternal educational attainment, six (NOURISH; First Steps for Mommy and Me; INFANT; TARGet Kids!; Fildes et al., 2015; Globus et al., 2019) reported that more than half of mothers had completed a college or university education. In addition to maternal

[1] Citation references for each study can be found in Table 4-5.

TABLE 4-6 Geographic Location of Included Health Care Studies and Publications

Country	Number of Studies	Number of Publications
Australia	3	13
United States	5	6
Italy	2	2
Netherlands	1	2
Canada, Germany, Israel, United Kingdom, Greece, and Portugal	1 (each)	1 (each)

SOURCE: Appendix E has further information on studies in the health care setting.

education, NOURISH also reported on Socio-Economic Indexes for areas in Australia. The Starting Early Program and French et al. (2012) also provided statistics on food assistance utilization. Three trials did not describe the SES of the study population (PROBIT; LIMIT; Growing Leaps and Bounds), although LIMIT provided an index of socioeconomic advantage.

One trial (Starting Early Program) enrolled an entirely Hispanic population. Two trials (Grow2Gether; Growing Leaps and Bounds) enrolled a substantial number of Black individuals, 88 percent and 48 percent of study participants, respectively. One trial enrolled women from a hospital that serves almost exclusively Navajo individuals (Sanghavi, 2005). Sample size varied significantly. Five trials enrolled less than 200 mother-infant dyads (Grow2Gether; First Steps for Mommy and Me; Fildes et al., 2015; Globus et al., 2019; Sanghavi, 2005), whereas three trials enrolled more than 500 mother-infant dyads (NOURISH; BBOFT; GeliS).

Intervention and Study Goals[2]

The included studies were generally intended to identify effective strategies to improve diet quality and promote healthy eating behavior in the first two years of life. Most studies' goals were to improve both *what* to feed and *how* to feed (see Table 4-7). In addition, some studies had the goal

[2] Citation references for each study can be found in Table 4-5.

TABLE 4-7 Study Goals of Included Health Care Studies Related to *What* and *How* to Feed

	What to Feed Only	How to Feed Only	Both What and How to Feed
All	2[a]	1[b]	13[c]
Obesity Focused	1[d]	1[e]	7[f]

[a] de Franchis et al., 2022; Schroeder et al., 2015.
[b] Taveras et al., 2011.
[c] Cameron et al., 2014; Campbell et al., 2013; Daniels et al., 2012, 2013, 2014, 2015; Dodd et al., 2014, 2018; Fiks et al., 2017; Fildes et al., 2015; French et al., 2012; Globus et al., 2019; Hesketh et al., 2020; Hoffmann et al., 2021; Magarey et al., 2016; Maguire et al., 2010; Messito et al., 2020; Morandi et al., 2019; Sanghavi, 2005; Spence et al., 2013, 2014; van Grieken et al., 2017; Vlasblom et al., 2020; Zheng et al., 2022.
[d] Schroeder et al., 2015.
[e] Taveras et al., 2011.
[f] Cameron et al., 2014; Campbell et al., 2013; Daniels et al., 2012, 2013, 2014, 2015; Dodd et al., 2014, 2018; Fiks et al., 2017; Hesketh et al., 2020; Magarey et al., 2016; Messito et al., 2020; Morandi et al., 2019; Schroeder et al., 2015; Spence et al., 2013, 2014; Taveras et al., 2011; van Grieken et al., 2017; Vlasblom et al., 2020; Zheng et al., 2022.
NOTE: Numbers refer to studies and references are to publications; some studies had more than one publication.

of preventing overweight or obesity, while some studies also included more specific goals. For example, the INFANT and NOURISH RCTs were designed to evaluate the effectiveness of a specific, theoretically informed program on infant nutrition (Campbell et al., 2008; Daniels et al., 2009), whereas others were designed to test new technologies (Grow2Gether; BBOFT; Sanghavi, 2005). Some evaluated antenatal education (LIMIT; GeliS) or compared the effect of different strategies for anticipatory guidance delivery (French et al., 2012).

Studies varied widely with respect to both the type and number of interventions directed at *what* and *how* to feed. Table 4-8 describes what to feed and how to feed topics that were addressed in health care sector studies include in the scoping review. As noted in the table, multiple stud-

TABLE 4-8 What/How to Feed Topics Addressed in Included Health Care Studies

What to Feed	
Topics Addressed	Number of Studies (references to associated publications)
Fruits and vegetables	4[a]
Sweets or sugar-sweetened beverages	7[b]
Dairy	5[c]
Juice	3[d]
Fats/saturated fats	1[e]
Iron rich foods	1[f]
Cereal/whole grains	1[g]
Fiber	1[h]
Vitamin D	1[i]
Protein	1[j]
Mediterranean diet	1[k]
Portion size	3[l]
Snacks	1[m]
Fast food	2[n]
Homemade baby food	2[o]
How to Feed	
Responsive feeding and recognition of satiation cues	8[p]
Avoiding feeding to soothe	2[q]
Avoiding using food as a reward	3[r]

TABLE 4-8 Continued

What to Feed	
Topics Addressed	Number of Studies (references to associated publications)
Improving the family meal environment (e.g., encouraging regularly scheduled meals, no television viewing during meals, etc.)	5[s]
Parental monitoring of healthy dietary intake	2[t]
Parental role in the modeling of healthy food intake	1[u]
Repeated exposure to healthy foods	1[v]
Cup introduction	2[w]

[a] Cameron et al., 2014; Campbell et al., 2013; Dodd et al., 2014, 2018; Fildes et al., 2015; French et al., 2012; Hesketh et al., 2020; Spence et al., 2013, 2014; Zheng et al., 2022.
[b] Cameron et al., 2014; Campbell et al., 2013; Fiks et al., 2017; French et al., 2012; Hesketh et al., 2020; Maguire et al., 2010; Morandi et al., 2019; Schroeder et al., 2015; Spence et al., 2013, 2014; van Grieken et al., 2017; Vlasblom et al., 2020; Zheng et al., 2022.
[c] Dodd et al., 2014, 2018; French et al., 2012; Maguire et al., 2010; Sanghavi, 2005; Schroeder et al., 2015.
[d] Fiks et al., 2017; Maguire et al., 2010; van Grieken et al., 2017; Vlasblom et al., 2020.
[e] Dodd et al., 2014, 2018.
[f] Globus et al., 2019.
[g] Hoffmann et al., 2021.
[h] Dodd et al., 2014, 2018.
[i] Globus et al., 2019.
[j] Morandi et al., 2019.
[k] de Franchis et al., 2022.
[l] French et al., 2012; Messito et al., 2020; Morandi et al., 2019.
[m] Cameron et al., 2014; Campbell et al., 2013; Hesketh et al., 2020; Spence et al., 2013, 2014; Zheng et al., 2022.
[n] de Franchis et al., 2022; French et al., 2012.
[o] Messito et al., 2020; Vlasblom et al., 2020.
[p] Daniels et al., 2012, 2013, 2014, 2015; Fiks et al., 2017; French et al., 2012; Globus et al., 2019; Hoffmann et al., 2021; Magarey et al., 2016; Messito et al., 2020; Morandi et al., 2019; Taveras et al., 2011.
[q] Messito et al., 2020; Taveras et al., 2011.
[r] Cameron et al., 2014; Campbell et al., 2013; Daniels et al., 2012, 2013, 2014, 2015; Hesketh et al., 2020; Magarey et al., 2016; Spence et al., 2013, 2014; van Grieken et al., 2017; Vlasblom et al., 2020; Zheng et al., 2022.
[s] Daniels et al., 2012, 2013, 2014, 2015; Fiks et al., 2017; French et al., 2012; Magarey et al., 2016; Messito et al., 2020; van Grieken et al., 2017; Vlasblom et al., 2020.
[t] Cameron et al., 2014; Campbell et al., 2013; Hesketh et al., 2020; Schroeder et al., 2015; Spence et al., 2013, 2014; Zheng et al., 2022.
[u] Daniels et al., 2012, 2013, 2014, 2015; Magarey et al., 2016.
[v] Daniels et al., 2012, 2013, 2014, 2015; Magarey et al., 2016.
[w] Maguire et al., 2010; Messito et al., 2020.
NOTE: Numbers refer to studies and references are to publications, some studies had more than one publication.

ies addressed intake of fruits and vegetables, SSB or sweets, dairy products, juice, snacks, portion size, and homemade baby foods, while a single study addressed each of the other topics. Regarding the specifics of *how* to feed, most studies focused on altering the feeding behavior of mother and infant. All topics were addressed by more than one study (see Table 4-8).

All 16 studies delivered the intervention through some form of counseling with anticipatory guidance. Approaches to counseling varied widely among studies. The most common intervention included individual counseling by health professionals (e.g., physicians, midwives, nurses, or dietitians) in the context of routine well-child visits (BBOFT; First Steps for Mommy and Me; Starting Early Program; PROBIT; de Franchis et al., 2022; French et al., 2012; Schroeder et al., 2015). One of these studies also held five parent support group sessions moderated by a dietitian during well-child clinic visits (Starting Early Program). Other studies provided counseling by health professionals outside of the context of routine care. The latter included counseling by a dietitian (LIMIT; Globus et al., 2019) or unspecified health care professionals (Fildes et al., 2015). Four studies provided only or primarily peer group interactive sessions moderated by a dietitian (INFANT), a psychologist (Grow2Gether), a psychologist and a dietitian (NOURISH), or a dietitian and a social worker (Globus et al., 2019). The Fiks et al. (2017) study was unique in that the intervention was delivered by interactive group sessions using social media (Facebook) exclusively. One study delivered the intervention through an electronic kiosk in the clinic waiting room (Sanghavi, 2005). Many studies supplemented the counseling intervention with written materials, phone calls, and links to digital information. One study used an eHealth module (BBOFT).

The frequency and duration of the counseling also varied widely. For example, the INFANT RCT (described below in additional detail) provided six 2-hour counseling sessions by registered dietitians beginning around 3 months of age, and one study provided a single counseling session at 9 months of age, with reinforcement at 15 months, if needed (LIMIT). Eleven trials limited the intervention to the antenatal period or the first 12 months of life (NOURISH; GeliS; First Steps for Mommy and Me; Grow2Gether; LIMIT; Starting Early Program; de Franchis et al., 2022; Fildes et al., 2015; French et al., 2012; Globus et al., 2019; Sanghavi, 2005), and the other five trials delivered the intervention throughout the first 24 months of life (INFANT; TARGet Kids!; BBOFT; Growing Leaps and Bounds; PROBIT).

Theoretical Frameworks

A large majority (n=11) of the studies identified within the health care setting did not report a theoretical framework. Descriptions of the

TABLE 4-9 Reported Theoretical Frameworks that Informed Health Care Studies

Theoretical Framework	Number of Studies (references to associated publications)
Social learning theory	1[a]
Attachment theory	2[b]
Social cognitive theory	3[c]
Theory of planned behavior	1[d]
Not reported	11[e]

[a] Messito et al., 2020.
[b] Daniels et al., 2012, 2013, 2014, 2015; Globus et al., 2019; Magarey et al., 2016.
[c] Cameron et al., 2014; Campbell et al., 2013; Daniels et al., 2012, 2013, 2014, 2015; Hesketh et al., 2020; Magarey et al., 2016; Spence et al., 2013, 2014;van Grieken et al., 2017; Vlasblom et al., 2020; Zheng et al., 2022.
[d] Vlasblom et al., 2020.
[e] de Franchis et al., 2022; Dodd et al., 2014, 2018; Fiks et al., 2017; Fildes et al., 2015; French et al., 2012; Hoffmann et al., 2021; Maguire et al., 2010; Morandi et al., 2019; Sanghavi, 2005; Schroeder et al., 2015; Taveras et al., 2011.
NOTE: Numbers refer to studies and references are to publications, some studies had more than one publication.

theoretical models can be found in Chapter 3. The studies that reported a theoretical framework are presented in Table 4-9. The theoretical framework of the INFANT trial is described in Chapter 5.

Tools and Outcomes[3]

All of the included studies used questionnaires to assess some or all outcomes (see Appendix E). The questionnaires and assessed outcomes varied from study to study. The most common outcome assessed was dietary intake, measured by 24-hour dietary recall and/or food frequency questionnaires (FFQ). The studies often relied on questionnaire instruments that had been previously evaluated for validity (see Table 4-10, Appendix E). Questionnaires without previous validation were also used including instruments assessing child dietary intake (INFANT, LIMIT, BBOFT; Firse Steps for Mommy and Me; Growing Leaps and Bounds; PROBIT; Starting Early Program), parent knowledge (Sanghavi, 2005) and child behavior (Grow2Gether). To improve the accuracy of dietary intake reports, one trial (INFANT) used computer-assisted standardized 24-hour dietary recall (Spence et al., 2013).

Two trials reduced the risk that the outcome assessments of infant feeding behavior would be socially biased by providing a blinded out-

[3] Citation references for each study can be found in Table 4-4.

TABLE 4-10 Instruments Used in Assessing Outcomes of Interest in Health Care Sector Studies

Validated Instruments	References
Behavior Risk Factor Surveillance System Fruit and Vegetable Module	(4)
Children's Eating Behaviour Questionnaire	(23–27)
Infant Feeding Practices Study II Questionnaire	(11)
Infant Feeding Style Questionnaire	(9, 11)
German Health Interview and Examination Survey for Children and Adolescents	(10)
KidMed questionnaire	(1)
Parental Feeding Style Questionnaire	(23–27)
Chatoor Feeding Scale	(8)
Child Feeding Questionnaire	(2, 23–27).

(1) de Franchis et al., 2022; (2) Schroeder et al., 2015; (3) Taveras et al., 2011; (4) French et al., 2012; (5) Vlasblom et al., 2020; (6) van Grieken et al., 2017; (7) Maguire et al., 2010; (8) Globus et al., 2019; (9) Fiks et al., 2017; (10) Hoffmann et al., 2021; (11) Messito et al., 2020; (12) Morandi et al., 2019; (13) Fildes et al., 2015; (14) Sanghavi, 2005; (15) Zheng et al., 2022; (16) Spence et al., 2013; (17) Spence et al., 2014; (18) Hesketh et al., 2020; (19) Campbell et al., 2013; (20) Cameron et al., 2014; (21) Dodd et al., 2018; (22) Dodd et al., 2014; (23) Daniels et al., 2014; (24) Daniels et al., 2012; (25) Daniels et al., 2013; (26) Daniels et al., 2015; (27) Magarey et al., 2016.

come assessment to accompany the parent's report. Fildes et al. (2015) assessed responses to unfamiliar foods using a blinded taste test of artichoke puree and of peach puree, with intake measured in grams. Globus et al. (2019) assessed child feeding behavior through videotapes of home feedings that were coded by blinded research staff using the Chatoor Feeding Survey which had been previously evaluated for validity.

Key Findings and Implications[4]

Within the health care setting, 13 studies reported outcomes on *what* to feed and 11 studies reported outcomes on *how* to feed (Appendix E), while two studies did not report outcomes on what or how to feed that could be used in this report (Dodd et al., 2014; Sanghavi, 2005). Overall, the heterogeneity of both interventions and assessment tools resulted in a wide variety of study outcomes and few consistent findings.

Among the 13 studies reporting outcomes for *what* to feed, the counseling interventions generally led to parents in the intervention groups

[4] Citation references for each study can be found in Table 4-4.

reporting healthier diets for their children, compared with controls. The two most studied dietary categories were vegetables and sugar-sweetened beverages (SSB). Five studies focused on vegetables, including four studies of interventions intended to increase vegetable intake (NOURISH; INFANT; de Franchis et al., 2022; Fildes et al., 2015; French et al., 2012); one aimed to increase both the intake of a variety of vegetables and preference for vegetables (NOURISH). Of these five, all but one very short-term study (15 days) reported a beneficial impact on vegetable intake in one of its study populations (United Kingdom but not Portugal or Greece) (Fildes et al., 2015). One study found that the increased vegetable intake persisted until 36 weeks post intervention (de Franchis et al., 2022), but another (NOURISH) found that the effect had dissipated at the 5-year follow-up (Magarey et al., 2016). Six studies reported results for SSB, including juice. Of these five studies, four (INFANT; BBOFT; Starting Early Program; Growing Leaps and Bounds) reported decreased consumption of SSB (Campbell et al., 2013; Hesketh et al., 2020; Messito et al., 2020; Schroeder et al., 2015; Spence et al., 2013, 2014; van Grieken et al., 2017; Vlasblom et al., 2020), while one study reported no change in this outcome (PROBIT), and one did not report the outcome (Grow2Gether). Many studies were designed to improve parents' knowledge of healthy food choices, but only two studies directly assessed knowledge improvement (INFANT; Sanghavi, 2005).

Among the 11 studies reporting outcomes on *how* to feed, seven reported on interventions designed to improve responsive feeding behaviors (NOURISH; Grow2Gether; Starting Early Program; PROBIT; First Steps for Mommy and Me; French et al., 2012; Globus et al., 2019); all of these interventions were counseling-based. All but one of the *how* to feed outcomes were assessed by parent report; one study (Globus et al., 2019) also used blinded videotaped maternal-infant interactions. All but two (First Steps for Mommy and Me; PROBIT) of the 11 studies on *how* to feed demonstrated a positive effect on responsive feeding behavior. One of these two studies used a very early intervention ending at 6 months of age (First Steps for Mommy and Me), while the other began its intervention at 1 month and showed no changes in responsive feeding behavior at 6 and 12 months (PROBIT). Interestingly, the study with blinded outcome assessment found that mothers assigned to the intervention group had more positive mother-infant mealtime interactions as well as were more responsive to infant cues than controls (Globus et al., 2019); however, a limitation of this trial is that it was not randomized.

Improvements in what to feed and how to feed were reported both by time-intensive interventions (e.g., multi-week interventions involving multiple in-person education sessions) (NOURISH; First Steps for Mommy and Me; Starting Early Program; Growing Leaps and Bounds;

Globus et al., 2019) and less intensive interventions (e.g., participation in a Facebook group, educational messaging; <3 in person visits) (Grow-2Gether; TARGet Kids!; de Franchis et al., 2022). Although a direct comparison of the effectiveness of time-intensive interventions to less time-intensive interventions was beyond the purview of this scoping review, it did not appear that these two types of interventions differed with respect to effectiveness.

Two studies in this sector stand out for their potential to influence future research to determine the best interventions to influence what and how to feed complementary foods (see Chapter 5). The Fiks et al. (2017) RCT may provide one model for an easily accessible intervention because it was conducted using social media, a platform for communication that has become increasingly utilized to guide food choices (Kucharczuk et al., 2022; McCarthy et al., 2022). The INFANT trial, the most comprehensive trial described in this report, found a beneficial impact of the intervention on parent report of overall dietary quality and television viewing time. Notably, these benefits were not apparent in the first 2 years of life and were first identified at a mean age of 3.6 years and persisted until 5 years of age (Hesketh et al., 2020). This ongoing trial has the potential to serve as a model for future work to identify effective and scalable interventions on what and how to feed complementary foods in the first 2 years of life (Laws et al., 2021; Marshall et al., 2022).

Early Care and Education

The committee reviewed interventions occurring within ECE settings (including child care centers or nurseries). Child care centers typically involve multiple child care providers caring for multiple children in "classroom" types of settings. The committee identified five studies (all with one corresponding publication) conducted in ECE settings that met the inclusion criteria (see Table 4-11). Only one of the five studies was conducted in the United States (Clark et al., 2009); the others were in the United Kingdom, Spain, or Belgium (Ahern et al., 2014; Caton et al., 2013; Roset-Salla et al., 2016; Verbestel et al., 2014).

Two studies investigated how to expose young children to novel vegetables to encourage vegetable intake (Ahern et al., 2014; Caton et al., 2013); the remaining three studies involved testing more comprehensive interventions to improve the diet and health of young children (Clark et al., 2009; Roset-Salla et al., 2016; Verbestel et al., 2014). One of these studies targeted child care center staff providers (Clark et al., 2009), and two studies targeted parents and their children enrolled in the child care centers (Roset-Salla et al., 2016; Verbestel et al., 2014).

TABLE 4-11 Included Studies and Publications Within the Early Care and Education Setting

Study Name	Publications	Publication Title
EniM	Roset-Salla et al. (2016)	Educational intervention to improve adherence to the Mediterranean diet among parents and their children aged 1–2 years. EniM clinical trial
—	Ahern et al. (2014)	The root of the problem: Increasing root vegetable intake in preschool children by repeated exposure and flavour–flavour learning
—	Verbestel et al. (2014)	Prevention of overweight in children younger than 2 years old: A pilot cluster-randomized controlled trial
—	Caton et al. (2013)	Repetition counts: Repeated exposure increases intake of a novel vegetable in UK pre-school children compared to flavour–flavour and flavour–nutrient learning
—	Clark et al. (2009)	Assessing an infant feeding web site as a nutrition education tool for child care providers

Study Population

The two studies that targeted child vegetable consumption were conducted in the United Kingdom and their study populations included young children of diverse ages: 108 children ages 9–38 months (Caton et al., 2013), and 42 children ages 15–56 months (Ahern et al., 2014). The study by Caton et al. (2013) involved children from six child care centers in multiple locations in West and South Yorkshire in an effort to include children from diverse ethnic and socioeconomic backgrounds, and the study by Ahern et al. (2014) involved children from three child care centers in West and South Yorkshire; no further information was provided on either study sample.

The study in the United States targeted training child care providers and included 38 staff from an unspecified number of child care centers in Colorado (Clark et al., 2009). While the age of the children in the centers was not specified, all child care providers were female; 1 was Asian, 3 were Black, 4 were Hispanic, and 30 were White.

Two studies in Belgium and Spain targeted parents of children attending the child care centers. The study in Belgium involved 203 parents and children (race/ethnicity not described; 17 percent low-income) ages 9–24 months at baseline from 70 child care centers located in 6 communities in Flanders (half intervention, half control) matched on SES (Verbestel et al., 2014). The study in Spain involved 195 parents of 206 children aged 1 to 2 years at baseline (149 parents and children at 8 months follow-up) from 12 child care centers in Mataró (Roset-Salla et al., 2016). Most study parents

(88 percent) were mothers with a mean age of 35 years and a body mass index (BMI) of 24.0 kg/m^2; 96 percent had partners, and just over half had a university education; race/ethnicity was not described.

Intervention and Study Goals

The two vegetable-focused studies exposed children repeatedly (6–10 exposures) to novel pureed vegetables over several weeks with or without added sugar or fat (Caton et al., 2013) or a familiar fruit (Ahern et al., 2014). The goal of both studies was to identify effective ways to increase young children's willingness to eat vegetables.

The U.S. study used a quasi-experimental pre- and post- design with the goal of assessing access to an educational website on child care providers' infant feeding knowledge, attitudes, and behaviors (Clark et al., 2009). The website focused on human milk feeding and solid food introduction, as well as on responding to infant hunger cues instead of feeding infants on a schedule. Child care providers were asked to view the website for 3 months, as desired.

The Belgian study was a cluster-randomized controlled pilot trial to evaluate a 1-year educational intervention for parents to improve toddlers' BMI z-score and activity and dietary behaviors (Verbestel et al., 2014). The parent education included guidelines and tips presented on a poster and through a tailored feedback form for parents. The focus of the information was on child intake of water, milk, soft drinks, sweets, savory snacks, fruits, and vegetables, as well as physical activity and screen time.

The study in Spain was a cluster-RCT of an educational intervention for parents whose goal was to improve child and parent adherence to the Mediterranean diet (Roset-Salla et al., 2016). Nurses delivered five educational workshops over a 5-month period. Topics included food groups, the Mediterranean diet, physical activity, food labels, and the progressive introduction of food groups to children.

Theoretical Frameworks

The UK vegetable exposure studies were based on associative learning theory (Ahern et al., 2014; Caton et al., 2013). The website for the United States child care providers was based on social learning theory (Clark et al., 2009). The Belgian educational materials were based on theories of information processing, the elaboration likelihood model, and the precaution-adoption process model (Verbestel et al., 2014). The Spanish study used a model of participatory-active education focusing on cognitive, emotional and skills content (Roset-Salla et al., 2016). All theoretical frameworks are discussed in detail in Chapter 3.

Tools and Outcomes

The United Kingdom vegetable exposure studies compared the weight of the vegetables consumed after each exposure and after a period of follow-up (5 weeks post-intervention in Caton et al., 2013; 1- and 6-month post-intervention in Ahern et al., 2014). In the study in the United States, child care providers completed study-specific surveys (all self-report) on infant feeding knowledge, attitudes, and behaviors before and after accessing the website and 6 months later (Clark et al., 2009). The Belgian study used parent-completed surveys (self-report), which included a FFQ previously evaluated for validity to assess child intake, and questions to assess changes in the amount of daily time that children were physically active and used screens (Verbestel et al., 2014). The study in Spain used parental-completed surveys (self-report): a FFQ previously evaluated for validity to assess parent intake and a modified FFQ to assess child intake; intakes were scored in several ways to assess adherence to the Mediterranean diet (Roset-Salla et al., 2016).

Key Findings and Implications

Repeated exposure to novel vegetables while attending child care can be effective in helping young children learn to like eating vegetables—at least over a relatively short period of time (e.g., several months); however, the long-term impacts on dietary intakes, including outside of child care, were not reported (Ahern et al., 2014; Caton et al., 2013). Providing training to child care providers may influence what young children eat in child care, but the only study identified with this intervention focused on human milk feeding and the timing of introduction to solid foods, factors that are outside of the scope of this report (Clark et al., 2009). Both educational interventions that aimed to reach parents through child care centers achieved positive outcomes; one improved child BMI (a greater decrease in BMI z-score in the intervention compared with the control group), but not diet (Verbestel et al., 2014), and the other improved diet quality, but the impact on parent diet quality was greater than on child diet (Roset-Salla et al., 2016). In both parent interventions, loss to follow-up may have affected the ability to detect differences.

Two studies in the ECE setting stand out for their potential to influence future research to determine the best interventions to influence what and how to feed complementary foods (see Chapter 5). The Roset-Salla et al. (2016) study may provide a model for providing education to parents within an ECE program. The Caton et al. (2013) study may provide a simple technique, repeated exposure of novel vegetables, that can be used in ECE settings.

University Cooperative Extension

The committee reviewed one study conducted in the United States that described an intervention conducted within the university cooperative extension (CE) system (see Table 4-12). This study is unique in the fact that the children remained in Early Head Start (EHS) care while parents attended lessons aimed at increasing feeding knowledge and self-efficacy.

Study Population

The study (Horodynski and Stommel, 2005) recruited 135 caregivers of children between 11 and 25 months old with low income (at or below 100 percent of the federal poverty level). Most of the caregivers were White (84 percent).

Intervention and Study Goals

The goal of the intervention was to enhance feeding practices by teaching parents to understand and respond to child hunger and satiation cues (Horodynski and Stommel, 2005). The intervention consisted of four nutrition lessons delivered at EHS sites that involved discussions, videos, and hands-on learning activities. Following the lessons, the children joined parents for food preparation and food-tasting lessons. A trained home visitor subsequently provided 18 reinforcement activities over 6 months, with special emphasis on child self-regulation.

Theoretical Frameworks

The study (Horodynski and Stommel, 2005) cited Bandura's self-efficacy theory, which states that a combined effect of a parent's knowledge and confidence can influence behavior (see Chapter 3).

Tools and Outcomes

Parental knowledge was assessed by the Facts on Feeding Children tool, which was developed for this study. Parental feeding self-efficacy

TABLE 4-12 Included Studies and Publications Within the University Cooperative Extension Setting

Study Name	Publications	Publication Title
NEAT (Nutrition Education Aimed at Toddlers)	Horodynski and Stommel (2005)	Nutrition education aimed at toddlers: An intervention study

was assessed by the Feeding Self-Efficacy questionnaire. The Child-Parent Mealtime Behavior Questionnaire, which was adapted from the Children's Eating Behavior Inventory, was used to measure child feeding self-regulation.

Key Findings and Implications

The intervention increased both parental knowledge and self-efficacy, although there was no impact on parent-report of child self-regulation (Horodynski and Stommel, 2005). Both parental knowledge and self-efficacy are potential mediators of feeding behaviors. Furthermore, participants stated they learned something new and felt that they had changed their behavior in response to the classes and home lessons. However, the intervention had several limitations, such as reinforcement activities being too long and not delivered as intended and challenges with participant attrition (only 43 of 62 caregivers in the intervention group completed the lesson and most of the reinforcement activities).

One unique feature of the study in this sector was that children remained under EHS care while the parents participated in four education and food preparation/tasting lessons, which were found to increase parental knowledge but had no impact on child self-regulation. The intervention is noteworthy given the wide-reaching EHS system and infrastructure.

Special Supplemental Nutrition Program for Women, Infants, and Children

The committee reviewed two studies (four publications) in the Special Supplemental Nutrition Program for Women, Infants, and Children (WIC) setting that met the inclusion criteria (see Table 4-13). The two identified studies were conducted in the United States. The studies are important because of their primary focus on modalities that may be instrumental in supporting behavior change related to complementary feeding, namely interactive texting, and the distribution of video content to be viewed in the home.

Study Population[5]

One study (three publications) was conducted in Puerto Rican and Hawaiian WIC populations (SMS WIC). The study population included mothers, about half of which had at least some college education. The

[5] Citation references for each study can be found in Table 4-4.

TABLE 4-13 Included Studies and Publications Within the WIC Setting

Study Name	Publications	Publication Title
SMS WIC (Short Messaging Service)	Macchi et al. (2022)	Effect of a short messaging service (SMS) intervention delivered to caregivers on energy, nutrients, and food groups intake in infant participants of the WIC program
	Gibby et al. (2019)	Acceptability of a text message-based intervention for obesity prevention in infants from Hawai'i and Puerto Rico WIC
	Palacios et al. (2018)	Effect of a multi-site trial using SMS on infant feeding practices and weight gain in low-income minorities
—	Scheinmann et al. (2010)	Evaluating a bilingual video to improve infant feeding knowledge and behavior among immigrant Latina mothers

population for the second study included foreign-born Latina women participating in WIC in New York City (Scheinmann et al., 2010). In both studies, most of the women were not working and lived with a parent or spouse, and half of the women had not graduated from high school. The sample size across the two studies ranged from 202 to 439 participants.

Intervention and Study Goals

The intervention in one study (SMS WIC) involved interactive text messages sent to caregivers participating in WIC in Puerto Rico or Hawaii. Study goals included (1) understanding the impact of texting on energy, nutrient, and food group intake (Macchi et al., 2022; Palacios et al., 2018) and infant feeding practices (Palacios et al., 2018); (2) demonstrating the acceptability of interactive text messaging among WIC participants (Gibby et al., 2019). The second study described the impact of an educational English/Spanish infant feeding video, distributed for home viewing at one WIC center in New York City, on encouraging breastfeeding, delaying the introduction of complementary foods until 6 months of age, and increasing maternal knowledge of appropriate infant feeding practices (Scheinmann et al., 2010).

Theoretical Frameworks

One study was based on the trans theoretical model of health and behavior change (SMS WIC). The other study did not describe the theoretical model upon which it was based (Scheinmann et al., 2010). These frameworks are described in Chapter 3.

Tools and Outcomes

The interactive texting study used questionnaires previously evaluated for validity to assess infant dietary intake (Macchi et al., 2022), the age of introduction of solids and juices, feeding methods, caregiver responses, and the feeding environment (Palacios et al. 2018); infant weight and length (Palacios et al., 2018); and quantitative and qualitative measures of the acceptability of the intervention (Gibby et al., 2019). The other study used infant feeding knowledge and behavior surveys adapted from the Bright Futures Nutrition series (Story et al., 2002) and telephone interviews to assess the impact of the video intervention on the age of introduction of various foods (Scheinmann et al., 2010).

Key Findings and Implications

Interactive texting was a highly accepted method of receiving education among women with low-income served by WIC (English and Spanish-speakers). Although most participants receiving the intervention text messages reported that the messages were useful and led them to make changes in the way they fed their infants (Gibby et al., 2019), impacts on measured behavior changes were mixed. At the 4-month follow-up, the intervention group had significantly higher intakes of total grains, protein, calcium, and zinc, compared with the control group, but no differences were seen in other food groups (Macchi et al., 2022), and there were no significant improvements in feeding practices or in weight status or rate of weight gain with the text message intervention (Palacios et al., 2018). This study stood out for its potential to influence what to feed and how to feed via a widely accessible and low-cost modality (SMS WIC).

The video intervention led to an increase in knowledge 6 months post intervention and positive changes in behavior, including later age of introduction of complementary foods (Scheinmann et al., 2010). The WIC studies are important in their primary focus on modalities that may be instrumental in supporting behavior change related to complementary feeding, namely interactive texting, and the distribution of video content to be viewed in the home.

Home Visiting

Of the interventions the committee reviewed that were carried out during home visits, 12 studies met the inclusion criteria, and the results of these studies were reported in 18 publications (see Table 4-14).[6] Six of

[6] Citation references for each study can be found in Table 4-4.

TABLE 4-14 Included Studies and Publications Within the Home Visiting Setting

Study Name	Publications
INSIGHT (Intervention Nurses Start Infants Growing on Healthy Trajectories)	Harris et al. (2020)
	Hohman et al. (2020)
	Savage et al. (2018)
	Hohman et al. (2017)
	Savage et al. (2016)
Sleep SAAF	Hernandez et al. (2022)
Babys First Bites	Van Vliet et al. (2022)
Family Spirit Nurture	Rosenstock et al. (2021)
Delta Healthy Sprouts	Tussing-Humphreys et al. (2019)
—	LoRe et al. (2019)
Early Childhood Obesity Prevention Program	Cloutier et al. (2018)
BLISS	Morison et al. (2018)
	Williams Erickson et al. (2018)
	Taylor et al. (2017)
POI	Fangupo et al. (2015)
—	Remy et al. (2013)
—	Wen et al. (2011)
—	Watt et al. (2009)

Publication Title
Effect of a responsive parenting intervention on child emotional overeating is mediated by reduced maternal use of food to soothe: The INSIGHT RCT
The Intervention Nurses Start Infants Growing on Healthy Trajectories (INSIGHT) responsive parenting intervention for firstborns affects dietary intake of second-born infants
INSIGHT responsive parenting intervention and infant feeding practices: Randomized clinical trial
INSIGHT responsive parenting intervention is associated with healthier patterns of dietary exposures in infants
Effect of the INSIGHT responsive parenting intervention on rapid infant weight gain and overweight status at age 1 year: A randomized clinical trial
Sleep SAAF responsive parenting intervention improves mothers' feeding practices: A randomized controlled trial among African American mother–infant dyads
The Baby's First Bites RCT: Evaluating a vegetable-exposure and a sensitive-feeding intervention in terms of child health outcomes and maternal feeding behavior during toddlerhood
Effect of a home-visiting intervention to reduce early childhood obesity among Native American children: A randomized clinical trial
Enhanced vs. standard parents as teacher curriculum on factors related to Infant feeding among African American women
Parent-directed intervention in promoting knowledge of pediatric nutrition and healthy lifestyle among low-SES families with toddlers: A randomized controlled trial
Outcomes of an early childhood obesity prevention program in a low-income community: A pilot, randomized trial
Impact of a modified version of baby-led weaning on dietary variety and food preferences in infants
Impact of a modified version of baby-led weaning on infant food and nutrient intakes: The BLISS randomized controlled trial
Effect of a baby-led approach to complementary feeding on infant growth and overweight: A randomized clinical trial
Impact of an early-life intervention on the nutrition behaviors of 2-y-old children: A randomized controlled trial
Repeated exposure of infants at complementary feeding to a vegetable puŕee increases acceptance as effectively as flavor-flavor learning and more effectively than flavor-nutrient learning
Effectiveness of an early intervention on infant feeding practices and "tummy time"
Effectiveness of a social support intervention on infant feeding practices: Randomised controlled trial

the identified studies were conducted in the United States (INSIGHT; Family Spirit Nurture; Delta Healthy Sprouts; LoRe et al., 2019; Early Childhood Obesity Prevention Program; Hernandez et al., 2022). Three of these U.S. studies were conducted in the context of home visiting models meeting Department of Health and Human Services (HHS) criteria to be designated an evidence-based (see Chapter 3): Parents as Teachers (Delta Healthy Sprouts; Early Childhood Obesity Prevention Program;) and Family Spirit (Rosenstock et al., 2021). Of the six studies conducted outside of the United States, two were completed in New Zealand (POI; BLISS), and one each in the Netherlands (Babys First Bites), France (Remy et al., 2013), United Kingdom (Watt et al., 2009), and Australia (Wen et al., 2011).

Study Population

Five of the studies included caregivers who were predominantly White or of European heritage and who had relatively high income and/or education levels (POI; INSIGHT; Babys First Bites; BLISS; Wen et al., 2011). Five U.S. studies included predominantly Black (Sleep SAAF; Delta Healthy Sprouts; LoRe et al., 2019), Hispanic (Early Childhood Obesity Prevention Program), or Navajo (Family Spirit Nurture) individuals; these study populations had a high proportion of economically disadvantaged caregivers. One study specifically recruited from low-income neighborhoods in the United Kingdom (Watt et al., 2009). The sample size ranged from 47 to 802, with many studies having greater than 100 participants.

Intervention and Study Goals

Ten studies tested interventions in which nutrition-focused education, counseling, and/or skill-building and goal-setting activities and resources (e.g., recipes) were delivered to caregivers one-on-one in the home setting and compared with a standard of care (e.g., usual home visiting curriculum or health care in the study area) or a similar education or counseling intervention on a non-nutrition related topic. The studies differed based on who delivered the education or counseling and the frequency and duration of those visits. The interventions were delivered by trained home visitors (Early Childhood Obesity Prevention Program), paraprofessionals (Family Spirit Nurture) or parent volunteers (Delta Healthy Sprouts; Watt et al., 2009) in four studies; by trained research staff in four studies (POI; Sleep SAAF; BLISS; LoRe et al., 2019); and by nurses in two studies (INSIGHT; Wen et al., 2011). Three studies specifically noted that the interventionists and participants had similar cultural backgrounds (Sleep SAAF; Family Spirit Nurture; Delta Healthy Sprouts).

Among the studies for which the number of intervention home visits was reported that number varied widely from 2 to 12 with a median of five visits (POI; INSIGHT; Sleep SAAF; BLISS; LoRe et al., 2019; Watt et al., 2009; Wen et al., 2011). The duration of the visits was infrequently reported but ranged from 45 to 120 minutes when specified (Early Childhood Obesity Prevention Program; Sleep SAAF; Family Spirit Nurture; Delta Healthy Sprouts). Two studies compared repeated exposures to vegetables to other infant feeding approaches (flavor–flavor learning, flavor–nutrient learning, or responsive parenting) (Babys First Bites; Remy et al., 2013); for these studies, the intervention was implemented in the home by parents who had been trained by research staff, and the data collection was done via home visits.

The studies' goals involved a variety of outcomes related to *what* to feed and *how* to feed infants. Five studies were intended to increase responsive feeding practices, such as not pressuring the child to eat and not using food to soothe or reward the child (Fangupo et al., 2015; Hernandez et al., 2022; Rosenstock et al., 2021; Savage et al., 2018; Wen et al., 2011). Five studies aimed to encourage the use of recommended bottle or cup feeding practices (Fangupo et al., 2015; Hernandez et al., 2022; Savage et al., 2018; Tussing-Humphreys et al., 2019; Wen et al., 2011). Four studies were designed to affect the quantity or variety of fruits or vegetables, or both, consumed by the child (Fangupo et al., 2015; Morison et al., 2018; Remy et al., 2013; Van Vliet et al., 2022).

Four studies were intended to decrease child access to SSBs or snacks with added sugar or sodium (Cloutier et al., 2018; Fangupo et al., 2015; LoRe et al., 2019; Rosenstock et al., 2021; Tussing-Humphreys et al., 2019). Two studies focused broadly on improving child diet quality (Hohman et al., 2017, 2020; Williams Erickson et al., 2018) or on improving caregiver infant and young child feeding knowledge, attitudes, and behaviors (LoRe et al., 2019; Tussing-Humphreys et al., 2019). Five studies had goals related to early childhood obesity prevention (Cloutier et al., 2018; Rosenstock et al., 2021; Savage et al., 2016; Taylor et al., 2017; Tussing-Humphreys et al., 2019).

Theoretical Frameworks

Seven studies reported their interventions to have been based on a theoretical framework (see Chapter 3 for description of frameworks). These frameworks included the Stages of Change model (Babys First Bites), social cognitive theory (Family Spirit Nurture; Delta Healthy Sprouts), the transtheoretical model of behavior change (LoRe et al., 2019; Delta Healthy Sprouts), the responsive parenting framework (INSIGHT), social support theory (Watt et al., 2009), the Chronic Care Model (Early

Childhood Obesity Prevention Program), and G.R. Patterson's family systems ecological development theory (Family Spirit Nurture). The remaining studies did not directly refer to a theoretical model (POI; BLISS; Sleep SAAF; Remy et al., 2013).

Tools and Outcomes

The studies used a variety of tools to measure outcomes related to what and how to feed infants and young children (see Appendix E). Parent knowledge and behaviors related to infant and young child feeding or perceptions of infant behaviors were assessed using questionnaires or questions developed for the study (Cloutier et al., 2018; Fangupo et al., 2015; LoRe et al., 2019; Morison et al., 2018; Savage et al., 2018; Taylor et al., 2017; Watt et al., 2009; Williams Erickson et al., 2018), or based on published questionnaires (Cloutier et al., 2018; Fangupo et al., 2015; Harris et al., 2020; Hernandez et al., 2022; Remy et al., 2013; Savage et al., 2018; Taylor et al., 2017; Van Vliet et al., 2022) or questions (Wen et al., 2011). Multiple-pass 24-hour dietary recalls (Tussing-Humphreys et al., 2019; Van Vliet et al., 2022; Watt et al., 2009), FFQ (Fangupo et al., 2015; Hohman et al., 2017, 2020; Savage et al., 2018), 3-day weighed diet records (Morison et al., 2018; Williams Erickson et al., 2018), or pre-post weighing of foods consumed (Remy et al., 2013; Van Vliet et al., 2022) were completed with caregivers to evaluate infant and young children dietary intake. One study conducted an eating-in-the-absence-of-hunger experiment with toddlers (Van Vliet et al., 2022), and videotaped observations of maternal feeding behaviors (Van Vliet et al., 2022).

Key Findings and Implications

Among the outcomes examined, caregivers' self-reported use of responsive feeding practices (Fangupo et al., 2015; Harris et al., 2020; Hernandez et al., 2022; Rosenstock et al., 2021; Savage et al., 2018; Van Vliet et al., 2022; Wen et al., 2011) was the outcome most consistently affected by home visiting interventions, especially those designed to reduce pressure on a child to eat. Home visiting interventions also significantly increased caregivers' self-reported use of recommended bottle or cup feeding practices (Savage et al., 2018; Watt et al., 2009; Wen et al., 2011), improved reported (Watt et al., 2009) or measured (Remy et al., 2013) child intake of specific fruits or vegetables, increased caregiver knowledge of recommended infant and young child feeding practices (LoRe et al., 2019), improved dietary patterns (relatively more fruits and vegetables and less juice and SSB) for formula-fed infants (Hohman et al., 2017), and decreased child-reported intake of SSB (Rosenstock et al., 2021).

Two studies documented that some of the improved outcomes persisted post-intervention (Morison et al., 2018; Rosenstock et al., 2021), and one study demonstrated a positive effect on the variety and frequency of vegetable consumption for the next child in the family, independent of any additional intervention (Hohman et al., 2020).

Most studies had null findings for some of the infant and young child feeding-related outcomes that they examined and some inconsistencies in effects across timepoints. Six studies reported no impact on most of the outcomes examined related to *what* or *how* to feed children (Fangupo et al., 2015; Hernandez et al., 2022; Morison et al., 2018; Taylor et al., 2017; Tussing-Humphreys et al., 2019; van Vliet et al., 2022; Watt et al., 2009; Williams Erickson et al., 2018). One additional study found no impact on any nutrition-related outcomes with the intention-to-treat analysis (Cloutier et al., 2018) but found that completers of the intervention were more likely to delay introduction of juice than non-completers.

Two studies within this sector stood out for their potential to influence what to feed and how to feed (see Chapter 5): the Family Spirit Nurture and INSIGHT trials.

Other Settings

The committee also reviewed interventions occurring in settings other than health care, ECE, CE, WIC, or home visiting. The settings of the interventions included research laboratories and/or virtual modalities. The committee reviewed 23 studies (28 publications) in other settings (see Table 4-15); five of the studies resulted in two publications each (Barends et al., 2013, 2014; Beinert et al., 2017; Helle et al., 2019a,b; Øverby et al., 2017; Røed et al., 2020, 2021; Verrall and Gray-Donald, 2005; Verrall et al., 2006). The geographic locations of these studies are presented in Table 4-16. The studies within the "Other" group could be classified into three study categories (see Table 4-17).

Study Population

Repeated Exposure Studies

Many of the studies that targeted repeated exposure to new foods did not report extensively on the sociodemographic characteristics of the sample, but when they did the study population was primarily highly-educated parents (e.g., with a college degree) (Beinert et al., 2017; Coulthard et al., 2014; Hetherington et al., 2015; Johansson et al., 2019; Johnson et al., 2021a; Kalhoff et al., 2021; Mennella et al., 2017; Øverby et al., 2017; Owen et al., 2018; Rapson et al., 2022; Tournier et al., 2021). All but three studies

TABLE 4-15 Included Studies and Publications Within Other Settings

Study Name	Publications	Publication Title
—	Harris et al. (2022)	Effects of sugary drink countermarketing videos on caregivers' attitudes and intentions to serve fruit drinks and toddler milks to young children
—	Rapson et al. (2022)	Starting complementary feeding with vegetables only increases vegetable acceptance at 9 months: a randomized controlled trial
—	Cauble et al. (2021)	A prenatal group based phone counseling intervention to improve breastfeeding rates and complementary feeding: a randomized, controlled pilot and feasibility trial
—	Johnson et al. (2021)	Infant and toddler responses to bitter-tasting novel vegetables: Findings from the Good Tastes Study
—	Kalhoff et al. (2021)	Feeding frozen complementary foods promotes food acceptance in infants: The randomized intervention trial Baby Gourmet
—	Ra (2021)	Evaluation of a mobile-based maternal feeding education program for overweight prevention in infants
Food4 Toddlers	Røed et al. (2021)	Effect of a parent-focused eHealth intervention on children's fruit, vegetable, and discretionary food intake (Food4toddlers): Randomized controlled trial
	Røed et al. (2020)	Process evaluation of an eHealth intervention (Food4toddlers) to improve toddlers' diet: Randomized controlled trial
—	Tournier et al. (2021)	Fostering infant food texture acceptance: A pilot intervention promoting food texture introduction between 8 and 15 months
—	Wen et al. (2020)	Effects of telephone and short message service support on infant feeding practices, "tummy time," and screen time at 6 and 12 months of child age: A 3-group randomized clinical trial
Early Food for Future Health	Helle et al. (2019b)	Evaluation of an eHealth intervention aiming to promote healthy food habits from infancy -the Norwegian randomized controlled trial Early Food for Future Health
	Helle et al. (2019a)	Examining the effects of an eHealth intervention from infant age 6 to 12 months on child eating behaviors and maternal feeding practices one year after cessation: The Norwegian randomized controlled trial Early Food for Future Health

TABLE 4-15 Continued

Study Name	Publications	Publication Title
OTIS	Johansson et al. (2019)	Protein-reduced complementary foods based on Nordic ingredients combined with systematic introduction of taste portions increase intake of fruits and vegetables in 9-month-old infants: A randomized controlled trial
—	Owen et al. (2018)	Peas, please! Food familiarization through picture books helps parents introduce vegetables into preschoolers' diets
—	Beinert et al. (2017)	No long-term effect of a 2-days intervention on how to prepare homemade food, on toddlers' skepticism for new food and intake of fruits and vegetables and sweet beverages: A randomized, controlled trial
	Øverby et al. (2017)	Effect of dietary interventions during weaning period on parental practice and lipoproteins and vitamin D status in two-year-old children
—	Mennella et al. (2017)	Learning to like vegetables during breastfeeding: A randomized clinical trial of lactating mothers and infants
—	Hetherington et al. (2015)	A step-by-step introduction to vegetables at the beginning of complementary feeding. The effects of early and repeated exposure
—	Coulthard et al. (2014)	Exposure to vegetable variety in infants weaned at different ages
—	Barends et al. (2014)	Effects of starting weaning exclusively with vegetables on vegetable intake at the age of 12 and 23 months
	Barends et al. (2013)	Effects of repeated exposure to either vegetables or fruits on infant's vegetable and fruit acceptance at the beginning of weaning
—	Maier et al. (2008)	Breastfeeding and experience with variety early in weaning increase infants' acceptance of new foods for up to two months
—	Mennella et al. (2008)	Variety is the spice of life: Strategies for promoting fruit and vegetable acceptance during infancy
—	Forestell and Mennella (2007)	Early determinants of fruit and vegetable acceptance
—	Koehler et al. (2007)	Measuring the effects of nutritional counseling on total infant diet in a randomized controlled intervention trial
—	Krebs et al. (2006)	Meat as a first complementary food for breastfed infants: Feasibility and impact on zinc intake and status

Continued

TABLE 4-15 Continued

Study Name	Publications	Publication Title
—	Verrall et al. (2006)	Community-based communication strategies to promote infant iron nutrition in northern Canada.
	Verrall and Gray-Donald (2005)	Impact of a food-based approach to improve iron nutrition of at-risk infants in northern Canada

TABLE 4-16 Geographic Location of Other Setting Identified Studies

Country	Number of Studies	Number of Publications
United States	7	7
United Kingdom	3	3
Canada	1	2
Netherlands	1	2
Germany	2	2
Sweden	1	1
Norway	4	6
France; Germany and France; Australia; South Korea; New Zealand	1 (each)	1 (each)

NOTE: Appendix E has further information on studies in other settings.

TABLE 4-17 Number of Publications Within Each Study Category

Category	Number of Studies	Number of Publications (references)
Repeated exposure of infants to new foods	15	17[a]
Counter-marketing messages on unhealthy beverages targeting parents of young children	1	1[b]
Comprehensive nutritional interventions delivered to parents virtually	7	10[c]

SOURCE:

[a] Barends et al., 2013, 2014; Beinert et al., 2017; Coulthard et al., 2014; Forestell and Mennella, 2007; Hetherington et al., 2015; Johansson et al., 2019; Johnson et al., 2021; Kalhoff et al., 2021; Krebs et al., 2006; Maier et al., 2008; Mennella et al., 2008, 2017; Øverby et al., 2017; Owen et al., 2018; Rapson et al., 2022; Rournier et al., 2021.

[b] Harris et al., 2022

[c] Cauble et al., 2021; Helle et al., 2019a,b; Koehler et al, 2007; Ra, 2021; Røed et al., 2020, 2021; Verrall et al., 2005, 2006; Wen et al., 2020.

involved infants 4–8 months old being introduced to complementary foods; the remaining three studies focused on children into their second year of life (Barends et al., 2013, 2014; Johnson et al., 2021a; Owen et al., 2018). All but one study focused on exposing the children to new foods; one study focused on exposing breastfeeding mothers to vegetable juices to test the impact on infants of flavor exposure in human milk (Mennella et al., 2017). Two studies compared the impacts of exposure to novel foods between breastfed and formula-fed infants (Forestell and Mennella, 2007; Maier et al., 2008). At baseline, sample sizes across studies ranged from 45 to 250.

Marketing Message Study

The single marketing message study was conducted with 600 U.S. caregivers of children aged 9–36 months. Approximately one-third were people with low incomes, one-third were Black, and one-quarter were Hispanic (Harris et al., 2022).

Comprehensive Intervention Studies

All seven of the more comprehensive interventions were conducted with primarily mothers and all but one focused on infants in the first year of life; one study (Røed et al., 2020, 2021) was conducted in children averaging 10 months old at baseline and 24 months old at the final follow-up. A Canadian study was conducted with an indigenous population with an average of 9 years of education (Verrall and Gray-Donald, 2005; Verrall et al., 2006). The remaining studies included mostly highly educated women with at least a college degree. In the study by Cauble et al. (2021), 95 percent of the sample was White. Race/ethnicity was not reported in the remaining five studies. At baseline, sample sizes across studies ranged from 29 to 1498.

Intervention and Study Goals

Repeated Exposure Studies

The goals of most of the studies that targeted repeated exposure to new foods when introducing solidswere to enable children to develop taste preferences for and eat more vegetables (Barends et al., 2013, 2014; Beinert et al., 2017; Coulthard et al., 2014; Forestell and Mennella, 2007; Hetherington et al., 2015; Johansson et al., 2019; Johnson et al., 2021a; Kalhoff et al., 2021; Maier et al., 2008; Mennella et al., 2008, 2017; Øverby et al., 2017; Owen et al., 2018; Rapson et al., 2022). Several compared exposures to vegetables and fruit (Forestell and Mennella, 2007; Johansson et al., 2019; Mennella et al., 2008; Owen et al., 2018). Some studies focused on a single vegetable, while others exposed children to a variety of vegetables. One study focused on introducing more textured foods (Tournier et al., 2021). Another emphasized introducing more homemade rather than commercially prepared foods (e.g., jarred baby foods), with a focus on a variety of vegetables and fruit, iron-rich foods, and drinking water instead of sugary drinks (Beinert et al., 2017; Øverby et al., 2017). Another compared introducing meat (pureed beef) or iron-fortified infant cereal in exclusively human milk fed infants who can be at risk of iron-deficiency anemia (Krebs et al., 2006).

Almost all studies used a RCT design (Barends et al., 2013, 2014; Beinert et al., 2017; Coulthard et al., 2014; Forestell and Mennella, 2007; Hetherington et al., 2015; Johansson et al., 2019; Kalhoff et al., 2021; Krebs et al., 2006; Mennella et al., 2008, 2017; Øverby et al., 2017; Owen et al., 2018; Rapson et al., 2022; Tournier et al., 2021). Maier et al. (2008) compared multiple experimental groups, and Johnson et al. (2021) used a crossover design, exposing all study children to a bitter vegetable with and without added salt or sugar.

The duration of exposure to the novel foods ranged across studies and included 1 day (Johnson et al., 2021a), 1–2 weeks (Coulthard et al., 2014; Forestell and Mennella, 2007; Owen et al., 2018), approximately 1 month (Barends et al., 2013, 2014; Hetherington et al., 2015; Johansson et al., 2019; Maier et al., 2008; Rapson et al., 2022), and 2–7 months (Kalhoff et al., 2021; Krebs et al., 2006; Mennella et al., 2017; Tournier et al., 2021). Many studies also included follow-up measures after the exposure period ended, ranging from approximately 3 months (Johansson et al., 2019; Kalhoff et al., 2021; Mennella et al., 2017; Owen et al., 2018; Rapson et al., 2022) to 12–24 months (Barends et al., 2014; Beinert et al., 2017; Hetherington et al., 2015; Øverby et al., 2017). Studies provided the novel foods or recipes for the foods (Johansson et al., 2019) or information to parents to expose their children to the selected foods. Some studies included parent support via Facebook (Johansson et al., 2019), written information (Barends et al., 2013, 2014), counseling (Hetherington et al., 2015), or videos (Rapson et al., 2022). Beinert et al. (2017) and Øverby et al. (2017) provided parents with a 2-day course on homemade food preparation. Tournier et al. (2021) provided individual counseling on what to feed but did not provide the foods. Owen et al. (2018) asked parents to read a book to their child about fruits or vegetables.

Marketing Message Study

The goal of the RCT by Harris et al. (2022) was to test the immediate effects of watching two brief (<60 seconds) counter-marketing videos on fruit drinks and toddler milks on parent attitudes toward and intentions to serve SSBs such as fruit drinks and toddler milks.

Comprehensive Intervention Studies

The goal of the more comprehensive intervention studies included testing the impacts of a variety of delivery strategies on multiple outcomes. All used some form of "virtual" interaction (e.g., radio, phone calls, texts, emails, website); Verrall et al. (2005, 2006) also conducted in-person cooking classes. All but one of the more comprehensive interventions used a RCT design; however, the study by Cauble et al. (2021) was described as a randomized controlled pilot and feasibility study. The study by Verrall et al. (2005, 2006) was a prospective study implemented in one community without a control or comparison community.

Verrall et al. (2005, 2006) disseminated information booklets, conducted cooking classes, and ran community-based radio segments on intake of iron-rich foods over a 6-month period. Koehler et al. (2007) tested the impact of researcher-delivered dietary counseling to mothers of infants from 2 to 10 months of age via a phone hotline available 3 times per week, with and without additional written information and individualized phone counseling. Helle et al. (2019a,b) use a website to test monthly online video clips on age-appropriate feeding topics coupled with cooking films and recipes delivered over a 6-month period beginning when children were 3-5 months old. Video topics included appropriate food types and textures, development of taste preferences, varied and adequate intake of fruit and vegetables, as well as responsive feeding practices. Røed et al. (2020, 2021) evaluated the impact of a website and emails on parental feeding practices and the child food environment and dietary intake over a 6-month period beginning when infants were 7–12 months old. The website included a total of 22 lessons to encourage healthy foods, such as fruits and vegetables, and discourage discretionary foods and beverages; recipes; and a discussion forum. Wen et al. (2020) tested the impact of informational booklets mailed to mothers coupled with either nurse-led telephone or text messages on infant feeding practices, tummy time, and screen time while infants were 1 to 10 months old. Cauble et al. (2021) tested six weekly 1-hour group-based phone counseling sessions delivered by a registered dietitian and a certified lactation consultant. The sessions began in late pregnancy and included information on human milk feeding, as well as types and amounts of solid foods to feed. Ra et al. (2021) developed a website that included information on human milk feeding as well as responding to hunger and satiation cues and not providing SSB and high calorie-snacks and encouraged mothers to access the content at least every 2 days from 38 weeks gestation until the child aged 6 months.

Theoretical Frameworks

Only one of the repeated exposure studies mentioned a theoretical framework: learning theory (Hetherington et al., 2015). The marketing message study (Harris et al., 2022) and three of the seven more comprehensive interventions (Cauble et al., 2021; Koehler et al., 2007; Ra, 2021) did not specify a theoretical underpinning. The other interventions were based on one or more theories, including social cognitive theory (Helle et al., 2019a,b; Røed et al., 2021), attachment theory (Helle et al., 2019a,b), anticipatory guidance framework (Helle et al., 2019a,b), health belief model (Wen et al., 2020), model of planned promotion for population health (Røed et al., 2021), and cognitive behavioral theories (Verrall et al., 2006).

Tools and Outcomes

Repeated Exposure Studies

Most repeated exposure studies compared the weight of the novel foods consumed (Barends et al., 2013, 2014; Forestell and Mennella, 2007; Hetherington et al., 2015; Kalhoff et al., 2021; Maier et al., 2008; Mennella et al., 2008; Rapson et al., 2022). Some of the studies used measures of child liking (e.g., facial expressions of enjoyment or distaste during feeding) (Barends et al., 2013, 2014; Coulthard et al., 2014; Forestell and Mennella, 2007; Johnson et al., 2021; Maier et al., 2008; Mennella et al., 2017; Tournier et al., 2021), rate of eating (Mennella et al., 2017), and parent self-report of intake at home using food records or FFQ (Barends et al., 2013, 2014; Beinert et al., 2017; Coulthard et al., 2014; Hetherington et al., 2015; Johansson et al., 2019; Krebs et al., 2006; Øverby et al., 2017; Owen et al., 2018; Rapson et al., 2022; Tournier et al., 2021).

Marketing Message Study

The study by Harris et al. (2022) used surveys to assess parent attitudes toward and intentions to serve fruit drinks and toddler milks after watching the counter-marketing video compared to control videos.

Comprehensive Intervention Studies

Dietary intake was measured by FFQ in two studies (Helle et al., 2019a,b; Røed et al., 2020, 2021). In the study by Koehler et al. (2007), the foods consumed by infants were assessed by maternal report. Parent knowledge and behaviors related to infant and young child feeding or perceptions of infant behaviors were assessed using questionnaires (Helle et al., 2019a,b; Ra, 2021; Wen et al., 2020). In the study by Verrall et al. (2005; 2006), maternal knowledge of iron-rich foods (based on questionnaire), child intake of iron-rich complementary foods (based on 24-hour recall), and community sales of infant-fortified cereals and other complementary foods rich in iron were measured. Many of the studies also assessed uptake or satisfaction of the intervention (Cauble et al., 2021; Helle et al., 2019a,b; Røed et al., 2020; Wen et al., 2020).

Key Findings and Implications

Repeated exposure to vegetables when introducing solids may be effective in helping young children eat vegetables, at least over a relatively short-term (e.g., several months); however, impacts on dietary intakes appear to diminish over time (Hetherington et al., 2015). Findings from one study suggest that reinforcing the feeding exposure with an educational component (e.g., reading children books about vegetables) may also improve intakes among young children (Owen et al., 2018). More long-term studies, including exposure of children to under-consumed foods after the introduction of complementary feeding are needed.

A single viewing of a video on unhealthy beverages can change parent attitudes over the short-term, but the degree of counter-marketing required for attitudes to persist and translate into changes in parental behavior and child dietary intake is unknown.

Findings from the more comprehensive interventions suggest that technology-based interventions, including use of phone calls, texting, and websites, show promise in being potentially scalable and having positive impacts on *what* and *how* to feed young children, at least in the first year of life, and with relatively well-educated mothers. Few studies, however, assessed longer-term impacts, and the few that did so found diminished effects, suggesting the need for a life course approach with ongoing interventions across various stages of childhood. Future comprehensive intervention trials among diverse groups of parents (both mothers and fathers) are needed.

One study within this sector stood out for their potential to influence both what to feed and how to feed (see Chapter 5). The Early Food for Future Health Study (Helle et al., 2019a,b) may provide one model for a web-based intervention that shows promise of impacting what to feed and how to feed behaviors.

SUMMARY

This chapter described key features of the 58 studies from 83 publications identified by the committee during the scoping review. While more than half of the studies took place in health care or other settings, the committee also examined studies that took place in ECE, CE, home visit, and WIC settings. Just over one-third of the publications reviewed by the committee took place in the United States, with another one-third taking place in Europe. Intervention modality varied by study, with most studies taking place live or using non-interactive remote technology. Studies targeted a range of what to feed and how to feed outcomes focused on both the caregiver and the child. Caregiver *what* to feed outcomes included increasing the provision of nutrient-dense foods and beverages, increasing the variety of foods, and reducing the provision of foods with added sugars, salt, and saturated and trans fats, while child outcomes related to consuming a high-quality diet with appropriate amounts and variety of nutrient-dense foods and beverages. Studies addressing *how* to feed outcomes largely addressed caregivers using responsive feeding practices and repeated exposures to unfamiliar foods. Fewer studies addressed child outcomes; the most popular topics were acceptance of a variety of nutrient-dense foods and beverages and timely transition to self-feeding. More than one-third of publications also addressed obesity prevention.

In addition to reviewing the included studies by setting, the committee identified select studies and study elements that are broadly informative for developing scalable new initiatives to address infant and young child complementary feeding. The next chapter describes these studies and study elements in detail.

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5

Identified Informative Studies and Elements

While scoping and mapping the literature on interventions aimed at improving infant and young child feeding, the committee identified a small number of studies with interventions and elements of interventions that are broadly informative for developing scalable new initiatives (see Chapters 2 and 3 for further information). While none are without methodologic limitations or universally effective in improving all outcome measures, they provide valuable models for future consideration. This chapter describes these "informative studies" and "informative elements" (defined in more detail below), along with key takeaways or lessons learned from each study or element.

The "informative studies" were identified based on the committee's expert judgment and assessment of three key characteristics:

1. Quality of methods
2. Evidence of effectiveness
3. Potential for scalability

Some studies that did not meet the criteria to be included as "informative studies" also contributed important ideas and insights. Those studies may have some, but not all, of the characteristics needed for the development of effective interventions. Specific elements of those studies, termed "informative intervention elements," offer clear suggestions of features that should be considered for incorporation into a program to be tested for effectiveness and scalability. Detailed extracted information from the "informative studies" and studies which had "informative intervention elements" can be found in Appendix E.

For the interventions described in the "informative studies," the committee utilized the Template for Intervention Description and Replication (TIDieR) checklist to understand intervention delivery features for implementation and scale-up (Hoffmann et al., 2014). In addition, to examine the difficulty of scaling up the interventions described in the "informative studies," the committee utilized the World Health Organization's (WHO's) ExpandNet checklist (WHO, 2011). The TIDieR tables and ExpandNet checklists can be found in Appendix F.

INFORMATIVE STUDIES

The committee identified three informative studies, one of which has led to a translational trial to assess the feasibility of implementing the interventions across a larger geographical area. The other two have not been scaled, but in the committee's judgement, they possess the potential for scalability.

Infant Feeding Activity and Nutrition (INFANT) Program

The Infant Feeding Activity and Nutrition (INFANT) program is designed to be an early life, family-centered, behavioral intervention intended to improve the dietary, physical activity, and screen time outcomes of children and caregivers with the ultimate goal of reducing childhood obesity incidence in the state of Victoria in Australia. The committee identified six publications with results from the original small-scale randomized controlled trial (RCT) completed in 2008 (Cameron et al., 2014; Campbell et al., 2013; Hesketh et al., 2020; Spence et al., 2013, 2014; Zheng et al., 2022), referred to as the efficacy RCT. In 2012, INFANT was delivered as a small-scale translation trial (Laws et al., 2016; Love et al., 2019), referred to as the translational trial. As of July 2023, INFANT is being scaled-up across Victoria, Australia, and being evaluated as a hybrid implementation-effectiveness trial (Laws et al., 2021; Marshall et al., 2022), referred to as the scale-up. Of note, the translation trial and the scale-up were not identified in the scoping review but were identified by committee members who reviewed INFANT.

Efficacy

As discussed above, INFANT was initially tested through an efficacy RCT with maternal–infant dyads recruited at 3 months and followed up until the child was 18 months old (Campbell et al., 2008). A subsequent publication provided the follow-up outcomes with the children at 2 and 3.5 years of age (Hesketh et al., 2020).

Target Behaviors and Conceptual Frameworks

INFANT targeted children's behaviors in four domains (infant feeding, food provision and dietary intake, physical activity, and sedentary behaviors) and parent behaviors in four domains (dietary intake, physical activity, sedentary behaviors, and overall well-being). The study was based on a combination of robust behavior change frameworks, including anticipatory guidance, social cognitive theory, parenting support skills, and the COM-B model, which proposes three components to any behavior (B), capability (C), opportunity (O) and motivation (M) (Michie et al., 2011). The combination of these frameworks made INFANT family-centered and focused on the rapid development of children during infancy and early toddlerhood. The INFANT efficacy RCT targeted first-time parents and used 20 behavioral change techniques, including goal setting, problem solving, and self-monitoring. In the scale-up, all parents were targeted.

Delivery Modalities

The INFANT efficacy RCT provided six 2-hour group sessions delivered by research dietitians to parents of infants at 3, 6, 9, 12, 15, and 18 months of age (Campbell et al., 2008; Marshall et al., 2023). More than two-thirds of the participants (68 percent) attended at least four of the six sessions.

Curriculum

The key content of INFANT's curriculum target behaviors is summarized in Table 5-1. The infant and toddler feeding components were evidence-based and addressed both what and how to feed, emphasizing responsive feeding principles. Ancillary materials included DVDs viewed during group sessions, handouts, and a newsletter. A unique aspect of the INFANT curriculum was that the parents' dietary intake was considered in addition to the child's dietary intake.

Study Findings

INFANT had a positive impact on children's dietary quality and reduced television viewing time, based on maternal self-report (Campbell et al., 2013; Hesketh et al., 2020; Spence et al., 2013; Zheng et al., 2022). The

TABLE 5-1 INFANT Targeted Behaviors and Intervention Focuses

Age	Infant Developmental Outcomes	Undesirable Caregiver Feeding Practices	Anticipatory Guidance Intervention Focus
3 months	Increased muscle control, strength, and coordination	Early weaning and introduction of solids. Introduction of nutrient-poor foods	To introduce basic concepts regarding parental feeding styles and how these might relate to beliefs about parenting To support parents to delay weaning/ introduction of solids to 6 months
6 months	Food rejection by infants Infant starts to sit briefly unsupported, reach with one hand; roll over	Adoption by parents of a feeding style and television viewing habits	To develop parents understanding regarding: • feeding styles and impact on children's eating • basic nutrition principals • sedentary behaviors in families and limits to acceptability
9 months	Infant crawls and pulls self upright and walks with handhold	Increasing use of television. Parents' increased awareness of child mobility	To develop understanding regarding: • parental modeling of eating, sedentary, and physical activity behaviors • impact of eating, activity, and sedentary behaviors on health of children and adults and the provision of opportunities
12, 15, and 18 months	Infant stands without support and beginning to walk	Increasing autonomy of child in eating and activity	Continued development of themes/skills regarding: • eating and moving for health of parents and children • how to feed/how to manage food rejection and demands • providing fail-safe food and activity environments

SOURCE: Campbell et al., 2008.

benefits persisted through 3.5 years of age (Hesketh et al., 2020). INFANT also demonstrated positive impacts on maternal dietary knowledge, self-efficacy, and diet quality (Cameron et al., 2014; Spence et al., 2014). The intervention did not affect infant and toddler body weight indicators (Campbell et al. 2013), which may be an important consideration in programmatic decision making. The researchers concluded that INFANT was efficacious at improving dietary intake behaviors and sedentary behaviors among infants and young toddlers (Cameron et al., 2014; Campbell et al. 2013; Hesketh et al., 2020; Spence et al., 2014).

Equity

The INFANT design considered the structure of the health care system in Victoria, but it did not have reducing inequities as a stated goal. The authors conducted an effect modification analysis based on maternal education and age (Cameron et al., 2014), and found that the intervention had greater effects in children with more highly educated mothers. The same effects were seen in children with mothers under 32 years of age (Cameron et al., 2014).

Scaling and Adaptations

As discussed above, the translational trial was conducted to determine the feasibility of implementing INFANT across the state of Victoria and of any adaptations that may be needed to scale the program (Laws et al., 2016; Love et al., 2019). As a result of this trial, which included input from multiple stakeholders, INFANT was scaled up in Victoria (Laws et al., 2021; Marshall et al., 2022). The scale-up uses well-established implementation frameworks and tools (e.g., the use of an implementation advisory committee consisting of interventionists and key practice and policy stakeholders; TIDieR; trainings and guides) and will systematically document the fidelity of implementation and reasons for adaptations made to the standard operating procedures (SOPs) tested in the original INFANT efficacy RCT. This trial will also report on implementation reach (coverage), fidelity, adoption, adaptations, cost, and sustainability. The key adaptions made in the scale-up are presented in Table 5-2 (also in Appendix F). Findings from the scale-up were not available at the time of this writing.

The committee assessed the potential scalability of INFANT and scored it positively on 13 of 22 scalability items in the WHO ExpandNet checklist, illustrating strong evidence base, stakeholder engagement, evidence-informed pragmatic adaptations for scale up, and funding mechanisms for scale up. Attributes could not be determined for nine items,

TABLE 5-2 Key Adaptations Made in the INFANT Scale-Up

Feature	Adaptions
Study Population	—Initial trial recruited first-time parents. All parents are recruited in the scale-up.
Materials	—Addition of app due to advances in technology and parental preference for online supplementary information. —Removal of tangible tools from the RCT due to cost and feasibility at scale. —Videos were reduced in length due to generational preference for briefer visual content online.
Procedures	—Reduced the number of sessions and the number of activities in the sessions, allowing for reduced session time (2 hours to 1.5 hours) due to limited workforce capacity at scale and the inclusion of some of the activities in the app. —Eight additional behavior change techniques were added
Providers	—Delivery agent expanded to offer flexibility according to organization and staff capacity, given that no additional funding was provided for delivery. Evidence from small-scale translation suggested that a wider group of health professionals could deliver the intervention once trained. Online training was offered to address the challenges faced by facilitators attending face-to-face training and the logistics of waiting for a cohort of participants. This also allowed broader reach and reduced the cost of the training.
Mode of Delivery	—The addition of the app facilitated the provision of all information in one place, at one time, made it possible for the app to be updated with changes in knowledge/ guidelines, increased the convenience for parents and facilitators, and made the program more cost-effective over a longer term.
Location	—In the scale-up, the specific venue choice was to be determined by the organization delivering the program. —To allow flexibility for implementation at scale, local organizations determined referral pathways and program set-up.
When and How Much	—Parents' earlier return to work (between 9 and 12 months as opposed to 15–18 months in the original trial) necessitated condensing content into 4 rather than 6 sessions concluding at 12 months but with app support to 18 months. Addition of the app was also in response to greater availability of online information and advances in technology.
Tailoring	—Formative research indicated the importance of tailored app push notifications, and the app delivery format allowed for this. Technology advances enabled the addition of this feature.
Modifications	—Modifications to allow flexibility for implementation at scale, including local contexts and community characteristics.
How well	—Fidelity measures adjusted according to scale-up evaluation.
Funding	—Stable funding from the National Health Medical Research Council (through a partnership mechanism as opposed to a grant mechanism in original trial) and the Victorian Department of Health that uses its own funding to deliver the trainings for INFANT providers.

SOURCE: Marshall et al., 2022

representing funding sustainability and political will beyond scale up to drive policy changes that may be needed, although the ongoing hybrid implementation trial has the potential to inform these attributes. The only attribute that scored negatively was related to equity (based on cultural, community, and gender factors) as there was no evidence of intent to address inequities in efficacy (Campbell et al., 2008), translation (Laws et al., 2016), or scale-up (Marshall et al., 2022).

Lessons Learned

INFANT is an example of a promising evidence-based intervention that can be scaled. Although the real-world effectiveness of INFANT on a larger scale is still being studied, the systematic process being followed by the investigators is based on robust implementation science principles and offers important lessons for others interested in improving infant and young child feeding practices and other lifestyle behaviors. Overall, the process to scale INFANT offers the following lessons for scaling up infant and young child feeding programs:

1. Co-design (with stakeholders) a multi-component program based on a family-centered approach grounded in robust behavior change conceptual frameworks.
2. Co-design a program with diverse stakeholders, taking health care systems context into account. It is vital to consider the system(s) that will need to engage with program implementation at scale, beginning at program conception.
3. Include an equity framework, such as the Health Equity Framework (Peterson et al., 2021), and corresponding metrics at program inception to ensure that equity is intentionally and substantively addressed throughout program co-design and implementation.
4. Use evidence-based curricula that adhere to current national or international dietary guidelines and pedagogical approaches.
5. Test the impact of the intervention under "ideal conditions" using an efficacy trial once the intervention SOP have been fully developed.
6. If the intervention proves to be efficacious, follow the efficacy trial with translational feasibility studies that use robust implementation frameworks, clearly documenting the rationale for any adaptations needed for scaling.
7. Consider the cost of implementation and the stability of funding sources as key drivers of program sustainability. For example, the addition of an app to the scaled INFANT intervention allowed for the number of sessions and session duration to be reduced while adding and reinforcing behavioral change targets.

8. Prior to scaling, a hybrid implementation trial should be conducted to assess: (1) program implementation, reach (coverage), fidelity, adoption, adaptations, cost, and sustainability; and (2) real-world effectiveness.
9. Disseminate the program findings and changes to stakeholders and keep them engaged throughout program implementation and scaling.
10. If the program works at scale, disseminate the SOP to other locations, including the process of adaptation to the local context without sacrificing the core functions of the program, and monitoring and evaluation procedures, including a quality assurance system.

The Intervention Nurses Start Infants Growing on Healthy Trajectories (INSIGHT) Study

The Intervention Nurses Start Infants Growing on Healthy Trajectories (INSIGHT) was a responsive parenting intervention delivered to U.S. families via home visiting with the overarching goal of early childhood obesity prevention.

Efficacy

INSIGHT was tested through a RCT. The research team recruited first-time mothers and their infants from a single maternity ward in Hershey, Pennsylvania, from January 2012 to March 2014 and followed the children until 1 year of age (Harris et al., 2020; Hohman et al., 2017; Savage et al., 2016, 2018). A follow-up observational cohort study (SIBSIGHT) enrolled a subset of mothers who underwent INSIGHT and had a second child (Hohman et al., 2020).

Target Behaviors and Conceptual Frameworks

INSIGHT aimed to encourage caregiver responsive feeding practices (e.g., not pressuring the child to eat or using food to soothe or reward the child) (Savage et al., 2018), the use of recommended bottle or cup feeding practices (Savage et al., 2018), and broad improvement in child diet quality (Hohman et al., 2017, 2020). A conceptual or theoretical framework for INSIGHT beyond the responsive parenting framework was not specified.

Delivery Modalities

Research nurses conducted four one-on-one home visits with families at infant ages 3–4 weeks, 16 weeks, 28 weeks, and 40 weeks (Savage et al., 2016). Almost all mothers (>89 percent) participated in the home visits at every time point. The study retention rate was 86 percent, with 125 of the 145 participants who had been randomized into the responsive parenting group completing the data collection visit when the child was 1 year old (Savage et al., 2016). Retention of those in the intervention was almost identical to that of the comparison group, which was a dose-matched home safety curriculum (Savage et al., 2016).

Curriculum

INSIGHT nurses provided caregivers with guidance on interacting with their infant during drowsy, sleepy, fussy, and alert behavioral states (Savage et al., 2016). Nutrition-specific education, demonstrations, discussion, and resources (e.g., *The Happiest Baby on the Block* video) were focused on helping caregivers recognize child hunger and satiation cues; provide age-appropriate portion sizes and repeated exposures to new foods and beverages; model healthy behaviors; avoid using food as a reward, punishment, or sole source of soothing; establish regular routines and limits; and understand growth charts. In addition, nurses provided caregivers with guidance and resources related to promoting healthy infant sleep, active play, and emotional regulation, and setting screen time limits. Of note, parental or family eating habits were not addressed within this intervention.

Study Findings

INSIGHT positively affected outcomes related to *how* to feed. When the child was 1 year of age, mothers in the intervention group were significantly more likely to report having consistent feeding routines and setting limits, and significantly less likely to soothe the child with food or pressure the child to finish their bottle or food (Savage et al., 2018). Mothers that received the responsive parenting content were also less likely to add cereal to the bottle at 20 weeks of age, prop the child's bottle at 28 weeks of age, or use a bottle or give the infant a bottle at bedtime at 1 year of age (Savage et al., 2018), feeding practices that are not recommended by experts.

INSIGHT had less impact on outcomes related to *what* to feed. At 9 months of age, almost two-thirds of children across study groups had diets that were low in fruits and vegetables or high in fruit juice, sugar-sweetened beverages (SSBs), and sweet or salty snacks (Hohman et al., 2017). Within the group of infants who were predominantly formula fed, there was evidence that the INSIGHT intervention positively impacted diet quality (Hohman et al., 2017). However, there were limited differences between study groups in child dietary intake at one year of age. Mothers in the intervention group reported via a food frequency questionnaire that their children ate salty snacks less frequently and vegetables more frequently than children of mothers in the comparison group, but there were no observed differences in fruit, juice, SSB, fried food, or sweets intake (Savage et al., 2018). INSIGHT had a positive effect on the variety and frequency of vegetable consumption for the next child in the family, independent of any additional intervention beyond maternal receipt of INSIGHT home visits for the first child (Hohman et al., 2020).

Infants in the intervention group had lower mean weight-for-length percentiles and less overweight prevalence at 1 year of age than infants in the comparison group (Savage et al., 2016). The study is unique in that it looked at a wide variety of outcomes related to both what to feed and how to feed. In addition, the intervention had long-term impacts, such that it affected feeding outcomes in the second-born child.

Equity

INSIGHT did not explicitly state having a goal to reduce health disparities. Mothers included in the study had high annual household incomes and education levels and were predominantly white and married.

Scaling and Adaptions

No translational trial has been conducted for INSIGHT. There was also no identified existing U.S. home visiting model that could be used for the scale-up process. However, within the U.S. context, the intensity of the intervention (four visits) could potentially be feasible for most home visiting models. It could be difficult to have a nurse deliver a scaled-up intervention, as many U.S. home visiting models are implemented by other professionals (e.g., social workers) or trained paraprofessionals. However, it is likely that all home visitors could be trained on the INSIGHT curriculum content, which is well-aligned with positive parenting practices and child development content already included as part of the curriculum for many home visiting models. For INSIGHT, there was no reported community engagement in the curriculum design or study implementation. INSIGHT intervention content might need to be adapted to improve the acknowledgement of family economic and social challenges and cultural sensitivity, since the intervention was tested with a homogenous, privileged population.

The committee assessed the potential scalability of the INSIGHT intervention using the WHO ExpandNet checklist, and it scored positively on 5 out of 22 scalability items, in that it tested an intervention that is broadly compatible with U.S. home visiting infrastructure and child health priorities. However, with only one efficacy trial conducted in one community with a homogenous, privileged group of participants and no evidence of community or stakeholder engagement in the design of the curriculum, the INSIGHT program would likely need substantial additional study and adaptation to be scaled up successfully.

Family Spirit Nurture

Family Spirit Nurture is a nutrition-focused home visiting intervention for U.S. Tribal communities with the overarching goal of early childhood obesity prevention.

Efficacy

Family Spirit Nurture (Part 1) was initially tested in the Navajo Nation (Shiprock, New Mexico) through an RCT. The research team recruited mothers and their infants from a pediatric clinic or Special Supplemental Nutrition Program for Women, Infants, and Children (WIC) clinic and via word of mouth from March 2017 to May 2018 (Rosenstock et al., 2021). The intervention began when a child was age 3–6 months, with the children and their mothers followed until the child was 1 year of age.

A more intensive version of Family Spirit Nurture (Part 2) was tested through an RCT conducted with two Navajo communities and one White Mountain Apache community (Fort Apache Indian Reservation) (Ingalls et al., 2019). The research team recruited expectant mothers starting in October 2017 and intervened from maternal pregnancy to until the child reached an age of 18 months, following the mother–child pairs until the children were 2 years of age.

Target Behaviors and Conceptual Frameworks

Family Spirit Nurture uses the same format and delivery system as Family Spirit, a national home visiting model designed by and for Tribal communities which meets the Department of Health and Human Services criteria to be designated as evidence-based (Bleiweiss-Sande et al., 2022; Rosenstock et al., 2021). The conceptual model for the project was based on G.R. Paterson's family systems ecological developmental theory and is represented in Figure 5-1 (Ingalls et al., 2019). It proposes that early childhood parenting behaviors are a central influence on child nutrition and physical activity behaviors and weight outcomes while acknowledging that an ecological approach that supports maternal mental health, household food and water security, and access to food and physical activ-

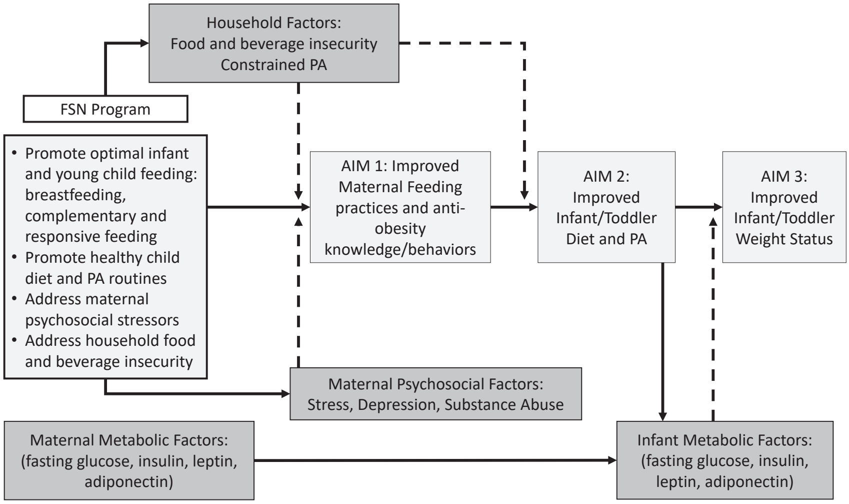

FIGURE 5-1 Conceptual model for Family Spirit Nurture (Part Two).
NOTE: PA = physical activity.
SOURCE: Ingalls et al., 2019.

ity opportunities is essential to promoting optimal parenting behaviors (Ingalls et al., 2019). The family health coaches that deliver Family Spirit Nurture are culturally matched and trained to be empathetic and to model healthy behaviors, based on social cognitive theory (Ingalls et al., 2019).

Family Spirit Nurture (Part 1) aimed to encourage caregiver responsive feeding practices (e.g., identifying infant's hunger and satiation cues, modeling healthy eating) and recommended complementary feeding practices and to reduce child access to SSB (Rosenstock et al., 2021). Family Spirit Nurture (Part 2) had similar child-focused aims. Additionally, it was also aimed to promote maternal psychosocial well-being and safe and reliable home environments (Ingalls et al., 2019).

Delivery Modalities

For Family Spirit Nurture (Part 1), Navajo paraprofessionals conducted six one-on-one, approximately 45-minute home visits with families from infant ages 3 to 6 months (Rosenstock et al., 2021). Of the 68 mothers randomized to the Family Spirit Nurture group, 60 received at least one home visit (88 percent). Assessments were completed by 77–92 percent of families at infant ages 6, 9, and 12 months, and there was no difference in attrition between the Family Spirit Nurture group and the comparison group, which received three home visits from infant ages 3 to 5 months that were focused on injury prevention (Rosenstock et al., 2021).

Family Spirit Nurture (Part 2) was also delivered by Navajo paraprofessionals (family health coaches). It is much more intensive and comprehensive than Family Spirit Nurture (Part 1), involving 36 one-on-one home visits, which last up to 60 minutes and occur bi-weekly from 28 weeks gestation until birth, weekly from birth to infant age 3 months, biweekly from infant ages 3 to 6 months, and monthly from child ages 6 to 18 months (Ingalls et al., 2019). The program intensity was based on evidence of the visit frequency used by effective home visiting programs (approximately 60 planned visits over 1–5 years, with completion of at least one-third to half of the visits) (Ingalls et al., 2019).

Curriculum

The Family Spirit Nurture (Parts 1 and 2) curricula were co-designed with the Tribal communities involved in the study (Ingalls et al., 2019; Rosenstock et al., 2021). Researchers sought cultural and contextual input on the curricula via one-on-one and group meetings with community leaders, home visitors, and other stakeholders (Ingalls et al., 2019).

Family Spirit Nurture (Parts 1 and 2) curriculum topics were aligned with the targeted behaviors for each project (Ingalls et al., 2019; Rosenstock et al., 2021). Lessons were delivered one-on-one in the family home or at another private location using tabletop flipcharts that included drawings by Indigenous artists and illustrative stories or scenarios (Ingalls et al., 2019). Family health coaches used motivational interviewing techniques and the VISION (visualize goal, identify sub-goals, set timeline, identify barriers, overcome roadblocks, nurture sources of support) tool to facilitate goal setting and problem solving with families at each visit (Ingalls et al., 2019). Of note, parental or family eating habits were not addressed within this intervention.

Study Findings

Family Spirit Nurture (Part 1) demonstrated some impact on all targeted behaviors. Relative to the comparison group, mothers in the intervention group reported significantly greater use of responsive feeding at child ages 6 and 9 months and significantly less child consumption of SSB at child ages 9 and 12 months. Infants in the intervention group had significantly lower changes in body mass index (BMI) z-scores at 6 and 9 months of age relative to infants in the comparison group (Rosenstock et al., 2021). Although the effects were no longer significant at child age 12 months, mothers in the intervention group continued to report greater use of responsive feeding, and child BMI z-scores remained lower relative to the comparison group.

Family Spirit Nurture (Part 2) completed data collection in February 2023. At the time this report was written, results from Family Spirit Nurture (Part 2) were not yet published.

Equity

Family Spirit Nurture was tested in communities that have been marginalized and exploited in the United States. Cultural sensitivity was explicitly considered during the project's design and implementation. The curricula were co-designed with Navajo and White Mountain Apache communities and delivered by culturally matched paraprofessionals (Ingalls et al., 2019; Rosenstock et al., 2021).

Scaling and Adaptions

A translational trial has not been conducted for Family Spirit Nurture. However, the original Family Spirit home visiting model is currently being implemented in more than 130 tribal communities in 21 U.S. states (Rosenstock et al., 2021), providing a ready-made network that could rapidly scale-up Family Spirit Nurture. While the number of visits included in the Family Spirit Nurture (Part 2) curriculum might be a challenge, the program's intensity was modeled after other successful home visiting models, indicating feasibility (Ingalls et al., 2019).

The potential scalability of Family Spirit Nurture was assessed using the WHO ExpandNet checklist, and it scored positively for 10 of 22 scalability items, with strong engagement of stakeholders and an accessible, nationwide network of affiliates already implementing the original, evidence-based Family Spirit home visiting model in rural and reservation-based communities which are disproportionately affected by obesity and its cardiometabolic consequences (see Appendix F). As translation and scale-up trials have not been conducted for Family Spirit Nurture, several items that could not be scored or that scored negatively were related to studying the implementation process and marshalling support for scale-up activities.

SELECT INFORMATIVE ELEMENTS FROM IDENTIFIED STUDIES IN THIS REPORT

In addition to the informative studies identified by the committee during the scoping review, other studies contained informative elements of specific utility for designing and scaling effective complementary feeding interventions. These study aspects can inform the design of future interventions.

Technology Intervention Elements: Grow2Gether

Overview

Grow2Gether is an RCT designed to foster healthy infant growth by encouraging healthful feeding behaviors for infants born to mothers with low-income attending obstetric clinics in Philadelphia, Pennsylvania (Fiks et al., 2017).

The development of the Grow2Gether intervention was informed by social learning theory, which emphasizes the importance of observing others performing a behavior and receiving positive feedback when a behavior is performed (Bandura, 1977). Before the initial Grow2Gether intervention was developed, a pilot study was conducted among 29 publicly insured Black mothers with low-income in Philadelphia (Gruver et al., 2016). The intervention in the pilot study incorporated the principles of social learning theory by organizing online, moderated social media peer groups that allowed participants to observe behavior among their peers and receive positive feedback in response to desired behaviors (Bandura, 1977; Gruver et al., 2016).

Following the initial pilot, the Grow2Gether RCT enrolled 87 pregnant people in Philadelphia who were overweight or obese and randomly assigned them to either the Grow2Gether intervention or to a control (Fiks et al., 2017). The study population was 100 percent publicly insured and 88 percent Black; 42 percent of the population was food insecure, and 3 percent had a bachelor's degree or higher level of education. Peer groups were formed, each consisting of 9 to 13 pregnant people with a similar estimated date of delivery.

The intervention was a private Facebook peer group for participants that concentrated on healthy parenting and infant growth (Fiks et al., 2017). The intervention was initiated approximately 2 months prior to each participant's expected due date and was continued through 9 months after delivery. Groups were facilitated by a psychologist and were structured around short videos that were posted weekly through 6 months of age and then biweekly through 9 months of age. Participants responded to the video curriculum by posting to the group, discussing parenting topics, and uploading photos and questions about parenting.

The investigators used several approaches to ensure privacy and human subject protections. First, access to the Facebook group was limited to enrolled participants and study staff. Second, participant posts were not put online until after they had been reviewed by study staff; posts that were critical or offensive were removed without posting. Third, the group was established using the highest available privacy setting, "secret." Fourth, participants were reminded that the group was not for urgent medical needs and that confidentiality could not be assured.

Both intervention and control group participants received text message reminders of recommended well child visits (Fiks et al., 2017). The control group received no additional intervention beyond the text message reminders.

Informative Aspects for Purpose of This Study

Four Facebook groups were formed, with an average of 30 participant posts per week per group, indicating a high degree of participant engagement. At the final follow up, 88 percent of participants agreed with the statements, “I would recommend this program” and “This program was helpful.” These findings suggest that the use of Facebook to deliver a social learning complementary feeding intervention is easily implementable and accepted.

At 9 months, participants in the intervention group had higher mean overall feeding behavior scores on the Infant Feeding Style Questionnaire and were less likely to report pressuring their children to finish food than controls. Participants assigned to the intervention were also less likely to report feeding cereal in a bottle at 6 months. This suggests that this intervention element can positively influence behavioral outcomes. However, no differences in weight-for-length z-score were observed between the groups.

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Limitations

A limitation of this study was its small sample size (n=87).

Takeaways

Grow2Gether is an example of a social media intervention, in this case a private social media peer group, that was feasible and acceptable to U.S. participants in an at-risk population. This study was given consideration by the committee because social media is an increasingly important tool for the dissemination of information, has the potential for scalability in a cost-effective manner, and may be convenient for families with young children.

Technology Intervention Elements: Early Food for Future Health

Overview

The Early Food for Future Health study is an example of an eHealth intervention aimed at improving the diet of young children (Helle et al., 2019a,b). This RCT was conducted and designed by researchers in Norway. The intervention was directed at mothers with children 5.5 months old at baseline. The majority of mothers had a college/university degree and were native Norwegians; both first-time mothers and mothers with older children were included. A total of 718 women were recruited through Facebook advertising and emails to health clinics. The intervention was delivered over 6 months via a website that featured monthly online video clips (a total of seven, each lasting 3–5 minutes) on age-appropriate feeding topics coupled with cooking films and recipes. Video topics included adequate and varied intake of fruit and vegetables, appropriate foods and textures, the development of taste preferences, and responsive feeding practices. Outcome measures were completed by 455 mothers at the end of the intervention when children were approximately 12 months old. A 1-year post-intervention assessment was completed by 295 mothers when children were approximately 24 months old.

Informative Aspects for the Purpose of This Study

Having access to the web-based child feeding videos, along with cooking films and recipes, resulted in improvements in frequency of intake of fruits and vegetables and variety of vegetables tasted by children at age 12 months; no differences were observed in intake of discretionary foods (e.g., cookies, other sweets, potato chips, sugary drinks). At 12 months, children in the intervention group also exhibited better mealtime habits, including being more likely to eat breakfast and dinner with family and eat the same dinner as family and being less likely to play or watch TV while eating. No differences were observed in maternal feeding practices as measured by the Infant Feeding Questionnaire (Baughcum et al., 2001). At 24 months, after a year without the intervention, these differences no longer remained.

The Early Food for Future Health study also included an evaluation of uptake and satisfaction with the intervention. Most mothers (85 percent) reported watching all or most of the video clips, 96 percent said they were easy to understand, and 11 percent said that they did not learn something new from them. Regarding the cooking films, 66 percent watched all/most, 92 percent said they were easy to understand, and only 9 percent reported not learning something new. Collectively, these findings suggest that online videos may be an acceptable way to affect child feeding practices during the first year of life.

Limitations

Although the tools used for assessments had been previously evaluated for validity, the measures relevant to this study were collected by mothers' self-report (Helle et al., 2019a,b). The study was powered to detect differences in maternal feeding practices outcomes with an expected total sample size of 800 at 12 months. However, recruitment was less than expected, and attrition was more than expected, resulting in only about half as many participants as were estimated to be needed to detect significant differences in feeding practices. Mothers lost to follow-up were slightly but significantly younger (29.8 years versus 30.8 years old) and less likely to have a college or university degree (77 percent versus 84 percent) than those who remained in the study. The high socioeconomic status of the sample limits generalizability to lower-resourced populations.

Takeaways

The findings suggest that an accessible web-based intervention shows promise in terms of being potentially scalable and having positive impacts on *what* and *how* to feed young children, at least over the short-term during the first year of life, and with relatively well-educated mothers. The finding that the intervention's impacts diminished after a year when the intervention was no longer in place (albeit partially attributable to the reduced sample size at 24 months) suggest the need for a life-course approach wherein ongoing boosters are provided. Additional studies will be needed to confirm that this web-based intervention has similar impacts with more diverse samples of parents.

Technology Intervention Elements: SMS WIC

Overview

The Short Messaging Service (SMS) WIC study is important as its primary focus is on an approach, interactive texting, that may be instrumental in supportive behavior change related to complementary feeding (Gibby et al., 2019; Macchi et al., 2022; Palacios et al., 2018). This intervention involved interactive text messages sent to caregivers participating in WIC in Puerto Rico and Hawaii, with the goals of (1) understanding the impact of texting on energy, nutrient, and food group intake (Gibby et al., 2019; Macchi et al., 2022; Palacios et al., 2018) on infant feeding practices and weight gain (Palacios et al., 2018); and (2) demonstrating the acceptability of interactive text messaging among WIC participants (Gibby et al., 2019). Based on the transtheoretical model of health and behavior change, the intervention involved sending caregivers one text message per week for 18 weeks starting from the time the caregiver's infant was enrolled in WIC (generally between birth and 2 months) until 4 months later. Messages were sent in English or Spanish, and were about human milk feeding, preventing overfeeding, delaying solids, and delaying and reducing juice consumption. A comparison group received text messages with the same periodicity, but on the topics of general infant health issues such as placing the infant on his or her back to sleep and proper use of car seats. Outcomes were measured using an infant food frequency questionnaire previously evaluated for validity at the end of the intervention (Macchi et al., 2022); an infant feeding practices questionnaire with questions about the type of infant feeding (breast or bottle-feeding), the age of introduction of solids and juices, methods of feeding the baby (use of bottles, spoons, adding foods to bottles), the caregiver's response to bottle feeding (e.g. encouraging the infant to finish a bottle), and distractions during feeding (e.g. using screens, eating with the rest of the family) (Palacios et al., 2018); assessments of infant weight and length (Palacios et al., 2018); and quantitative and qualitative measures of the acceptability of the intervention (Gibby et al., 2019).

Informative Aspects for Purposes of This Study

The study's findings demonstrated that interactive texting was a highly accepted method of receiving education among women with low-income served by WIC. Most participants receiving the intervention text messages reported that all messages were useful and that the messages led them to make changes in the way they fed their infants (Gibby et al., 2019). Acceptability was high for both English- and Spanish-speakers. Impacts on measured behavior changes were mixed. At 4–6 months of age, compared with the control group, the intervention group had significantly higher intakes of total grains, protein, calcium, and zinc, but no differences were seen in other food groups (Macchi et al., 2022). There were no significant improvements in feeding practices or in weight with the text message intervention (Palacios et al., 2018).

Limitations

Technical hurdles in establishing a web-based texting platform were the primary limitations in this study. Due to the capabilities of the text messaging platform used, participants only had a 12-hour window to send an interactive response. In addition, different servers were needed to support texting to different phone carriers, causing a small number of participants in Puerto Rico to receive only 28–67 percent of messages. The study also did not include other caregivers who were directly involved in infant feeding. Finally, the optimal "dose" of texting cannot be determined from this study, as all caregivers received one text per week over a 4-month period.

Takeaways

A WIC-based texting campaign is highly implementable, as it is fairly low-burden and low-cost. This method of intervention could be implemented across settings within and outside of WIC.

Other Intervention Elements: Repetition Counts

Overview

The Repetition Counts study was carried out in the United Kingdom with the goal of comparing the effectiveness of different learning strategies in promoting the intake of a novel vegetable (Caton et al., 2013). Children aged between 9 and 38 months were recruited to participate from private child care nurseries; nursery managers were given details on the study and distributed participant information sheets and consent. To increase ethnic diversity, nurseries were selected for participation from a variety of locations in West and South Yorkshire, United Kingdom. The children (n=72) were randomly assigned to one of three conditions: repeated exposure, flavor–flavor learning, or flavor–nutrient learning. Each child was offered 10 exposures to their version of a novel vegetable (artichoke). The amounts of artichoke puree and carrot puree (control vegetable) consumed before and after the intervention were measured.

At pre-intervention, carrot intake was significantly higher than artichoke intake. The intake of both vegetables increased over time; however, artichoke intake increased significantly more the carrot intake, even after controlling for higher carrot intake at baseline. Artichoke intake increased to the same extent in all three conditions, and this effect was persistent up to 5 weeks post-intervention. Five exposures were sufficient to increase intake compared with the first exposure.

Based on the study conclusion, repeated exposure to three variants of a novel vegetable was sufficient to increase intake of this vegetable, regardless of the addition of a familiar taste or energy. It indicates that repetition is a critical factor in promoting novel vegetable intake in children under the age of 2.

Informative Aspects for Purposes of This Study

There are several informative elements of this research study. It uses associative learning theory and outlines interventions aimed at improving infant feeding behaviors (Baranowski, 2008). The intervention was conducted in an early care and education (ECE) setting in a high-income country (United Kingdom) and addresses aspects of both *what* (vegetable intake) and *how* to feed young children (repeated exposure to vegetables through flavor-flavor learning and flavor-nutrient learning for children).

Limitation(s)

This study did not assess environmental and other factors that could affect vegetable consumption, such as the home environment, exposure to vegetables in the home, and parental feeding practices. A relatively small sample size per condition may have weakened the strength of the effects observed. Future studies should extend findings by offering the vegetables in their pure form to children old enough to no longer need purees. This would ensure that both the taste and texture of the vegetables are experienced, and not just the taste in puree form. A control group was not used for this study. Therefore, it is difficult to know if increases in intake would have been observed in the absence of repeated exposure.

Takeaways

This study suggests that repeated exposure is a simple technique that can be used in both home and child care settings to improve acceptance of novel vegetables. Using cycle menus in ECE settings that participate in the Child and Adult Care Food Program (CACFP) could allow the repeated exposure concept to be further incorporated within existing CACFP program guidelines.

Other Intervention Elements: EniM Clinical Trial

Overview

The EniM study was conducted in Spain to evaluate the effectiveness of an educational program for parents of children ages 1 to 2 years of age that was focused on the acquisition of healthy eating habits for the parents themselves and their children (Roset-Salla et al., 2016). The study was conducted in 12 child care centers, with parents at the participating child care centers being invited to informational meetings with pamphlets and posters. No details were given on how the child care centers were recruited. The study design was a multicenter, multidisciplinary, RCT carried out in a community setting.

The intervention group received four educational lessons at the beginning of the study that covered both theoretical and practical content on food groups, the Mediterranean diet, physical activity, food labels, and progressive introduction to food groups for children; outcome measures were assessed via questionnaires and other metrics during workshops. There was one reminder workshop at 4 months. Parents in the control group received non-nutrition education classes on a different topic.

Regarding child-focused outcomes, the study found that adherence to the Mediterranean diet improved in the intervention group compared with the control group, although there were no significant differences in observed nutrient intakes between the two groups of children. Among the parents, those in the intervention group showed significant improvement in Mediterranean diet adherence; increased consumption of vegetables, fish, olive oil, and vitamins C and D; and decreased intake of butter, margarine, and industrial bakery products compared with the control group. The study concluded that an educational intervention for parents at the time children are incorporated into the family table can significantly increase parental adherence to the Mediterranean diet, suggesting future improvement in other indicators of health and an expected influence on the diet of their children.

Informative Aspects for Purposes of This Study

This research study outlines interventions aimed at improving adult and child feeding behaviors in an ECE setting within a high-income country (Spain). The intervention itself addressed *what* to feed (e.g., dietary fats and fiber consistent with a Mediterranean diet) by focusing on the diets of both the caregiver and the child. While *how* to feed was not included in the intervention, human milk feeding was assessed as a comparative factor between the intervention group and the control group.

Limitation(s)

Those who did not finish the study were likely to have lower education levels. Participants had specific socioeconomic and cultural characteristics (high education level, employment), which may limit the generalizability of the findings.

Takeaways

Providing an educational program to parents in existing ECE programs has efficacy for improving infant and young child dietary intake and may facilitate programmatic implementation.

Other Intervention Elements: Early Childhood Obesity Prevention Program

Overview

The Early Childhood Obesity Prevention (ECHO) Program is a multi-component pilot RCT of a obesity prevention program for mother/newborn dyads with a community focus (Cloutier et al., 2018). The study aim is to test the feasibility of an ecologic approach to obesity prevention in children in the first year of life. Mother/newborn dyads were recruited from one of six low-income neighborhoods in Hartford, Connecticut that were served by a Brighter Future Family (BFF) Center that was linked to the Nurturing Families Network (NFN) home visiting program. BFF Centers were paired by socioeconomic status and racial/ethnic composition and were randomly assigned to conduct either the standard NFN home visiting program or the intervention NFN home visiting program. People who were pregnant or postpartum and eligible for participation in NFN were screened for eligibility for ECHO. Participants received the standard NFN home visitation program or an enhanced program (NFN+) that incorporated behavioral change strategies (e.g., goal setting, problem solving) and focused on six obesity-associated behaviors (human milk feeding, juice/SSB, solids, infant sleep, television/screen time, and soothability) with linkages to community resources.

Participants who completed the ECHO program were less likely to have introduced juice/SSB at 6 months of age and more likely to have introduced juice at an older age than to those who did not complete the program. Fruit and vegetable intake did not differ between groups. Those who stayed in the NFN+ program longer had also human milk fed for a longer time at 12 months. Infants of completers had a higher BMI than infants of non-completers at birth, but a lower BMI at 6 and 12 months. Infants whose mothers completed ECHO had a lower weight-for-length z-score at 12 months than those who did not complete the program.

Informative Aspects for Purposes of This Study

The ECHO program is grounded in theory and uses an ecologic framework to support partnerships across community sectors to support family behavioral change (Cloutier et al., 2018). The study outlines interventions aimed at improving infant feeding behaviors and was conducted in a diverse low-income community in the United States. The intervention occurred in the home visiting context and addressed *what* to feed (related to SSB, juice, solids, fruits, and vegetables) and *how* to feed (including cup use and human milk feeding). The strength of the ECHO program is the use of an existing evidence-based home visiting program to deliver an intervention.

Limitation(s)

The study sample size was small because it was designed as a pilot/feasibility study.

The dropout rate during the intervention for the NFN dyads was high, although it was similar to the rate for NFN enrollees and the rates observed in other studies.

Takeaways

The ECHO program delivered module elements in 10–20-minute segments over multiple home visits. This study demonstrates that it is feasible to conduct an ecological intervention in an existing home visiting program. If demonstrated to be effective, the program could be a sustainable intervention capable of wide dissemination.

SUMMARY

This chapter describes the efficacy and scaling of the three informative studies and key takeaways of the six informative intervention elements. These informative studies were conducted within the health care setting and home visit setting, while the informative intervention elements were conducted within health care, ECE, WIC, and home visiting settings. These studies provide evidence for and elements of scalable intervention elements. However, due to these studies' reliance on participant-reported outcomes such as changes in attitudes and beliefs, the impact of the interventions on key public health metrics such as obesity is unknown.

The next chapter describes considerations for scaling infant and young child feeding programs based on the informative studies and informative elements reviewed by the committee, along with considerations related to settings and systems responsible for implementing complementary feeding interventions.

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6

Considerations for Scaling Infant and Young Child Feeding Interventions

In this chapter the committee describes conclusions from both the scoping review identified literature as well as existing information on considerations needed for scaling infant and young child feeding interventions. The chapter begins with discussing the importance of identifying the systems each setting fits within and concludes with a discussion of considerations for scaling infant and young child feeding interventions that were informed by the identified studies within the scoping review.

SHIFTING PERSPECTIVE FROM SETTINGS TO SYSTEMS

As indicated in Chapter 4, the number of studies identified in the scoping review varied across settings, with 16 studies in health care settings (27 publications), 12 studies in home-visiting programs (18 publications), 5 studies in early care and education (ECE) (5 publications), two studies in the Special Supplemental Nutrition Program for Women, Infants, and Children (WIC) settings (4 publications), 1 study in university cooperative extension (CE) programs (1 publication), and 23 studies (28 publications) that did not occur in any of the pre-specified settings. To ensure effective implementation and scaling, it is important to know, in addition to the setting, the system of systems that would be responsible for overseeing the implementation, scale up, monitoring, evaluation, and maintenance of the programs or interventions. This approach is needed because a sector may be engaged in coordinating the delivery of a program across multiple settings, including those outside of the sector. For example, the health care system may coordinate infant and young child feeding programs delivered at home or at ECE centers, and the food assistance sector may coordinate delivery of programs such as WIC in partnership with the health care system. Many programs also involve social networking and information technology (IT) communications systems.

As discussed earlier, the committee identified and classified informative studies (n=3) and informative intervention elements (n=6) by setting and system (see Table 6-1). Which systems would be likely to oversee the coordination of program implementation and sustainability on a large scale was inferred from the program or discrete intervention implementation characteristics, primarily considering the U.S. context. One of the informative studies fell within the health system, and the other two were within the home-visiting system (see Table 6-1). Among the six discrete interventions that provided informative elements, two fell within health and social media/IT, one within the food assistance, one in health and social media/IT, and three in health and education. As these different systems are operated by different agencies, multisectoral coordination is needed for the successful implementation of informative programs and elements across settings.

TABLE 6-1 Noteworthy Features of Informative Studies and Intervention Elements by Systems and Settings

Program/ Intervention [Location]	System(s)	Setting(s)	Comment
Informative Studies			
Infant Feeding Activity and Nutrition (INFANT) [Victoria, Australia]	**Health** National (funding) and state (funding and operational) levels Scaling up funded by National Medical Research Council with in-kind support from the Victoria Department of Health	Diverse health care provider practices	Delivered as part of routine practice by dietitians, maternal and child health nurses, health promotion officers, midwives, other parenting support or allied health workers A new scale-up iteration of the program relies on an interactive app and is currently being tested for effectiveness
Intervention Nurses Start Infants Growing on Healthy Trajectories (INSIGHT) [PA, USA]	**Home Visit** Academic study funded by the National Institutes of Health (NIH)	Home	Research nurses delivered the intervention at home visits

TABLE 6-1 Continued

Program/ Intervention [Location]	System(s)	Setting(s)	Comment
Family Spirit Nurture [Navajo Nation, USA]	**Home Visit** Academic study funded by Healthy Eating Research, Navajo Area Indian Health Service, Osprey Foundation, the McCune Charitable Foundation, and The Robert Wood Johnson Foundation	Home	Delivered by Navajo paraprofessional family health coaches
Informative Intervention Elements			
Grow2Gether [PA, USA]	**Health and Social Media/IT** Academic study funded by the Children's Hospital of Philadelphia Healthy Weight Program Could be delivered by multiple sectors providing infant feeding services	Private Facebook peer group	Videos based on American Academy of Pediatrics (AAP) Bright Futures guidelines Interactive Facebook groups of pregnant people assembled by the research team and facilitated by a psychologist postpartum and throughout early infancy
Early Food for Future Health [Norway]	**Health and Social Media/IT** Study funded by the University of Agder, with financial support from the Eckbo Foundation, Norway	Website	Website videos developed by research team Participants recruited from child health centers and Facebook
Short messaging service (SMS) WIC [Puerto Rico and HI, USA]	Food and Health and Social Media/IT Study supported by the National Institute of Minority Health and Health Disparities	Interactive text messages	Participants recruited at WIC clinics SMS reinforced WIC education messages

continued

TABLE 6-1 Continued

Program/ Intervention [Location]	System(s)	Setting(s)	Comment
Early Childhood Obesity Prevention Program (ECHO) [CT, USA]	**Health and Education** Academic study in partnership with a children's medical center and existing home visiting program funded by the Hartford Foundation for Public Giving Research study funded by NIH	Home	Staff from existing home visiting program trained on delivery of enhanced home visiting sessions
Repetition Counts [UK]	**Health and Education** Academic study Funded by the European Community's Seventh Framework Programme	Early Care and Education (ECE)	ECE staff conducted the repeated exposures in ECE settings
EniM [Spain]	**Health and Education** Academic study with support from primary health care clinic	Early Care and Education	Unclear who delivered educational sessions to parents of infants and young toddlers at the ECE centers, but intervention may be delivered by nurses at primary health care centers

SOURCES: Cameron et al. (2014); Campbell et al. (2008, 2013); Caton et al. (2013); Cloutier et al. (2018); Fiks et al. (2017); Gibby et al. (2019); Harris et al. (2020); Helle et al. (2019a,b); Hohman et al. (2017, 2020); Ingalls et al. (2019); Macchi et al. (2022); Palacios et al. (2018); Paul et al. (2014); Rosenstock et al. (2021); Roset-Salla et al. (2016); Savage et al. (2016, 2018); Spence et al. (2013, 2014); Zheng et al. (2022).

FACTORS FOR SUCCESSFUL SCALING OF INFANT AND YOUNG CHILD FEEDING INTERVENTIONS

The committee identified several interventions in what and how to feed infants and young children that reported improvements in self-reported outcomes, but their scalability and generalizability to diverse populations is unknown and their results will require replication with objective measures to avoid social desirability bias in outcome assessment. When designing an intervention with the promise to be viable and effective for wide dissemination, considering factors important for scaling will facilitate broader implementation of the implementation in large or diverse populations. Programs that were designed as research studies and tested in homogenous, non-representative, highly educated, or otherwise privileged populations or restricted to those who were highly motivated to participate in research may not be applicable to broader populations. The committee identified factors to consider when developing programs, monitoring progress, making adaptions and obtaining funding that are important for scaling infant and young child feeding interventions (see Box 6-1).

BOX 6-1
Factors to Consider in Scaling Infant and Young Child Complementary Feeding Programs

Based on the findings from the scoping review and identified informative examples, the committee members identified the following factors for consideration when developing and/or scaling up and sustaining programs.

Program Development

1. Base programs on family-centered interventions that have already been shown to be efficacious under "real-world" conditions and address the parent/family diet, eating habits, and role modeling.
2. Maintain a central focus on equity and inclusion of marginalized and/or disadvantaged populations.
3. Use a life course approach and provide consistent information through multiple touchpoints over the course of the life span. This includes addressing family eating habits, given the infant transitions to family foods.
4. Engage all family members and individuals who care for the child.
5. Limit the burden on the caregiver to complete the program or intervention.
6. Utilize a hybrid model (both live and technology-based) to reduce costs and ensure accessibility and convenience for families.
7. Include key stakeholders (e.g., community leaders, caregivers, personnel who will deliver the intervention) from the beginning and throughout the scale-up process, including formative research, translation trials, and sustainability phases.
8. Use standard operation procedures (SOPs) manuals for proper implementation, including workforce training and operational implementation of all activities and processes.

Monitoring

9. Develop and apply a cost-effective rapid response monitoring and evaluation system to continuously assess implementation fidelity and identify and address bottlenecks and issues with quality in a timely manner and with input from key stakeholders.
10. Develop and implement a rigorous assessment of the effectiveness of the intervention with respect to patient-important outcomes. Rigorous assessment should include one or more objective measures of effectiveness, alone or in combination with subjective measures.

Continued

BOX 6-1 Continued

12. Advocate for and monitor policy changes to ensure program sustainability following successful scale up.

Adaptions

13. Identify adaptations to improve the cultural and linguistic fit of the intervention and additional family-level and structural supports that may be needed for families experiencing racism, discrimination, and other social and economic hardships.
14. Develop reports, manuscripts, and SOP to support dissemination to other contexts within and across countries.
15. Document all adaptations made during scale up and clearly explain the contextual factors driving them.

Funding

16. Ensure that systems in charge (e.g., health care, early care and education, university cooperative extension, Special Supplemental Nutrition Program for Women, Infants and Children, home visiting) are ready to support and sustain the program, building from existing structures.
17. Ensure funding streams are in place for the development, scale up, and maintenance phases.

To support effective implementation, it is important to give consideration to the skills that staff members will need to implement the intervention and to reconcile these with the organization's ability to identify, maintain, and compensate those with the needed expertise. An intervention that requires extensive time and knowledge or that can only be done by highly specialized, skilled staff may not be realistic for broader use.

Limiting the burden on caregivers and children will increase the likelihood that an intervention is tolerable, or even welcomed, by recipients. An intervention that is engaging and motivating will have higher retention than one that is demanding or uninteresting to participants, and its effects are more likely to be sustained. Using culturally and linguistically appropriate program components and content that is sensitive to diverse views on child feeding and care will also increase acceptance among the target population. A program that is not respectful of tradition or that comes across as an imposition from outsiders would not be well received. Any program may have features that need to be adapted to different populations to be effective.

An intervention that considers a household's diet will support full integration into the day-to-day life of program participants since the infant or young child will, over time, start consuming the family diet.

Thus, child dietary changes that occur as the result of the intervention (e.g., consumption of more fruits and vegetables) need to become the household norm in order to be sustained, rather than just a temporary accommodation for the infant or young child.

Limiting implementation costs will allow a program to be broadly implementable and sustainable over time. A program that is costly on a per-participant basis may be feasible for a small, select group or for a limited period of time, but to have a meaningful public health impact, the program should be suitable for widespread application over an indefinite period of time. While studies reviewed by the committee generally did not address the costs required to implement the intervention, the committee noted that programs with modest implementation costs are generally more feasible for widespread implementation.

Continuous monitoring, evaluation, and refinement of any large-scale program will help to ensure adequate coverage and quality of delivery of services. No matter how carefully a program is developed, unexpected challenges may call for changes based on practical experience or to recognize changes in the food system. Those changes may involve making the intervention as cost-effective as possible, enabling the intervention to be implemented by the most readily available and employable staff, and imposing the minimum necessary burden with maximum appeal to the target audience. Ongoing monitoring and evaluation will require systems for data collection from staff, intervention participants, and others engaged in the settings in which the program is being implemented and an ongoing experimental or quality improvement approach to identify, test, refine, adapt, and adopt changes.

NEXT STEPS FOR SCALING COMPLEMENTARY FEEDING INTERVENTIONS

These scalability lessons learned through the committee's analysis are highly consistent with the findings of implementation science (Weiner et al., 2023) and with equity principles (Kumanyika et al., 2019, 2022), and they indicate the need for further implementation science research to improve the implementation, impact, and sustainability of large-scale infant and young toddler comprehensive feeding programs. Such a research agenda could also further address equity considerations and the sustainability of programs following successful scale-up.

The committee notes that only two of the studies reviewed (INFANT and Family Spirit Nurture) had evidence of moving beyond one efficacy study, likely due to the many barriers that exist to moving interventions from research study to scaled interventions. In addition to the studies described in this report, the committee identified 16 ongoing interventions for which results had not been published as of June 2023 (Alayli et al., 2020; Bryant et al., 2021; Dennis et al., 2021; Díaz-Rodríguez et al., 2020; Economos et al., 2023; Ferris et al., 2022; Hughes et al., 2016; Ingalls et al., 2019; Karssen et al., 2021, 2022; Laws et al., 2021; O'Reilly et al., 2021; Øverby et al., 2022; Pate et al., 2020; Reifsnider et al., 2013; Urkia-Susin et al., 2021). Many of these ongoing studies align with the life-stage approach; are guided by evidence-based frameworks, theories, and models; and will evaluate aspects of scalability as well as include implementation and process evaluation aspects. As made clear by the 83 publications identified in the scoping review and these ongoing studies that will result in additional publications in the coming years, infant and young child complementary feeding is an active area of research, and the evidence will continue to evolve.

SUMMARY

This chapter discussed the identification of the specific systems that can coordinate complementary feeding interventions within the settings that the committee reviewed in this report. The committee also identified factors and next steps for scaling complementary feeding interventions based on its scoping review, and it identified examples. While the evidence is evolving, the current literature suggests the need for multi-system approaches, improving the implementation, impact, equity, and sustainability of large-scale infant and young toddler comprehensive feeding programs to improve feeding behaviors.

The next chapter describes opportunities and challenges for both building effective, scalable complementary feeding programs that consider the existing infrastructure and for future data collection and research.

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7

Implications and Considerations for Design of Interventions to Improve Infant and Young Child Feeding Behavior in the United States

In this chapter, the committee describes conclusions drawn from the literature identified in the scoping review as well as from additional information on the considerations important in designing infant and young child feeding interventions. At the request of the sponsor, the committee described factors (such as financial or human resources, barriers and facilitators, as well as measurable and standardized indicators) needed to scale interventions and affect infant and young child feeding behavior and the potential of the interventions to reduce inequities and complement existing federal-level programs. The committee then discusses the role of building off existing systems and infrastructure, collecting and applying standardized indicators, reaching underserved populations, and final considerations and opportunities for future actions.

BUILDING FROM EXISTING SYSTEMS AND INFRASTRUCTURE: OPPORTUNITIES AND CHALLENGES

Distinct opportunities and challenges to harnessing existing programs and harmonizing strategies exist across the settings and systems reviewed by the committee, including health care; early care and education (ECE); university cooperative extension (CE); the Special Supplemental Nutrition Program for Women, Infants, and Children (WIC); and home visiting programs. The expansion and harmonization of existing supports for complementary feeding in the United States across settings would facilitate families with young children receiving consistent messages about complementary feeding and responsive feeding. The opportunities and challenges specific to each setting identified by the committee are described in the following sections, followed by those that apply across settings.

Health Care

As noted in Chapter 3, recent national survey data suggest that more than 95 percent of U.S. children have health insurance coverage (Conmy et al., 2023), and as of 2018, more than 90 percent of young children ages 0–4 years old receive a well-child checkup at least annually (CDC, 2020). As of June 2021, 40 million children (nearly 50 percent) in the United States are insured either through Medicaid or the Children's Health Insurance Program (CHIP), with the vast majority insured through Medicaid (Alker, 2022). Furthermore, between 2019–2021, more than 98 percent of pregnant individuals received prenatal care (Martin and Osterman, 2023). The expenditures for the health care ecosystem are greater than the funds available for the other settings included in this report (Gibbs and Malik, 2022).

Among studies in this report examining interventions conducted in the health care system, five of the six U.S. studies and one study from Canada used pediatric office or clinic visits to deliver interventions to influence dietary choices and eating behavior in the first 2 years of life (French et al., 2012; Maguire et al., 2010; Messito et al., 2020; Sanghavi, 2005; Schroeder et al., 2015; Taveras et al., 2011). The other U.S. study (Fiks et al., 2017) recruited from an obstetric clinic and delivered the intervention electronically. Importantly, four of the six U.S. studies enrolled participants in health care settings serving primarily individuals with public insurance or low-income communities (Fiks et al., 2017; French et al., 2012; Messito et al., 2020; Sanghavi, 2005), which are populations of high relevance for public health interventions. The 10 health care setting studies conducted outside the United States and Canada often enrolled participants outside of pediatric clinics (e.g., parent groups, home visits) and largely studied well-educated populations (Cameron et al., 2014; Campbell et al., 2013; Daniels et al., 2012, 2013, 2014, 2015; Fildes et al., 2015; Globus et al., 2019; Hesketh et al., 2020; Magarey et al., 2016; Maguire et al., 2010; Spence et al., 2013, 2014; van Grieken et al., 2017; Vlasblom et al., 2020; Zheng et al., 2022) or did not report socioeconomic status (SES) (de Franchis et al., 2022; Hoffmann et al., 2021; Morandi et al., 2019). Consideration of factors such as the characteristics of the study population, the settings where the participants were enrolled in and completed the study, and the country in which the study was conducted are important in considering the implications of study findings in the health care sector, as health care infrastructure and social, cultural, and other factors can vary widely by population and geographic location.

As described in Chapter 3, preventive health care for U.S. children ages 0–24 months is determined by Bright Future guidelines from the American Academy of Pediatrics (AAP, 2023) and by the Early and Periodic Screening, Diagnostic and Treatment (EPSDT) benefit of Medicaid, for children enrolled in Medicaid (Commonwealth Fund, 2005). Counseling on what to feed and how to feed in the first 2 years of life is aligned with the EPSDT requirement to provide anticipatory guidance regarding healthy lifestyles, and data suggest that it is common for pediatricians to provide brief guidance about limiting juice, avoiding sugar-sweetened beverages (SSB) and consuming a variety of fruits and vegetables daily (Boundy et al., 2020; VanFrank et al., 2018). Limited time is typically spent on nutrition counseling during well child visits, with one small study reporting approximately 2–8 minutes of nutrition counseling per visit (Kaar et al., 2019).

Given the number of components required by EPSDT and Bright Futures and the brevity of most well-child visits, physicians are under significant time constraints to complete all services. In the United States, more than 80 percent of well-child visits last fewer than 20 minutes (Halfon et al., 2011; Konrad et al., 2010). Thus, only a few trials included in this review studied counseling interventions provided primarily by pediatricians, none of which were in the United States (de Franchis et al., 2022; Morandi et al., 2019). Most trials studied interventions provided by other health professionals, such as registered dietitians, social workers, or psychologists, either alone (Cameron et al., 2014; Campbell et al., 2013; Daniels et al., 2012, 2013, 2014, 2015; Dodd et al., 2014, 2018; Fiks et al., 2017; Fildes et al., 2015; Globus et al., 2019; Hesketh et al., 2020; Magarey et al., 2016; Messito et al., 2020; Spence et al., 2013, 2014; Zheng et al., 2022) or in concert with a pediatrician (French et al., 2012; Schroeder et al., 2015; Taveras et al., 2011; van Grieken et al., 2017; Vlasblom et al., 2020). Beneficial effects on what to feed and on how to feed were noted both from interventions delivered by physicians and from interventions delivered by other health care personnel, suggesting that further studies focused on interventions delivered by registered dietitians, psychologists, social workers or other health professionals might facilitate future implementation. However, in the United States, these professionals are not routinely available in most settings providing preventive health care to children nor are they consistently reimbursed by public and private health care payers.

While only one of the included studies (Fiks et al., 2017) reported adherence data, it is known that adherence to well-child visits is low for U.S. children overall and even lower for those with adverse social determinants of health (SDOH), placing them at increased risk for adverse outcomes (Abdus and Selden, 2022). Among the 10 preventive visits recommended in the first 2 years, the 15-month-old and 18-month-old visits are the most likely to be missed (Wolf et al., 2018).

The inclusion of community health workers and peer counselors in well-child visits can improve the cultural sensitivity of the information communicated and expand linguistic competency (CMS, 2021). These efforts would have the potential to reduce the overwhelming burden of nutrition-related chronic disease on the health care system. Furthermore, augmentation of services by community health workers or peer counselors would greatly enhance the feasibility of population-wide nutrition education in the health care setting (Burt and Sisselman-Borgia, 2020). Taking all these factors into account and because the review identified beneficial effects on feeding from both interventions delivered by physicians and interventions delivered by other health care personnel, the effectiveness and scalability of nutrition counseling interventions could be improved by their delivery by registered dietitians, psychologists, or other health or social support professionals, along with community health workers and other trained paraprofessionals. Limited insurance coverage for nutrition counseling interventions provided by registered dietitians, psychologists, and other health and social support professionals and paraprofessionals presents a barrier to broader access to these services (Aspry et al., 2018). The covered services vary by service, provider type, insurance type, state, and plan. Services covered under Medicaid vary by state, with registered dietitian and community health worker services currently covered only in some states (AND, n.d.; MACPAC, 2022) and, in some cases, only for specific clinical indications (Petrin et al., 2014). Broader insurance coverage for these individuals, such as through Medicaid and CHIP, would greatly facilitate addressing cultural and social factors, including SDOH, during dissemination of nutrition recommendations and help to extend interventions within areas that have significant health care workforce shortages (RHIhub, 2023).

The committee concludes that healthy eating interventions involving the U.S. health care system are of particular interest given the health care system's potential to reach nearly all young children and their parent/caretaker through prenatal care and regular well-child visits. Expanding state Medicaid and CHIP coverage of counseling interventions by registered dietitians, psychologists, or social workers, augmented by community health workers or peer counselors, could reduce physician burden, and improve intervention adherence, since these professionals and paraprofessionals may be able to operate more flexibly and spend more time with families than physicians.

Early Care and Education (ECE)

According to the Centers for Disease Control and Prevention (CDC), ECE settings can help young children build a foundation for healthy living (CDC, 2023b). Children who attend ECE programs can consume one-half to two-thirds of their daily calorie intake while in care, making ECE programs key settings for the development of healthy habits (Benjamin-Neelon, 2018).

The studies identified within the scoping review in this setting all involved publicly- and privately-funded child care centers; however, many children ages 0 to 24 months receive care from home-based child care providers. Many of these studies focused on repeated exposure to healthy foods and had positive outcomes. In the ECE setting, intervention opportunities for repeated exposure to healthy foods are abundant, as are opportunities to engage and educate parents through center-based care. More research can help to improve understanding of how to best support the involvement of home-based care providers with repeated exposure as well as other complementary feeding interventions.

The Child and Adult Care Food Program (CACFP) is the largest federal nutrition program in the U.S. ECE system and, as noted in Chapter 3, it provides reimbursements for nutritious meals and snacks served to eligible children at participating child care centers and family child care homes (FNS, n.d.). Studies suggest that centers and homes that participate in CACFP provide healthier foods and beverages than those that do not participate in the program (Chriqui et al., 2020; Cotwright et al., 2019; Dave et al., 2022; Erinosho et al., 2018; Gurzo et al., 2020; Kenney et al., 2020, 2023; Ritchie et al., 2012; Zaltz et al., 2020) and that, on average, children's diets are healthier in ECE settings than at home (i.e., children consumed more energy and less fruits, vegetables, and milk outside of ECE settings) (Robson et al., 2015). However, only one of the five studies the committee reviewed in the ECE setting was conducted in the United States (Clark et al., 2009), and it did not assess CACFP as a stand-alone intervention. Moreover, while participation in CACFP among family child care homes varies across states, it has been declining nationwide (FRAC, 2019; USDA, 2022a). Barriers to CACFP participation by child care providers include perceptions that the nutrition requirements, monitoring and paperwork required are too challenging given the amount of reimbursement and support provided by the program (Andreyeva et al., 2022; Erinosho et al., 2022; Heinz et al., 2022; Jana et al., 2023; Lee et al., 2022).

While CACFP nutrition standards cover the specific types and amounts of food groups provided at up to three meals or snacks per day, many children eat more than three times while in a full day of child care, and the CACFP standards do not apply to foods and beverages served outside of the reimbursed meals and snacks (Korenman et al., 2013). While CACFP also provides guidance and resources on best practices for feeding young children, these additional recommendations are optional to implement and focus primarily on what to feed, rather than how to feed, young children (Kline, 2016). Furthermore, while one of the ECE studies reviewed by the committee found that repeated exposure of young children to novel vegetables while in child care was effective in helping young children to eat more vegetables (Caton et al., 2013), repeated exposure to novel vegetables is not currently addressed by CACFP resources, for example (FNS, 2023d).

Responsive parenting/feeding guidelines tailored to health care providers, WIC professionals, and ECE providers have been developed for the U.S. context (AAP, 2011; Sigman-Grant et al., 2017). However, the extent to which these guidelines are implemented by ECE providers who are responsible for feeding multiple children simultaneously, is unclear. As also discussed by the 2020 National Academies report *Feeding Infants and Children from Birth to 24 Months: Summarizing Existing Guidance*, guidance on responsive feeding could be incorporated into future CACFP and state nutrition requirements (NASEM, 2020). CACFP could be strengthened by including resources and requirements related to how to feed in addition to what to feed, providing more guidance on nutrition to ECE providers, and increasing the number of reimbursable meals/snacks offered under the program that are required to meet nutrition guidelines.

As described in Chapter 3, Early Head Start (EHS) is a center or home-based program administered by the Department of Health and Human Services (HHS) to promote school readiness for children ages 0–3 in families with low-income (ACF, n.d.-a). While there has not been an assessment of the impacts of program participation on dietary outcomes, Head Start sites have been found to provide healthier meals and snacks than most other types of child care (Ritchie et al., 2012). Of note, the one study the committee identified that was conducted as part of CE was conducted in an EHS center (as discussed below) (Horodynski and Stommel, 2005). The National Center on Parent, Family, and Community Engagement has developed evidence-based practices for Early Head Start/Head Start and other ECE settings across the country (CSSP, n.d.). This existing infrastructure could help with translating complementary feeding interventions into ECE settings, since community and parent engagement are essential.

Outside of CACFP, there are no federal nutrition requirements for ECE settings. Some states require all licensed ECE centers or licensed and license-exempt homes to follow CACFP nutrition standards or to have instituted additional nutrition requirements, while others do not (Adams and Hernandez, 2021). However, state policies are typically not comprehensive, and monitoring and enforcement challenges remain (Benjamin et al., 2009; Benjamin-Neelon et al., 2017; Lee et al., 2021; Public Health Law Center, n.d.). States also vary in the amount, if any, of nutrition training that child care providers must complete before becoming licensed. For example, in 2016, California mandated that newly licensed child care providers complete 1 hour of nutrition training out of 16 total hours of required training (California State Assembly Bill, 2013).

Challenges to scalability and implementation of programs or interventions on what to feed and how to feed exist in ECE settings. HHS's newly launched National Early Care and Education Workforce Center reported that as of February 2023, the child care sector had lost almost 80,000 jobs (about 7.5 percent of its workforce) since the COVID-19 pandemic (ACF, 2023). It noted that ECE workers are among the lowest-paid workforces in the country, despite the skills and expertise they possess to support the development of young children (ACF, 2023; Coffey, 2022). Family child care providers tend to make even less money than child care center providers; yet home-based care is used at higher rates by Hispanic and Black families, rural families, families with low incomes, and parents with lower educational attainment (HHS, 2019). Of note, none of the studies identified by the committee were conducted in family child care homes. In addition to inadequate staffing, staff compensation, and staff training, a lack of time has been identified as a barrier to implementing health interventions in ECE settings (Asada et al., 2023). The new ECE Workforce Center will support research and technical assistance for states, communities, territories, and Tribal nations to improve both the recruitment and retention of a diverse and qualified workforce across ECE programs (ACF, 2023).

The committee concludes that the existing infrastructure of both CACFP and EHS could be enhanced to improve translation of complementary feeding interventions in ECE settings. Strategies that fund and support ECE providers of all types to adopt CACFP meal patterns, routinize the introduction of new healthy foods into the diets of children under age 2 years, and involve parents in menu planning such that similar healthy foods are included in family meals would be well-positioned to impact complementary feeding outcomes. Barriers to ECE providers introducing new foods to children, such as the potential for increased food waste, and therefore, cost should be addressed. CACFP, for example, provides reimbursement for up to two meals and snacks per day, but not necessarily cover the costs of all foods provided. Research is needed to understand ECE barriers to the provision of healthful foods in ECE setting and the impact of interventions in family child care homes and thus to help ensure equity in improving what and how to feed young children.

University Cooperative Extension

Academics and educators within the CE system, along with the public health departments and other community organizations with whom they collaborate, have substantial expertise and experience providing nutrition education and implementing policy, systems, and environmental change efforts through the Supplemental Nutrition Assistance Program–Education (SNAP-Ed) and the Expanded Food and Nutrition Education Program (EFNEP) to improve dietary intake and health in populations with low incomes. Moreover, the CE system exists in land-grant universities in every state and territory, including the District of Columbia. Curricula to address infant and toddler nutrition have been developed for these programs (e.g., see Eating Smart, Being Active,[1] Families Eating Smart and Moving More,[2] *and* Food Smarts for Adults[3]). Of note, while both EFNEP and SNAP-Ed collect annual program evaluation data to assess reach and outcomes, this funding cannot be used for research (NIFA, n.d.; UNC, 2022), which may help to explain why the committee identified few published studies involving CE.

CE interventions may be most effective when engaged with the other settings described in this report. This was exemplified by the one CE-led study reviewed by the committee, where group lessons were provided to parents and young children in an ECE setting (Early Head Start) coupled with individualized counseling delivered via home visits. This multi-component intervention improved parental knowledge and self-efficacy on what and how to feed young children (Horodynski and Stommel, 2005). Moreover, CE academics and educators have the potential to implement many of the interventions categorized by the committee as outside of the prespecified settings. Such interventions included repeated exposure to novel foods, marketing messaging, and more comprehensive interventions for feeding young children. CE engagement outside of the prespecified settings would also allow program delivery curriculums to target diverse audiences and would facilitate the grounding of programs in sound behavior change embedded in socio-ecological conceptual frameworks that take equity into account from early life (Kumanyika et al., 2019; Skouteris et al., 2021).

The committee concludes that university cooperative extension is ideally positioned to integrate messaging across settings, working with home visiting programs, health care, WIC, and other sectors. Intentional partnerships between cooperative extension academics and educators and settings focused on complementary feeding of children under age 2 years could improve nutrition education and training options for caregivers, early childhood educators, and paraprofessionals such as community health workers, and could have a significant impact on complementary feeding interventions.

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[1] See https://eatingsmartbeingactive.colostate.edu/eating-smart-%e2%80%a2-being-active/about/description (accessed June 27, 2023).

[2] See https://snapedtoolkit.org/interventions/programs/families-eating-smart-and-moving-more-fesmm (accessed June 27, 2023).

[3] See https://snapedtoolkit.org/interventions/programs/food-smarts (accessed June 27, 2023).

WIC

As noted in Chapter 3, infants and young children with household incomes at or below 185 percent of the federal policy level (FPL) who are at nutrition risk are eligible for WIC (USDA, 2020). The program reaches nearly 82 percent of eligible infants less than 12 months old and nearly 57 percent of eligible toddlers of ages 12–23 months (FNS, 2023b) with supplemental healthy foods and beverages, nutrition education, human milk feeding support, and health/social service referrals (Oliveira and Frazão, 2015).

Although few WIC studies (n=2) met the eligibility criteria for inclusion in this scoping review of promising interventions around complementary feeding, the WIC program, through the provision of healthy first foods paired with human milk feeding support and nutrition education, is itself already a highly impactful complementary feeding intervention for infants and young children under age 2 years. There is extensive published literature on WIC and program impacts, including a recent systematic review of maternal and child health outcomes associated with program participation (Caulfield et al., 2022). WIC participation has been shown to have an impact on numerous outcomes, including improved diet quality of infants and young children (Anderson et al., 2022; Au et al., 2019; Weinfield et al., 2020) and healthier growth trajectories following the 2009 improvements to the WIC food packages (Chaparro et al., 2019a,b, 2020).

WIC already has a broad reach, and its breastfeeding and nutrition education are needed by new caregivers (FNS, 2023a), regardless of income level. Few Americans in any demographic groups have diets that are aligned with the *U.S. Dietary Guidelines for Americans* (FNS, 2023b). The WIC workforce includes a highly diverse collection of registered dietitians and nutrition professionals and paraprofessionals whose exclusive focus is on optimizing healthy nutritional outcomes for pregnant and postpartum women and children under age 5. A recent study of WIC participants from across the United States found that 95 percent of caregivers report that the education, information, and advice they get from WIC is a reason they continue to participate in the program (Borger, 2022). WIC nutrition education is designed to support any family with young children. For those higher-income families who do not qualify for WIC food benefits, the WIC food list can serve as a shopping list of healthy foods appropriate for young children so that all families with young children in the United States can "eat like WIC" (Caulfield, 2022). In fact, the labeling of WIC foods in food retailers already occurs in many regions, making healthy WIC foods easy for families to identify and offering a potential marketing strategy for expanding familiarity of WIC foods for all.

Co-location of WIC and health care settings has the potential to benefit both ecosystems by facilitating referrals across settings and improving both WIC participation and preventive care use among the WIC-eligible population. The geographic co-location of WIC and health care services could also help to increase access to registered dietitians, social workers, or psychologists in clinical settings.

The committee concludes that locating WIC services in health care settings would allow for optimal co-location of services and enhanced staffing of registered dietitians, social workers, or psychologists in clinical settings. In addition, given the positive impact and broad reach of WIC to the populations with low incomes across the United States, a promising strategy for consideration is expanding access to WIC's nutrition education and nutrition support to those of all income levels. Thus, exploring appropriate funding approaches to expand the reach of WIC nutrition education and human milk feeding support to families with incomes above the 185 percent of the federal policy level income threshold has great potential for optimizing complementary feeding for all families in the United States.

Home Visiting

As noted in Chapter 3, U.S. early childhood home visiting programs provide a variety of health-, education-, and social support-oriented services to families with pregnant individuals and/or children ages 0–5 years old (NHVRC, n.d.-b). Evidence-based home-visiting programs are available across all 50 U.S. states; Washington, DC; Tribal communities; and U.S. territories (Ingalls et al., 2019; NHVRC, n.d.-a; Rosenstock et al., 2021) and are accessible within about 62 percent of zip codes in the United States (NHVRC, n.d.-a). The services offered, the target audience, the professionals or paraprofessionals delivering the content, and the duration, frequency, and modality (in-person or virtual) of the home visits vary across home visiting models. Not all home-visiting programs in the United States currently deliver child nutrition content or have documented positive impact in the child health domain (HHS, 2022, n.d.-a).

Notwithstanding the variability in content of current home visiting models, after reviewing the studies included in this scoping review (see Appendix E), the committee determined that most U.S. home visiting models could incorporate and deliver the infant and young child feeding interventions identified in the review. Ten of the 12 home-visiting studies reviewed tested interventions consistent with typical home-visiting activities (e.g., one-on-one delivery of education, counseling, skill-building, and goal setting content and resources to caregivers) (Cloutier et al., 2018; Harris et al., 2020; Hernandez et al., 2022; Hohman et al., 2017, 2020; LoRe et al., 2019; Rosenstock et al., 2021; Savage et al., 2016, 2018; Tussing-Humphreys et al., 2019). Six of these 10 studies were conducted in the United States, with 5 of those including predominantly Black caregivers (Hernandez et al., 2022; LoRe et al., 2019; Tussing-Humphreys et al., 2019) or Black and Hispanic caregivers (Cloutier et al., 2018), or Navajo (Rosenstock et al., 2021). Analogous to the heterogeneity of home-visiting programs in the United States, the included studies varied with respect to who delivered the education or counseling and the frequency and duration of the intervention visits in the studies, potentially justifying flexibility during a scale-up process. Two U.S. home-visiting studies, Family Spirit Nurture and INSIGHT (Harris et al., 2020; Hohman et al., 2017, 2020; Ingalls et al., 2019; Rosenstock et al., 2021; Savage et al., 2016, 2018), were highlighted in this report as informative studies because of the strength of their design and evaluation and evidence of impact on some feeding outcomes of interest. Three studies emphasized the importance of cultural concordance between the individuals delivering the home-visiting content and caregivers (Hernandez et al., 2022; Rosenstock et al., 2021; Tussing-Humphreys et al., 2019) and co-design of the curriculum with the community to ensure cultural sensitivity (Rosenstock et al., 2021).

Home visiting staff could use their professional experience to further adapt the content and delivery based on their program infrastructure and the cultural and linguistic needs of the populations that they serve. Documenting any adaptations will allow for the impact of adapted curricula to be examined through implementation research and/or quality improvement projects. An additional question for further research is whether nutrition content can be effectively delivered virtually in the home visiting setting. The home visiting intervention studies reviewed in this report delivered content in-person, but many U.S. home visiting programs are incorporating virtual service delivery options (NHVRC, n.d.-c). Other studies included in this scoping review demonstrate the potential of virtual approaches.

Similar to the case with interventions in a medical setting, home visitors have many content areas to cover within their curricula. As with the ECE setting, additional efforts are needed to recruit, train, and fairly compensate the home visiting workforce to sustain high-quality home visiting programs that can effectively deliver nutrition content to caregivers (HRSA, n.d.; Sandstrom et al., 2020). Unlike the other settings discussed thus far, the biggest barrier to leveraging home visiting to deliver infant and young child feeding interventions is its limited reach within the U.S. population. Despite nearly $350 million in federal and state investment in the home visiting infrastructure (HFA, n.d.), U.S. family engagement with home visiting is low. Only about 1–3 percent of the approximately 18 million potentially eligible families in the United States are estimated to have contact with a home visiting program (NHVRC, 2019). More intensive efforts to identify eligible families and recruit and retain them in home visiting programs could help to increase participation (HHS, 2023). A more integrated approach across home visiting, health care, ECE, CE, and WIC settings could be mutually beneficial, as home visitors can provide families with intensive, hands-on, long-term support across many overlapping areas of focus, including responsive parenting and feeding practices, child development, food security, and economic and social stability.

The committee concludes that home visiting programs could feasibly implement many of the interventions identified as efficacious in this scoping review. There is the opportunity for home visiting programs to expand their involvement in the delivery of complementary feeding interventions in the United States To facilitate this, multiple settings (e.g., health care, ECE, CE, WIC) could collaborate to develop, distribute, and provide training on interactive what to feed and how to feed modules for U.S. home visiting programs and to refer families to home visiting programs. Expanded referrals to home visiting programs from multiple settings could increase the proportion of families that engage with home visiting services, improving the services' reach and potential impact on child health outcomes. In addition, guidance and support for home visitors could enhance the nutrition content of home visiting curricula and help home visitors balance delivery of nutrition content against other priorities in their curricula during home visits.

Connections Across Settings and Systems

As noted in Chapter 6, several of the interventions tested by the studies under review here required coordination of program implementation across multiple settings. While there are currently connections across many of the settings and systems (see Figure 7-1) described in this report via referral and other processes, there still is a recognized need to improve these linkages. Collaboration across systems may vary at the community or state level, depending on how much effort has been made to establish and maintain communication across settings and systems. There is the potential for the health care system to be a hub for connections across systems, especially given the near-universal participation in the health care system and the Joint Commission requirements that patients be screened for social determinants of health (e.g., food insecurity) and provided with information about community resources and supports (Joint Commission, 2022). Home visiting is similarly situated to be a hub across these systems, but, as noted above, fewer U.S. families engage with home visiting than with primary health care.

Strengthening collaboration across the settings and systems could help advance progress toward the common goals of promoting responsive parenting, healthy child growth and development, and improving family health outcomes and health equity across the U.S. population. As interventions are translated and scaled up within the United States, it will be important to

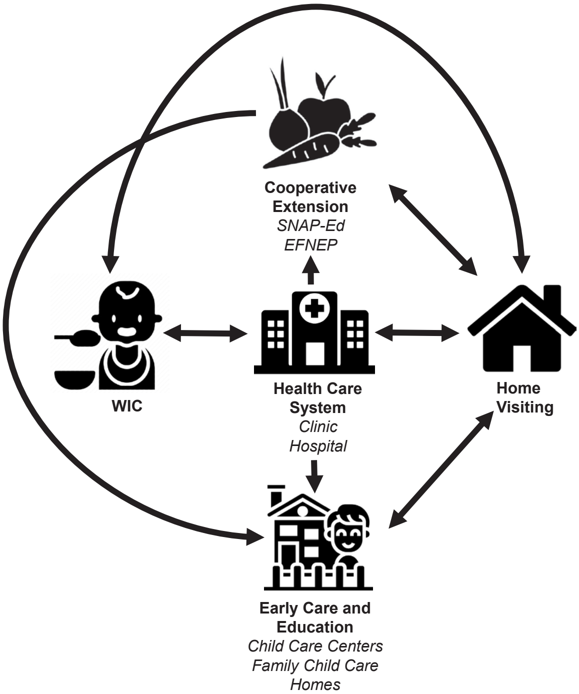

FIGURE 7-1 Connections across systems and settings.

consider how to facilitate and improve connections across these settings and systems as part of evaluation and quality improvement efforts. There are clear opportunities to enhance the focus on complementary feeding in each setting through the expansion of funding to support the workforce necessary for such efforts and the integration of nutrition into existing initiatives.

COLLECTION AND APPLICATION OF STANDARDIZED INFANT AND YOUNG CHILD FEEDING OUTCOMES

The collection of a harmonized set of process and impact outcomes across the settings described in this report would have several practical implications. The routine collection, analysis, and reporting of a consistent set of process outcomes evaluating service delivery and impact outcomes assessing caregiver implementation of recommendations related to *what to feed* and *how to feed* infants and young children could be used to inform day-to-day medical, early childhood educator and program operations; quality assurance systems and quality improvement projects; applied research and program evaluation efforts; and future infant and young child feeding guidelines (see Figure 7-2). It will be important for all programmatic evaluation to include at least some objective assessment of patient outcomes related to nutrition, such as weight-for-length z-score or body mass index (BMI) z-score.

Both this report and the 2020 National Academies report scoping existing guidelines for feeding infants and young children can be used to guide outcome selection for future interventions (NASEM, 2020). The current report presents evidence that complementary feeding interventions increased child consumption of fruits and vegetables, improved caregiver responsive feeding behaviors, and decreased child consumption of SSBs and snacks high in added sugar or salt. The interventions shown to be beneficial in effectiveness trials should be prioritized. Including outcomes that provide an objective assessment of what-to-feed and how-to-feed recommendations from recognized authorities highlighted in the 2020 National Academies report could also be beneficial (Atkinson et al., 2021; Jimenez et al., 2021; NASEM, 2020; Pérez-Escamilla et al., 2021).

As described in this report (see Chapters 3, 4, and Appendix E), there are many ways to measure complementary feeding impact outcomes,

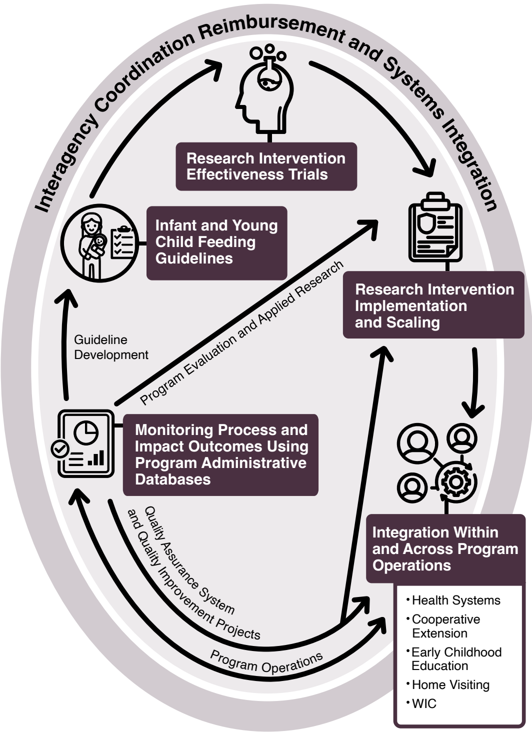

FIGURE 7-2 Utility of collection and application of standardized indicators.

requiring varying degrees of time and skill both for program personnel to administer and for caregivers to complete. Outcomes related to *what to feed* can be evaluated using standardized and validated approaches to assessing dietary intake by self-report (e.g., 24-hour dietary recalls, food frequency questionnaires, individual questions about intake of specific foods) or can be evaluated by objective measures such as observed food intake. *How to feed*, or responsive feeding behaviors (e.g., identification of hunger and satiation cues, nurturing and stimulating verbalizations, not forcing the child to eat, family meals, child repeated exposure to new foods, and caregiver encouragement of self-feeding and self-regulation), can be measured by direct observations (live or via video) and/or caregiver self-report of the child's feeding behaviors. Although the research studies on complementary feeding interventions reviewed in this report used many different approaches, the predominant approach was caregiver self-report via questionnaires. While it may be feasible for program personnel to collect self-reported information via questionnaire, many research questionnaires may be too long and complex to use as part of standard operations. The identification and broad adoption of short questionnaires that have been evaluated for validity and that can accurately capture intakes of fruits, vegetables, and foods to avoid and assess caregiver responsive feeding behaviors can make monitoring and evaluation efforts across systems more practical and useful. Examples of questionnaires include those developed by Townsend et al. for use in EFNEP/SNAP-Ed interventions (Ontai et al., 2016, 2019; Townsend et al., 2018, 2020). The collection of existing data on objective measures such as child growth may also be possible and could be facilitated by collaborative efforts across settings. Identifying key impact outcomes and validating the tools that can be used to assess them across settings and platforms is a critical next step.

All of the settings already use data systems to track operations and support service delivery to infants and young children and their families. For example, electronic medical records are now used by most health care delivery settings for the purposes of documenting medical care, and WIC and home visiting programs use administrative databases to enable timely enrollment and follow-up of the families served (Lin et al., 2019). However, despite the availability of these data systems, the information captured related to what to feed outcomes is inconsistent across providers, states, and systems (Pérez-Escamilla and Segura-Pérez, 2020). In addition, although all settings use data systems that track health indicators, these systems are generally setting-specific and communication across data systems for children who are served in multiple settings is very limited. Examples of process outcomes that could potentially be informative include tracking waitlists, number and duration of appointments, whether certain core topics are discussed with caregivers, and whether caregivers are satisfied with the services they receive. Tracking similar process outcomes across settings could help to identify gaps in services and to estimate the total contact time and the infant and young child feeding messaging that families receive from these sources.

To complement an ongoing monitoring and evaluation approach, more intensive collection of complementary feeding outcomes could occur with subsets of participants on a periodic or as needed basis, as has been done to enhance evaluation of child nutrition programs and WIC (FNS, 2022). These more intensive evaluations could also collect comprehensive cost information to allow for the calculation of economic outcomes such as cost-effectiveness and cost-benefit (Adams et al., 2019).

The committee concludes that the development of consensus complementary feeding impact outcomes and measurement tools and integration of these tools into the everyday operations of the settings discussed in the report will allow for systemwide changes to improve complementary feeding and infant and early childhood nutrition in the United States. Improved interagency collaboration within and across the settings described in this report (see Figure 7-2) and across states to capture, share, and report the same key impact outcomes would allow for more effective evaluation and improve U.S. complementary feeding efforts. Improved harmonization of process outcomes documenting service implementation could also strengthen implementation and improvement efforts. Efforts to develop innovative data strategies to facilitate data sharing across settings and minimize administrative burden would be well placed. Monitoring and evaluation efforts that include identification of disparities in access to services, program impact, and outcomes measures by race/ethnicity, parental education level, and SES could be used to drive program refinements that improve health equity.

REACHING UNDERSERVED POPULATIONS

It is a priority of the sponsor and the committee that any complementary feeding intervention or strategy maximize the potential for equitable reach to diverse populations, which is why the sponsor requested the committee to describe ways that interventions could reach underserved populations and improve equity. The previous chapters have detailed studies that provide promising interventions around complementary feeding in early childhood. However, most of these studies enrolled primarily white populations of relatively high income and education, making it difficult to know how these interventions might translate to culturally, racially, ethnically, economically, linguistically, and geographically diverse populations. It should also be noted that several of these studies took place outside the United States, where programs and services available differ from the U.S. context.

Health equity is a priority for the U.S. government, as indicated in Healthy People 2030: "Healthy People 2030 has a strong focus on eliminating health disparities and creating equitable opportunities for people to live healthy lives" (HHS, n.d.-b). Healthy People 2030 further indicates a commitment to "advance health equity, increase health literacy, and address SDOH in communities across the nation" (HHS, n.d.-b). Health equity and SDOH also align strongly with the priorities of the study sponsor, CDC. CDC has taken multiple steps to ensure that efforts to address SDOH are built into their work (CDC, 2022), including the development of six pillars that support the integration of equity considerations and provide a useful framework for aligning the studies reviewed in previous chapters to maximize equitable outcomes for all children (see Box 7-1).

A crucial step in future work to implement complementary feeding interventions will be to ensure that the strategies that have been shown to work effectively in more highly resourced populations can be implemented in less-resourced ones. This will likely require additional

BOX 7-1
Centers for Disease Control and Prevention's Social Determinants of Health Pillars

Pillar 1: Data and surveillance Embed a consistent SDOH approach to standardization, collection, analysis, and dissemination of data across the agency.

Pillar 2: Evaluation and evidence building Advance evaluation and build evidence for strategies that address SDOHs to reduce disparities and promote health equity.

Pillar 3: Partnerships and collaboration Establish criteria, actionable steps, and strategies for partnerships, collaborations, and relationships that result in improved health outcomes over the long term.

Pillar 4: Community engagement Foster meaningful, sustained community engagement across all phases of CDC intervention planning and implementation.

Pillar 5: Infrastructure and capacity Strengthen and sustain infrastructure such as workforce, training, and access to financial resources required to address SDOHs and reduce health disparities.

Pillar 6: Policy and law Identify evidence, tools, and resources to enhance communication about policies that affect SDOHs with policy makers and other stakeholders.

SOURCE: CDC, 2022.

resources and the appropriate input and vetting from families with the fewest resources, and who are the most marginalized and underrepresented in society. Families and communities with few resources are often overlooked but are most able to devise effective solutions that meet their needs. Strategically embedding CDC's pillars of partnership and collaboration and community engagement into interventions from the very early stages of planning and translation of research interventions into practice will help to maximize the chance that the interventions will be successful with historically and currently underrepresented populations. Aligning with all six CDC SDOH pillars will ensure interventions address SDOH.

At the center of the work on complementary feeding, and also a focus of the previous chapters, is the evidence surrounding the important behaviors related to *what to feed* and *how to feed*. Interventions that fail to consider the diverse social determinants that influence what and how to feed—ranging from diversity in basic access to healthy, affordable food options to cultural norms and practices around feeding—are unlikely to be successful at achieving optimal outcomes across diverse populations. It is unlikely that a one-size-fits-all model of intervention will equitably reach or impact families and communities across the United States, given the rich diversity of cultural and linguistic backgrounds and daily lived experiences in the U.S. population. Similarly, not all families or communities may require the same intensity of intervention, nor will they necessarily respond to the same messaging. However, from the challenge of identifying uniquely impactful interventions to meet myriad needs comes the opportunity to identify strategies that hold promise in their ability to adhere to an evidence base while also being able to adapt to the input of the target communities. Many elements of the interventions noted in the earlier chapters of this report hold that promise.

As an example, the INFANT study is an early life family-centered behavioral intervention designed to improve dietary, physical activity, and screen time outcomes among children and caregivers with the ultimate goal of reducing childhood obesity incidence in the state of Victoria in Australia. INFANT targeted behaviors in four domains for children (infant feeding, food provision, dietary intake, physical activity, and sedentary behaviors) and four domains for parents (dietary intake, physical activity, sedentary behaviors, and overall well-being). The original trial targeted first-time parents and used behavioral change techniques, including goal setting, problem solving, and self-monitoring (Campbell et al., 2008). As the INFANT trial is being scaled-up for broader implementation across the region, modifications are being made to reflect the need for a population-based intervention to flexibly adapt while also maintaining its evidence base (Marshall et al., 2022). By incorporating feedback from stakeholders, the scaled-up version expands its target population, adapts the number and duration of sessions, and broadens the type of personnel delivering the intervention and the modalities in which the intervention is delivered (e.g., online modalities in addition to face to face).

In addition, other studies offer the opportunity to consider how aspects of interventions can be adapted to meet the needs of more diverse populations. The COVID-19 pandemic brought about rapid changes in remote and digital service delivery methods. While their long-term impacts have not been examined, the proliferation of digital strategies creates new and engaging ways to increase reach to and engagement of underserved populations (MacMillan Uribe et al., 2023). As noted by MacMillan Uribe et al. (2023), "while a 'digital divide' exists with some [digital technologies], like desktop/laptop ownership and home broadband internet access, most people own smart phones (≥ 76 percent) or use social media (≥ 65 percent), regardless of income, race and ethnicity, or age" (p. 391). Thus, the digital technologies noted throughout this report (such as texting within the WIC SMS study) hold great promise for both customizability and reach to less-resourced families, especially in concert with ongoing efforts to subsidize internet access for families with low-income and improve internet infrastructure in rural U.S. and Tribal communities (FCC, 2023; House, 2022). Studies both before and during the pandemic, for example, suggest that remote options for receiving nutrition counseling and information are both feasible and acceptable to WIC populations (Anderson and Whaley, 2023; Au et al., 2016, 2022; Bensley et al., 2011; Ritchie et al., 2021).

The committee concludes that the successful implementation of complementary feeding interventions in underserved populations will require partnership, collaboration, and community engagement with the target populations throughout the research, implementation, and scale up processes. The most effective interventions will adapt to the needs and input of the target communities, while adhering to the evidence base.

ADDITIONAL CONSIDERATIONS

Barriers to the effectiveness of any nutrition intervention in the United States include food insecurity, unhealthy food marketing, and poor nutrition literacy. These three issues are cross-cutting and apply to interventions implemented in all settings considered in this report.

Food Insecurity

Despite the positive impacts of WIC and SNAP programs, food insecurity remains common in the United States, with 12.5 percent of families with children being food insecure (USDA, 2023). Food insecurity is defined by the U.S. Department of Agriculture (USDA) as access to adequate food needed for active, healthy living that is limited by a lack of money or other resources (USDA, 2022b). Food insecurity during childhood can have a lifelong influence on dietary intake patterns, leading to increased intake of energy dense foods, lower consumption of fruits and vegetables, and other unhealthy dietary behaviors (Landry et al., 2019). Nutrition education interventions may not be as effective when families do not have access to or cannot afford healthy foods. Food insecurity has been associated with caregiver reluctance to repeatedly offer novel foods that may not be eaten (Daniel, 2016) but findings are mixed on the association between food insecurity and controlling or pressured caregiver feeding practices (Arlinghaus and Laska, 2021). An intervention that decreases food insecurity, as done with WIC, might be an effective way to improve complementary feeding.

The committee concludes that for the anticipatory guidance, nutrition education, and brief targeted feeding interventions reviewed in this report to be most effective, they should also assess and address food insecurity.

Food Marketing

Food marketing is ubiquitous in the United States. In 2015, $77 million was spent on advertising for foods that specifically targeted infants and toddlers (Rudd Center, 2016). These advertised foods were generally less healthy than the variety of fruits, vegetables and iron-containing foods that are recommended (Harris and Pomeranz, 2020; Harris et al., 2017). For example, in 2015, companies spent $17 million to promote toddler milks in the United States (Rudd Center, 2016). These products contain added sugars and are more expensive than the plain whole milk recommended for children ages 1 to 2 years old (Choi et al., 2020; Harris, 2017). Families with young children are besieged by food advertising virtually everywhere they go, through a variety of media including television, print, and social media. In the United States, food advertising is regulated by the Federal Trade Commission in conjunction with the Food and Drug Administration. A variety of approaches toward regulating food advertising have been attempted with varying success (Taillie et al., 2019); none have been studied in a way that met inclusion criteria for this review. The one marketing message study reviewed by the committee showed that exposure to a brief counter-marketing video can change parent attitudes about beverages that are appropriate for young children (Harris et al., 2022), and the communication strategy study demonstrated that mass media communications can change parents' knowledge and food purchases (Verrall et al., 2006).

The committee concludes that counter-marketing and mass media communications strategies directed at families with young children is a promising intervention deserving of further study, with evaluation over longer time periods.

Nutrition Literacy

The goal of complementary feeding is to gradually introduce solid foods so that by the time children are 2 years old they are eating similarly to the rest of the family, as families eat together and children model the behaviors of others. An inherent challenge, however, is that most Americans do not eat a healthy diet (e.g., as recommended by the *2020–2025 Dietary Guidelines for American*s [USDA and HHS, 2020]).

Nutrition (or food) literacy includes attributes such as nutrition knowledge, food purchasing and preparation skills, and self-efficacy (Azevedo Perry et al., 2017). Nutrition literacy for caregivers of young children also includes knowledge of developmentally appropriate nutrition needs and what and how to feed young children 6–24 months old. It also should include skills to identify credible sources of information to combat the misinformation readily available online. Nutrition literacy is important as one determinant of diet quality (Gibbs et al., 2016; Taylor et al., 2019). In the United States, few parents and others who care for young children receive nutrition education regarding their own eating habits outside of the WIC setting. Notably, while the United States has a school meals program that includes nutrition standards to ensure healthy meals and some nutrition education occurs in U.S. schools (NCES, n.d.), the United States is among a minority of nations that does not include nutrition education as a required part of the K–12 school curriculum (UNESCO, 2023). According to the CDC, children attending U.S. schools receive less than 8 hours of formal health and nutrition education per year (CDC, 2023a). WIC, SNAP-Ed, and EFNEP help households with low incomes eat healthier, but not all parents have access to these programs. While national expenditures on SNAP-Ed and EFNEP in fiscal year 2017 reached, respectively, $404 million and $51 million (GAO, 2019), this funding is small compared with the nearly $2.54 billion spent in advertising by the food industry, most of which promotes unhealthy food (Finlay et al., 2022; Potvin Kent et al., 2022; Rudd Center, n.d.).

It is important to consider the nutrition literacy of caregivers of young children in designing any intervention to improve nutrition (Gibbs, 2016). However, few of the interventions reviewed include a focus on the dietary habits of the family. Professional training on nutrition is also limited. ECE professionals may receive nutrition education prior to becoming licensed, but the amount and content of this education is limited and not standardized (ACF, n.d.-b). Universities and colleges do not require nutrition as part of the general education curriculum. While some health care providers receive training on nutrition, it is also variable and not required by many schools or programs (Crowley et al., 2019).

The committee concludes that considering the nutrition literacy of caregivers and professionals in the design of interventions aimed at improving child *feeding practices behaviors is necessary. Adapting the content accordingly will allow for interventions to better reach a wide range of caregivers and families. Nutrition literacy for caregivers of young children includes understanding the developmentally appropriate nutrition needs of and what and how to feed young children 6–24 months old, as well as skills to identify credible sources to combat misinformation. In addition, interventions that address the age-appropriate feeding practices and eating behaviors of young children and the dietary habits of the whole family may be best positioned to sustainably improve dietary intakes of young children.*

GOING FORWARD: FINAL CONSIDERATIONS

The existing literature contains many studies that have examined interventions aimed at improving nutrition for infants and young children. Based on this scoping review, the committee did not identify any one specific intervention that could be immediately scaled in the United States. However, the committee can offer guidance on what such successful interventions might look like. Many interventions were conducted in controlled clinical or research settings without their effectiveness and potential for translation and scalability being assessed in practical, real-life settings, with the INFANT study being a notable exception. In addition, nearly two-thirds of the publications were from outside the United States, with interventions occurring in different cultural, legal, and political contexts. Collectively, the evidence-based interventions identified were based on messaging that was highly consistent with the "what to feed" aspects of the *2020–2025 Dietary Guidelines for Americans* (USDA and HHS, 2020) recommendations focusing on children under two years of age and the "how to feed" aspects of the responsive feeding framework (Pérez-Escamilla et al., 2021).

INFANT was the most scaled up program identified. Its development and testing provide a strong model for carefully orchestrating the process of translating findings from a randomized controlled trial (RCT) to widespread implementation of an intervention in the community. Although the applicability of the INFANT intervention to the U.S. population is unknown, the scale-up process utilized for the INFANT model is highly applicable in the United States. The INFANT intervention was family-centered and relied on group sessions with parents, taking advantage of existing Australian programs and contact opportunities through the health care system. The INFANT intervention was delivered by diverse health professionals including dietitians, nurses, and parenting skills instructors. In the United States, it is possible to envision an INFANT-like program delivered through WIC, CE (SNAP-Ed or EFNEP), child care centers (including EHS), or well-child visits, and it could be particularly effective if these systems were coordinated this effort with each other through a multi-agency coordinating body including agencies such as CDC, USDA, HHS, and the Administration for Children and Families. Such coordination will be especially important in designing an intervention that ensures generalizability to the U.S. population and that is centered in equity.

Such an integrated, coordinated approach could be facilitated by the new White House National Strategy on Hunger, Nutrition, and Health which calls for strengthening the links between food assistance programs and health care and education systems starting in early life (EOP, 2022). An example of the implementation of this strategy is the now strong national- and state- level support for the co-design and scale-up of produce-prescription programs for patients across the life-course (Mozaffarian et al., 2022). These programs are already being tested in partnership with WIC and SNAP-Ed programs and can include innovative maternal, infant, and young child feeding evidence-based curricula focusing on what and how to feed infants and young children (Harris et al., 2020; Hohman et al., 2017, 2020; Savage et al., 2016, 2018), taking cultural preferences and the SDOHs into account (Ingalls et al., 2019; Rosenstock et al., 2021).

The Family Spirit Nurture home-visiting intervention also holds promise as an intervention that could be readily scaled in the United States, pending the findings from the second RCT. There is a strong existing home-visiting infrastructure in place through the Johns Hopkins Bloomberg School of Public Health, with affiliates trained to implement the Family Spirit home-visiting model in 130 U.S. communities (primarily rural and reservation-based) across 21 U.S. states (Ingalls et al., 2019; JHU, n.d.; Rosenstock et al., 2021). Since Family Spirit is delivered in primarily rural and reservation-based communities that have experienced historical and present-day marginalization, the scaling of this community-co-designed, culturally sensitive infant and young child feeding intervention could have important health equity implications. The INSIGHT home-visiting intervention also demonstrated efficacy with respect to many nutrition outcomes and is potentially scalable, although its delivery by nurses is not consistent with many existing home-visiting models in the United States. Nevertheless, adaptation of its content for delivery by paraprofessionals and other home visitors would be possible and could potentially be done in a way that centered on equity.

There were also other interventions conducted across settings that had promising components that could be part of multi-component "packages" of interventions delivered across systems to address what and how to feed infants and young children. For example, there were interventions that highlighted the potential to reach families using social media (e.g., Facebook groups) (Fiks et al., 2017), via interactive mobile applications (Campbell et al., 2008), and with two-way text messaging (Gibby et al., 2019; Macchi et al., 2022; Palacios et al., 2018). To achieve health equity, these interventions would need to be pursued in tandem with ongoing efforts to improve internet access and infrastructure for marginalized populations in the United States.

In chapter 6, the committee describes factors for consideration in scaling infant and young child feeding interventions. As the INFANT program has shown, translational trials and implementation monitoring and evaluation are crucial when going to scale. Following a similar approach in the United States would help to ensure that effective programs can be properly adapted to diverse contexts, while maintaining their effectiveness and promoting health equity based on implementation frameworks that take equity into account (Brownson et al., 2021). It will be important for the United States to add additional, harmonized infant and young child feeding indicators that address dietary intake and responsive feeding practices to data collection systems across settings and to its broader infant and young child feeding monitoring systems (Pérez-Escamilla et al., 2021). Currently, such infant and young child feeding monitoring systems focus mainly on monitoring human milk feeding and commercial infant formula indicators (Vaz et al., 2021).

All families with infants and young children can benefit from access to credible information on best feeding practices. Because healthy eating behaviors are established early in the life course, widespread implementation of best practices for feeding infants and young children can establish an important strong foundation for U.S. population health in the long term, in concert with continued efforts later in the life course. The implementation and sustainment of large-scale, effective, population-wide infant and young child feeding programs across the settings identified in this report would help make progress toward this goal. For this reason, intergovernmental agency collaboration on workforce development, internet and technology infrastructure, evaluation and program improvement, and efforts to increase funding levels and options and reimbursement for this work is essential. It is also important for both public and private health insurance actors to be engaged with this effort, as was called for in the White House Strategy on Hunger, Nutrition, and Health (EOP, 2022).

The committee concludes that although a specific, scalable intervention model was not identified, there were several interventions with promising elements that could be part of a multi-component constellation of interventions delivered across settings and systems to address what and how to feed infants and young children. The settings and corresponding systems that were examined—health care, ECE, CE, home visiting, and WIC—are critically important to leverage. No one system *is currently equipped or adequately funded to reach all children up to age 2 years in the United States, but the existing complementary feeding supports available for some families in the United States could be expanded and harmonized such that all families with young children receive consistent messages about complementary feeding and responsive feeding across multiple settings. The effective scaling of any intervention requires consideration of implementation science and equity principles. Securing permanent funding for program implementation; supporting personnel recruitment, training, and retention; and considering integration of virtual options across the settings highlighted in this report will be key for sustainability.*

SUMMARY

This chapter provided the committee's conclusions, based on its scoping review, related to design of interventions to improve infant and young child feeding behavior in the United States. It addressed opportunities and challenges to build from existing ecosystems in each of the systems reviewed by the committee and connections across settings and systems. It discussed the collection and application of standardized infant and young child feeding outcomes and ways to reach underserved populations with complementary feeding interventions. Additional considerations, including food insecurity, food marketing, and nutrition literacy were also addressed.

Overall, this report addresses the committee's Statement of Task (see Chapter 1, Box 1-1) by providing the results of its scoping review and assessment of the peer-reviewed published literature and other publicly available information on interventions aimed at improving infant and young child feeding behaviors. As dictated by the sponsor, the review was limited to developed countries or U.S.-specific contexts and interventions occurring in health care, ECE, and CE settings and those that complement existing federal-level programs. This report summarizes the available evidence and provides information on possible interventions that could be scaled up or implemented at a community or state level. Using the committee's learnings to develop, implement, and scale complementary feeding programs for infants and children should improve current and future infant and young child nutrition and health outcomes for years to come.

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Appendix A

Committee Member Biographies

David A. Savitz, Ph.D. (*Chair*), is a professor of epidemiology in the Brown University School of Public Health, with joint appointments as a professor of obstetrics and gynecology and pediatrics in the Alpert Medical School. From 2013 to 2017, Dr. Savitz served as the vice president for research at Brown University. He came to Brown in 2010 from the Mount Sinai School of Medicine, where he had served as the Charles W. Bluhdorn Professor of Community and Preventive Medicine and the director of the Disease Prevention and Public Health Institute since 2006. Before that appointment, he taught and conducted research at the University of North Carolina School of Public Health and at the Department of Preventive Medicine and Biometrics at the University of Colorado School of Medicine. His epidemiologic research has addressed a wide range of public health issues, including exposures related to military deployments, veterans' health, environmental effects of energy development, risks from environmental exposures during pregnancy, and drinking water safety. He has authored more than 400 papers in professional journals and is the editor or author of four books on environmental epidemiology. He has served as president of the Society for Epidemiologic Research, the Society for Pediatric and Perinatal Epidemiologic Research, and the North American Regional Councilor for the International Epidemiological Association. Dr. Savitz is a member of the National Academy of Medicine, inducted in 2007, and has previously served on 14 consensus committees, eight of which he chaired or vice-chaired, in addition to serving on several other convening activities for the National Academies of Sciences, Engineering, and Medicine. He chaired the 2017 and 2022 committees on the Assessment of the Department of Veterans Affairs Airborne Hazards and Open Burn Pit Registry. Dr. Savitz received his undergraduate training in psychology at Brandeis University, holds a master's degree in preventive medicine from The Ohio State University, and received his Ph.D. in epidemiology from the University of Pittsburgh Graduate School of Public Health.

Laura E. Caulfield, Ph.D., is a professor in the Program in Human Nutrition, at the Johns Hopkins Bloomberg School of Public Health. Dr. Caulfield conducts epidemiologic research in several areas, including maternal nutrition and pregnancy outcomes, infant feeding, child growth and development; the design and evaluation of nutritional interventions; and methodological issues in the use and interpretation of nutrition data. She has conducted research in diverse populations with the goal of providing scientific evidence to inform policy. Most recently she led a systemic review of WIC participation and maternal and child health outcomes for the U.S. government. Dr. Caulfield has been a member of two prior scientific advisory committees for the National Academies. She has served on the editorial boards of both the *Journal of Nutrition* and the *American Journal of Clinical Nutrition* and has held various leadership roles within the American Society of Nutrition, including leadership of the Global Nutrition Council. She received her B.S. in human nutrition from Colorado State University and her Ph.D. in nutrition from Cornell University. Prior to joining Johns Hopkins in 1990, she was at the University of Minnesota School of Public Health.

Valerie J. Flaherman, M.D., M.P.H., is a professor of pediatrics, a professor of epidemiology and biostatistics, and core faculty at the Institute for Health Policy Studies at the University of California, San Francisco (UCSF). Her research focuses on infant nutrition, and she has been the principal investigator (PI) of five randomized controlled trials of infant feeding interventions. Additionally, over the past 3 years she has assessed the long-term impacts of COVID-19 on children, first as co-PI of the Pregnancy and Coronavirus Registry (PRIORITY) study and currently as co-PI of the RECOVER UCSF Pregnancy Cohort. Dr. Flaherman is a practicing pediatrician and lactation consultant and a UCSF Diversity, Equity and Inclusion Champion. She is the co-managing director of the Better Outcomes through Research for Newborns (BORN) network and a program leader of the Academic Pediatric Association. She received her medical degree from Harvard Medical School and her master's degree in public health from the University of California Berkeley. She completed a pediatric residency at Children's Hospital Oakland and a preventive medicine residency at UCSF and is currently board certified in pediatrics and in preventive medicine and is an internationally board-certified lactation consultant.

Frank R. Greer, M.D., is a professor of pediatrics at the University of Wisconsin School of Medicine, emeritus. He also held an affiliate appointment in the Department of Nutritional Sciences. He was an attending neonatologist at the University of Wisconsin from 1980 to 2014. Dr. Greer's research career was primarily in infant nutrition (fat-soluble vitamins and minerals). He served on the American Academy of Pediatrics (AAP) Committee on Nutrition from 1999 to 2009 and was chairperson from 2005 to 2009. He has coedited the seventh, eighth, and ninth editions of the AAP's *Pediatric Nutrition*. Dr. Greer is a member and honorary fellow of the American Society for Nutrition. He has received the Callon Leonard Award, Wisconsin Association for Perinatal Care and the Douglas Richardson Memorial Award New England Association of Neonatologists. He completed his residency in pediatrics (1978) and fellowship (1980) in neonatal perinatal medicine at the Cincinnati Children's Hospital. Dr. Greer's relevant committee assignments include chairing Working Group Two for the Complementary Feeding, Birth to Two Dietary Guidelines Task Force (National Institute of Child Health and Human Development [NICHD], Food and Drug Administration [FDA], U.S. Department of Agriculture [USDA]) in 2012–2013 and serving as a member of Premature Infant Dietary Guidelines Task Force (Pre-B) (NICHD, FDA, USDA) in 2014–2015, and as a member of the Technical Expert Committee for USDA–Department of Health and Human Services Development Project for Dietary Guidelines for Infants and Toddler from Birth to 24 Months and Women Who Are Pregnant (2015–2018). Dr. Greer received his M.D. from University of Pennsylvania School of Medicine. Dr. Greer served on the National Academies' Committee on Scoping Existing Guidelines for Feeding Recommendations for Infants and Young Children Under Age 2 (2014–2015).

Elizabeth Yakes Jimenez, Ph.D., is a professor and the assistant dean for research in the College of Population Health at the University of New Mexico Health Sciences Center, with secondary appointments in the departments of pediatrics and internal medicine. Dr. Yakes Jimenez conducts research, program evaluation, and quality-improvement projects to develop and test interventions to improve maternal and child health, to better prevent and treat malnutrition and chronic disease, and to strengthen the integration of community services and medical care. She is a pediatric registered dietitian nutritionist with an M.S. in public health nutrition from Case Western Reserve University and a Ph.D. in epidemiology from the University of California, Davis. She served as a committee member for the National Academies' consensus study on Feeding Infants and Children from Birth to 24 Months (2020).

Rafael Pérez-Escamilla, Ph.D., is a tenured professor at the Yale School of Public Health where he is the director of the Office of Public Health Practice, the Global Health Concentration, and the Maternal Child Health Promotion Program. His three-decades long research program has led to global improvements in infant and young child feeding, early childhood health and development, and household food and nutrition security. He has published more than 330 peer-reviewed research articles and has given hundreds of lectures across world regions. He is a member of the National Academy of Medicine (elected in 2019) and served on the National Academies' Food and Nutrition Board from 2012 to 2018. He served in the 2010 and 2015 U.S. Dietary Guidelines Advisory Committees. He is co-editor-in-chief of the *Maternal and Child Nutrition* journal and deputy editor of *Current Developments in Nutrition*. He has a B.S. in chemical engineering from Universidad Iberoamericana in Mexico City, a master's degree in food science, and a Ph.D. in nutrition from the University of California, Davis, where he also completed a postdoctoral program on nutrition and early childhood development. He served as a committee member of the National Academies' consensus study on Feeding Infants and Children from Birth to 24 Months, which published its report in 2020. He was a lead coordinator and co-author of the 2023 Lancet Series on Breastfeeding and served from 2019 to 2023 in the Development Group of the World Health Organization Guideline for Complementary Feeding of Infants and Young Children 6–23 Months of Age.

Lorrene Ritchie, Ph.D., is the director of the Nutrition Policy Institute and a cooperative extension specialist at the University of California Division of Agriculture and Natural Resources. She has devoted 30 years to research topics related to pediatric nutrition and health promotion through program, policy, and environmental approaches. She co-authored the first book on the dietary determinants of obesity and was lead author of the Academy of Nutrition and Dietetics 2006 position paper on pediatric weight management and co-authored the 2013 update. She served on the Institute of Medicine Committee on Evaluating Obesity Prevention Efforts: A Plan for Measuring Progress, the Robert Wood Johnson Foundation's Expert Panel on Feeding Guidelines for Infant and Young Toddlers, and on the National Collaborative on Childhood Obesity Research (NCCOR) Childhood Obesity Evidence Base project to test a novel meta-analytic method for evidence aggregation on obesity prevention in young children. She is currently participating in the National Institutes of Child Health and Human Developments' Biomarkers of Nutrition for Development-Knowledge Indicating Dietary Sufficiency effort to identify surveillance markers of child nutrition. She has given more than 100 professional presentations, published more than 200 articles, and testified in Washington, DC, on policy-relevant research. In 2022 she was awarded the National WIC Association Leadership Award. Dr. Ritchie has an M.S. and a Ph.D. in nutrition from the University of California, Berkeley, and is a registered dietitian.

Charlene M. Russell-Tucker, M.S.M., R.D.N., was appointed by Governor Ned Lamont as commissioner for the Connecticut State Department of Education in August 2021. Until her appointment, she served as acting commissioner from March through August 2021. Prior to serving as acting commissioner, she served as the department's deputy commissioner, a role in which she oversaw educational supports and wellness priorities. Previously, she served as the chief operating officer and division chief for the department's Office of Student Supports and Organizational Effectiveness. She also served as an associate commissioner of education and bureau chief within the department, previously overseeing a portfolio of programs and services that included student health, nutrition and safety, family engagement, magnet and charter schools, afterschool programs and services, school climate, adult education, and special education. She is a performance-driven and visionary education leader with over 20 years' experience in successfully leveraging the inter-connectedness of the social, emotional, physical, and mental health of students and their families as foundations for positive school and life outcomes. She passionately supports family and community engagement in education and has successfully led school attendance and school discipline initiatives with intensive focus on equity and diversity. Ms. Russell-Tucker has participated on various state and national committees, such as the Connecticut General Assembly Committee on Children Strategic Action Group on Chronic Absence, and she has served as an expert panel member on committees of the National Academies of Sciences, Engineering and Medicine. She has also served in the role of president of the Connecticut Academy of Nutrition and Dietetics and is a member of the nominating committee of the National Academy of Nutrition and Dietetics. Ms. Russell-Tucker has extensive teaching experience, formerly serving as an adjunct faculty member at Albertus Magnus College School of New Dimensions. In 2015, Ms. Russell-Tucker was named to the inaugural class of 100 Women of Color in Connecticut. In 2018 she was welcomed to the Campaign for Grade-Level Reading's Council of Champions. In 2021, Ms. Russell-Tucker received MENTOR National's Public Service–State and

Local Excellence in Mentoring Award and was also named among the 100 Most Influential Blacks in Connecticut by the Connecticut chapter of the National Association for the Advancement of Colored People. In 2022, Ms. Russell-Tucker was awarded the Albertus Magnus College prestigious honor, the St. Dominic Medal, in recognition of her distinguished achievements and her service to society. Ms. Russell-Tucker received her master of science in management and organizational leadership from Albertus Magnus College.

Shannon E. Whaley, Ph.D., is the director of research and evaluation at Heluna Health's PHFE WIC program, the largest local agency WIC program in the nation. In her 25-year career with PHFE WIC, Dr. Whaley has become an expert in the planning, development and evaluation of interventions designed to optimize the healthy development of children and families served by WIC. Her work spans a broad range of topics including childhood nutrition and obesity, the prevention of prenatal alcohol use, the promotion of early literacy for low-income children, and examination of the impact of the WIC food package on WIC participants. Her most recent focus has been on factors associated with WIC program retention and on impacts of the COVID-19 pandemic on WIC families. She has given over 70 professional presentations and published more than 100 research articles. Dr. Whaley received the National WIC Association Leadership Award in 2014 and served as vice chair on the National Academies Committee to Review the WIC Food Packages (2014–2017). Dr. Whaley has an M.A. and a Ph.D. in developmental psychology from the University of California, Los Angeles.

Appendix B

Open Session Materials

This appendix contains the following:

- B-1: Meeting 1 open session agenda
- B-2: Presentation slides from Heather Hamner, Meeting 1 open session
- B-3: Meeting 3 open session agenda
- B-4: PICO portal presentation slides from Eitan Agai and Riaz Qureshi, Meeting 3 open session

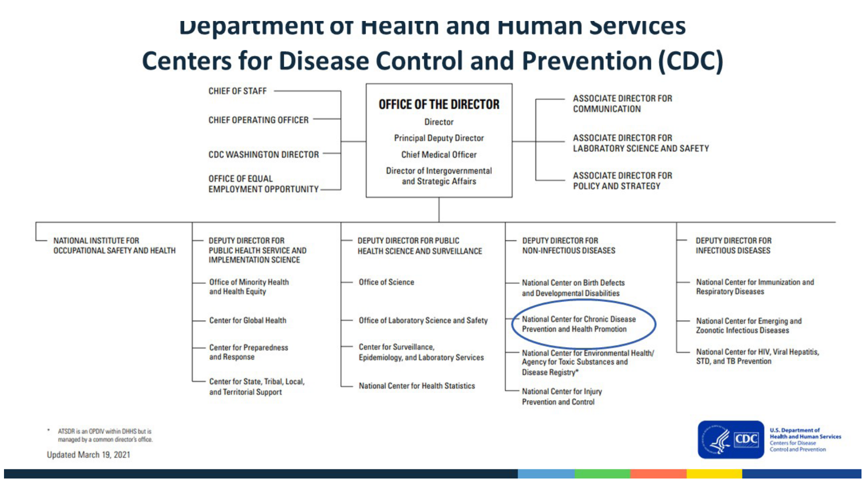
B-1: Meeting 1 Open Session Agenda

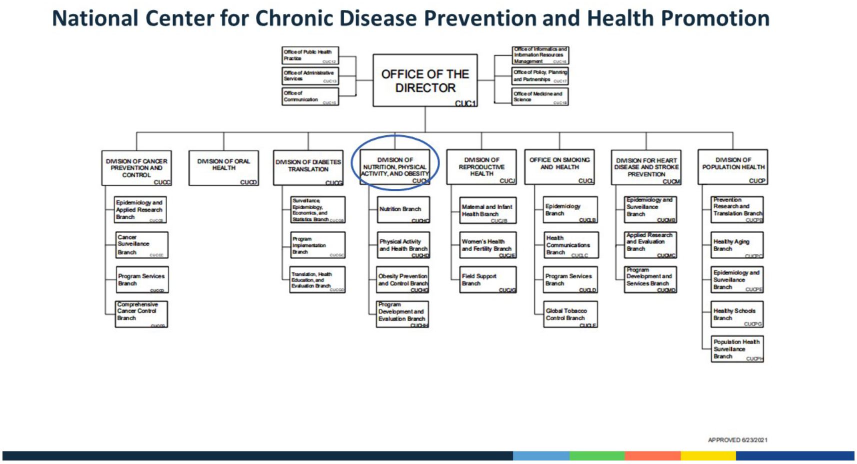
November 2, 2022

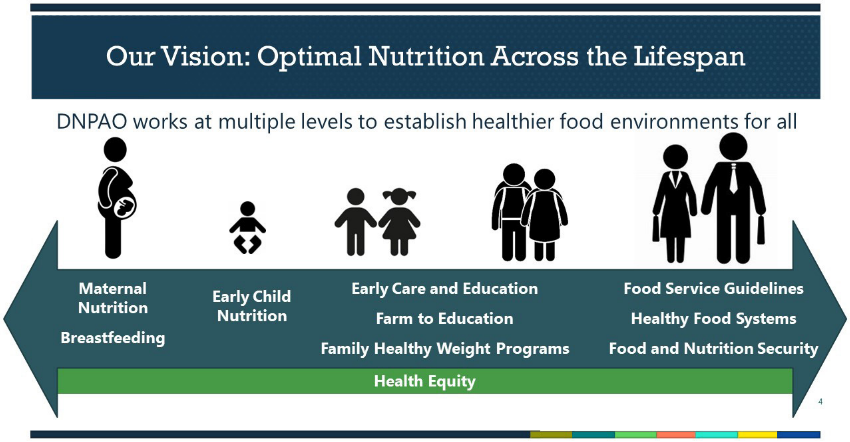
1:00–2:00 PM ET

1:00 p.m.	Opening Remarks **David Savitz,** *Committee Chair*
1:05 p.m.	Sponsor Remarks **Heather Hamner,** *Division of Nutrition, Physical Activity and Obesity* *National Center for Chronic Disease Prevention and Health Promotion* *Centers for Disease Control and Prevention*
1:30 p.m.	Questions from Committee **David Savitz,** *Committee Chair*
2:00 p.m.	Adjourn Open Session

B-2: Presentation Slides from Heather Hamner, Meeting 1 Open Session




National Center for Chronic Disease Prevention and Health Promotion
OFFICE OF THE DIRECTOR CUC1
Office of Public Health Practice
Office of Administrative Services
Office of Communication
Office of Informatics and Information Resources Management
Office of Policy, Planning and Partnerships
Office of Medicine and Science
DIVISION OF CANCER PREVENTION AND CONTROL CUCC
Epidemiology and Applied Research Branch
Cancer Surveillance Branch
Program Services Branch
Comprehensive Cancer Control Branch
DIVISION OF ORAL HEALTH CUCD
DIVISION OF DIABETES TRANSLATION CUCG
Surveillance, Epidemiology, Economics, and Statistics Branch
Program Implementation Branch
Translation, Health Education, and Evaluation Branch
DIVISION OF NUTRITION, PHYSICAL ACTIVITY, AND OBESITY
Nutrition Branch
Physical Activity and Health Branch
Obesity Prevention and Control Branch
Program Development and Evaluation Branch
DIVISION OF REPRODUCTIVE HEALTH CUCJ
Maternal and Infant Health Branch CUCJB
Women's Health and Fertility Branch CUCJE
Field Support Branch CUCJG
OFFICE ON SMOKING AND HEALTH CUCL
Epidemiology Branch
Health Communications Branch
Program Services Branch
Global Tobacco Control Branch
DIVISION FOR HEART DISEASE AND STROKE PREVENTION CUCM
Epidemiology and Surveillance Branch CUCMB
Applied Research and Evaluation Branch CUCMC
Program Development and Services Branch CUCMD
DIVISION OF POPULATION HEALTH CUCP
Prevention Research and Translation Branch CUCPB
Healthy Aging Branch CUCPC
Epidemiology and Surveillance Branch CUCPE
Healthy Schools Branch CUCPG
Population Health Surveillance Branch CUCPH
APPROVED 6/23/2021

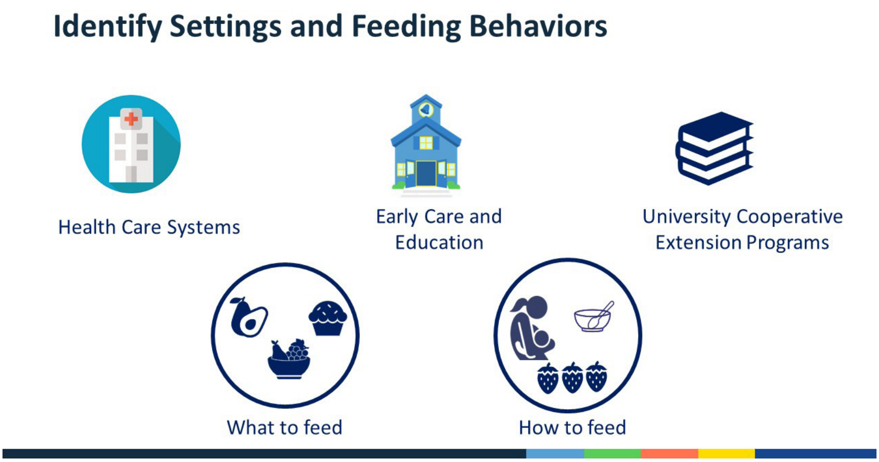

Our Vision: Optimal Nutrition Across the Lifespan
DNPAO works at multiple levels to establish healthier food environments for all
Maternal Nutrition
Breastfeeding
Early Child Nutrition
Early Care and Education
Farm to Education
Family Healthy Weight Programs
Food Service Guidelines
Healthy Food Systems
Food and Nutrition Security
Health Equity
4

Effect of Maternity Care Practices on Breastfeeding

DiGirolamo et al. (2008). Pediatrics, 122(Supplement 2), S43-S49.

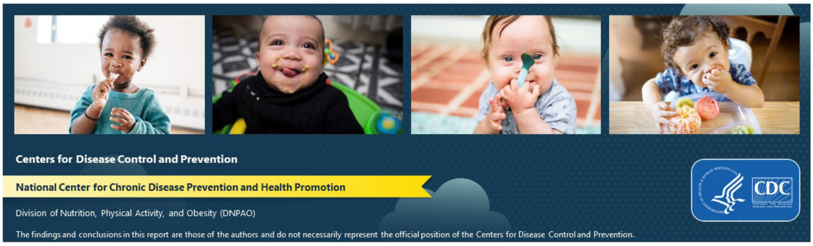
Improve nutrition for infants and young children

- **Interventions in a research or clinical setting – can they work at a community or state level?**
- **Key areas for review:**
  - **Identify** interventions that can be implemented in real-world settings
  - **Impact** select nutrition behaviors/outcomes
  - **Reach** higher risk populations, reduce inequities and complement existing federal-level programs for lower income populations


Identify Settings and Feeding Behaviors
Health Care Systems
Early Care and Education
University Cooperative Extension Programs
What to feed
How to feed


Impact, Scalability, and Implications

Thank you


Centers for Disease Control and Prevention
National Center for Chronic Disease Prevention and Health Promotion
Division of Nutrition, Physical Activity, and Obesity (DNPAO)
The findings and conclusions in this report are those of the authors and do not necessarily represent the official position of the Centers for Disease Control and Prevention.
CDC

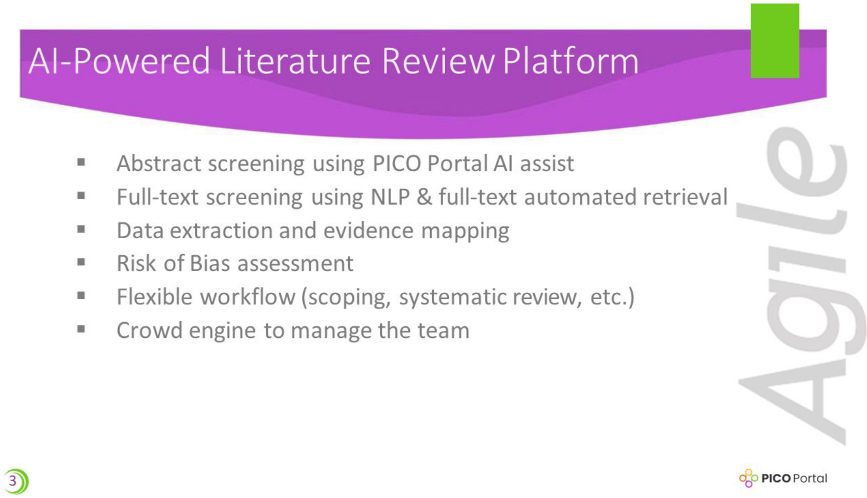
B-3: Meeting 3 Open Session Agenda

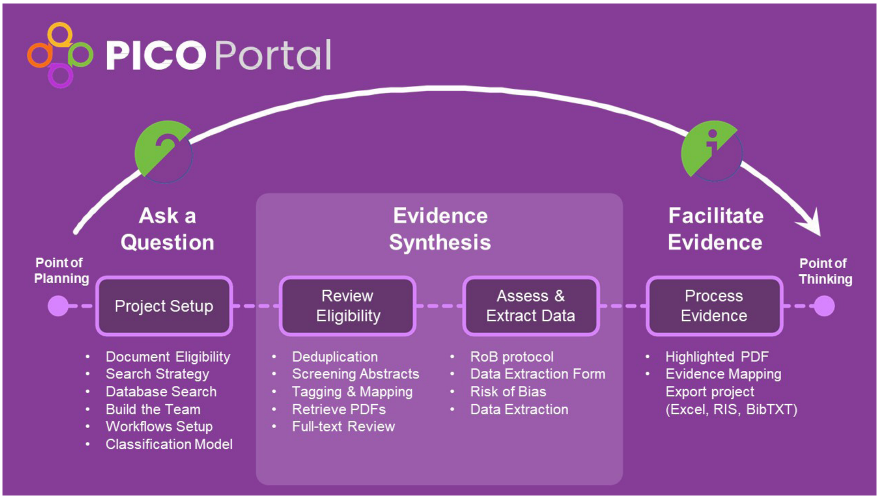
January 18, 2023

4:00–5:00 PM ET

4:00 p.m.	Opening Remarks **David Savitz,** *Committee Chair*
4:05 p.m.	PICO Portal Presentation **Eitan Agai** (Founder) **and Riaz Qureshi,** *PICO Portal*
4:30 p.m.	Questions from Committee Moderated by **David Savitz,** *Committee Chair*
5:00 p.m.	Adjourn Open Session

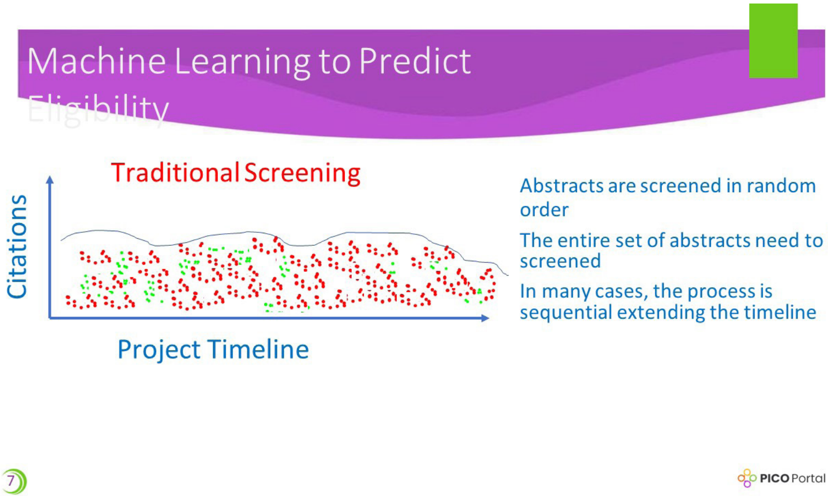
B-4: PICO Portal Presentation Slides

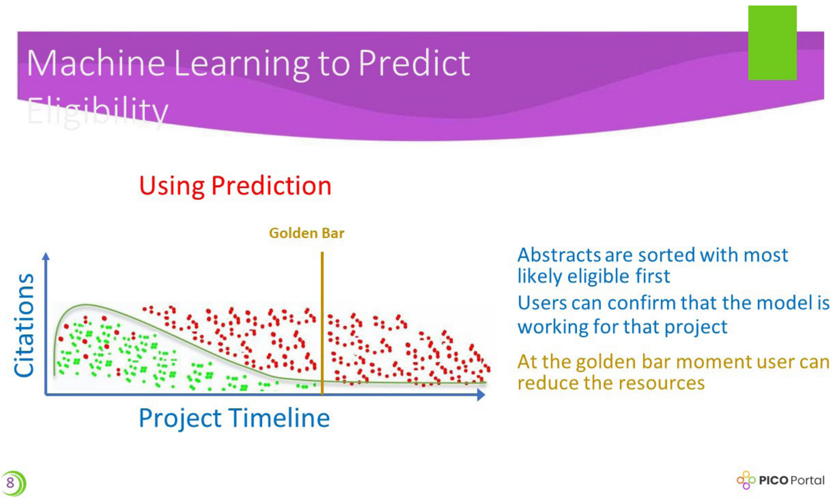

AI-Powered Literature Review Platform
Abstract screening using PICO Portal AI assist
Full-text screening using NLP & full-text automated retrieval
Data extraction and evidence mapping
Risk of Bias assessment
Flexible workflow (scoping, systematic review, etc.)
Crowd engine to manage the team
Agile
3
PICO Portal

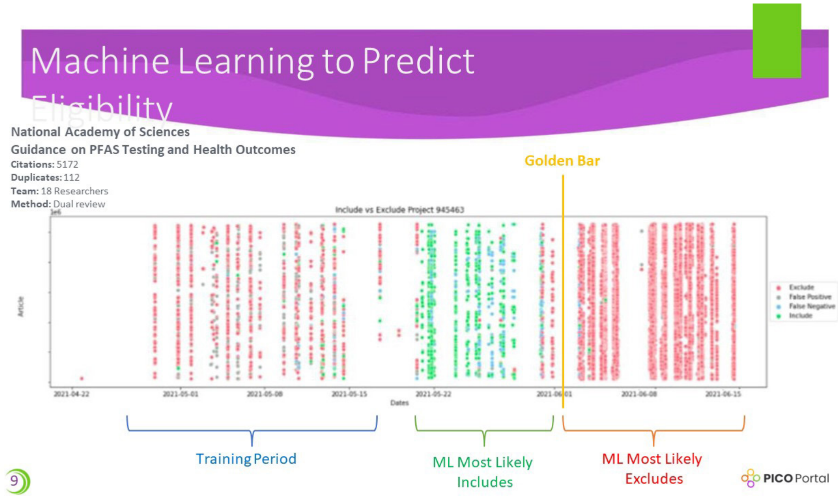

PICO Portal
Ask a Question
Evidence Synthesis
Facilitate Evidence
Point of Planning
Point of Thinking
Project Setup
Review Eligibility
Assess & Extract Data
Process Evidence
Document Eligibility
Search Strategy
Database Search
Build the Team
Workflows Setup
Classification Model
Deduplication
Screening Abstracts
Tagging & Mapping
Retrieve PDFs
Full-text Review
RoB protocol
Data Extraction Form
Risk of Bias
Data Extraction
Highlighted PDF
Evidence Mapping
Export project
(Excel, RIS, BibTXT)

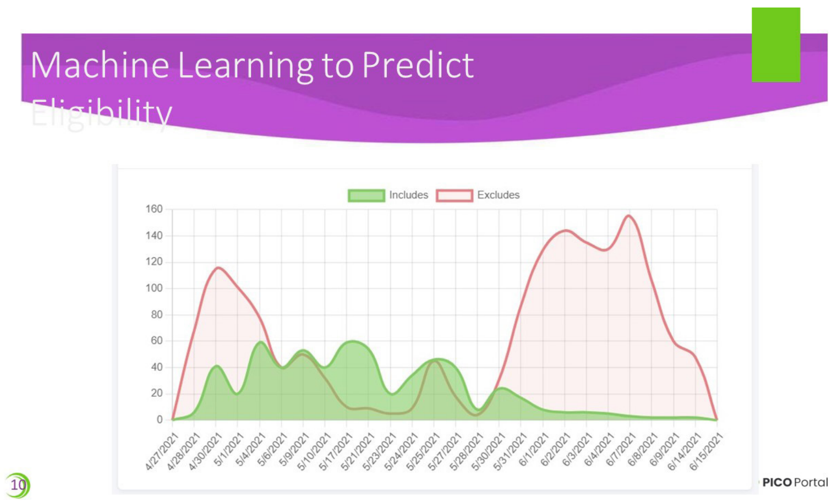

Just to name a Few...
moderna
Pfizer
U.S. Department of Veterans Affairs
UNSW SYDNEY
University of Minnesota
Johns Hopkins Medicine
Cochrane Skin
Therapeutics Initiative
ΠΑΝΕΠΙΣΤΗΜΙΟ ΠΕΙΡΑΙΩΣ UNIVERSITY OF PIRAEUS
Cochrane Eyes and Vision
McMaster University
University of Colorado Anschutz Medical Campus
Universidad de Guadalajara
Red Universitaria de Jalisco
Cornell University Founded A.D. 1865
University of South Florida
universidad de león
IHCAI INSTITUTE
costello medical
University of Washington
Loma Linda University
Universität zu Köln
MONASH University
VALUE MOMENTUM
5
PICO Portal


Screening Articles with Ease
PICO Portal AI
Liver enzyme elevation and acute liver injury are independently associated with adverse clinical outcomes in patients with COVID-19: A territory-wide cohort study of 1,040 patients in Hong Kong
Reset
Yes
Maybe
Not English
Exclude
Abstract Review
Article Analysis:
Supplemental links and PDFs (0)
6
PICO Portal


Machine Learning to Predict Eligibility
Traditional Screening
Citations
Project Timeline
Abstracts are screened in random order
The entire set of abstracts need to be screened
In many cases, the process is sequential extending the timeline
7
PICO Portal


Machine Learning to Predict Eligibility
Using Prediction
Golden Bar
Citations
Project Timeline
Abstracts are sorted with most likely eligible first
Users can confirm that the model is working for that project
At the golden bar moment user can reduce the resources
8
PICO Portal

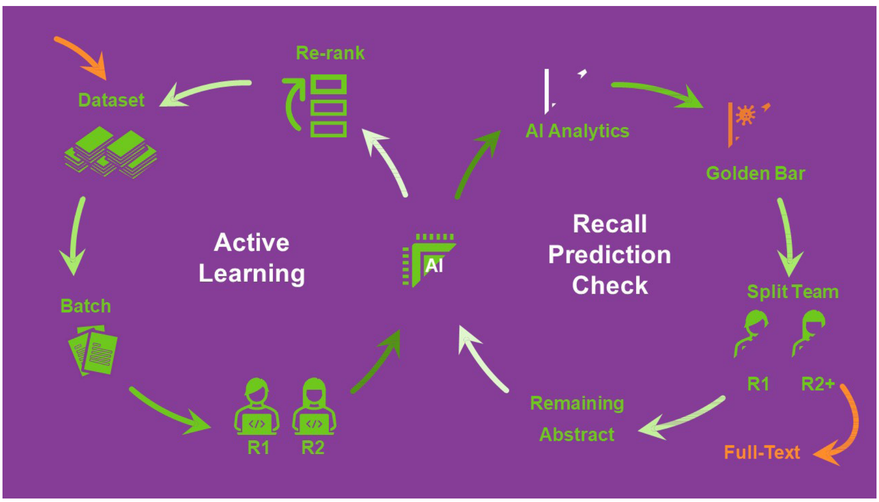

Machine Learning to Predict Eligibility
National Academy of Sciences
Guidance on PFAS Testing and Health Outcomes
Citations: 5172
Duplicates: 112
Team: 18 Researchers
Method: Dual review
Golden Bar
Include vs Exclude Project 945463
Article
Dates
2021-04-22
2021-05-01
2021-05-08
2021-05-15
2021-05-22
2021-06-01
2021-06-08
2021-06-15
Exclude
False Positive
False Negative
Include
Training Period
ML Most Likely Includes
ML Most Likely Excludes
9
PICO Portal


Machine Learning to Predict Eligibility
Includes
Excludes
160
140
120
100
80
60
40
20
0
4/27/2021
4/28/2021
4/30/2021
5/1/2021
5/4/2021
5/6/2021
5/9/2021
5/10/2021
5/17/2021
5/21/2021
5/23/2021
5/24/2021
5/25/2021
5/27/2021
5/28/2021
5/30/2021
5/31/2021
6/1/2021
6/2/2021
6/3/2021
6/4/2021
6/7/2021
6/8/2021
6/9/2021
6/14/2021
6/15/2021
10
PICO Portal

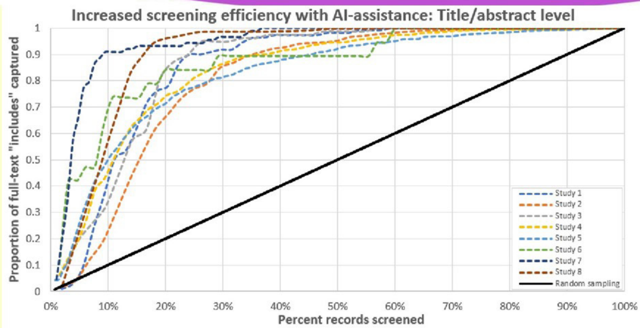
AI Prediction on PICO Portal

- Using active learning
- Deep Learning and Decision Tree engines
- Voting algorithm
- AI Analytics
- AI Simulation engine
- ON going AI research

11 PICO Portal



Increasing Screening Efficiency with AI Assist



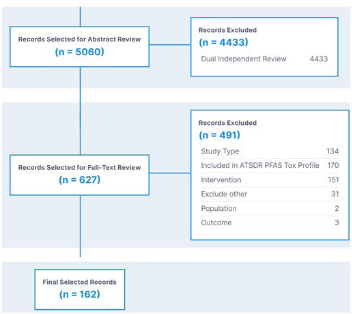
Range of review topics:

- Infectious disease
- Socioeconomic disparities
- Environmental
- Lifestyle
- Diagnostic assessment

13

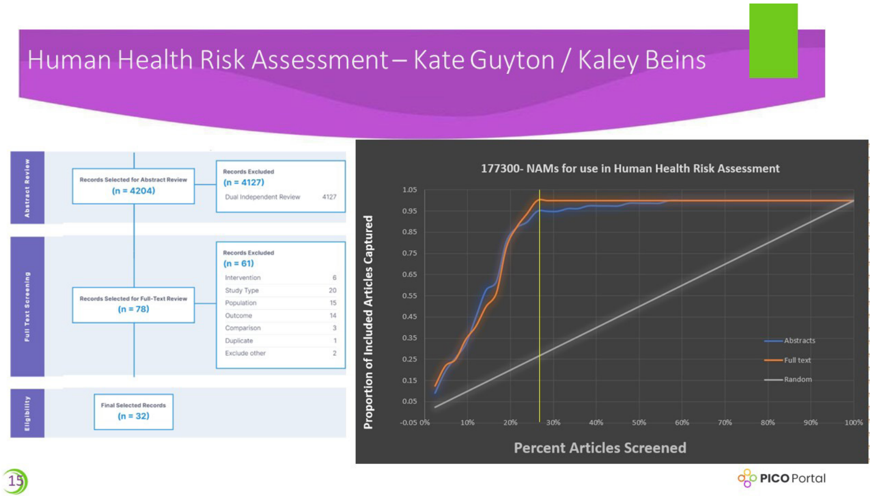
PICO Portal

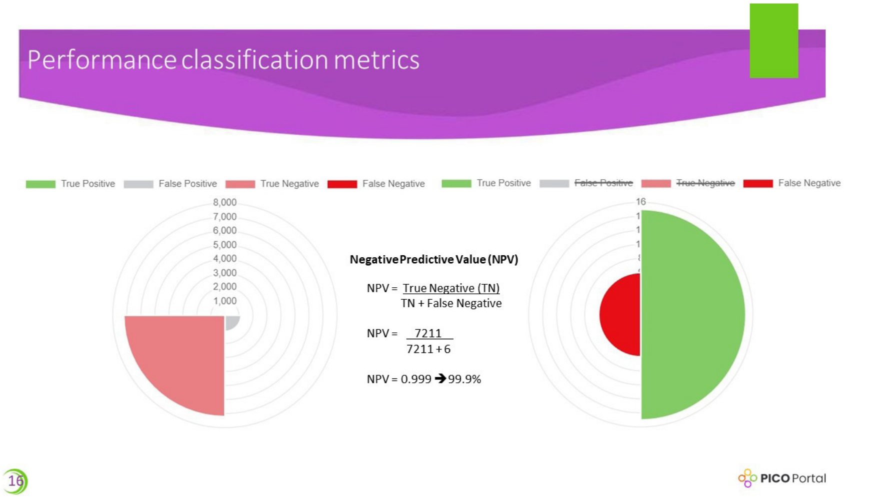
Guidance on PFAS – Elizabeth Boyle / Kaley Beins

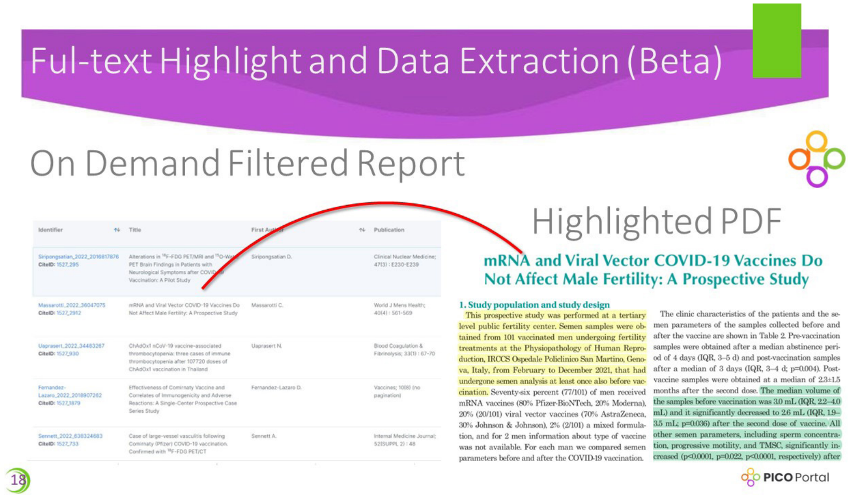


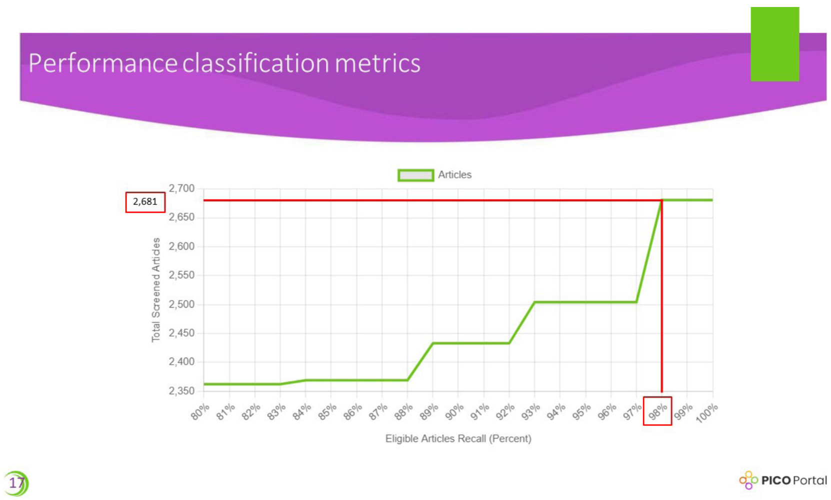
14

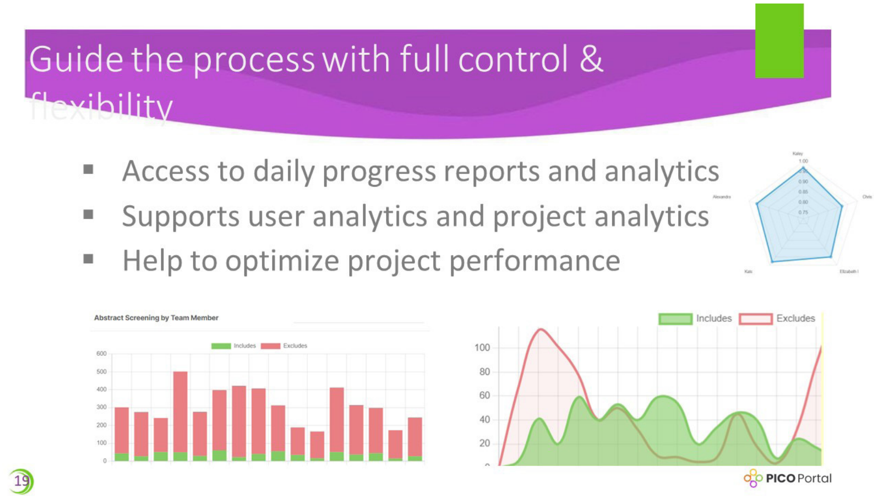
PICO Portal

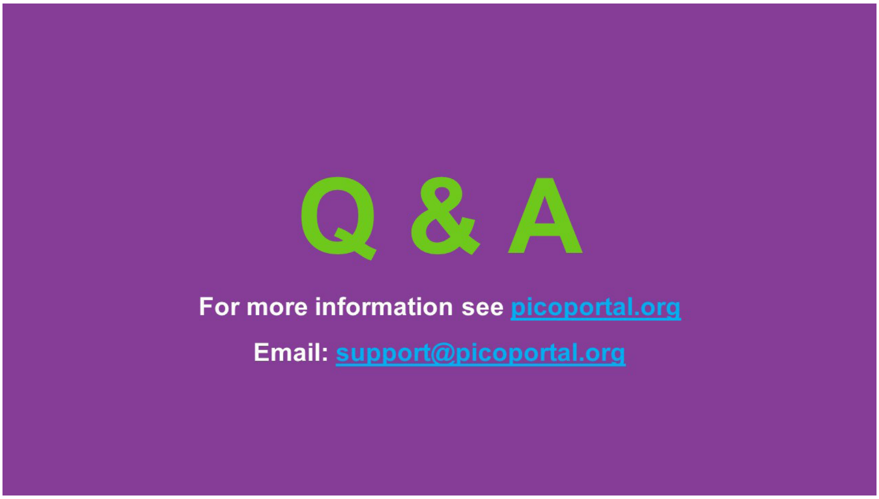

Human Health Risk Assessment – Kate Guyton / Kaley Beins
Abstract Review
Records Selected for Abstract Review
(n = 4204)
Records Excluded
(n = 4127)
Dual Independent Review 4127
Full Text Screening
Records Selected for Full-Text Review
(n = 78)
Records Excluded
(n = 61)
Intervention 6
Study Type 20
Population 15
Outcome 14
Comparison 3
Duplicate 1
Exclude other 2
Eligibility
Final Selected Records
(n = 32)
177300- NAMs for use in Human Health Risk Assessment
Proportion of Included Articles Captured
Percent Articles Screened
Abstracts
Full text
Random
15
PICO Portal


Performance classification metrics
True Positive
False Positive
True Negative
False Negative
Negative Predictive Value (NPV)
NPV = True Negative (TN) / TN + False Negative
NPV = 7211 / 7211 + 6
NPV = 0.999 → 99.9%
16
PICO Portal


Ful-text Highlight and Data Extraction (Beta)
On Demand Filtered Report
Highlighted PDF
Identifier
Title
First Author
Publication
Siripongsatian_2022_2016817876
CiteID: 1527_295
Alterations in 18F-FDG PET/MRI and 15O-Water PET Brain Findings in Patients with Neurological Symptoms after COVID-19 Vaccination: A Pilot Study
Siripongsatian D.
Clinical Nuclear Medicine; 47(3) : E230-E239
Massarotti_2022_36047075
CiteID: 1527_2912
mRNA and Viral Vector COVID-19 Vaccines Do Not Affect Male Fertility: A Prospective Study
Massarotti C.
World J Mens Health; 40(4) : 561-569
Uaprasert_2022_34483267
CiteID: 1527_930
ChAdOx1 nCoV-19 vaccine-associated thrombocytopenia: three cases of immune thrombocytopenia after 107720 doses of ChAdOx1 vaccination in Thailand
Uaprasert N.
Blood Coagulation & Fibrinolysis; 33(1) : 67-70
Fernandez-Lazaro_2022_2018907262
CiteID: 1527_1879
Effectiveness of Comirnaty Vaccine and Correlates of Immunogenicity and Adverse Reactions: A Single-Center Prospective Case Series Study
Fernandez-Lazaro D.
Vaccines; 10(8) (no pagination)
Sennett_2022_638324683
CiteID: 1527_733
Case of large-vessel vasculitis following Comirnaty (Pfizer) COVID-19 vaccination. Confirmed with 18F-FDG PET/CT
Sennett A.
Internal Medicine Journal; 52(SUPPL 2) : 48
mRNA and Viral Vector COVID-19 Vaccines Do Not Affect Male Fertility: A Prospective Study
1. Study population and study design
This prospective study was performed at a tertiary level public fertility center. Semen samples were obtained from 101 vaccinated men undergoing fertility treatments at the Physiopathology of Human Reproduction, IRCCS Ospedale Policlinico San Martino, Genova, Italy, from February to December 2021, that had undergone semen analysis at least once also before vaccination. Seventy-six percent (77/101) of men received mRNA vaccines (80% Pfizer-BioNTech, 20% Moderna), 20% (20/101) viral vector vaccines (70% AstraZeneca, 30% Johnson & Johnson), 2% (2/101) a mixed formulation, and for 2 men information about type of vaccine was not available. For each man we compared semen parameters before and after the COVID-19 vaccination.
The clinic characteristics of the patients and the semen parameters of the samples collected before and after the vaccine are shown in Table 2. Pre-vaccination samples were obtained after a median abstinence period of 4 days (IQR, 3–5 d) and post-vaccination samples after a median of 3 days (IQR, 3–4 d; p=0.004). Post-vaccine samples were obtained at a median of 2.3±1.5 months after the second dose. The median volume of the samples before vaccination was 3.0 mL (IQR, 2.2–4.0 mL) and it significantly decreased to 2.6 mL (IQR, 1.9–3.5 mL; p=0.036) after the second dose of vaccine. All other semen parameters, including sperm concentration, progressive motility, and TMSC, significantly increased (p<0.0001, p=0.022, p<0.0001, respectively) after
18
PICO Portal


Performance classification metrics
Articles
2,681
2,700
2,650
2,600
2,550
2,500
2,450
2,400
2,350
Total Screened Articles
80% 81% 82% 83% 84% 85% 86% 87% 88% 89% 90% 91% 92% 93% 94% 95% 96% 97% 98% 99% 100%
Eligible Articles Recall (Percent)
17
PICO Portal


Guide the process with full control & flexibility
Access to daily progress reports and analytics
Supports user analytics and project analytics
Help to optimize project performance
Abstract Screening by Team Member
Includes Excludes
600 500 400 300 200 100 0
Includes Excludes
100 80 60 40 20
19
PICO Portal


Q & A
For more information see picoportal.org
Email: support@picoportal.org

Appendix C

Literature Search Strategies and Results

Literature searches were performed in Medline, Embase, PubMed, and Scopus in January of 2022. The searches were restricted to English language articles published in the time period of January 2002–January 2023. The search and results are presented in the following tables.

SEARCH PARAMETERS FOR PEER-REVIEWED LITERATURE

Database: Medline

Date: January 6, 2023

Search No.	Syntax	Results
1	(Beverages OR bottle* OR cup* OR Diet* OR drink* OR eat OR eating OR wean OR weaning OR feed OR feeding* OR food* OR beverage* OR nutrition* OR meal* OR spoon* OR utensil* OR "Infant nutritional physiological phenomena" OR "allergenic food*" OR bread OR breads OR cereal* OR grain* OR cheese* OR corn OR cracker* OR dairy OR eggs OR fruit* OR juice* OR grits OR honey OR legume* OR meat* OR fish* OR poultry OR milk OR pasta* OR "solid food*" OR tea OR teas OR tortillas OR vegetable* OR "drinking water" OR yogurt OR yoghurt).ti,ab,kw,kf.	251,1620
2	Beverages/ OR Bottle feeding/ OR "Diet, food, and nutrition"/ OR Drinking/ OR Drinking behavior/ OR Eating/ OR Feeding behavior/ OR Feeding methods/ OR "Food and beverages"/ OR Foods, specialized/ OR Meals/ OR Child nutrition sciences/ OR "Cooking and eating utensils"/ OR Weaning/ OR Infant nutritional physiological phenomena/	207,609
3	Bread/ OR Edible grain/ OR Exp dairy products/ OR Eggs/ OR "Food and beverages"/ OR Foods, specialized/ OR Fruit/ OR "Fruit and vegetable juices"/ OR edible grain/ OR whole grains/ OR Honey/ OR Infant food/ OR Exp meat/ OR Milk/ OR Milk substitutes/ OR Tea/ OR Vegetables/ OR Drinking water/	307,034
4	#1 OR #2 OR #3	2,601,229
5	(baby OR babies OR "early childhood" OR infancy OR infant* OR "thousand days" OR toddler* OR "two year old" OR "two years old" OR "young child*").ti,ab,kw,kf.	669,681
6	Infant/ OR Infant, newborn/	1,234,550
7	#5 OR #6	1,472,049
8	("behavior therapy" OR "before after stud*" OR "before and after stud*" OR "clinical trial*" OR "comparative effectiveness" OR "comparative stud*" OR "controlled stud*" OR "controlled clinical trial*" OR "controlled trial*" OR "early intervention*" OR "evaluation stud*" OR "follow up stud*" OR intervention* OR "outcome assessment*" OR "patient outcome*" OR "pragmatic clinical trial*" OR "pragmatic trial*" OR "program evaluation*" OR "quality improvement" OR "quasiexperimental stud*" OR "quasi experimental stud*" OR "randomized controlled" OR "diet therapy" OR "nutrition therapy" OR therapy OR therapies OR treatment* OR trial*).ti,ab,kw,kf.	8,047,058

9	Behavior therapy/ OR controlled before-after studies/ OR exp clinical trials as topic/ OR comparative effectiveness research/ OR controlled clinical trials as topic/ OR early intervention, educational/ OR evaluation studies as topic/ OR follow-up studies/ OR outcome assessment, health care/ OR patient outcome assessment/ OR pragmatic clinical trials as topic/ OR program evaluation/ OR quality improvement/ OR non-randomized controlled trials as topic/ OR randomized controlled trials as topic/ OR treatment outcome/ OR diet therapy/ OR nutrition therapy/	2,253,030
10	#8 OR #9	8,956,125
11	#4 AND #7 AND #10	56,692
12	(andorra OR "Antigua and Barbuda" OR Aruba OR Australia OR Austria OR Bahamas OR Bahrain OR Barbados OR Belgium OR Bermuda OR "British Virgin Islands" OR Brunei OR Canada OR "Cayman Islands" OR "Channel Islands" OR Chile OR Croatia OR Curacao OR Cyprus OR "Czech Republic" OR Denmark OR England OR Estonia OR "Faroe Islands" OR Finland OR France OR "French Polynesia" OR Germany OR Gibraltar OR "Great Britain" OR Greece OR Greenland OR Guam OR "Hong Kong" OR Hungary OR Iceland OR Ireland OR "Isle of Man" OR Israel OR Italy OR Japan OR "Korea South" OR Kuwait OR Latvia OR Liechtenstein OR Lithuania OR Luxembourg OR Macao OR Malta OR Monaco OR Nauru OR Netherlands OR "New Caledonia" OR "New Zealand" OR "Northern Ireland" OR "Northern Mariana Islands" OR Norway OR Oman OR Panama OR Poland OR Portugal OR "Puerto Rico" OR Qatar OR Romania OR "Saint Kitts and Nevis" OR "San Marino" OR "Saudi Arabia" OR Scotland OR Seychelles OR Singapore OR "Sint Maarten" OR "Slovak Republic" OR Slovenia OR "South Korea" OR Spain OR "St Kitts and Nevis" OR "St maarten" OR "St Maartin" OR Sweden OR Switzerland OR Taiwan OR "Trinidad and Tobago" OR "Turks and Caicos" OR "United Arab Emirates" OR "United Kingdom" OR "United States" OR USA OR "u.s.a." OR "u s a" OR Uruguay OR "Virgin Islands" OR Wales).ti,ab,kw,kf.	1,692,222

13	Andorra/ OR "Antigua and Barbuda"/ OR Aruba/ OR Australia/ OR Austria/ OR Bahamas/ OR Bahrain/ OR Barbados/ OR Belgium/ OR Bermuda/ OR "British Virgin Islands"/ OR Brunei/ OR Canada/ OR "West Indies"/ OR "Channel Islands"/ OR Chile/ OR Croatia/ OR Curacao/ OR Cyprus/ OR "Czech Republic"/ OR Denmark/ OR England/ OR Estonia/ OR Denmark/ OR Finland/ OR France/ OR Polynesia/ OR Germany/ OR Gibraltar/ OR "Great Britain"/ OR Greece/ OR Greenland/ OR Guam/ OR "Hong Kong"/ OR Hungary/ OR Iceland/ OR Ireland/ OR "United Kingdom"/ OR Israel/ OR Italy/ OR Japan/ OR Kuwait/ OR Latvia/ OR Liechtenstein/ OR Lithuania/ OR Luxembourg/ OR Macao/ OR Malta/ OR Monaco/ OR Micronesia/ OR Netherlands/ OR "New Caledonia"/ OR "New Zealand"/ OR "Northern Ireland"/ OR Micronesia/ OR Norway/ OR Oman/ OR Panama/ OR Poland/ OR Portugal/ OR "Puerto Rico"/ OR Qatar/ OR Romania/ OR "Saint Kitts and Nevis"/ OR "San Marino"/ OR "Saudi Arabia"/ OR Scotland/ OR Seychelles/ OR Singapore/ OR "Sint Maarten"/ OR Slovakia/ OR Slovenia/ OR "Republic of Korea"/ OR Spain/ OR "St Kitts and Nevis"/ OR Sweden/ OR Switzerland/ OR Taiwan/ OR "Trinidad and Tobago"/ OR "West Indies"/ OR "United Arab Emirates"/ OR "United Kingdom"/ OR "United States"/ OR Uruguay/ OR "United States Virgin Islands"/ OR Wales/	2,779,625
14	#12 OR #13	3,579,408
15	#11 AND #14	8,760
16	English language; 2002-current	6,498
17	16 NOT (exp animals/ NOT humans/)	6,465
18	limit 17 to journal article	6,348

Database: Embase

Date: January 6, 2023

Search No.	Syntax	Results
1	(Beverages OR bottle* OR cup* OR Diet* OR drink* OR eat OR eating OR wean OR weaning OR feed OR feeding* OR food* OR beverage* OR nutrition* OR meal* OR spoon* OR utensil* OR "Infant nutritional physiological phenomena" OR "allergenic food*" OR bread OR breads OR cereal* OR grain* OR cheese* OR corn OR cracker* OR dairy OR eggs OR fruit* OR juice* OR grits OR honey OR legume* OR meat* OR fish* OR poultry OR milk OR pasta* OR "solid food*" OR tea OR teas OR tortillas OR vegetable* OR "drinking water" OR yogurt OR yoghurt).ti,ab,kw.	2,908,197
2	Beverage/ OR Bottle feeding/ OR Feeding bottle/ OR Diet/ OR Drinking behavior/ OR Eating/ OR Feeding/ OR Infant feeding/ OR Feeding behavior/ OR Infant nutrition/ OR Meal/ OR Nutrition/ OR Weaning/	593,100
3	Baby food/ OR Bread/ OR Cereal/ OR Cheese/ OR Maize/ OR Sweet corn/ OR Dairy product/ OR Egg/ OR Food/ OR Fruit/ OR Fruit juice/ OR Food grain/ OR Whole grain/ OR Honey/ OR Legume/ OR Sea food/ OR Milk/ OR Artificial milk/ OR Pasta/ OR "Plant-based milk"/ OR Tea/ OR Vegetable/ OR Fruit vegetable/ OR "Fruit and vegetable juice"/ OR Vegetable juice/ OR Drinking water/ OR Yoghurt/ OR Fermented dairy product/	436,412
4	#1 OR #2 OR #3	3,066,945
5	(baby OR babies OR "early childhood" OR infancy OR infant* OR "thousand days" OR toddler* OR "two year old" OR "two years old" OR "young child*").ti,ab,kw.	702,848
6	baby/ OR infancy/ OR infant/ OR newborn/ OR toddler/	1,054,650
7	#5 OR #6	1,341,801
8	("behavior therapy" OR "before after stud*" OR "before and after stud*" OR "clinical trial*" OR "comparative effectiveness" OR "comparative stud*" OR "controlled stud*" OR "controlled clinical trial*" OR "controlled trial*" OR "early intervention*" OR "evaluation stud*" OR "follow up stud*" OR intervention* OR "outcome assessment*" OR "patient outcome*" OR "pragmatic clinical trial*" OR "pragmatic trial*" OR "program evaluation*" OR "quality improvement" OR "quasiexperimental stud*" OR "quasi experimental stud*" OR "randomized controlled" OR "diet therapy" OR "nutrition therapy" OR therapy OR therapies OR treatment* OR trial*).ti,ab,kw.	10,466,412

9	Behavior therapy/ OR exp clinical trial/ OR comparative effectiveness/ OR comparative study/ OR controlled study/ OR controlled clinical trial/ OR early intervention/ OR evaluation study/ OR follow up/ OR intervention study/ OR outcome assessment/ OR pragmatic trial/ OR program evaluation/ OR program effectiveness/ OR quasi experimental study/ OR randomized controlled trial/ OR therapy/ OR treatment outcome/ OR diet therapy/	13,419,747
10	#8 OR #9	18,217,654
11	#4 AND #7 AND #10	109,953
12	(andorra OR "Antigua and Barbuda" OR Aruba OR Australia OR Austria OR Bahamas OR Bahrain OR Barbados OR Belgium OR Bermuda OR "British Virgin Islands" OR Brunei OR Canada OR "Cayman Islands" OR "Channel Islands" OR Chile OR Croatia OR Curacao OR Cyprus OR "Czech Republic" OR Denmark OR England OR Estonia OR "Faroe Islands" OR Finland OR France OR "French Polynesia" OR Germany OR Gibraltar OR "Great Britain" OR Greece OR Greenland OR Guam OR "Hong Kong" OR Hungary OR Iceland OR Ireland OR "Isle of Man" OR Israel OR Italy OR Japan OR "Korea South" OR Kuwait OR Latvia OR Liechtenstein OR Lithuania OR Luxembourg OR Macao OR Malta OR Monaco OR Nauru OR Netherlands OR "New Caledonia" OR "New Zealand" OR "Northern Ireland" OR "Northern Mariana Islands" OR Norway OR Oman OR Panama OR Poland OR Portugal OR "Puerto Rico" OR Qatar OR Romania OR "Saint Kitts and Nevis" OR "San Marino" OR "Saudi Arabia" OR Scotland OR Seychelles OR Singapore OR "Sint Maarten" OR "Slovak Republic" OR Slovenia OR "South Korea" OR Spain OR "St Kitts and Nevis" OR "St maarten" OR "St Maartin" OR Sweden OR Switzerland OR Taiwan OR "Trinidad and Tobago" OR "Turks and Caicos" OR "United Arab Emirates" OR "United Kingdom" OR "United States" OR USA OR "u.s.a." OR "u s a" OR Uruguay OR "Virgin Islands" OR Wales).ti,ab,kw.	2,381,319

13	Andorra/ OR "Antigua and Barbuda"/ OR Aruba/ OR Australia/ OR Austria/ OR Bahamas/ OR Bahrain/ OR Barbados/ OR Belgium/ OR Bermuda/ OR "British Virgin Islands"/ OR Brunei/ OR Canada/ OR "West Indies"/ OR "Channel Islands"/ OR Chile/ OR Croatia/ OR Curacao/ OR Cyprus/ OR "Czech Republic"/ OR Denmark/ OR England/ OR Estonia/ OR Denmark/ OR Finland/ OR France/ OR Polynesia/ OR Germany/ OR Gibraltar/ OR "Great Britain"/ OR Greece/ OR Greenland/ OR Guam/ OR "Hong Kong"/ OR Hungary/ OR Iceland/ OR Ireland/ OR "United Kingdom"/ OR Israel/ OR Italy/ OR Japan/ OR Kuwait/ OR Latvia/ OR Liechtenstein/ OR Lithuania/ OR Luxembourg/ OR Macao/ OR Malta/ OR Monaco/ OR Micronesia/ OR Netherlands/ OR "New Caledonia"/ OR "New Zealand"/ OR "Northern Ireland"/ OR Micronesia/ OR Norway/ OR Oman/ OR Panama/ OR Poland/ OR Portugal/ OR "Puerto Rico"/ OR Qatar/ OR Romania/ OR "Saint Kitts and Nevis"/ OR "San Marino"/ OR "Saudi Arabia"/ OR Scotland/ OR Seychelles/ OR Singapore/ OR "Sint Maarten"/ OR Slovakia/ OR Slovenia/ OR "Republic of Korea"/ OR Spain/ OR "St Kitts and Nevis"/ OR Sweden/ OR Switzerland/ OR Taiwan/ OR "Trinidad and Tobago"/ OR "West Indies"/ OR "United Arab Emirates"/ OR "United Kingdom"/ OR "United States"/ OR Uruguay/ OR "United States Virgin Islands"/ OR Wales/	3,257,507
14	#12 OR #13	4,217,840
15	#11 AND #14	16,240
16	English language; 2002-current	13,525
17	16 NOT ((exp animal/ or nonhuman/) NOT exp human/)	12,756
18	Limit 17 to journal	12,704

Database: Scopus

Date: January 6, 2023

TITLE-ABS-KEY ((((((beverage OR beverages OR bottle* OR cup OR cups OR diet OR diets OR drink OR drinking OR drinks OR eat OR eating OR wean OR weaning OR feed OR feeding OR feedings OR food OR foods OR beverage OR beverages OR nutrition OR nutritional OR meal OR meals OR mealtime* OR spoon OR spoons OR utensil* OR {Infant nutritional physiological phenomena} OR "allergenic food*" OR bread OR breads OR cereal OR cereals OR grain OR grains OR cheese OR cheeses OR corn OR crackers OR dairy OR eggs OR fruit* OR juice* OR grits OR honey OR legume* OR meat OR meats OR fish OR poultry OR milk OR pasta OR "solid food" OR "solid foods" OR tea OR teas OR tortillas OR vegetable* OR {drinking water} OR yogurt OR yoghurt) AND (baby OR babies OR "early childhood" OR infancy OR infant* OR "thousand days" OR toddler* OR {two year old} OR {two years old} OR "young child*") AND ("behavior therapy" OR "before after stud*" OR "before and after stud*" OR "clinical trial*" OR "comparative effectiveness" OR "comparative stud*" OR "controlled stud*" OR "controlled clinical trial*" OR "controlled trial*" OR "early intervention*" OR "evaluation stud*" OR "follow up stud*" OR intervention* OR "outcome assessment*" OR "patient outcome*" OR "pragmatic clinical trial*" OR "pragmatic trial*" OR "program evaluation*" OR "quality improvement" OR "quasiexperimental stud*" OR "quasi experimental stud*" OR "randomized controlled" OR "diet therapy" OR "nutrition therapy" OR therapy OR therapies OR treatment* OR trial*) AND (human OR humans)))))) PUBYEAR > 2001 AND AFFILCOUNTRY (andorra OR "Antigua and Barbuda" OR aruba OR australia OR austria OR bahamas OR bahrain OR barbados OR belgium OR bermuda OR "British Virgin Islands" OR brunei OR canada OR "Cayman Islands" OR "Channel Islands" OR chile OR croatia OR curacao OR cyprus OR "Czech Republic" OR denmark OR england OR estonia OR "Faroe Islands" OR finland OR france OR "French Polynesia" OR germany OR gibraltar OR "Great Britain" OR greece OR greenland OR guam OR "Hong Kong" OR hungary OR iceland OR ireland OR "Isle of Man" OR israel OR italy OR japan OR "Korea South" OR kuwait OR latvia OR liechtenstein OR lithuania OR luxembourg OR macao OR malta OR monaco OR nauru OR netherlands OR "New Caledonia" OR "New Zealand" OR "Northern Ireland" OR "Northern Mariana Islands" OR norway OR oman OR panama OR poland OR portugal OR "Puerto Rico" OR qatar OR romania OR "Saint Kitts and Nevis" OR "San Marino" OR "Saudi Arabia" OR scotland OR seychelles OR singapore OR "Sint Maarten" OR "Slovak Republic" OR slovenia OR "South Korea" OR spain OR "St Kitts and Nevis" OR "St maarten" OR "St Maartin" OR sweden OR switzerland OR taiwan OR "Trinidad and Tobago" OR "Turks and Caicos" OR "United Arab Emirates" OR "United Kingdom" OR "United States" OR usa OR "u.s.a." OR "u s a" OR uruguay OR "Virgin Islands" OR wales) AND (LIMIT-TO (SRCTYPE , "j")) AND (EXCLUDE (AFFILCOUNTRY , "India") OR EXCLUDE (AFFILCOUNTRY , "Bangladesh") OR EXCLUDE (AFFILCOUNTRY , "China") OR EXCLUDE (AFFILCOUNTRY , "Kenya") OR EXCLUDE (AFFILCOUNTRY , "Malawi") OR EXCLUDE (AFFILCOUNTRY , "South Africa") OR EXCLUDE (AFFILCOUNTRY , "Tanzania") OR EXCLUDE (AFFILCOUNTRY , "Uganda") OR EXCLUDE (AFFILCOUNTRY , "Ethiopia") OR EXCLUDE (AFFILCOUNTRY , "Pakistan") OR EXCLUDE (AFFILCOUNTRY , "Mexico”) OR EXCLUDE (AFFILCOUNTRY , “Nepal”) OR EXCLUDE (AFFILCOUNTRY , “Burkina Faso”) OR EXCLUDE (AFFILCOUNTRY , “Ghana”) OR EXCLUDE (AFFILCOUNTRY , “Peru”) OR EXCLUDE (AFFILCOUNTRY , “Gambia”) OR EXCLUDE (AFFILCOUNTRY , “Indonesia”) OR EXCLUDE (AFFILCOUNTRY , “Viet Nam”) OR EXCLUDE (AFFILCOUNTRY , “Thailand”) OR EXCLUDE (AFFILCOUNTRY , “Egypt”) OR EXCLUDE (AFFILCOUNTRY , “Nigeria”) OR EXCLUDE (AFFILCOUNTRY , “Senegal”) OR EXCLUDE (AFFILCOUNTRY , “Turkey”) OR EXCLUDE (AFFILCOUNTRY , “Guatemala”) OR EXCLUDE (AFFILCOUNTRY , “Argentina”) OR EXCLUDE (AFFILCOUNTRY , “Iran”) OR EXCLUDE (AFFILCOUNTRY , “Malaysia”) OR EXCLUDE (AFFILCOUNTRY , “Niger”) OR EXCLUDE (AFFILCOUNTRY , “Cambodia”) OR EXCLUDE (AFFILCOUNTRY , “Zambia”) OR EXCLUDE (AFFILCOUNTRY , “Colombia”) OR EXCLUDE (AFFILCOUNTRY , “Philippines”) OR EXCLUDE (AFFILCOUNTRY , “Guinea-Bissau”) OR EXCLUDE (AFFILCOUNTRY , “Mali”) OR EXCLUDE (AFFILCOUNTRY , “Zimbabwe”) OR EXCLUDE (AFFILCOUNTRY , “Russian Federation”) OR EXCLUDE (AFFILCOUNTRY , “Congo”) OR EXCLUDE (AFFILCOUNTRY , “Cote d’Ivoire”) OR EXCLUDE (AFFILCOUNTRY , “Laos”) OR EXCLUDE (AFFILCOUNTRY , “Rwanda”) OR EXCLUDE (AFFILCOUNTRY , “Ecuador”) OR EXCLUDE (AFFILCOUNTRY , “Lebanon”) OR EXCLUDE (AFFILCOUNTRY , “Jamaica”) OR EXCLUDE (AFFILCOUNTRY , “Mozambique”) OR EXCLUDE (AFFILCOUNTRY , “Serbia”) OR EXCLUDE (AFFILCOUNTRY , “Belarus”) OR EXCLUDE (AFFILCOUNTRY , “Democratic Republic Congo”) OR EXCLUDE (AFFILCOUNTRY , “Bulgaria”) OR EXCLUDE (AFFILCOUNTRY , “Papua New Guinea”) OR EXCLUDE (AFFILCOUNTRY , “Benin”) OR EXCLUDE (AFFILCOUNTRY , “Sri Lanka”) OR EXCLUDE (AFFILCOUNTRY , “Madagascar”) OR EXCLUDE (AFFILCOUNTRY , “Haiti”) OR EXCLUDE (AFFILCOUNTRY , “Puerto Rico”) OR EXCLUDE (AFFILCOUNTRY , “Bolivia”) OR EXCLUDE (AFFILCOUNTRY , “Costa Rica”) OR EXCLUDE (AFFILCOUNTRY , “Myanmar”) OR EXCLUDE (AFFILCOUNTRY , “Sierra Leone”) OR EXCLUDE (AFFILCOUNTRY , “Sudan”) OR EXCLUDE (AFFILCOUNTRY , “Cameroon”) OR EXCLUDE (AFFILCOUNTRY , “Jordan”) OR EXCLUDE (AFFILCOUNTRY , “Morocco”) OR EXCLUDE (AFFILCOUNTRY , “Ukraine”) OR EXCLUDE (AFFILCOUNTRY , “Venezuela”) OR EXCLUDE (AFFILCOUNTRY , “Angola”) OR EXCLUDE (AFFILCOUNTRY , “Afghanistan”) OR EXCLUDE (AFFILCOUNTRY , “Bahrain”) OR EXCLUDE (AFFILCOUNTRY , “Georgia”) OR EXCLUDE (AFFILCOUNTRY , “Liberia”) OR EXCLUDE (AFFILCOUNTRY , “Algeria”) OR EXCLUDE (AFFILCOUNTRY , “Burundi”) OR EXCLUDE (AFFILCOUNTRY , “Namibia”) OR EXCLUDE (AFFILCOUNTRY , “Uruguay”) OR EXCLUDE (AFFIL-

COUNTRY , “Armenia”) OR EXCLUDE (AFFILCOUNTRY , “Gabon”) OR EXCLUDE (AFFILCOUNTRY , “Guinea”) OR EXCLUDE (AFFILCOUNTRY , “North Macedonia”) OR EXCLUDE (AFFILCOUNTRY , “Paraguay”) OR EXCLUDE (AFFILCOUNTRY , “Bosnia and Herzegovina”) OR EXCLUDE (AFFILCOUNTRY , “Central African Republic”) OR EXCLUDE (AFFILCOUNTRY , “Cuba”) OR EXCLUDE (AFFILCOUNTRY , “Equatorial Guinea”) OR EXCLUDE (AFFILCOUNTRY , “Honduras”) OR EXCLUDE (AFFILCOUNTRY , “Nicaragua”) OR EXCLUDE (AFFILCOUNTRY , “South Sudan”) OR EXCLUDE (AFFILCOUNTRY , “Syrian Arab Republic”) OR EXCLUDE (AFFILCOUNTRY , “Togo”) OR EXCLUDE (AFFILCOUNTRY , “Tunisia”) OR EXCLUDE (AFFILCOUNTRY , “Albania”) OR EXCLUDE (AFFILCOUNTRY , “French Guiana”) OR EXCLUDE (AFFILCOUNTRY , “Mongolia”) OR EXCLUDE (AFFILCOUNTRY , “Palestine”) OR EXCLUDE (AFFILCOUNTRY , “Somalia”) OR EXCLUDE (AFFILCOUNTRY , “Yemen”) OR EXCLUDE (AFFILCOUNTRY , “American Samoa”) OR EXCLUDE (AFFILCOUNTRY , “Botswana”) OR EXCLUDE (AFFILCOUNTRY , “Chad”) OR EXCLUDE (AFFILCOUNTRY , “Dominican Republic”) OR EXCLUDE (AFFILCOUNTRY , “El Salvador”) OR EXCLUDE (AFFILCOUNTRY , “Grenada”) OR EXCLUDE (AFFILCOUNTRY , “Iraq”) OR EXCLUDE (AFFILCOUNTRY , “Kyrgyzstan”) OR EXCLUDE (AFFILCOUNTRY , “Swaziland”)) AND (LIMIT-TO (DOCTYPE , “ar”)) AND (LIMIT-TO (LANGUAGE , “English”))

Limits: English language; human; 2002-current; journal articles
Geographic affiliation limit; then removal of additional unwanted countries in results set.
Results: 41,195

SEARCH PARAMETERS FOR GRAY LITERATURE

The gray literature search included identifying conference papers and interventions aimed at improving infant and young child feeding behaviors that were completed but not yet published via clinicaltrials.gov. In addition to searching Medline, Embase, and Scopus, the research librarian hand searched relevant government and non-government websites.

Database: Medline

January 12, 2023

1	(Beverages OR bottle* OR cup* OR Diet* OR drink* OR eat OR eating OR wean OR weaning OR feed OR feeding* OR food* OR beverage* OR nutrition* OR meal* OR spoon* OR utensil* OR "Infant nutritional physiological phenomena" OR "allergenic food*" OR bread OR breads OR cereal* OR grain* OR cheese* OR corn OR cracker* OR dairy OR eggs OR fruit* OR juice* OR grits OR honey OR legume* OR meat* OR fish* OR poultry OR milk OR pasta* OR "solid food*" OR tea OR teas OR tortillas OR vegetable* OR "drinking water" OR yogurt OR yoghurt).ti,ab,kw,kf.	2,511,620
2	Beverages/ OR Bottle feeding/ OR "Diet, food, and nutrition"/ OR Drinking/ OR Drinking behavior/ OR Eating/ OR Feeding behavior/ OR Feeding methods/ OR "Food and beverages"/ OR Foods, specialized/ OR Meals/ OR Child nutrition sciences/ OR "Cooking and eating utensils"/ OR Weaning/ OR Infant nutritional physiological phenomena/	207,609
3	Bread/ OR Edible grain/ OR Exp dairy products/ OR Eggs/ OR "Food and beverages"/ OR Foods, specialized/ OR Fruit/ OR "Fruit and vegetable juices"/ OR edible grain/ OR whole grains/ OR Honey/ OR Infant food/ OR Exp meat/ OR Milk/ OR Milk substitutes/ OR Tea/ OR Vegetables/ OR Drinking water/	307,034
4	#1 OR #2 OR #3	2,601,229
5	(baby OR babies OR "early childhood" OR infancy OR infant* OR "thousand days" OR toddler* OR "two year old" OR "two years old" OR "young child*").ti,ab,kw,kf.	669,681
6	Infant/ OR Infant, newborn/	1,234,550
7	#5 OR #6	1,472,049
8	("behavior therapy" OR "before after stud*" OR "before and after stud*" OR "clinical trial*" OR "comparative effectiveness" OR "comparative stud*" OR "controlled stud*" OR "controlled clinical trial*" OR "controlled trial*" OR "early intervention*" OR "evaluation stud*" OR "follow up stud*" OR intervention* OR "outcome assessment*" OR "patient outcome*" OR "pragmatic clinical trial*" OR "pragmatic trial*" OR "program evaluation*" OR "quality improvement" OR "quasiexperimental stud*" OR "quasi experimental stud*" OR "randomized controlled" OR "diet therapy" OR "nutrition therapy" OR therapy OR therapies OR treatment* OR trial*).ti,ab,kw,kf.	8,047,058

9	Behavior therapy/ OR controlled before-after studies/ OR exp clinical trials as topic/ OR comparative effectiveness research/ OR controlled clinical trials as topic/ OR early intervention, educational/ OR evaluation studies as topic/ OR follow-up studies/ OR outcome assessment, health care/ OR patient outcome assessment/ OR pragmatic clinical trials as topic/ OR program evaluation/ OR quality improvement/ OR non-randomized controlled trials as topic/ OR randomized controlled trials as topic/ OR treatment outcome/ OR diet therapy/ OR nutrition therapy/	2,253,030
10	#8 OR #9	8,956,125
11	#4 AND #7 AND #10	56,692
12	(andorra OR "Antigua and Barbuda" OR Aruba OR Australia OR Austria OR Bahamas OR Bahrain OR Barbados OR Belgium OR Bermuda OR "British Virgin Islands" OR Brunei OR Canada OR "Cayman Islands" OR "Channel Islands" OR Chile OR Croatia OR Curacao OR Cyprus OR "Czech Republic" OR Denmark OR England OR Estonia OR "Faroe Islands" OR Finland OR France OR "French Polynesia" OR Germany OR Gibraltar OR "Great Britain" OR Greece OR Greenland OR Guam OR "Hong Kong" OR Hungary OR Iceland OR Ireland OR "Isle of Man" OR Israel OR Italy OR Japan OR "Korea South" OR Kuwait OR Latvia OR Liechtenstein OR Lithuania OR Luxembourg OR Macao OR Malta OR Monaco OR Nauru OR Netherlands OR "New Caledonia" OR "New Zealand" OR "Northern Ireland" OR "Northern Mariana Islands" OR Norway OR Oman OR Panama OR Poland OR Portugal OR "Puerto Rico" OR Qatar OR Romania OR "Saint Kitts and Nevis" OR "San Marino" OR "Saudi Arabia" OR Scotland OR Seychelles OR Singapore OR "Sint Maarten" OR "Slovak Republic" OR Slovenia OR "South Korea" OR Spain OR "St Kitts and Nevis" OR "St maarten" OR "St Maartin" OR Sweden OR Switzerland OR Taiwan OR "Trinidad and Tobago" OR "Turks and Caicos" OR "United Arab Emirates" OR "United Kingdom" OR "United States" OR USA OR "u.s.a." OR "u s a" OR Uruguay OR "Virgin Islands" OR Wales).ti,ab,kw,kf.	1,692,222

13	Andorra/ OR "Antigua and Barbuda"/ OR Aruba/ OR Australia/ OR Austria/ OR Bahamas/ OR Bahrain/ OR Barbados/ OR Belgium/ OR Bermuda/ OR "British Virgin Islands"/ OR Brunei/ OR Canada/ OR "West Indies"/ OR "Channel Islands"/ OR Chile/ OR Croatia/ OR Curacao/ OR Cyprus/ OR "Czech Republic"/ OR Denmark/ OR England/ OR Estonia/ OR Denmark/ OR Finland/ OR France/ OR Polynesia/ OR Germany/ OR Gibraltar/ OR "Great Britain"/ OR Greece/ OR Greenland/ OR Guam/ OR "Hong Kong"/ OR Hungary/ OR Iceland/ OR Ireland/ OR "United Kingdom"/ OR Israel/ OR Italy/ OR Japan/ OR Kuwait/ OR Latvia/ OR Liechtenstein/ OR Lithuania/ OR Luxembourg/ OR Macao/ OR Malta/ OR Monaco/ OR Micronesia/ OR Netherlands/ OR "New Caledonia"/ OR "New Zealand"/ OR "Northern Ireland"/ OR Micronesia/ OR Norway/ OR Oman/ OR Panama/ OR Poland/ OR Portugal/ OR "Puerto Rico"/ OR Qatar/ OR Romania/ OR "Saint Kitts and Nevis"/ OR "San Marino"/ OR "Saudi Arabia"/ OR Scotland/ OR Seychelles/ OR Singapore/ OR "Sint Maarten"/ OR Slovakia/ OR Slovenia/ OR "Republic of Korea"/ OR Spain/ OR "St Kitts and Nevis"/ OR Sweden/ OR Switzerland/ OR Taiwan/ OR "Trinidad and Tobago"/ OR "West Indies"/ OR "United Arab Emirates"/ OR "United Kingdom"/ OR "United States"/ OR Uruguay/ OR "United States Virgin Islands"/ OR Wales/	2,779,625
14	#12 OR #13	3,579,408
15	#11 AND #14	8,760
16	English language; 2002-current	6,498
17	16 NOT (exp animals/ NOT humans/)	6,465
18	limit 17 to (clinical conference or congress)	12

Database: Embase

January 12, 2023

1	(Beverages OR bottle* OR cup* OR Diet* OR drink* OR eat OR eating OR wean OR weaning OR feed OR feeding* OR food* OR beverage* OR nutrition* OR meal* OR spoon* OR utensil* OR "Infant nutritional physiological phenomena" OR "allergenic food*" OR bread OR breads OR cereal* OR grain* OR cheese* OR corn OR cracker* OR dairy OR eggs OR fruit* OR juice* OR grits OR honey OR legume* OR meat* OR fish* OR poultry OR milk OR pasta* OR "solid food*" OR tea OR teas OR tortillas OR vegetable* OR "drinking water" OR yogurt OR yoghurt).ti,ab,kw.	2,908,197
2	Beverage/ OR Bottle feeding/ OR Feeding bottle/ OR Diet/ OR Drinking behavior/ OR Eating/ OR Feeding/ OR Infant feeding/ OR Feeding behavior/ OR Infant nutrition/ OR Meal/ OR Nutrition/ OR Weaning/	593,100
3	Baby food/ OR Bread/ OR Cereal/ OR Cheese/ OR Maize/ OR Sweet corn/ OR Dairy product/ OR Egg/ OR Food/ OR Fruit/ OR Fruit juice/ OR Food grain/ OR Whole grain/ OR Honey/ OR Legume/ OR Sea food/ OR Milk/ OR Artificial milk/ OR Pasta/ OR "Plant-based milk"/ OR Tea/ OR Vegetable/ OR Fruit vegetable/ OR "Fruit and vegetable juice"/ OR Vegetable juice/ OR Drinking water/ OR Yoghurt/ OR Fermented dairy product/	436,412
4	#1 OR #2 OR #3	3,066,945
5	(baby OR babies OR "early childhood" OR infancy OR infant* OR "thousand days" OR toddler* OR "two year old" OR "two years old" OR "young child*").ti,ab,kw.	702,848
6	baby/ OR infancy/ OR infant/ OR newborn/ OR toddler/	1,054,650
7	#5 OR #6	1,341,801
8	("behavior therapy" OR "before after stud*" OR "before and after stud*" OR "clinical trial*" OR "comparative effectiveness" OR "comparative stud*" OR "controlled stud*" OR "controlled clinical trial*" OR "controlled trial*" OR "early intervention*" OR "evaluation stud*" OR "follow up stud*" OR intervention* OR "outcome assessment*" OR "patient outcome*" OR "pragmatic clinical trial*" OR "pragmatic trial*" OR "program evaluation*" OR "quality improvement" OR "quasiexperimental stud*" OR "quasi experimental stud*" OR "randomized controlled" OR "diet therapy" OR "nutrition therapy" OR therapy OR therapies OR treatment* OR trial*).ti,ab,kw.	10,466,412

9	Behavior therapy/ OR exp clinical trial/ OR comparative effectiveness/ OR comparative study/ OR controlled study/ OR controlled clinical trial/ OR early intervention/ OR evaluation study/ OR follow up/ OR intervention study/ OR outcome assessment/ OR pragmatic trial/ OR program evaluation/ OR program effectiveness/ OR quasi experimental study/ OR randomized controlled trial/ OR therapy/ OR treatment outcome/ OR diet therapy/	13,419,747
10	#8 OR #9	18,217,654
11	#4 AND #7 AND #10	109,953
12	(andorra OR "Antigua and Barbuda" OR Aruba OR Australia OR Austria OR Bahamas OR Bahrain OR Barbados OR Belgium OR Bermuda OR "British Virgin Islands" OR Brunei OR Canada OR "Cayman Islands" OR "Channel Islands" OR Chile OR Croatia OR Curacao OR Cyprus OR "Czech Republic" OR Denmark OR England OR Estonia OR "Faroe Islands" OR Finland OR France OR "French Polynesia" OR Germany OR Gibraltar OR "Great Britain" OR Greece OR Greenland OR Guam OR "Hong Kong" OR Hungary OR Iceland OR Ireland OR "Isle of Man" OR Israel OR Italy OR Japan OR "Korea South" OR Kuwait OR Latvia OR Liechtenstein OR Lithuania OR Luxembourg OR Macao OR Malta OR Monaco OR Nauru OR Netherlands OR "New Caledonia" OR "New Zealand" OR "Northern Ireland" OR "Northern Mariana Islands" OR Norway OR Oman OR Panama OR Poland OR Portugal OR "Puerto Rico" OR Qatar OR Romania OR "Saint Kitts and Nevis" OR "San Marino" OR "Saudi Arabia" OR Scotland OR Seychelles OR Singapore OR "Sint Maarten" OR "Slovak Republic" OR Slovenia OR "South Korea" OR Spain OR "St Kitts and Nevis" OR "St maarten" OR "St Maartin" OR Sweden OR Switzerland OR Taiwan OR "Trinidad and Tobago" OR "Turks and Caicos" OR "United Arab Emirates" OR "United Kingdom" OR "United States" OR USA OR "u.s.a." OR "u s a" OR Uruguay OR "Virgin Islands" OR Wales).ti,ab,kw.	2,381,319

13	Andorra/ OR "Antigua and Barbuda"/ OR Aruba/ OR Australia/ OR Austria/ OR Bahamas/ OR Bahrain/ OR Barbados/ OR Belgium/ OR Bermuda/ OR "British Virgin Islands"/ OR Brunei/ OR Canada/ OR "West Indies"/ OR "Channel Islands"/ OR Chile/ OR Croatia/ OR Curacao/ OR Cyprus/ OR "Czech Republic"/ OR Denmark/ OR England/ OR Estonia/ OR Denmark/ OR Finland/ OR France/ OR Polynesia/ OR Germany/ OR Gibraltar/ OR "Great Britain"/ OR Greece/ OR Greenland/ OR Guam/ OR "Hong Kong"/ OR Hungary/ OR Iceland/ OR Ireland/ OR "United Kingdom"/ OR Israel/ OR Italy/ OR Japan/ OR Kuwait/ OR Latvia/ OR Liechtenstein/ OR Lithuania/ OR Luxembourg/ OR Macao/ OR Malta/ OR Monaco/ OR Micronesia/ OR Netherlands/ OR "New Caledonia"/ OR "New Zealand"/ OR "Northern Ireland"/ OR Micronesia/ OR Norway/ OR Oman/ OR Panama/ OR Poland/ OR Portugal/ OR "Puerto Rico"/ OR Qatar/ OR Romania/ OR "Saint Kitts and Nevis"/ OR "San Marino"/ OR "Saudi Arabia"/ OR Scotland/ OR Seychelles/ OR Singapore/ OR "Sint Maarten"/ OR Slovakia/ OR Slovenia/ OR "Republic of Korea"/ OR Spain/ OR "St Kitts and Nevis"/ OR Sweden/ OR Switzerland/ OR Taiwan/ OR "Trinidad and Tobago"/ OR "West Indies"/ OR "United Arab Emirates"/ OR "United Kingdom"/ OR "United States"/ OR Uruguay/ OR "United States Virgin Islands"/ OR Wales/	3,257,507
14	#12 OR #13	4,217,840
15	#11 AND #14	16,240
16	English language; 2002-current	13,525
17	16 NOT ((exp animal/ or nonhuman/) NOT exp human/)	12,756
18	limit 17 to (conference abstract or conference paper or "conference review")	3,300

Database: Scopus

TITLE-ABS-KEY ("infant feeding" OR "infant nutrition" OR "complementary feeding") AND (infant* OR baby OR babies OR toddler*) AND (intervention* OR "behavior therapy" OR "before after stud*" OR "before and after stud*" OR "clinical trial*" OR "comparative effectiveness" OR "comparative stud*" OR "controlled stud*" OR "controlled clinical trial*" OR "controlled trial*" OR "early intervention*" OR "evaluation stud*" OR "follow up stud*" OR intervention* OR "outcome assessment*" OR "patient outcome*" OR "pragmatic clinical trial*" OR "pragmatic trial*" OR "program evaluation*" OR "quality improvement" OR "quasiexperimental stud*" OR "quasi experimental stud*" OR "randomized controlled") PUBYEAR > 2001 AND AFFILCOUNTRY (andorra OR "Antigua and Barbuda" OR aruba OR australia OR austria OR bahamas

OR bahrain OR barbados OR belgium OR bermuda OR "British Virgin Islands" OR brunei OR canada OR "Cayman Islands" OR "Channel Islands" OR chile OR croatia OR curacao OR cyprus OR "Czech Republic" OR denmark OR england OR estonia OR "Faroe Islands" OR finland OR france OR "French Polynesia" OR germany OR gibraltar OR "Great Britain" OR greece OR greenland OR guam OR "Hong Kong" OR hungary OR iceland OR ireland OR "Isle of Man" OR israel OR italy OR japan OR "Korea South" OR kuwait OR latvia OR liechtenstein OR lithuania OR luxembourg OR macao OR malta OR monaco OR nauru OR netherlands OR "New Caledonia" OR "New Zealand" OR "Northern Ireland" OR "Northern Mariana Islands" OR norway OR oman OR panama OR poland OR portugal OR "Puerto Rico" OR qatar OR romania OR "Saint Kitts and Nevis" OR "San Marino" OR "Saudi Arabia" OR scotland OR seychelles OR singapore OR "Sint Maarten" OR "Slovak Republic" OR slovenia OR "South Korea" OR spain OR "St Kitts and Nevis" OR "St maarten" OR "St Maartin" OR sweden OR switzerland OR taiwan OR "Trinidad and Tobago" OR "Turks and Caicos" OR "United Arab Emirates" OR "United Kingdom" OR "United States" OR usa OR "u.s.a." OR "u s a" OR uruguay OR "Virgin Islands" OR wales) AND (EXCLUDE (AFFILCOUNTRY , "India") OR EXCLUDE (AFFILCOUNTRY , "Bangladesh") OR EXCLUDE (AFFILCOUNTRY , "China") OR EXCLUDE (AFFILCOUNTRY , "Kenya") OR EXCLUDE (AFFILCOUNTRY , "Malawi") OR EXCLUDE (AFFILCOUNTRY , "South Africa") OR EXCLUDE (AFFILCOUNTRY , "Tanzania") OR EXCLUDE (AFFILCOUNTRY , "Uganda") OR EXCLUDE (AFFILCOUNTRY , "Ethiopia") OR EXCLUDE (AFFILCOUNTRY , "Pakistan") OR EXCLUDE (AFFILCOUNTRY , "Mexico") OR EXCLUDE (AFFILCOUNTRY , "Nepal") OR EXCLUDE (AFFILCOUNTRY , "Burkina Faso") OR EXCLUDE (AFFILCOUNTRY , "Ghana") OR EXCLUDE (AFFILCOUNTRY , "Peru") OR EXCLUDE (AFFILCOUNTRY , "Gambia") OR EXCLUDE (AFFILCOUNTRY , "Indonesia") OR EXCLUDE (AFFILCOUNTRY , "Viet Nam") OR EXCLUDE (AFFILCOUNTRY , "Thailand") OR EXCLUDE (AFFILCOUNTRY , "Egypt") OR EXCLUDE (AFFILCOUNTRY , "Nigeria") OR EXCLUDE (AFFILCOUNTRY , "Senegal") OR EXCLUDE (AFFILCOUNTRY , "Turkey") OR EXCLUDE (AFFILCOUNTRY , "Guatemala") OR EXCLUDE (AFFILCOUNTRY , "Argentina") OR EXCLUDE (AFFILCOUNTRY , "Iran") OR EXCLUDE (AFFILCOUNTRY , "Malaysia") OR EXCLUDE (AFFILCOUNTRY , "Niger") OR EXCLUDE (AFFILCOUNTRY , "Cambodia") OR EXCLUDE (AFFILCOUNTRY , "Zambia") OR EXCLUDE (AFFILCOUNTRY , "Colombia") OR EXCLUDE (AFFILCOUNTRY , "Philippines") OR EXCLUDE (AFFILCOUNTRY , "Guinea-Bissau") OR EXCLUDE (AFFILCOUNTRY , "Mali") OR EXCLUDE (AFFILCOUNTRY , "Zimbabwe") OR EXCLUDE (AFFILCOUNTRY , "Russian Federation") OR EXCLUDE (AFFILCOUNTRY , "Congo") OR EXCLUDE (AFFILCOUNTRY , "Cote d'Ivoire") OR EXCLUDE (AFFILCOUNTRY , "Laos") OR EXCLUDE (AFFILCOUNTRY , "Rwanda") OR EXCLUDE (AFFILCOUNTRY , "Ecuador") OR EXCLUDE (AFFILCOUNTRY , "Lebanon") OR EXCLUDE (AFFILCOUNTRY , "Jamaica") OR EXCLUDE (AFFILCOUNTRY , "Mozambique") OR EXCLUDE (AFFILCOUNTRY , "Serbia") OR EXCLUDE (AFFILCOUNTRY , "Belarus") OR EXCLUDE (AFFILCOUNTRY , "Democratic Republic Congo") OR EXCLUDE (AFFILCOUNTRY , "Bulgaria") OR EXCLUDE (AFFILCOUNTRY , "Papua New Guinea") OR EXCLUDE (AFFILCOUNTRY , "Benin") OR EXCLUDE (AFFILCOUNTRY , "Sri Lanka") OR EXCLUDE (AFFILCOUNTRY , "Madagascar") OR EXCLUDE (AFFILCOUNTRY , "Haiti") OR EXCLUDE (AFFILCOUNTRY , "Puerto Rico") OR EXCLUDE (AFFILCOUNTRY , "Bolivia") OR EXCLUDE (AFFILCOUNTRY , "Costa Rica") OR EXCLUDE (AFFILCOUNTRY , "Myanmar") OR EXCLUDE (AFFILCOUNTRY , "Sierra Leone") OR EXCLUDE (AFFILCOUNTRY , "Sudan") OR EXCLUDE (AFFILCOUNTRY , "Cameroon") OR EXCLUDE (AFFILCOUNTRY , "Jordan") OR EXCLUDE (AFFILCOUNTRY , "Morocco") OR EXCLUDE (AFFILCOUNTRY , "Ukraine") OR EXCLUDE (AFFILCOUNTRY , "Venezuela") OR EXCLUDE (AFFILCOUNTRY , "Angola") OR EXCLUDE (AFFILCOUNTRY , "Afghanistan") OR EXCLUDE (AFFILCOUNTRY , "Bahrain") OR EXCLUDE (AFFILCOUNTRY , "Georgia") OR EXCLUDE (AFFILCOUNTRY , "Liberia") OR EXCLUDE (AFFILCOUNTRY , "Algeria") OR EXCLUDE (AFFILCOUNTRY , "Burundi") OR EXCLUDE (AFFILCOUNTRY , "Namibia") OR EXCLUDE (AFFILCOUNTRY , "Uruguay") OR EXCLUDE (AFFILCOUNTRY , "Armenia") OR EXCLUDE (AFFILCOUNTRY , "Gabon") OR EXCLUDE (AFFILCOUNTRY , "Guinea") OR EXCLUDE (AFFILCOUNTRY , "North Macedonia") OR EXCLUDE (AFFILCOUNTRY , "Paraguay") OR EXCLUDE (AFFILCOUNTRY , "Bosnia and Herzegovina") OR EXCLUDE (AFFILCOUNTRY , "Central African Republic") OR EXCLUDE (AFFILCOUNTRY , "Cuba") OR EXCLUDE (AFFILCOUNTRY , "Equatorial Guinea") OR EXCLUDE (AFFILCOUNTRY , "Honduras") OR EXCLUDE (AFFILCOUNTRY , "Nicaragua") OR EXCLUDE (AFFILCOUNTRY , "South Sudan") OR EXCLUDE (AFFILCOUNTRY , "Syrian Arab Republic") OR EXCLUDE (AFFILCOUNTRY , "Togo") OR EXCLUDE (AFFILCOUNTRY , "Tunisia") OR EXCLUDE (AFFILCOUNTRY , "Albania") OR EXCLUDE (AFFILCOUNTRY , "French Guiana") OR EXCLUDE (AFFILCOUNTRY , "Mongolia") OR EXCLUDE (AFFILCOUNTRY , "Palestine") OR EXCLUDE (AFFILCOUNTRY , "Somalia") OR EXCLUDE (AFFILCOUNTRY , "Yemen") OR EXCLUDE (AFFILCOUNTRY , "American Samoa") OR EXCLUDE (AFFILCOUNTRY , "Botswana") OR

EXCLUDE (AFFILCOUNTRY , "Chad") OR EXCLUDE (AFFILCOUNTRY , "Dominican Republic") OR EXCLUDE (AFFILCOUNTRY , "El Salvador") OR EXCLUDE (AFFILCOUNTRY , "Grenada") OR EXCLUDE (AFFILCOUNTRY , "Iraq") OR EXCLUDE (AFFILCOUNTRY , "Kyrgyzstan") OR EXCLUDE (AFFILCOUNTRY , "Swaziland")) AND (LIMIT-TO (DOCTYPE , "cp")) AND (LIMIT-TO (LANGUAGE , "English"))

Limits: English language; human; 2002-current; conference papers (DOCTYPE=CP)
285 results

Appendix D

Data Extraction Criteria

TABLE D-1 Data Extraction Criteria

Criteria Category	Internal Validity or Generalizability	Scalability Dimension
Study design	Yes	Cultural appropriateness/equity
Setting	Yes	—
Objective	—	Implementation
Population	Yes	Reach
	Yes	—
	Yes	Cultural appropriateness/equity

Item	Format/Response Requested
What was the study design?	Free-text
Where was the study conducted (geographically)?	Country
Intervention aim/objective	From the abstract
Inclusion criteria	General summary
Exclusion criteria	General summary
Recruitment	General summary
Number of individuals/settings approached, eligible, enrolled, complete	Number or not reported Number approached (individual or setting) Number eligible (individual or setting) Number enrolled (participated/completed baseline assessment) Number who completed the intervention (Note: not follow-up)
Number of participants starting the study in the **intervention** group	Baseline: Number End: Number Follow-up: Number or no follow-up
Number of participants starting the study in the **comparator** group	Baseline: Number End: Number Follow-up: Number or no follow-up
Was there any sample size calculation done to determine the number of participants?	Yes or no
Participant characteristics at baseline	General summary: include if reported—if not, write not reported SES: (reported mean or median) Education level: (% < high school OR as reported) Race: (% Black), Ethnicity: (e.g., % Asian, % Hispanic/Latino, % Indigenous), Language: (largest % speaking English, Spanish, or other), maternal age: (years) *NOTE: presented as combined/total unless article only describes by groups (staff will note this)

Continued

TABLE D-1 Continued

Criteria Category	Internal Validity or Generalizability	Scalability Dimension
Intervention	Yes	Implementation

Item	Format/Response Requested
Intervention description	Succinct description
Intervention location	Physical location in which the participant received the intervention
Type of intervention	Free text: Single intervention or multifaceted: Education (individual or group) Counseling (individual or group) Tasting opportunities Gardening materials/technical assistance Provision of food Other (describe) Unclear or not reported
Method of delivery	Free text: Communication (written or verbal) Visuals Media Feeding experiences Website Other (describe)
Comparator	Usual care Equivalent intervention on a different topic Other—describe
What to feed topics covered	Free text—describe topics Unclear or not reported
How to feed topics covered	Free text—describe topics covered Unclear or not reported
Theoretical framework	Theoretical model or not reported
Intervention delivered by	Who implemented the intervention/what type of staff would be needed (e.g., registered dietitians, nurses, pediatricians, community workers, etc.)
Intervention duration/intensity	Free text capturing the number of contacts/visits, duration of visit, duration of full intervention

Continued

TABLE D-1 Continued

Criteria Category	Internal Validity or Generalizability	Scalability Dimension
Outcomes	Yes	Maintenance/ effectiveness
	Yes	
	Yes	
	Yes	
Measures	—	—
Statistics	Yes	—
	Yes	—

Item	Format/Response Requested
What was the impact on outcomes related to **what to feed?** *Note if caregiver, childcare provider, or child-focused*	Time-point noted and brief description of outcomes *NOTE: Statistical significance not provided here Follow-up: describe OR NA
What was the impact on outcomes related to **how to feed?** *Note if caregiver, childcare provider, or child-focused*	Time-point noted and brief description of outcomes *NOTE: Statistical significance not provided here Follow-up: describe OR N/A
Other feeding-related outcomes that do not fit into previous two columns	Time-point noted and brief description of outcomes *NOTE: Statistical significance not provided here Follow-up: describe OR N/A
What was the impact on nutrition-related **health?**	Timepoint noted and brief description of outcomes *NOTE: Statistical significance not provided here Follow-up: describe OR N/A
List tools used and note if validated or self-report	Free text list of tools
Was there any consideration for covariates/confounding? Was it adequate?	Yes or no or N//A
Correction for testing multiple hypothesis	Yes or no or N/A

Appendix E

Data Extraction Tables

This appendix contains the following:

- E-1: General Study and Population Characteristics—Data Extraction Table
- E-2: Intervention Description—Data Extraction Table
- E-3: Outcomes—Data Extraction Table

TABLE E-1 General Study and Population Characteristics

Trial Name [Country]	Author Last Name, Year	Study Design	Study Objective	Inclusion and Exclusion Criteria	Recruitment	Population Characteristics	Number of Individuals Approached and Completed the Intervention	Number of Participants in Intervention Group	Number of Participants in Comparator Group
Health Care									
INFANT [Australia]	Zheng et al. (2022)	Cluster RCT	Using an integrative lifestyle pattern analysis approach, the objective was to assess the effectiveness of the INFANT program on change across multiple behaviors.	Inclusion: English-speaking first-time parents participating in "first-time parents group" who can freely give informed consent Exclusion: unable to give informed consent or communicate in English	Parents were recruited from first-time parent groups and assessed by the nurse. All intervention and control families who remained enrolled in the program at the end of the intervention were recontacted and	SES: NR Education level: 20% completed high school Race: NR Ethnicity: NR Language 95% English Maternal age: 32 yrs *Values reflect characteristics at baseline.*	Approached: NR Eligible: 630 main carers (62 first-time parent groups) Enrolled: 542 main carers (62 first-time parent groups) Completed: 480 main carers Data used for lifestyle pattern analysis at 3.5 yrs post-	Baseline: 262 End: 241 Follow-up: 172 *Baseline used for lifestyle pattern analysis at 3.5 yrs*	Baseline: 266 End: 239 Follow-up: 165 *Baseline used for lifestyle pattern analysis at 3.5 yrs*

INFANT [Australia]	Hesketh et al. (2020)	Cluster RCT	Assess post-intervention effects of the INFANT program to child age 5 yrs on diet, movement, and adiposity.	Infants with chronic health problems that could influence height, weight, physical activity, or eating habits were excluded from analyses but permitted to participate in the study	invited to participate.		intervention: 297 participants	Baseline: 262 End: 241 Follow-up: 172 children *(Follow-up: 254 children from both groups analyzed for diet outcome measures)*	Baseline: 266 End: 239 Follow-up: 165 children *(Follow-up: 254 children from both groups analyzed for diet outcome measures)*
INFANT [Australia]	Spence et al. (2014)	Cluster RCT	Assess whether maternal feeding knowledge, feeding practices, self-efficacy, and dietary intakes acted as mediators of the effect of the INFANT intervention to improve child diet quality.					Baseline: 262 End: 241 Follow-up: NR	Baseline: 266 End: 239 Follow-up: NR

continued

TABLE E-1 Continued

Trial Name [Country]	Author Last Name, Year	Study Design	Study Objective	Inclusion and Exclusion Criteria	Recruitment	Population Characteristics	Number of Individuals Approached and Completed the Intervention	Number of Participants in Intervention Group	Number of Participants in Comparator Group
INFANT [Australia]	Cameron et al. (2014)	Cluster RCT	Assess the effectiveness of the INFANT program according to maternal education and age.					Baseline: 262 End: NR Follow-up: NR	Baseline: 266 End: NR Follow-up: NR
INFANT [Australia]	Spence et al. (2013)	Cluster RCT	Assess the effect of the INFANT program on young children's dietary patterns.					Baseline: 262 End: NR Follow-up: NR	Baseline: 266 End: NR Follow-up: NR
INFANT [Australia]	Campbell et al. (2013)	Cluster RCT	Assess the effectiveness of the INFANT program on infants' obesity-risk behaviors and BMI.					Baseline: 271 End: 241 Follow-up: NR (389 children from both groups analyzed for dietary outcomes)	Baseline: 271 End: 239 Follow-up: NR (389 children from both groups analyzed for dietary outcomes)

— [Italy]	de Franchis et al. (2022)	RCT	Verify the effects of weaning (i.e., the introduction of solid foods in infants previously fed only with milk) using adult foods typical of Mediterranean diet on children eating habits.	Inclusion: Healthy infants, stable clinical conditions and feeding by mouth with human milk or formula. Exclusion: Infants either with associated comorbidities (including prematurity) or with low birth weight.	18 pediatricians participated and each enrolled 10–15 infants between 4–6 mo of age (authors' description of this is not consistent with reported sample size).	SES: NR Education level: 31% (control) and 33% (intervention) with a degree or higher Race: NR Ethnicity: NR Maternal age: NR	Approached: 425 Eligible and enrolled: 394 Completed: 358	Baseline: 194 End: 177	Baseline: 200 End: 181

continued

TABLE E-1 Continued

Trial Name [Country]	Author Last Name, Year	Study Design	Study Objective	Inclusion and Exclusion Criteria	Recruitment	Population Characteristics	Number of Individuals Approached and Completed the Intervention	Number of Participants in Intervention Group	Number of Participants in Comparator Group
GeliS [Germany]	Hoffmann et al. (2021)	Prospective cluster RCT	Evaluate effect of antenatal lifestyle intervention on development and feeding practices.	Inclusion: (a) pre-pregnancy BMI between 18.5 and 40.0 kg/m2, (b) singleton pregnancy, (c) age 18–43 yrs, (d) sufficient German language skills and (e) stage of pregnancy before end of 12th wk of gestation. Exclusion: miscarriage, terminations, pregnancy complications interfering with intervention, and maternal death during the trial.	71 participating maternal clinics and mid-wifery practices (intervention n = 39; control n = 32) recruited participants. Before 12th wk of gestation, pregnant women were invited by midwives or medical staff to participate.	SES: NR Education level: 42% vocational school, 42% academic high school and 16% general school Race: NR Ethnicity: 89% born in Germany Language Spoken: NR Maternal age: 30 yrs pre-pregnancy	Approached: 2,286 Eligible and enrolled: 2,261 End: 1,998	Baseline: 1,139 End: 1,003 12 mo follow-up: 902	Baseline: 1,122 End: 995 12 mo follow-up: 881

BBOFT [Netherlands]	Vlasblom et al. (2020)	Cluster RCT	Evaluate effectiveness of BBOFT+ program on child BMI, health behavior, and parenting behavior.	Inclusion: Parents of children belonging to the youth health care organization; internet literacy.	Parents were informed about the study during regular home visit of youth health care team nurse 2 wks after their baby was born.	SES: NR [83% employed] Education level: 53% (control) and 46% (intervention) "high" education level Race: NR Ethnicity: 80% Dutch (control) and 86% Dutch (intervention) 82% Dutch (total) Language spoken: NR Maternal age: 31 years (both control and intervention)	50 youth health care organizations (7,985 invited parents) were invited to participate.	17 teams BBOFT+ Baseline: 1,008 6 mo: 687 14 mo: 680 36 mo: 663 17 teams eHealth	17 teams Baseline: 1,094 6 mo: 834 14 mo: 821 36 mon: 766
	van Grieken et al. (2017)	Cluster RCT	Evaluate E-health4Uth Healthy Toddler, an intervention educating parents of children 18–24 mo regarding health-related behaviors, as compared with usual care.	Exclusion: Parents unable to read the Dutch language			10 organizations (3,003 parents) participated (51 YHC teams, each serves one or more municipalities of the region).		

continued

TABLE E-1 Continued

Trial Name [Country]	Author Last Name, Year	Study Design	Study Objective	Inclusion and Exclusion Criteria	Recruitment	Population Characteristics	Number of Individuals Approached and Completed the Intervention	Number of Participants in Intervention Group	Number of Participants in Comparator Group
Starting Early Program [United States]	Messito et al. (2020)	RCT	Determine impact of child obesity prevention intervention on maternal infant feeding practices, knowledge, and styles at 10 mo in low-income Hispanic families.	Inclusion: Pregnant, Hispanic women ≥18 yr, English/Spanish speaking, singleton uncomplicated pregnancy, intended to receive pediatric care at the study sites. Women with diabetes, depression, or intrauterine growth restriction were not excluded. Exclusion: women with severe medical or psychiatric illness (e.g.,	Pregnant women who intended to receive pediatric care at the study sites. Interested women were informed about the study, consented, and randomized at 32 wks of gestation.	SES: NR Education level: 31% (control) and 38% (intervention) had less than high school education Race: NR Ethnicity: 100% Hispanic Language spoken: English and Spanish(percentage not specified) Maternal age: 29 yrs (both intervention and control groups)	Approached: 1,263 Eligible: 933 Enrolled: 533 Completed: 412	Baseline: 266 End: 202 Note: the low-income urban site was in this group.	Baseline: 267 End: 210

				sickle cell disease or psychosis) or fetal anomalies (e.g., chromosomal disorders).					
— [Israel]	Globus et al. (2019)	Non-RCT	Examine if professional, behavioral, and nutritional training for first-time mothers can improve feeding interaction at age 12 mo.	Inclusion: NR Exclusion: Mother's self-reported history of present/past mental illness (e.g., schizophrenia, eating disorders) and infants' special nutritional needs (e.g., milk allergy, celiac disease).	Recruitment was performed using 2 advertisements: the first for group training for mothers of infants aged 4–6 mo (intervention) and the second for mealtime videotaping of infants aged 11 mo who received standard support through well-baby clinics (control).	SES: 79% employed (proxy for SES) Education level: 16 average yrs of education Race: NR Ethnicity: 85% of mothers born in Israel Language spoken: NR Maternal age: 30 yrs (mean)	Approached: 166 dyads Eligible: not reported Enrolled: 128 dyads Completed: NR	Baseline: 86 End: NR	Baseline: 42 End: NR

continued

TABLE E-1 Continued

Trial Name [Country]	Author Last Name, Year	Study Design	Study Objective	Inclusion and Exclusion Criteria	Recruitment	Population Characteristics	Number of Individuals Approached and Completed the Intervention	Number of Participants in Intervention Group	Number of Participants in Comparator Group
PROBIT [Italy]	Morandi et al. (2019)	RCT	Prevent overweight or obesity occurring at 2 yrs of life; improve feeding patterns during infancy.	Inclusion: Healthy full-term newborns whose parents or guardians gave informed consent. Exclusion: Pre- or post-term birth or any congenital disorder, disease, or syndrome.	Primary pediatricians registered in the district interested in research projects were mailed invitations to participate. Each pediatrician then selected 30 participants for enrollment from the practice.	SES: NR Education level: NR [professional category was 4-scale of 1–9] Race: NR Ethnicity: NR Maternal age: NR	Approached: all pediatricians in Veneto region interested in research Eligible: 22 pediatricians leading to 569 newborns Enrolled: 562 End: 468	Baseline: 267 newborns; 11 pediatricians 1st yr well visit: 251 2nd yr well visit (end): 216	Baseline: 295 newborns; 11 pediatricians 1st yr well visit: 278 2nd yr well visit (end): 252

LIMIT [Australia]	Dodd et al. (2014)	RCT	To determine the effect of antenatal dietary and lifestyle interventions on health outcomes in overweight and obese pregnant women.	Inclusion: Women who had a BMI ≥25 and singleton pregnancy at 10+0 to 20+0 weeks' gestation. Exclusion: Women with Type I or II diabetes diagnosed before pregnancy	Women recruited from three major metro maternity hospitals within Adelaide, South AU. Each participant provided written informed consent, and the ethics committee at each collaborating hospital approved the protocol.	SES: (reported mean or median) 30.8% in most disadvantaged group *(using a socioeconomic disadvantage index of 1–5 categories where 1 is most disadvantaged and 5 is least)* Education level: (% < high school?) not reported Race: (% Black) not reported Ethnicity: (2.7% Asian, 3.4% Other 3.4% Indian) H/Lat. not reported Language: % speaking English, % Spanish not reported Maternal age: 29.4 years (mean)	Approached: NR Eligible: 5,474 women Enrolled: 2,212 Successfully completed: NR	Baseline: 1,018 women and 1,075 liveborn infants End: 985 women and 1,070 infants *(numbers derived from drop-out values given)* Follow-up: NR	Baseline: 1,104 women and 1,067 liveborn infants End: 1,077 women and 1,065 infants *(numbers derived from drop-out values given)* Follow-up: NR

continued

TABLE E-1 Continued

Trial Name [Country]	Author Last Name, Year	Study Design	Study Objective	Inclusion and Exclusion Criteria	Recruitment	Population Characteristics	Number of Individuals Approached and Completed the Intervention	Number of Participants in Intervention Group	Number of Participants in Comparator Group
LIMIT [Australia]	Dodd et al. (2018)	RCT	Evaluate the effect of an antenatal dietary and lifestyle intervention in pregnant women who are overweight or obese on child outcomes at age 18 mo.	Inclusion: Women who had a BMI ≥25 and singleton pregnancy at 10+0 to 20+0 weeks' gestation. Exclusion: Women with Type I or II diabetes diagnosed before pregnancy.	Women recruited from three major metro maternity hospitals within Adelaide, South AU. Each participant provided written informed consent, and the ethics committee at each collaborating hospital approved the protocol.	SES: (reported mean or median) NR Education level: (% < high school) NR Race: (% Black) NR Ethnicity: 2.9% Asian, 2.6% Other, 3.8% Indian Language: % speaking English, % Spanish NR Maternal age: yrs (mean) 30	Approached: NR Eligible: 5,530 women Enrolled: 2,212 women Successfully completed: 1,602 parents and infants eligible for follow-up and completed consent.	Baseline: 1,108 End: NR Follow-up: 816 children assessed at 18 months	Baseline: 1,104 End: NR Follow-up: 786 children assessed at 18 months

Grow2 Gether [United States]	Fiks et al. (2017)	RCT Block allocation	Test a Facebook peer-group intervention for low-income mothers to foster behaviors promoting healthy infant growth and preventing obesity.	Inclusion: Women whose pre-pregnancy BMI >25 kg/m2) and were Medicaid insured; >18 yrs old and English speaking; singleton pregnancy between 20–32 wks at the time of enrollment, owned a smartphone with a data plan. Exclusion: Women with a major mental illness (e.g., schizophrenia) or other severe morbidity (e.g., renal failure).	Mothers recruited from two high-volume obstetric clinics.	SES: 78% annual household income <$15,000; 45% employed Education level: 51% high school graduates Race: 88% Black Ethnicity: 2% Latina, 7% Asian or American Indian Language spoken: NR Maternal age: 27 yrs	Approached: 319 Eligible: 115 Enrolled: 111 Completed run-in period and were randomized: 87 Completed: 85	Baseline: 43 End: 43 6 mo follow-up:43 9 mo follow-up: 34	Baseline: 44 End: 42 6 mo follow-up :42 9 mo follow-up: 37

continued

TABLE E-1 Continued

Trial Name [Country]	Author Last Name, Year	Study Design	Study Objective	Inclusion and Exclusion Criteria	Recruitment	Population Characteristics	Number of Individuals Approached and Completed the Intervention	Number of Participants in Intervention Group	Number of Participants in Comparator Group
NOURISH [Australia]	Magarey et al. (2016)	Multi-center RCT stratified by clinic.	Evaluate dietary intake impact outcomes up to 3.5 yrs after the NOURISH early feeding intervention.	Inclusion: healthy term infants (>35 wks, >2,500 g). Infants must be first born, at least 18 yrs of age, parents willing and able to attend sessions at designated metropolitan child health clinics and have ability to write and speak English. Low stress (maternal score on the Kessler 10 Psychological Distress Scale, K10, below 30)	Healthy newborns/ caregivers were recruited while still in the maternity hospitals. When the infant were 4–6 mo of age, caregivers were recontacted by mail for full enrollment.	SES: SEIFA 33 Education level: 58% university degree Race: NR Ethnicity: NR Maternal age at delivery: 30 yrs	Approached: 4,376 Eligible: 3,334 Enrolled: 698 Completed: NR (598 at the start of follow-up)	Baseline: 352 End: NR 18 mo after baseline: 260 *5 yr follow-up: 213*	Baseline: 346 End: NR 18 mo after baseline: 281 *5 yr follow-up: 211*

Exclusion: Clinical range score on the Kessler 10 Psychological Distress Scale (K10) below 30; if the infant has any diagnosed congenital abnormality or chronic condition likely to influence normal development (including feeding behavior) or the mother has a documented history of domestic violence or intravenous substance abuse or self-reported eating disorders, psychiatric disorders or mental health problems.

continued

TABLE E-1 Continued

Trial Name [Country]	Author Last Name, Year	Study Design	Study Objective	Inclusion and Exclusion Criteria	Recruitment	Population Characteristics	Number of Individuals Approached and Completed the Intervention	Number of Participants in Intervention Group	Number of Participants in Comparator Group
	Daniels et al. (2015)	Multi-center RCT stratified by clinic.	Report long-term outcomes of intervention effects on maternal feeding practices and child anthropometric indicators of obesity risk across 4 outcome assessment points (14 months and 2, 3.5, and 5 years of age) of the NOURISH RCT, which evaluated a universal intervention to provide anticipatory guidance to first-time						

		mothers on "protective" complementary feeding practices to reduce childhood obesity risk.
Daniels et al. (2014)	Multi-center RCT stratified by clinic.	Describe parent-reported child eating behavior and maternal parenting impact outcomes of an infant feeding intervention to reduce child obesity risk.
Daniels et al. (2013)	Multi-center RCT stratified by clinic.	Evaluate outcomes of a universal intervention to promote protective feeding practices that commenced in infancy and aimed to prevent childhood obesity.

continued

TABLE E-1 Continued

Trial Name [Country]	Author Last Name, Year	Study Design	Study Objective	Inclusion and Exclusion Criteria	Recruitment	Population Characteristics	Number of Individuals Approached and Completed the Intervention	Number of Participants in Intervention Group	Number of Participants in Comparator Group
	Daniels et al. (2012)	Multi-center RCT stratified by clinic.	Evaluate a universal obesity prevention intervention, which commenced at infant age 4–6 mo, using outcome data assessed 6 mo after completion of the first of two intervention modules and 9 mo from baseline.						

Growing Leaps and Bounds [United States]	Schroeder et al. (2015)	Cluster-stratified RCT	A pediatric office-based intervention was implemented following a randomized, controlled design, aimed at improving child feeding practices and growth patterns and ultimately reducing risk for overweight and obesity later in life.	Inclusion: all healthy newborns with ≥2,000 g body weight and who were not requiring specialized medical or nutritional care and discharged home within 5 days after birth. Exclusion: NR	Four Johns Hopkins Community Physicians centers were randomized to control (n = 2) or intervention (n = 2); two urban sites and 2 suburban sites; one of the urban sites was low income.	SES: NR Education level: NR Race: 48% Black, 35% White Ethnicity: 2% Hispanic, 2% Asian, 6%, other Language spoken: NR Maternal age: NR *Intervention group had higher number of African American caregivers, higher unemployment rate, lower household income, lower completed education level, and less home ownership than the control group*	Approached: NR Eligible: NR Enrolled: 292 Completed: 232	Baseline: 134 End: 112	Baseline: 144 End: 110

continued

TABLE E-1 Continued

Trial Name [Country]	Author Last Name, Year	Study Design	Study Objective	Inclusion and Exclusion Criteria	Recruitment	Population Characteristics	Number of Individuals Approached and Completed the Intervention	Number of Participants in Intervention Group	Number of Participants in Comparator Group
[United Kingdom, Greece, Portugal]	Fildes et al. (2015)	Individually randomized, parallel group study design.	Explore the impact of advising parents to introduce a variety of single vegetables as first foods on infants' subsequent acceptance of a novel vegetable.	Inclusion: 18 yrs old at recruitment; sufficiently proficient in each country's respective native language to understand the study materials; infant was born after 37 wks gestation, without diagnosed feeding problems. Exclusion: NR	Women in the final trimester of pregnancy and mothers of infants aged <6 mo were recruited from antenatal clinics, primary care, pediatricians, and hospitals in London (UK), Athens (Greece), and Porto (Portugal); consent forms and baseline questionnaire were sent to women who wanted to participate; a subsample of interested women was taken to participate in the trial.	SES: (reported mean or median) NR Education level: (% < high school?) (Intervention— 27%) *and* (Control— 29% below university level Race: NR Language spoken: NR (all mothers speak in native language of their respective country) Maternal age at birth: 33 yrs	Approached: NR Eligible: NR Enrolled: 146 families Successfully completed: 139 families	Baseline: 75 End: NR Follow-up: 71	Baseline: 71 End: NR Follow-up: 68

— [United States]	French et al. (2012)	3-arm cluster RCT	Evaluate the effect of 2 anticipatory guidance styles (maternal focused [MOMS] and infant focused [Ounce of Prevention]) directed at mothers of infants aged newborn to 6 mo on their infant feeding behaviors at 1 yr compared with routine advice as outlined in Bright Futures (BF).	Inclusion: English-speaking mother, healthy full-term infant, lives with biological mother, and infant aged 2 mo or younger. Exclusion: History of NICU stay, gestation less than 37 wks, chronic disease, foster placement, or known genetic disorder.	Potential participants were identified by screening clinic schedules for infants 2 mo of age or younger and by screening of waiting families by research staff. Then, research staff obtained written informed consent and described the study in depth.	*Reporting by trial arm (BF, MOMS, OP)* SES: NR Education level: 19%/ 36%/ 34% < high school Race: Black 61%/ 20% 74% Black; 24%/ 66%/ 21% White Ethnicity: NR Language spoken: NR Maternal age: 24/ 23/ 23 yrs (mean)	Approached: 11 clinics Eligible: 3 clinics Enrolled: 292 mother–infant dyads Successfully completed: 57% completion	Intervention Group 1 (1 clinic) Baseline: MOMS-101; OP- 1,010 participants End: 64 Follow-up: NR Intervention Group 2 (1 clinic) Baseline: 101 participants End: 61 Follow-up: NR	(1 clinic) Baseline: 104 participants End: 66 Follow-up: NR

continued

TABLE E-1 Continued

Trial Name [Country]	Author Last Name, Year	Study Design	Study Objective	Inclusion and Exclusion Criteria	Recruitment	Population Characteristics	Number of Individuals Approached and Completed the Intervention	Number of Participants in Intervention Group	Number of Participants in Comparator Group
First Steps for Mommy and Me [United States]	Taveras et al. (2011)	Non-ran-dom-ized controlled pilot trial clusters.	Assess the feasibility of a pediatric primary care based intervention to promote healthful behaviors among 0–6 mo old infants and their mothers.	Inclusion: Mother–infant pairs who received their pediatric care at the 3 primary care offices between January and June 2008. All infants aged 0–1 mo. old with a mother who could respond to interviews and questionnaires in English with all infants receiving pediatric care at the 3 primary care offices. Exclusion: Any infant whose mother would not be able to	Mothers were mailed a letter introducing and encouraging study participation with an opt-out option. They telephoned those mothers who did not refuse additional contact within 5 days of mailing the letter.	SES: Education level *(college graduate)*: 93% Race/Ethnicity: only reported 74% White Language spoken: 100% English *(as inclusion requirement)* Maternal age: 33 yrs (mean)	Approached (pre-eligible): 160 Eligible: NR Enrolled: 84 Completed (At follow-up): 80	Baseline: 60 End (At follow-up): 58	Baseline: 24 End (at follow-up): 22

				follow study procedures for 6 mo; families who planned to leave HVMA during the study; infants or mothers with severe health conditions.					
TARGet Kids! [Canada]	Maguire et al. (2010)	Pragmatic RCT	Determine whether an office-based, educational intervention for parents of 9-mo-old children could reduce bottle use and iron depletion at 2 yrs of age.	Inclusion: Parents of healthy infants 9 mo. of age who were attending a routine, 9-mo health maintenance visit with their primary care pediatrician.	Parents of ~9 mo old infants attending routine health maintenance visit were approached for participation from a 3-physician (Drs Jacobson, Peer, and Taylor),	*Reporting by Intervention%/ Control %* SES: NR Education level: 86%/89% college education Race: 5%/5% Black; 71%/70% White Ethnicity: 9%/15% Asian; 14%/11%	Approached: 301 Eligible: NR Enrolled: 251 Completed: NR	Baseline: 129 End: NR *Follow-up (2 years): 102*	Baseline: 122 End: NR *Follow-up (2 years): 99*

continued

TABLE E-1 Continued

Trial Name [Country]	Author Last Name, Year	Study Design	Study Objective	Inclusion and Exclusion Criteria	Recruitment	Population Characteristics	Number of Individuals Approached and Completed the Intervention	Number of Participants in Intervention Group	Number of Participants in Comparator Group
				Exclusion: Children with birth weights of 2 kg or less, a chronic illness other than asthma, had previously diagnosed anemia, or were currently receiving iron supplements.	community-based, pediatric group practice located in Toronto, Canada.	Hispanic Language spoken: NR Maternal age: NR			

— [United States]	Sanghavi (2005)	Experi-mental study	Design a waiting room educational kiosk that uses interactive, self-guided, computerized tutorials to give anticipatory guidance to parents at the 6-wk and 4-mo well-child visits, and assess impact on parent knowledge.	Inclusion: NR Exclusion: Parents of 4-mo-old infants who had previously completed the questionnaire at the 6-wk visit during the control period were excluded from analysis.	Study population consisted of parents of children receiving healthy well-child visits at 6 wks and 4 mo of age at the Gallup Indian Medical Center in Gallup, NM. *No info given on consent or recruiting strategy.*	*Reporting by intervention/control group* SES: (reported mean or median) NR Education level: (83%/ 79% high school diploma) Race: (% Black) NR Ethnicity: (% Asian, % Hispanic/Latino, % Indigenous) NR Language: (% speaking English, % Spanish) NR Maternal age: 27/28 yrs (mean)	Approached: NR Eligible: NR Enrolled: 101 parents Successfully completed: NR	Baseline: 49 parents End: NR Follow-up: NR	Baseline: 52 parents End: NR Follow-up: NR

continued

TABLE E-1 Continued

Trial Name [Country]	Author Last Name, Year	Study Design	Study Objective	Inclusion and Exclusion Criteria	Recruitment	Population Characteristics	Number of Individuals Approached and Completed the Intervention	Number of Participants in Intervention Group	Number of Participants in Comparator Group
ECE									
EniM [Spain]	Roset-Salla et al. (2016)	RCT	Evaluate the effectiveness of an educational program on healthy alimentation, carried out in day-care centers and aimed at the parents of children from 1 to 2 yrs of age, regarding the acquisition of healthy eating habits among themselves and their children.	Inclusion: Children 1–2 yrs of age, other factors not reported. Exclusion: Children still exclusively breast-feeding or whose parents were not responsible for their alimentation, children with special diets due to chronic diseases (such as celiac disease, food intolerances or allergies, inflammatory bowel disease),	All parents at the participating day care centers were invited to information meetings with pamphlets and posters. No details given on how day care centers were recruited.	SES: NR Education level: 55% University education Race: NR Ethnicity: NR Language spoken: NR (but primarily Spanish) Maternal age: 35 yrs (for both parents combined)	Approached/potential sample: 581 children Eligible: 206 children and 195 parents Enrolled: 149 children and 139 parents Successfully completed: NR	Baseline: 111 children and 103 parents End: 75 children and 67 parents Follow-up: NR	Baseline: 81 children and 78 parents End: 74 children and 72 parents Follow-up: NR

— [United Kingdom]	Ahern et al. (2014)	Within subjects design	Investigate the effectiveness of flavor–flavor learning as a strategy for increasing vegetable intake in preschool children.	parents with language difficulties, parents unable to attend the educational workshops, and those who did not sign the informed consent Inclusion: Children who attended nursery for at least 2 days per wk. Exclusion: NR	Parents of pre-school children aged 12–60 mo through local day care nurseries via email or telephone, and managers were given study instructions. 42 children aged 15–56 mo were recruited from the 3 participating nurseries.	SES: NR Education level: NR Race: NR Ethnicity: NR Language spoken: NR Maternal age: NR	Approached: 15 nurseries Eligible: NR Enrolled: 4 Successfully completed: 3	Baseline: 42 children End: 29 1 month follow up: 28 6 month follow up: 10	N/A

continued

TABLE E-1 Continued

Trial Name [Country]	Author Last Name, Year	Study Design	Study Objective	Inclusion and Exclusion Criteria	Recruitment	Population Characteristics	Number of Individuals Approached and Completed the Intervention	Number of Participants in Intervention Group	Number of Participants in Comparator Group
— [Belgium]	Verbestel et al. (2014)	Cluster RCT	Evaluate the effects of a 1-yr family-based healthy lifestyle intervention implemented through day-care centers on toddlers' BMI z-scores and reported activity and dietary-related behaviors.	Inclusion: Belgian toddlers aged 9–24 mo in child care centers located in low-SES and medium-SES communities. Exclusion: Children classified as underweight or obese using BMI z-scores.	Six communities chosen and measured ordinally by SES status resulting in recruiting 2 child care centers per SES status. Parents were invited to enroll their child into the study with completed informed consent.	*Values reported for children* SES: 17% low SES Education level: NR Race: NR Ethnicity: NR Language: NR Maternal age: NR	Approached/ potential sample: 404 children, 137 day cares Eligible: NR Enrolled: 203 children, 70 day care centers Successfully completed: 191 children (included in analyses) *Follow-up (12 months): 156 children*	Baseline: NR End: 126 children Follow-up: 100 children	Baseline: NR End: 65 children Follow-up: 56 children
— [United Kingdom]	Caton et al. (2013)	Within-subject design	Compare the effectiveness of different learning strategies in promoting the intake of a novel vegetable.	Inclusion: NR Exclusion: children with food allergies and older than 40 mo of age.	Parents of children aged 6–36 mo were invited to participate. Recruited from private day care nurseries;	SES: NR Education level: NR Race: NR Ethnicity: NR Language spoken: NR Maternal age: NR	Approached: 26 nurseries; 108 children Eligible: NR Enrolled: 10 nurseries Successfully completed: 6 nurseries; 72 children	Baseline: 72 End: 72 children Follow up: 45 Within-subject design does not give comparator group	N/A

— [United States]	Clark et al. (2009)	Experi-mental Design	Determine child care providers' infant feeding knowledge, attitude and behavior changes after viewing the infant feeding website. Determine the effectiveness of the website and bilingual educational materials.	Inclusion: NR Exclusion: NR	nursery managers were given details on study and, if interested, distributed participant info sheets and consent forms to parents. Called and mailed postcards to child care centers with consent for each phase of the intervention. Instructions mailed to participants on how to access and take the online survey.	*Reported by Intervention/Control* SES: NR Education level: NR Race: 4% / 13% Black; 83% / 74% White Ethnicity: 4% / 0% Asian, 9% / 13% Hispanic / Latino, 0% / 0% American Indian Language: 100% English; 0% Spanish Maternal age: 21–29: 35% / 20% 30–39: 26% / 27% 40–49: 26% / 20% 50 or older: 13% / 33%	Approached: NR Eligible: NR Enrolled: 48 (child care providers) Successfully completed: 38	Baseline: 23 End: 8 total were lost between the I and C groups *(does not specify how many from each group)* Follow-up: 6	Baseline: 15 End: 8 total were lost between the I and C groups *(does not specify how many from each group)* Follow-up: 9

continued

TABLE E-1 Continued

Trial Name [Country]	Author Last Name, Year	Study Design	Study Objective	Inclusion and Exclusion Criteria	Recruitment	Population Characteristics	Number of Individuals Approached and Completed the Intervention	Number of Participants in Intervention Group	Number of Participants in Comparator Group
Cooperative Extension									
NEAT [United States]	Horodynski and Stommel (2005)	Quasi-experiment	Assess the effectiveness of an intervention, Nutrition Education Aimed at Toddlers (NEAT), aimed at enhancing parent–toddler feeding practices.	Inclusion: (1) "low income" defined as family/ household income at or below 100% of the Poverty Index, and (2) toddlers between the ages of 11 and 25 mo at the time of intake into the study. Exclusion: Caregivers with toddlers who already had diagnosed eating problem and non-English speaking families.	Caregivers with children enrolled in Early Head Start programs were contacted by Early Head Start staff.	SES: 66% caregivers not employed, all low-income to be eligible for Early Head Start Education level: 24% < high school Race: 84% White Ethnicity: NR Language spoken: NR Maternal age: mean age 26 yrs	Approached: NR Eligible and enrolled: 135 Completed: 96	Baseline: 62 End: 43	Baseline: 73 End: 53

WIC									
SMS Intervention [United States]	Macchi et al. (2022)	Multi-site RCT— pilot	Test the effect of a weekly test message (SMS) intervention for improving feeding practices on infant intake of energy, nutrients, and specific food groups.	Inclusion: Caregiver age 18 yrs and older, owner of a mobile phone with unrestricted SMS capability, responsible for infant care, and willing to participate for the full study duration. Exclusion: Infants with special diets, infants with limited mobility, pre-term birth (<37 wks), small or large for gestational age (birthweight <10th or >90th percentile), inability to consent to participate, unwillingness to be randomized, and not being able to read.	Caregivers participating in WIC program in Puerto Rico (2) and Hawaii (4) were recruited.	*Reported by Intervention/Control* SES: NR Education level: 29%/38% college or higher Race: 4%/4% Black; 10%/14% White Ethnicity: 17%/13% Asian; 3%/2% Native Hawaiian; 5%/2% Pacific Islander; 56%/58% Hispanic; 6%/6% Mixed/Unknown Language spoken: NR Maternal age: 26/28	Approached: NR Eligible: 202 Enrolled: 202 Completed: 170 *Gibby: final analysis 80 as only included intervention group*	Baseline: 102 End: 84 Follow-up: 22% loss to follow-up overall *FFQ available for 79 dyads (Macchi)*	Baseline: 100 End: 86 Follow-up: 22% loss to follow-up overall *FFQ available for 84 dyads (Macchi)*
	Gibby et al. (2019)	Multi-site RCT— pilot	Investigated the acceptability of a text message-based intervention for prevention of excessive weight gain in infants from Hawai‘i and Puerto Rico WIC clinics.						
	Palacios et al. (2018)	Multi-site RCT— pilot	Test the effect of weekly SMS for improving infant feeding practices and infant weight.						

continued

TABLE E-1 Continued

Trial Name [Country]	Author Last Name, Year	Study Design	Study Objective	Inclusion and Exclusion Criteria	Recruitment	Population Characteristics	Number of Individuals Approached and Completed the Intervention	Number of Participants in Intervention Group	Number of Participants in Comparator Group
— [United States]	Scheinmann et al. (2010)	Quasi-experimental design	Encourage breastfeeding, the delay of feeding complementary foods until 6 mo of age, and increase maternal knowledge of appropriate infant feeding practices.	Inclusion: Self-identification as Latina; speaking English and/or Spanish; 18 yrs of age or older; singleton infant <5 mo old enrolled in WIC; and agreeing to be contacted by telephone 3 and 6 mo after the baseline interview. Exclusion: Mothers of non-singleton children, and infants who had been born prematurely or at low or very low birth weight. In analysis	Women were recruited from the Public Health Solutions Neighborhood WIC program in NYC. Women in the intervention group were recruited from the waiting room of the WIC center and control group from three other WIC centers.	Intervention group/comparator group SES: Majority not working (84%) and either living with parent or spouse (73%) Education level: 50% < high school Race: NR Ethnicity: 100% Latina Language spoken: 70% only Spanish 30% English and Spanish 2% Only English Maternal age: 18–24: 25% 25–29: 35% 30–34: 23% 35+: 17%	Approached: NR Number eligible: NR [does say 13 eligible women refused to participate] Enrolled: 439 Completed: 339 Kept in analysis: 272 (Excluded U.S.-born women because of disproportionately large number of U.S.-born women in the intervention group).	Combined baseline: 439 enrolled Combined 3-mo follow-up: 368 (84%) Combined 6-mo follow-up: 339 (77%) Analysis limited to 143 women in the intervention group who completed all visits.	Combined Baseline: 439 enrolled Combined 3-mo follow-up: 368 (84%) Combined 6-mo follow-up: 339 (77%) Analysis limited to 129 women in the intervention group who completed all visits.

				phase excluded U.S.-born women as over-represented in intervention group.					
Home Visit									
Sleep SAAF [United States]	Hernandez et al. (2022)	RCT	This secondary analysis of data from the Sleep SAAF (Strong African American Families) RCT tests the effects of a responsive parenting intervention designed to prevent rapid infant weight gain on African American mothers' infant feeding practices.	Inclusion: Primiparous mothers ≥17 yrs that self-identified as African American/Black, full-term (≥37 wks) singleton pregnancy, English speaking, lived within ≤75 miles of Augusta, GA, and had an infant ≥2,500 g at birth.	Mother–infant dyads were recruited shortly after delivery (infant mean age = 1.5 days at enrollment) from the mother/infant nursery at Augusta University Medical Center.	SES: 47% participated in SNAP and 76% in WIC Education level: 60% some or completed high school Race: 100% Black Ethnicity: 99% non-Hispanic Language spoken: NR Maternal age: Intervention: 24 years; Control: 22 years	Approached: NR Eligible: NR Enrolled: NR Randomized: 212 Completed: 194	Baseline: 96 Follow-up: NR	Baseline: 94 Follow-up: NR

continued

TABLE E-1 Continued

Trial Name [Country]	Author Last Name, Year	Study Design	Study Objective	Inclusion and Exclusion Criteria	Recruitment	Population Characteristics	Number of Individuals Approached and Completed the Intervention	Number of Participants in Intervention Group	Number of Participants in Comparator Group
				Exclusion: Known medical condition that could affect postnatal care (e.g., major mental illness, substance use disorder), medical condition that would affect feeding or growth (e.g., cleft palate), if there was an adoption plan in place, or if there was a plan to move out of the area within 4 mo of delivery.					

INSIGHT[2] [United States]	Harris et al. (2020)	RCT	Examine the effect of a responsive parenting intervention on mother-reported child emotional overeating, explore whether effects are mediated by mother-reported use of food to soothe child distress.	Inclusion: Primiparous mothers with healthy, term, singleton newborns; English-speaking (Harris); ≥20 yrs of age (Harris). Exclusion: If there was a plan for the newborn to be adopted or move from Central Pennsylvania within 3 yrs, if a prenatal		*Reported as Intervention/Control* SES: income of \$50,000 or more: 90%/75% Education level: college or higher degree: 72%/84% Race: 93%/96% White Ethnicity: 3%/ 2% Hispanic Language spoken: 100% English speaking Maternal age: 29/30	Screened: 3,276 Enrolled: 316 Randomized: 291 Completed: 279 (completed 3–4 week visit) 12-mo. follow-up: 250 2-yr follow-up: 243	Baseline: 145 End (completed 1-year visit): 125 Harris n = 105 individuals	Baseline: 146 End (completed 1-year visit): 125 Harris n = 102 individuals

continued

TABLE E-1 Continued

Trial Name [Country]	Author Last Name, Year	Study Design	Study Objective	Inclusion and Exclusion Criteria	Recruitment	Population Characteristics	Number of Individuals Approached and Completed the Intervention	Number of Participants in Intervention Group	Number of Participants in Comparator Group
	Hohman et al. (2020) (SIB-SIGHT study)	RCT	Examine birth-order differences in dietary intake between first-born (FB) and second born (SB) siblings; determine whether a responsive parenting (RP) intervention modified birth-order effects on diet.			*Reported as intervention FB/SB; control FB/SB* SES: income of $50,000 or more 89%/89%; 77%/83% Education: College grad 75%/75%; 77%/77% Race: NR Ethnicity: NR Maternal age: 30/32; 28/31	Screened: 138 Enrolled: 117 Completed 1-yr clinic visit: 117 *Sibling pairs* *6 mon = 97* *12 mon =100*	Firstborn-RP Baseline: 57 End:NR Second-born siblings of RP group Baseline: 57 End: NR At 12 months: 48 total for both RP groups	Firstborn control group Baseline: 60 End:NR Secondborn siblings of control group Baseline: 60 End: NR At 12 months: 52 total for both control groups

Savage et al. (2018)	RCT	Examine the effect of a responsive parenting (RP) intervention designed for obesity prevention on parents' infant feeding practices in the first yr after birth.		*Reported as Intervention/Control* SES: 50% reporting annual household incomes above $75,000 Education: college and postgrad 62%/63% Race: Black 7%5% White 87%/91% Ethnicity: NH/PI 0.7%/0% Asian: 4%/3% Other: 1.4%/0.7% Hispanic/Latino 9%/5% Maternal age: 29/29 years	Approached: NR Eligible: NR Enrolled: 279 Completed at 52 weeks: 253	Savage (2018) Baseline: 140 End: NR	Baseline: 139 End: NR

continued

TABLE E-1 Continued

Trial Name [Country]	Author Last Name, Year	Study Design	Study Objective	Inclusion and Exclusion Criteria	Recruitment	Population Characteristics	Number of Individuals Approached and Completed the Intervention	Number of Participants in Intervention Group	Number of Participants in Comparator Group
	Hohman et al. (2017)	RCT	Determine whether a responsive parenting (RP) intervention affects infant dietary patterns.			*Reported as Intervention/Control* SES: $50,000 annual household income or above 83%/68% Education: college and postgrad 66%/65% Race: Black 5.4%/4.6% White 89.2%/92.3% Ethnicity: NH/PI 0.8%/0% Asian 3.1%/3.1% Other 1.6%/0% Hispanic 7%/6% Maternal age 29/29 years		Baseline: 145 End (completed 1-yr visit): 125 Final analysis: 129	Baseline: 146 End (completed 1-yr visit): 125 Final analysis: 130

Savage et al. (2016)	RCT	Examine the effect of a responsive parenting (RP) intervention on infant weight gain between birth and 28 wks and overweight status at age 1 yr.	SES: 72% fully employed Education: NR Race: Non-Hispanic 93% White 88% Ethnicity: NR Maternal age: NR	Approached with written consent: 316 Randomized: 291 Completed first visit: 279 Completed at 52 weeks: 253	Baseline: NR End: NR	Baseline: NR End: NR

continued

TABLE E-1 Continued

Trial Name [Country]	Author Last Name, Year	Study Design	Study Objective	Inclusion and Exclusion Criteria	Recruitment	Population Characteristics	Number of Individuals Approached and Completed the Intervention	Number of Participants in Intervention Group	Number of Participants in Comparator Group
Babys First Bites[3] [Netherlands]		Van Vliet et al. (2022)	RCT	Determine the effect of (1) promoting repeated exposure to a variety of vegetables, (2) promoting responding sensitively to child signals during mealtime, or (3) the combination of promotions on vegetable consumption and self-regulation of energy intake. Secondary outcomes were child anthropometrics and maternal feeding practices.	Emails sent to mothers with information about the study and a link to the study website. Mothers that were emailed signed up for the "Nutricia for parents" group or ordered a gift box containing baby merchandise from "WIJ Special Media."	SES: NR Education level: 47% master's degree Race: NR Ethnicity: NR Language spoken: 100% Dutch Maternal age: 31 yrs	Contacted: 5,565 Approached: NR Eligible: NR Enrolled: 243 Completed: 217	Baseline: RVE group (n = 60), VIPP-FI (n = 60), Combination (n = 60) Follow-up: RVE group 61% VIPP-FI62% Combination 60%	Baseline: n = 60 Follow-up: 63%

Family Spirit Nurture [United States]	Rosenstock et al. (2021)	RCT	Assess the impact of a brief home-visiting approach on sugar-sweetened beverage (SSB) consumption, responsive parenting, and infant feeding practices, and optimal growth through 12 mo postpartum.	Inclusion: Maternal age 13 yrs or older, self-reported race/ethnicity, mother to an infant <14 wks, and residence within 50 miles of the Northern Navajo Medical Center, located in Shiprock, New Mexico. Exclusion: Unable to fully participate or were unwilling to undergo randomization.	Mothers were recruited from the local pediatric clinic and WIC program as well as word of mouth.	SES: 84% not employed, 69% received help with groceries, 55% receiving SNAP or EBT, 45% receive WIC, 2% receive TANF, 55% report one or more financial hardships, 35% water insecure, 23% low or and very low food security Education level: 50% completed education beyond high school Race/ethnicity: 100% Navajo Language spoken: NR Maternal age: 27 yrs	Assessed for Eligibility: 369 Eligible: 151 Enrolled: 134 Completed: NR Follow up at 12 months: 123	Baseline: 68 End: NR Completed at least one follow-up: 66	Baseline: 66 End: NR Completed at least one follow-up: 63

continued

TABLE E-1 Continued

Trial Name [Country]	Author Last Name, Year	Study Design	Study Objective	Inclusion and Exclusion Criteria	Recruitment	Population Characteristics	Number of Individuals Approached and Completed the Intervention	Number of Participants in Intervention Group	Number of Participants in Comparator Group
Delta Healthy Sprouts [United States]	Tussing-Humphreys et al. (2019)	Two-arm parallel RCT	Determine the comparative impact of the standard Parents as Teachers (PAT) to the nutrition and physical activity enhanced version (PATE) of the perinatal educational curriculum on compliance with infant feeding recommen-dations and changes in maternal infant feeding knowledge and beliefs.	Inclusion: at least 18 yrs of age; <19 wks pregnant with first, second, or third child; singleton pregnancy; and resident of Washington, Bolivar, or Humphreys County in Mississippi. Exclusion: NR	Recruitment occurred via passive (flyers/brochures) and active (study staff onsite) methods at local health clinics and health fairs. Women were also referred by clinic staff, WIC nutritionists, social services, and other participants.	PATE/PAT Group SES: 30%/40% unemployed, 63%/87% receiving SNAP, 83%/93% receiving WIC Education level: 50%/40% high school or less Race: African American 96%/97% White 4%/3% Ethnicity: NR Language spoken: NR Maternal age: 24 yrs	Approached: 193 Eligible: NR Enrolled: 105 Completed: NR *Completed Follow-up: Pate group 21; PAT group 25*	PATE ARM PAT ARM Baseline: n = 39 End:26	PATE Control PAT Control Baseline: 43 End: 33

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— [United States]	LoRe et al. (2019)	Matched-pair RCT	Determine the efficacy of an interactive, home visiting curriculum tailored to low-socioeconomic status families in improving parental knowledge of pediatric nutrition and healthy lifestyle.	Inclusion: Parents at least 18 yrs old, have a child aged 13–16 mo without significant cognitive or physical impairments, and have a household income level below 200% of the federal poverty line. Exclusion: Parents with a graduate or professional degree, did not have legal custody or lived with child, or did not spend at least 2 full days per wk with child.	Participants were recruited through postings at day care centers, libraries, health clinics, local stores, public transportation, and community organizations serving low-income populations.	Intervention/control SES: all low-income (<200% of federal poverty line), >80% on WIC or LINK (not defined) 51%/47% employed Education level: 73%/78% less than associates degree Race: African American: 86%/82% non-Hispanic White: 4%/4% Ethnicity: NR Language spoken: NR Maternal age: 29 yrs (both groups)	Approached: NR Eligible: NR Enrolled: 104 Completed: NR	Baseline: 55	Baseline: 49

continued

TABLE E-1 Continued

Trial Name [Country]	Author Last Name, Year	Study Design	Study Objective	Inclusion and Exclusion Criteria	Recruitment	Population Characteristics	Number of Individuals Approached and Completed the Intervention	Number of Participants in Intervention Group	Number of Participants in Comparator Group
ECHO [United States]	Cloutier et al. (2018)	RCT	Test the feasibility of an ecologic approach to obesity prevention in children in the first yr of life.	Inclusion: Enrollment in Nurturing Families Network (NFN), English or Spanish-speaking, singleton birth >34 wks, no chronic conditions that could affect growth or development of the infant and residence in a BFF Center neighborhood at infants birth. Exclusion: Infants with major	Mother–newborn dyads were recruited from one of six low-income neighborhoods in Hartford, CT, served by a Brighter Future Family (BFF) Center linked to the NFN home visiting program. BFF centers were paired by SES and racial/ethnic composition and were randomly assigned to conduct either the standard NFN home visiting.	SES: 30% of participating neighborhoods had high poverty; 43% earned less than $15,000/year; 12% unemployed Education level: 40% < high school Race: 19% African American/Black Ethnicity: 60% Hispanic/Latino, 19% other, 2% unknown Language spoken: NR Maternal age: 23 yrs	Approached: 117 mothers (screened) Eligible: 49 dyads Enrolled: 47 dyads Successfully completed: 34 assessed at 12 mo	Baseline: 26 End: 22 Follow-up: NR	Baseline: 21 End: 12 Follow-up: NR

				malformations, admission to the NICU or a prolonged hospital stay or infants who were SGA and required special or supplemental nutrition.	program or the intervention NFN home visiting program				
BLISS [New Zealand]	Morison et al. (2018)	2-arm RCT	Determine whether food variety and perceived food preferences differ in infants following baby-led instead of traditional spoon-feeding approaches to introducing solids.	Inclusion: Book into the birthing unit at Queen Mary Maternity Hospital <34 wks gestation; speak English or Te Reo Māori; plan to live in the Dunedin, New Zealand,	All pregnant women booked in the Dunedin hospital were invited to participate.	*Reported by Intervention/Control* SES: NR Education level: 45%/53% university Race: NR Ethnicity: 79%/84% New Zealand European, 14%/10% Maori or Pacific, 7%/6% Asian Language spoken: NR Maternal age: 31 yrs (both groups)	Approached: 1,900 Potentially Eligible: 1,061 Eligible: 214 Enrolled: 206 Completed: 166	Baseline: 105 End (24 mo): 88	Baseline: 101 End (24 mo): 78

continued

TABLE E-1 Continued

Trial Name [Country]	Author Last Name, Year	Study Design	Study Objective	Inclusion and Exclusion Criteria	Recruitment	Population Characteristics	Number of Individuals Approached and Completed the Intervention	Number of Participants in Intervention Group	Number of Participants in Comparator Group
	Williams Erickson et al. (2018))	2-arm RCT	Determine the impact of modified BLW (i.e., Baby-Led Introduction to Solids; BLISS) on food and nutrient intake at 7–24 mo of age.	area until their child is at least 2 yrs; and is 16 yrs of age or older. Exclusion: Not living locally, mother ≤16 years, booked after 34 wks gestation; congenital abnormality, physical condition, or intellectual disability, likely to affect feeding or growth is identified.					
	Taylor et al. (2017)	2-arm RCT	Determine whether a baby-led approach to complementary feeding results in a lower body mass index than traditional spoon-feeding.						
POI [New Zealand]	Fangupo et al. (2015)	RCT	Assess the effect of prevention strategy interventions from 0 to 18 mo of age on	Inclusion: Women >15 yrs; are booked into the birthing unit at Queen Mary	Women booking into the Queen Mary Maternity Unit were eligible to	FAB + Combo/ Sleep + UC/ Sleep + Combo/ FAB + UC groups: 38%/36%/36%/38%	Assessed for eligibility: 2,946 Eligible: 1,458 Enrolled: 802 families 666 completed	FAB Baseline: 205 End: 171 Combo Baseline: 196	Baseline: 209 End: 182

food and nutrient intake, eating behaviors, and parental feeding practices in 18- to 24-mo-old children.	Maternity Unit, Dunedin Hospital, or are notified by their home birth LMC, < 34 wks gestation; are able to communicate in English or Te Reo Māori (Māori language); and are not planning to leave the local area prior to their child's second birthday Exclusion: Babies born before 36.5 wks, or if a congenital abnormality or a physical or intellectual disability likely to affect feeding, physical activity, or growth is identified.	participate. Families were enrolled by research nurses.	SES (New Zealand Deprivation Index Score): 38% / 36% / 36% / 38% low Education level: 67% / 64% / 64% / 67% university degree or higher Race: NR Ethnicity: 80% / 77% / 78% / 79% New Zealand European; all groups 8% Maori; 2% / 2% / 3% / 1% Pasifica; 10% / 12% / 11% / 11% other Language spoken: NR Maternal age: All groups 32 yrs		End: 154 Sleep Baseline: 192 End: 159

continued

TABLE E-1 Continued

Trial Name [Country]	Author Last Name, Year	Study Design	Study Objective	Inclusion and Exclusion Criteria	Recruitment	Population Characteristics	Number of Individuals Approached and Completed the Intervention	Number of Participants in Intervention Group	Number of Participants in Comparator Group
— [France]	Remy et al. (2013)	Experimental design	Compare learning mechanisms to increase vegetable acceptance in infants at complementary feeding, namely repeated exposure (RE), flavor–flavor learning (FFL), and flavor–nutrient learning (FNL); measure the stability of the learning effect; and examine the impact of infant's feeding history on vegetable acceptance.	Inclusion: Age between 4 and 8 mo, introduction of complementary foods was started at >2 wk and <2 mo before the start of the study, no health problems or food allergies at the beginning of the study, and gestational age of 36 wks or more. Exclusion: NR	Parents were recruited by leaflets or posters distributed in health professionals consulting rooms, pharmacies, and day-care centers.	SES: NR Education level: NR Race: NR Ethnicity: NR Language spoken: NR Maternal age: NR	Approached: 123 Eligible: 100 Enrolled: NR Completed: 95	FFL: Baseline: NR End: 31 2-wk follow-up: 31 3-mo follow-up: 30 6-mo follow-up: 30 FNL Baseline: NR End: 32 2-wk follow-up: 32 3-mo follow-up: 31 6-mo follow-up: 30	RE Baseline: NR End: 32 2-wk follow-up, 3-mo follow-up, 6-mo follow-up: all 32

— [Australia]	Wen et al. (2011)	RCT	Assess the effectiveness of a home-based early intervention on infant feeding practices and "tummy time" for infants in the first yr of life.	Inclusion: Women aged ≥16, expecting their first child, between 24–34 wks of pregnancy, able to communicate in English, and lived in the local area. Exclusion: Women with a severe medical condition as evaluated by their physician.	Pregnant women were approached by nurses at antenatal clinics of Liverpool and Campbelltown Hospitals.	Reported by intervention/control SES: 23%/19% unemployed Education level:- 54%/56% completed-HSC to TAFE certificate or diploma Race: NR Ethnicity: NR Language: 90%/88% speaking English, other 10%/12% Maternal age: 76%/76% < 30 yrs	Approached/potential sample: 2,700 women *(assessed for eligibility)* Eligible: 780 Enrolled: 667 women Successfully completed *(at the 12-mo mark):* 527 women	Baseline: 337 End: NR 6-mo follow-up:278 12-mo follow up: 268	Baseline: 330 End: NR 6-mo follow-up: 283 12-mo follow up: 259

continued

TABLE E-1 Continued

Trial Name [Country]	Author Last Name, Year	Study Design	Study Objective	Inclusion and Exclusion Criteria	Recruitment	Population Characteristics	Number of Individuals Approached and Completed the Intervention	Number of Participants in Intervention Group	Number of Participants in Comparator Group
— [United Kingdom]	Watt et al. (2009)	RCT	Assess whether monthly home visits from trained volunteers could improve infant feeding practices at age 12 mo, a RCT was carried out in two disadvantaged inner city London boroughs.	Inclusion: Women from Registrar General occupational classes II-V (nonprofessional); babies born ≥37 wks; birth weight >2,500 g; singletons; women able to understand English; and residents in the study area. (Eligibility was changed to all new mother due to recruiting difficulties) Exclusion: Women <17 yrs old; infants diagnosed with a serious.	Women were recruited from baby clinics located in more disadvantaged neighborhoods across Camden and Islington where Surestart programs existed.	Intervention/control SES: 52%/51% receive income support/jobseeker's allowance Education level: 39%/33% left full time education (<16 years) Race: NR Ethnicity: 50% White Language spoken: 100% English Maternal age: (at child birth) 29/31 yrs	Approached: 542 Eligible: 381 Enrolled: 312 Completed: 212	Baseline: 157 End (3 mo): 133 12-mo follow-up: 115 18-mo follow-up: 104	Baseline: 155 End (3 mo): 155 12-mo follow-up: 124 18-mo follow-up: 108

				medical condition or were on special diets; infants >12 wks; women or their partners were from social class I (professional)				
Other								
— [United States]	Harris et al. (2022)	RCT	Test the effects of counter-marketing videos addressing common misperceptions about ingredients and claims on children's sugary drinks.	Inclusion: NR Exclusion: NR	InnovateMR panel company recruited panel members from diverse online sources through ads on social media and special interest websites. Emails were sent to eligible panel members.	SES: 35% SNAP participants, 35% WIC participants (low-income) Education level: 27% high school or less Race: 33% Black, 46% White, 10% Asian, 8% mixed or other Ethnicity: 26% Hispanic Language spoken: NR Parental age: 69% 18–34 yrs	Approached: 1,330 Eligible: 665 Enrolled: 665 Completed: 600	Baseline: 334 End: 302	Baseline: 331 End: 298

continued

TABLE E-1 Continued

Trial Name [Country]	Author Last Name, Year	Study Design	Study Objective	Inclusion and Exclusion Criteria	Recruitment	Population Characteristics	Number of Individuals Approached and Completed the Intervention	Number of Participants in Intervention Group	Number of Participants in Comparator Group
— [New Zealand]	Rapson et al. (2022)	RCT: parallel group study	Test whether exposure to vegetables only during the first 4 wks of complementary feeding increases later vegetable acceptance compared with a control group receiving fruit and vegetables.	Inclusion: Born ≥37 wk, of normal growth/weight, had not started complementary feeding, and had no known food allergies/medical conditions. Exclusion: Starting complementary feeding before the trial commenced, development of medical concerns (e.g., allergies, reflux), wanting to follow baby-led weaning and control over the types of first foods fed, concerns regarding heel prick, too busy.	NR	SES: NR Education level: 90% university or higher Race: NR Ethnicity: NZ European and other 91%; Maori and Pacific Island 6%; Other 8% Language: NR Maternal age: 33 yrs	Approached: 282 Eligible: 214 Enrolled: 154 Successfully completed (including follow-up): 108	Baseline: 61 End: 56	Baseline: 56 End: 52

— [United States]	Cauble et al. (2021)	RCT— pilot feasibility trial	Assess a prenatal behavioral lifestyle intervention (PBLI) delivered via group-based phone counseling (GBPC) and its effectiveness on rates of breastfeeding up to 6 mo postpartum, rates of early introduction of solids, and infant feeding progression.	Inclusion: Pregnant 18–35 yrs olds, who were 9–30 wksin gestation with their first child or who had exclusively breastfed for less than 3 mo with a previous child. Exclusion: pregnancies conceived using fertility treatments, those at high risk for pre-term delivery, those with multiple gestation (i.e. twins, triplets, etc.), or pregnancies complicated by morbid obesity, diabetes, hypertension, metabolic dysfunction, etc.	Pregnant women were recruited from their OBGYN.	SES: 46% with annual income < or equal to $75K Education level: 66% associate's degree or higher Race:95% White Ethnicity: NR Language spoken: NR Maternal age: 26 yrs	Approached: 67 Eligible: 53 Enrolled: 45 Completed: 41	Baseline: 22 Follow-up: 20 2-wk follow-up: 19 2-mo follow-up: 19 4- & 6-mo follow-up: 19	Baseline: 23 Follow-up: 23 2-wk follow-up: 22 2-mo follow-up: 21 4- & 6-mo follow-up: 19

continued

TABLE E-1 Continued

Trial Name [Country]	Author Last Name, Year	Study Design	Study Objective	Inclusion and Exclusion Criteria	Recruitment	Population Characteristics	Number of Individuals Approached and Completed the Intervention	Number of Participants in Intervention Group	Number of Participants in Comparator Group
— [United States]	Johnson et al. (2021)	Cross-sectional observational study	Determine whether reducing bitterness by adding small amounts of sugar or salt would alter infant acceptance of kale purées.	Inclusion: Caregivers 18–51 yrs of age, could read and speak English, lived within 75 miles of the Children's Eating Laboratory in Aurora, CO. Infants between 6–24 mo of age, term (≥37 wk gestation), had experienced at least 1 complementary food, and did not have food allergies or genetic or metabolic disorders that could affect food intake. Exclusion: NR	A university listserv, flyers posted on campus and in the community, posts on social media, using a listserv created from previous studies in which participants had agreed to be recontacted, and participant referrals between September 2018 and April 2019.	SES: household income level more than $60,570 (51%) Education level: 90% college grad/post grad Race: 82% White, 18% other Ethnicity: 8% Hispanic/Latin, 92% non-Hispanic White Language: NR Parental age: 94% were female with 74% of all parents aged 30–49 yrs	Approached: 113 Eligible: 109 Enrolled: 109 Successfully completed: 106 (analyzed)	NR	No comparator group

— [Germany]	Kalhoff et al. (2021)	RCT	Test whether preserving the taste of the ingredients of commercially prepared complementary foods would increase the acceptance of new foods, especially vegetables.	Inclusion: Parents: at least 18 yrs old, good German language skills; Infants were healthy term, 0 to 3 mo, no known allergies or food related intolerances. Exclusion: NR	Families with infants in maternity hospitals or in postnatal courses in the Dortmund region, Germany. Parents were informed about the study. Written informed consent was obtained, if they wanted to participate and to feed their baby according to the recommended schedule.	Intervention group/ control group SES: NR Education level: 8/25 and 4/26 mothers with secondary Race: NR Ethnicity: NR Language: NR Maternal age: 30 or younger (7/26 mothers); >30 (13/19 mothers)	Approached: NR Eligible: 670 Enrolled: 72 Successfully completed: 51	Baseline: 36 mothers End: 25	Baseline: 36 mothers End: 26

continued

TABLE E-1 Continued

Trial Name [Country]	Author Last Name, Year	Study Design	Study Objective	Inclusion and Exclusion Criteria	Recruitment	Population Characteristics	Number of Individuals Approached and Completed the Intervention	Number of Participants in Intervention Group	Number of Participants in Comparator Group
— [South Korea]	Ra (2021)	Pre–post test design with non-equiv-alent control group.	Evaluate a mobile-based maternal feeding education program for overweight prevention in infants based on breastfeeding attitude, self-efficacy, and duration, recognition of hunger and satiety cues, and knowledge regarding providing solids foods.	Inclusion: Mothers who gave consent to participate, primary caregivers; infants born >37 wks and weighing >2,500 g at birth. Exclusion: Mothers with twin infants, infants with congenital deformities (e.g., cleft palate) or other health issues related to feeding difficulties. If mother participated in other feeding education programs for overweight prevention in infants within 1 yr of this study.	First time pregnant mothers with more than 36 weeks gestational age were recruited from two obstetrics and gynecology clinics.	*Reported by intervention/ control* SES: 73%/79% perceived SES as middle-income (not defined) Education level: 93%/71% 2 or 4-yr college Race: NR Ethnicity: NR Language spoken: NR Maternal age: 32/31 yrs	Approached: 33 Eligible: 33 Enrolled: 33 Completed: 29	Baseline: 19 End: 15	Baseline: 14 End: 14

Food4 Toddlers [Norway]	Roed et al. (2021)	2-arm RCT	Determine the effect of the Food4toddlers eHealth intervention, which aimed to enhance toddlers' diets by shaping their food and eating environment.	Inclusion: Parents had to have a child born between August 2016 and April 2017 and the parents had to be literate in Norwegian. Exclusion: NR	Participants were recruited through Facebook (short video with a link to the project website).	SES: NR Education level: 45% 4 yrs of college or less Race: NR Ethnicity: 86% born in Norway Language spoken: NR Paternal age: 32 yrs	Approached: 404 Eligible: NR Enrolled: 298 Completed (follow-up 2 n used): 174	Baseline: 148 End: 144 Follow-up 2: 84	Baseline: 150 End: 147 Follow-up 2: 90
	Roed et al. (2020)	2-arm RCT	Conduct a process evaluation of Food4toddlers eHealth intervention targeting food environment, parental feeding practices, and toddlers' diet and to examine possible differences in these areas according to education and family composition.						

continued

TABLE E-1 Continued

Trial Name [Country]	Author Last Name, Year	Study Design	Study Objective	Inclusion and Exclusion Criteria	Recruitment	Population Characteristics	Number of Individuals Approached and Completed the Intervention	Number of Participants in Intervention Group	Number of Participants in Comparator Group
— [France]	Tournier et al. (2021)	Pilot experimental inter-vention with prospective follow-up.	Test if providing extended recommendations (compared to current national recommendations) to mothers when their infant was between 8 and 15 mo old would result in a higher exposure to textured foods and a higher food texture acceptance by their infant.	Inclusion: Parents >18 yrs old. Children in good health (no food allergy, tube feeding, chronic disease, or gastroesophageal reflux requiring medication), >37 wks and >3 kg. Exclusion: Children introduced to complementary foods before 4 mo or after 6 mo, using the baby-led weening method, and those already involved in another study on eating behavior.	Flyers distributed in maternity wards, pediatric offices, day care centers, an internal consumer database via a local recruitment agency.	*Reported by Intervention/Control* SES: NR Education level: 23%/23% mothers with HS diploma at most Race: NR Ethnicity: NR Language: NR Maternal age: 32/32 yrs (mean)	Approached: 69 Eligible: 64 Enrolled (actual start of intervention): 61 Successfully completed at 15 mo Follow-up: 60	Baseline: 31 End: NR	Baseline: 30 End: NR

— [Australia]	Wen et al. (2020)	Three-group RCT	Determine the effectiveness of either nurse-led telephone or SMS support in improving infant feeding practices and tummy time and reducing screen time.	Inclusion: Aged 16 yrs or older, between wks 24 and 34 of pregnancy, able to communicate in English, had a mobile phone, and lived in the recruitment areas. Exclusion: NR	Pregnant women were recruited by research assistants at antenatal clinics with a letter of invitation.	SES: 55% > or equal to $80,000 household income 62% employed (included paid/unpaid maternity leave) Education level: 66% university Race: NR Ethnicity: NR Language spoken: 54% English, 46% Other Maternal age: 85% above 25-39 years	Approached: 4,429 Eligible: 3,217 Enrolled: 1,498 Randomized: 1,155 Follow-up completed at 6 months: 947 Follow up completed at 12 months: 920	Baseline telephone: 386 6-mo follow-up: 293 12-mo follow-up: 286 Baseline SMS: 384 6-mo follow-up: 338 12-mo follow-up: 322	Baseline: 385 6-mo follow-up: 316 12-mo follow-up: 312

continued

TABLE E-1 Continued

Trial Name [Country]	Author Last Name, Year	Study Design	Study Objective	Inclusion and Exclusion Criteria	Recruitment	Population Characteristics	Number of Individuals Approached and Completed the Intervention	Number of Participants in Intervention Group	Number of Participants in Comparator Group
Early Food for Future Health [Norway]	Helle et al. (2019b)	RCT	Evaluate the effects of an eHealth intervention on parental feeding practices and infant eating behaviors.	Inclusion: Parents eligible to participate in the study if they had a 3–5 mo old infant, were literate in Norwegian and responsible for providing food to their infant. Exclusion: NR	Parents were recruited through Facebook advertising and through emailing Norwegian municipalities child health clinics.	Intervention/control at baseline SES: NR Education level: 83%/80% college/university degree Race: NR Ethnicity: NR Language spoken: 7%/8% not Norwegian as native language Maternal age: 31/30 yrs	Approached: 1,010 Eligible: 960 Enrolled: 715 Completed T2 (child age 12 mo): 455 Completed T3 (child age 24 mo, 1 yr of cessation of intervention): 295	Baseline: 360 End T2: 236–269 End T3: 152–178	Baseline: 358 End T2: 219–264 End T3: 143–165
	Helle et al. (2019a)	RCT	Evaluate the effects of the intervention at child age 24 mo, 1 yr after cessation.						

OTIS [Sweden]	Johansson et al. (2019)	RCT	Study effects of a systematic introduction of taste portions and a novel protein-reduced complementary diet based on Nordic foods on fruit and vegetable intake, growth and iron status to 9 mo of age.	Inclusion: Healthy, singleton infants, 4–6 mo of age >37 wks and >2,500 g living in Umeå and remain in the study area and would not commence Child care outside the home. Exclusion: Chronic illnesses that would affect nutrient intake or outcomes; iron deficiency or any other biochemical abnormality, or started complementary feeding at the time of recruitment.	Singleton parents recruited by letter.	SES: 78%/77% annual household income between 20-49.9 Euros Education level: 71%/67% university Race: NR Ethnicity: (of mother) 98%/95% Sweden Language spoken: NR Maternal age: 31 yrs (both groups)	Approached: 2,504 Eligible: NR Enrolled: 250 Completed: 232	Baseline: 125 End: 111	Baseline: 125 End: 121

continued

TABLE E-1 Continued

Trial Name [Country]	Author Last Name, Year	Study Design	Study Objective	Inclusion and Exclusion Criteria	Recruitment	Population Characteristics	Number of Individuals Approached and Completed the Intervention	Number of Participants in Intervention Group	Number of Participants in Comparator Group
— [United Kingdom]	Coulthard et al. (2014)	Quasi-ex-peri-mental.	Examine the effectiveness of different vegetable exposure methods over a 9-day period in two groups of infants: those introduced to solids prior to the age of 5.5 mo, and those introduced after 5.5 mo as is recommended.	Inclusion: Infants had to be healthy, full term, had been breast fed from birth and had been breastfed exclusively until the age of introduction of complementary feeding. Exclusion: Infants who had eaten peas, were not exclusively breast fed until complementary feeding, had been weaned earlier than anticipated or were being weaned directly onto finger foods (baby-led weaning).	Parent-infant dyads were recruited from children's centers, playgroups, and post-natal groups.	SES: NR Education level: 16 yrs Race: NR Ethnicity: NR Language spoken: NR Maternal age: early introduction: 31 yrs; later introduction: 34 yrs	Approached: 77 Eligible: 60 Enrolled: 60 Completed: NR	[early introduction] Baseline: 29 End: NR	[late introduction] Baseline: 31 End: NR

— [United Kingdom]	Owen et al. (2018)	Three group RCT	Investigated whether parents' attempts to introduce fruit and vegetables through repeated taste exposure were helped by prior visual familiarization to foods—specifically, looking at picture books about foods immediately before these were offered to children to taste.	Inclusion: NR Exclusion: NR	Recruited from the University's Child Development Group's database, advertisements placed on parenting websites, and flyers placed in local nurseries.	SES household income indicator (% £50k+ pa): (VBG: 50%; FBG: 55%; 42%) Education level (% with degree): (VBG: 48%/ FBG: 60%/ CG: 59%) Race: 83%/86%/82% White British Ethnicity: NR Language spoken: NR Maternal age: NR	Approached: NR Eligible: NR Enrolled: 127 End: 105 Follow-up: 78	Fruit book group/ veggie book group Baseline: 42/46 End: 34/36	Baseline: 39 End: 35
— [Norway]	Beinert et al. (2017)	RCT	Examine the long-term effect on toddlers' fruit and vegetable intake and sweet beverages, and skepticism for new food, of a 2-days' intervention on how to prepare homemade food for toddlers.	Inclusion: NR Exclusion: NR	Parents were recruited through health care centers.	*Reported by Intervention/Control* SES: NR Education level: 89%/80% some college or more Race: NR Ethnicity: NR Language spoken: NR Maternal age: 30/31 yrs	Approached: NR Eligible: NR Enrolled: 110 Completed: NR	Baseline: 56 End: NR 15 mo: 44 24 mo: 40	Baseline: 54 End: NR 15 mo: 27 24 mo: 24

continued

TABLE E-1 Continued

Trial Name [Country]	Author Last Name, Year	Study Design	Study Objective	Inclusion and Exclusion Criteria	Recruitment	Population Characteristics	Number of Individuals Approached and Completed the Intervention	Number of Participants in Intervention Group	Number of Participants in Comparator Group
— [United States]	Mennella et al. (2017)	RCT	Determine the effects of the timing and duration of eating a variety of vegetables during breastfeeding on the liking of vegetables in both members of the dyad.	Inclusion: A healthy, term, singleton birth; an establishment of lactation with the intention to exclusively breastfeed for >4 mo; and no reported allergies to fruit or vegetables. Exclusion: NR	Pregnant women or newly parturient women were recruited from advertisement in local newspapers, websites, and Philadelphia Women, Infants, and Children offices.	*Reported by 0.5–1.5/1.5–2.5/2.5–3.5/0.5–3.5 months/control* SES: 65%/47%/50%/71%67% household income >$50,000 Education level: 76%/67%/50%/71%/67% college Race: African American: 18%/40%/29%/21%/27% Caucasian: 59%/47%/43%/64%/60% Asian: 0%/7%/0%/0%/7% More than one: 24%/7%/29%/14%/7% Ethnicity: NR Language spoken: NR Maternal age: 33/31/30/32/32 yrs	Approached: NR Eligible: NR Enrolled: 97 Completed: NR	Exposure 0.5–1.5 mo Baseline: NR End: 17 Exposure 1.5–2.5 mo Baseline: NR End: 15 Exposure 2.5–3.5 mo Baseline: NR End: 14 Exposure 0.5–3.5 mo Baseline: NR End: 14	Baseline: NR End: 15

— [Norway]	Øverby et al. (2017)	RCT	Evaluate if a two-day course for parents on nutrition and applied baby food preparation influenced child's intake of home-made foods, lipid concentration, and vitamin D status.	Inclusion: NR Exclusion: NR	Parents attending 6-mo check-up at four health care clinics were invited to participate.	*Intervention group/ control group* SES: NR Education level: maternal (17 years or more) 87%/ 90% Race: NR Ethnicity: NR Language spoken: NR Maternal age: 30/ 31 yrs (mean)	Approached: 143 Eligible: NR Enrolled: 110 End: 59	Baseline: 56 End (12-mo follow-up): 39	Baseline: 54 End (12-mo follow-up): 20
— [United Kingdom]	Hether-ing-ton et al. (2015)	Exploratory trial	Test the effects of providing vegetables step-by-step in milk and then in cereal during complementary feeding on intake and liking of pure vegetables; investigate the acceptability of this strategy among mothers.	Inclusion: NR Exclusion: Infants under the age of 12 wks were not able to participate but could be part of the study after this time; infants with a chronic health condition that required medication, born prematurely before 37 wks of gestation, fed hydrolysed-protein formula, or had a known food allergy.	Advertising in the local community within mother and baby groups and a recruitment agency.	SES: NR Education level: 43% below university Race: NR Ethnicity: NR Language: NR Maternal age: 32 yrs (average)	Approached: NR Eligible: 40 mothers Enrolled: 40 Successfully completed: 35	Baseline: 20 End: 17 Follow-up (6 mo): 15 Follow-up (18 mo): 11	Baseline: 20 End: 18 Follow-up (6 mo): 16 Follow-up (18 mo): 3

continued

TABLE E-1 Continued

Trial Name [Country]	Author Last Name, Year	Study Design	Study Objective	Inclusion and Exclusion Criteria	Recruitment	Population Characteristics	Number of Individuals Approached and Completed the Intervention	Number of Participants in Intervention Group	Number of Participants in Comparator Group
— [Netherlands]	Barends et al. (2014)	Longi-tudinal intervention study.	*Follow-up study*-to examine whether the group that started weaning with vegetables continued eating more vegetables than the group that started weaning with fruits.	Inclusion: Met criteria of previous 19-day study (same study cohort). Exclusion: NR	Recruited for this follow-up study via a previous 19- day intervention study; parents completed informed consent at baseline.	*Reported by intervention (veggie) vs comparator (fruit):* SES: (reported mean or median)- NR Education level: High- 40%/ 48% Race: NR Ethnicity: NR Language: NR maternal age- 31/32 yrs	Approached: NR Eligible: NR Enrolled: 101 parent–infant pairs Successfully completed: NR	Baseline: 51 End: NR Follow-up: NR	Baseline: 50 End: NR Follow-up: NR

Barends et al. (2013)	Longi-tudinal intervention study	investigated the effects of repeated exposure to either vegetables or fruits on an infant's vegetable and fruit acceptance during the first 18 days of weaning	Inclusion: healthy infants between 4 and 7 months old, who were not being weaned yet Exclusion: infants with known food allergies, swallowing or digestion problems, or other medical problems that could influence the ability to eat	Recruited from the area of Wageningen and Almere in the Netherlands where both the research locations were via local newspapers, maternity or infant welfare centers, postnatal care groups, and a mailing to subscribers of babyinfo.nl (a Dutch advertisement website that gives a box with free products for subscribers expecting a baby)	*Green bean group/artichoke/apple/plum* SES: NR Education level: High 58%/ 44%/ 38%/ 63% Race: NR Ethnicity: NR Language: NR Maternal age: 31/30/21/32	Approached: NR Eligible: NR Enrolled: 101 parent–infant pairs Successfully completed: NR	*Green bean group/artichoke/apple/plum* Baseline: 24/27/24/24 End: NR Follow-up: NR	NR

continued

TABLE E-1 Continued

Trial Name [Country]	Author Last Name, Year	Study Design	Study Objective	Inclusion and Exclusion Criteria	Recruitment	Population Characteristics	Number of Individuals Approached and Completed the Intervention	Number of Participants in Intervention Group	Number of Participants in Comparator Group
— [France, Germany]	Maier et al. (2008)	Experimental	Examine effects of breast or formula feeding and experience with different levels of vegetable variety early in weaning on new food acceptance during 2 mo following the start of weaning.	Inclusion: Mothers with infants having no illness or allergy who had not begun to give vegetables. Exclusion: NR	Flyers posted at local hospitals, pediatric practices, day care centers, and nurseries, asking them to contact the team by telephone if interested to participate in a study of infant feeding practices. Consent form completed by mother.	In Dijon: (average taken for BF group/formula fed (FF) group at baseline SES: NR Education level: NR Race: NR Ethnicity: NR Language: NR Maternal age: 29/30 yrs In Aalen: (average taken for BF group/formula fed (FF) group at baseline SES: NR Education level: NR Race: NR Ethnicity: NR Language: NR Maternal age: 30/30 yrs	Approached: NR Eligible: NR Enrolled: 147 mother–infant pairs participated in phases A and B (in both locations);143 in phase C	Breast-fed group Baseline: 45 infants (Dijon) and 38 (Aalen) End: NR	Formula-fed group Baseline: 27 infants (Dijon) and 37 (Aalen) End: NR

— [United States]	Mennella et al. (2008)	Experimental	First study: examine the effects of repeated dietary experience with either one fruit or a variety of fruits on infants' acceptance of pears and green beans. Second study: determine whether different dietary variety experiences affect infants' acceptance of the target vegetables.	Inclusion: Healthy infants with at least 2 wks of experience eating cereal or fruit from a spoon and little experience with the target fruits and vegetables. Exclusion: NR	Mothers with infants ages 4–9 mo were recruited from advertisements in local newspapers and from WIC programs in Philadelphia, PA.	SES: NR Education level: NR Race: 55% Black; 30% White Ethnicity: 3% Hispanic/Latin, 12% other or mixed Language spoken: NR Maternal age: 26 yrs	Approached: NR Eligible: NR Enrolled: 74 infants total (*Study 1: 39 infants; Study 2: 35)* Successfully completed: 60 *Values here include both studies.*	Study 1: Baseline: 20 infants End: NR Study 2: Baseline: GBG 11; BM-WM 12 End: NR	Study 1: Baseline: 19 infants End: NR Study 2: Baseline: BM Variety 12 End: NR

continued

TABLE E-1 Continued

Trial Name [Country]	Author Last Name, Year	Study Design	Study Objective	Inclusion and Exclusion Criteria	Recruitment	Population Characteristics	Number of Individuals Approached and Completed the Intervention	Number of Participants in Intervention Group	Number of Participants in Comparator Group
— [United States]	Forestell and Mennella (2007)	Experimental	Evaluate the effects of breastfeeding and dietary experiences on fruit and green vegetable acceptance by 4- to 8-mo-old infants.	Inclusion: Only infants who had been weaned to cereal but had little experience with vegetables and fruits. Exclusion: NR	Mothers of infants ages 4–8 mo old were recruited through advertisements in local newspapers, breastfeeding support groups, and WIC in Philadelphia, PA.	SES: 44% (20/45) WIC participants Education level: 27%-with some college education Race: 36% Black, 46% White Ethnicity: % Asian, 7% Hispanic/Latino, % Indigenous, 11% mixed/other Language: NR Maternal age: 32 yrs for GB group and 32 yrs for GB+P group	Approached: NR Eligible: NR Enrolled: 45 Successfully completed: NR	GB group Baseline: 16 End: NR Follow-up: NR	GB-P group Baseline: 29 End: NR Follow-up: NR
— [Germany]	Koehler et al. (2007)	RCT	Examine the effects of nutritional counseling for the infant diet focused on complementary feeding and total diet by use of dietary scores.	Inclusion: mothers speak German, be available by telephone, and provide written informed consent of participation. Infants were good health, full-term birth (>37 wks of pregnancy), and birth weight exceeding >2,500 g. Exclusion: NR	Mothers were recruited and enrolled from maternity wards and through nationwide health insurance company.	SES: NR Education level: 61% "high" Race: NR Ethnicity: NR Language spoken: NR: Maternal age: 67% 30 yrs or older	Approached: NR Eligible: 727 Consented: 235 Enrolled: 183 End: NR	IG1 Baseline: 55 IG2 Baseline: 40 IG3 Baseline: 47	Baseline: 41

— [United States]	Krebs et al. (2006)	RCT	Assess the feasibility and effects of consuming either meat or iron-fortified infant cereal as the first complementary food.	Inclusion: the infants were required to be healthy, born at term with birth weights appropriate for gestational age, and to be exclusively breastfed and receiving no routine vitamin or mineral supplements. Exclusion: NR	Advertisements in physicians' offices and parenting newsletters and word of mouth.	SES: NR Education level: NR Race: NR Ethnicity: NR Language spoken: NR Maternal age: NR	Approached: NR Eligible: NR Enrolled: 88 Completed: 72	Baseline: 46 End: NR Follow-up: NR	Baseline: 42 End: NR Follow-up: NR
— [Canada]	Verrall et al. (2006)	Prospective process evaluation	Evaluate innovative communication strategies promoting iron nutrition for infants at risk for iron deficiency anemia in a northern Aboriginal community.	Inclusion: NR Exclusion: NR	Survey/Questionnaires responders post intervention recruited from telephone list provided by health care offices.	SES: NR Education level: NR Race: NR Ethnicity: 100% Cree Language spoken: NR Maternal age: NR	Approached: 70 Eligible: NR Enrolled: 45 Completed: 45	Baseline: 45 End: 45	NR

continued

TABLE E-1 Continued

Trial Name [Country]	Author Last Name, Year	Study Design	Study Objective	Inclusion and Exclusion Criteria	Recruitment	Population Characteristics	Number of Individuals Approached and Completed the Intervention	Number of Participants in Intervention Group	Number of Participants in Comparator Group
— [Canada]	Verrall and Gray-Donald (2005)	Cross-sectional	Evaluated the impact of a food-based approach in promoting iron-rich complementary feeding for mothers with infants at-risk for iron deficiency anemia (IDA).	Inclusion: NR Exclusion: NR	Survey/question-naires responders post intervention recruited from telephone list provided by health care offices.	Time period 1/2 SES: Employed 28%/27% Education level: 10/9 yrs Race: NR Ethnicity: 100% Cree Language spoken: NR Maternal age: 24/28 yrs	Approached: 126 Eligible: 96 Enrolled: 54 Complete: NR	Time period 1: Baseline: 32 End: NR	Time Period 2: Baseline: 22 End: NR

TABLE E-2 Intervention Description

Trial Name [Country]	Author Last Name, Year	Intervention Description	Intervention Location	Intervention Type	Intervention Mode	Intervention Delivered by	Intervention Duration/Intensity	Theoretical Framework Cited
Health Care								
INFANT [Australia]	Zheng et al. (2022) Hesketh et al. (2020) Spence et al. (2014) Cameron et al. (2014) Spence et al. (2013) Campbell et al. (2013)	Intervention (4 to 18 mo): educational strategies including brief didactic sessions, use of group discussion and peer support, exploration of perceived barriers, use of visual and written messages, follow-up delivery of messages mail-outs. All educational concepts will be developed iteratively, that is, messages will be repeated and expanded upon over the course of the intervention. Follow up (2 and 3.5 yrs): parents completed questionnaire before home visit, researchers visited each participant's home to collect child anthropometric data, physical activity data, and collect questionnaires. Dietary recalls were conducted at unscheduled times following the home visit.	Maternal and child health centers	Live; remote tech-interactive; remote tech non-interactive Multifaceted Counseling (individual and peer)	(Verbal) didactic sessions, group discussion and peer support, exploration of perceived barriers, visual and written messages, follow-up mail.	Dietician	Number of contacts/duration of Visits: six 2-hr sessions delivered at 3-mo intervals during the regular meeting time of the first-time parents' group. Duration of full Intervention: 15 mo; follow-up occurred at 2 yrs and 3.5 yrs post-intervention.	Parenting support theory; social cognitive theory; anticipatory guidance framework

continued

TABLE E-2 Continued

Trial Name [Country]	Author Last Name, Year	Intervention Description	Intervention Location	Intervention Type	Intervention Mode	Intervention Delivered by	Intervention Duration/Intensity	Theoretical Framework Cited
— [Italy]	de Franchis et al. (2022)	Children were weaned with a Mediterranean diet schema using only fresh foods appropriately adapted to infants (smoothie or crashed foods). Fruit and vegetables were proposed as purée and various kinds of fresh blue fish were proposed at 7 mo. Mothers were encouraged to cook in a tasty way and to taste food before offering it to the kid. They also received a reinforcing message on nutritional education toward the Mediterranean diet at each pediatric visit.	Pediatric visit	Live; remote tech non-interactive Multi-faceted Education, counseling; tasting opportunities	Feeding experience Communication (written)	Pediatrician	Duration/intensity not described well. Reinforcement lasted 5 minutes at the end of the clinical visit. Adherence described and may give a sense of intensity.	NR
GeliS [Germany]	Hoffmann et al. (2021)	Participants received counselling on adequate gestational weight gain based on IOM recommendations and the importance of a healthy antenatal lifestyle in relation to optimal offspring development during childhood. Women were also provided information on the introduction of complementary foods, infant hunger and satiety signals and infant feeding practices according to recommendations.	Prenatal visits and on postpartum visit	Live; remote tech non-interactive Single counseling	Communication (verbal, written) Resources (pedometer, list of local exercise programs)	Previously trained midwives, gynecologists or medical staff	Three antenatal face-to-face counselling session (~wk 15, ~wk 18, ~wk 32) and one postpartum face-to-face counseling session (6–8th wk postpartum). Each session was 30–45 minutes.	NR

BBOFT [Netherlands]	Vlasblom et al. (2020)	BBOFT+ intervention provides targeted education and guidance of parents. At well child visits, care professionals used a booklet which contained illustrations of parents and children performing desired behaviors and age-appropriate items. Intervention consisted of building a positive relationship, risk assessment, introducing booklet, asking parents what booklet items they would like to focus on, providing that information.	Well child visit	Live: Remote tech non-interactive multifaceted: counseling; education	Communication (written); visuals	N/A	8 to 11 contacts in the first yr, 5 total in the second yr.	Social learning theory
	van Grieken et al. (2017)	The eHealth module provides customized advice regarding health behaviors for preventing overweight (promote breakfast consumption, stimulate exercise, discourage sweetened beverages, discourage TV) Parents were invited to complete eHealth module 1 mo before 18 and 24 mo well child visit. The module included tailored advice and developing an implementation-intention plan. The plan was discussed with the care team at the well child visit. Follow-up email with advice was sent.	Well child visit; internet		Website; communication (verbal)	Physician, nurse, and assistant	1 mo prior to well child visit parents prompted to visit the website. They attended the visit. Then 1 mo later received a reminder including tailored advice. Occurred at 18 mo and 24 mo	Theory of planned behavior; social cognitive theory; information processing theories (e.g., McGuire communication model); social ecological model.

continued

TABLE E-2 Continued

Trial Name [Country]	Author Last Name, Year	Intervention Description	Intervention Location	Intervention Type	Intervention Mode	Intervention Delivered by	Intervention Duration/Intensity	Theoretical Framework Cited
Starting Early Program [United States]	Messito et al. (2020)	The main intervention components were individual nutrition counseling in prenatal and postpartum periods and nutrition and parenting support groups (NPSG) coordinated with well-child visits. NPSG addressed feeding (responsive feeding, age-appropriate healthy foods, portion sizes, etc.), activity, and parenting (family meals, soothing without feeding). Consistent groups of 4–8 families were seen together from 1 mo to 3 yrs. Picture based plain language handouts and two nutrition education DVDs were provided.	Pediatric visit	Live; remote-live; remote tech non-interactive Multi-faceted counseling (one on one); other (support group)	Communication (verbal and written); media (DVD)	Registered dietitian that was a certified lactation consultant	Two individual counseling sessions (3rd trimester and peripartum period) and 5 peer-support group sessions at 1, 2, 4, 6, and 9 mo well child visits	Social learning theory
— [Israel]	Globus et al. (2019)	Four 2-hr training sessions were delivered in small subgroups of 8–12 dyads. All groups were trained by the same clinical dietitian and social worked when infants were 4–6 mo. An internet-based forum was also set up where facilitators provided written information and to respond to maternal requests based on needs until the infant was 12 mo.	Social worker clinic	Live; remote tech non-interactive Multi-component intervention: educational (group and individual); counseling	Communication (verbal, written), visuals (handouts)	Dietician and social worker	Occurring weekly—four 2-hr training sessions were delivered in small subgroups of 8 to 12 dyads	Attachment theory

		The first part of the session was led by the dietitian focusing on nutritional issues and the second part was led by the social worker focusing on parent-child feeding relationships. Each part incorporated psycho-educational material through discussion and films, in addition to actual exercises and real-time feeding practice. Outcome data collected via questionnaire at 12 mo of age.						
PROBIT [Italy]	Morandi et al. (2019)	"Intervention pediatricians" were trained to provide parents with standardized oral and written information concerning protective practices at all routine visits (1, 3, 6, 12, and 24 mo of age).	Health hcare visits	Live; remote tech non-interactive Multifaceted; counseling, education	Communication (verbal and written)	Trained or control pediatrician	2 yrs (5 routine pediatric visits)	NR

continued

TABLE E-2 Continued

Trial Name [Country]	Author Last Name, Year	Intervention Description	Intervention Location	Intervention Type	Intervention Mode	Intervention Delivered by	Intervention Duration/Intensity	Theoretical Framework Cited
LIMIT [Australia]	Dodd et al. (2018) Dodd et al. (2014)	Women randomized to lifestyle advice participated in a dietary and lifestyle intervention over the remainder of their pregnancy: components included a combination of dietary, exercise, and behavioral strategies. Individualized dietary advice included maintaining a balance of carbohydrates, fat, and protein and to reduce intake of foods high in refined carbohydrates and saturated fats, while increasing intake of fiber and promoting consumption of two servings of fruit, five servings of vegetables, and three servings of dairy each day; also completed goal setting during sessions; also included a PA component. Follow-up: conducted 18 mo after birth After ethics approval and after obtaining informed parental consent.	NR *(but met for planning sessions with dietician for some in-person meetings; some through telephone but location not specified)*	Live; remote-live multifaceted antenatal counseling (individual)	Communication (in-person, telephone)	Research dietician and trained research assistants	Number of contacts/duration of visits: planning session had information reinforced during subsequent inputs provided by the research dietician (at 28 wks' gestation) and trained research assistants (via telephone call at 22, 24, and 32 wks gestation and a face-to-face visit at 36 wks' gestation. (5 interactions total, *duration of each visit not reported*) Duration of full intervention: NR	NR

Grow2 Gether [United States]	Fiks et al. (2017)	Intervention participants joined a private Facebook peer group for mothers and focused on healthy parenting and infant growth. Four separate peer groups (9–13 women) were formed and each group was facilitated by a psychologist. The curriculum included infant feeding practices (11 wks) sleep (7 wks) positive parenting (12 wks: 4 activity, 4 parenting expectations, 4 infant cues and calming) and maternal well-being (8 wks). Facebook group was structured around video-based curriculum (posted weekly through 6 mo and bi-weekly 6–9 mo) and encouraged participant interaction. Information also provided in written posts.	Facebook group and two in-person meetings (prenatally for introductions and setting of ground rules and once at 4 mo of age) (unsure location).	Live; remote tech non-interactive Multi-faceted: education, other (peer support); counseling.	Video media, website, written materials, some in-person.	Psychologist	Run-in period where participants received and responded to weekly texts containing pregnancy advice. Two in-person meetings and access to Facebook group/lessons for 11 mo—2 mo prenatal to facilitate bonding before delivery and continued to 9 mo of age. 11 wks of infant feeding curriculum and 12 wks of positive parenting curriculum.	NR

continued

TABLE E-2 Continued

Trial Name [Country]	Author Last Name, Year	Intervention Description	Intervention Location	Intervention Type	Intervention Mode	Intervention Delivered by	Intervention Duration/Intensity	Theoretical Framework Cited
NOURISH [Australia]	Magarey et al. (2016) Daniels et al. (2015) Daniels et al. (2014) Daniels et al. (2013) Daniels et al. (2012)	Intervention was a comprehensive skills-based program which focused on feeding and parenting practices that mediate children's early feeding experiences. Intervention included interactive group sessions (12) co-led by a dietitian and psychologist and included two modules (Module 1: establishing solid feeding including variety and texture, neutral repeated exposure to healthy foods, limited exposure to non-core foods and realistic expectations of growth and nutritional requirements) (Module 2: promote development of a positive feeding environment and managing toddler eating behavior in the context of increased autonomy. Encourages structured food choice and eating pattern, positive role modelling and avoidance of coercion, use of rewards, and emotional feeding).	Existing child health clinic	Live; remote tech non-interactive Multifaceted; education (group interactive sessions), counseling	Communication (verbal and written)	Dietitian and psychologist with standardized training	12 fortnightly group sessions (10–15 caregivers per group) co-led by dietitian and psychologist [each 1–1.5 hrs] Module 1 was 3 mo in length.	Social cognitive theory, anticipatory guidance; attachment theory

Growing Leaps and Bounds [United States]	Schroeder et al. (2015)	Intervention was based on Growing Leaps and Bounds modules (educational materials aimed to promote exchange between patient and pediatrician about nutrition feeding and activity, providing parents with information to enhance self-efficacy, helping parents make heathy food choices for the infants and themselves. 12 sets of educational brochures were designed to be presented and discussed with caregivers at pediatric visits (age 1, 2, 4, 6, 9, 12, 15, 18, 24 mo – then annually until 5 yr). Parents also received phone calls every mo (providing encouragement and for answering questions) and reminder post cards (containing educational messages). Clinical staff received training before start of the sessions and refresher sessions held every 2-3 mo.	Clinic visits	Live; Remote live human-to-human; remote tech non-interactive Multifaceted Education, counseling	Communication (written and verbal)—in person and phone calls	Trained pedia-tricians, nurse practitioners, and clinic staff	12 visits during ages 1 to 24 mo, then annually until 5 yrs Staff training refreshers held every 2–3 mo	NR

continued

TABLE E-2 Continued

Trial Name [Country]	Author Last Name, Year	Intervention Description	Intervention Location	Intervention Type	Intervention Mode	Intervention Delivered by	Intervention Duration/Intensity	Theoretical Framework Cited
— [United Kingdom, Greece, Portugal]	Fildes et al. (2015)	Mothers of 4- to 6-mo-old infants were randomized to either an intervention group, who received guidance on introducing five vegetables (one per day) as first foods repeated over 15 days, or a control group who received country-specific 'usual care'. Outcomes of interest included infant's consumption (g) and liking (maternal and researcher rated) of an unfamiliar vegetable	Participant's home or pediatrician's office	Live; remote tech-noninter-active Single intervention; counseling	Feeding experiences, visuals, communications	Researcher or health professional	Number of contacts/visits: NR Duration of visits: NR Duration of full intervention: Feb 2011–July 2012 *Mothers determined precise timing of visitation*	NR
— [United States]	French et al. (2012)	Intervention Group 1: maternal-focused (MOMS) anticipatory guidance aimed at maternal eating habits with a focus on seven different elements in eating behaviors, including frequency of meals, family meals, milk consumption, increased fruit and veggie consumption, and limiting soda and fast food. Simple messages were used to increase behaviors protective against the development of obesity. Mothers in this group received direct guidance regarding their own eating patterns. Message development focused on how mothers ate and the influence of mothers' behaviors on their children.	Pediatric primary care clinics in Nationwide Children's Hospital primary care network in Columbus, OH	Live; remote tech non-interactive Multi-faceted: counseling (individual)	Communication (in-person well visits), visuals (handouts)	Clinic physicians, nurses, and medical assistants	Number of contacts/duration of visits: delivered at the 2-, 4-, 6-, 9-, and 12-mo well child visits *(duration of each visit not reported)* Duration of full intervention: 12 mo	NR

		Intervention Group 2: Ounce of Prevention (OP) received a detailed program of infant feeding AG focusing on serving size and tips for introducing different foods for the infant; focused on feeding behaviors of mothers.						
First Steps for Mommy and Me [United States]	Taveras et al. (2011)	Multifaceted intervention consisting of brief focused negotiation by pediatrician during five routine visits, four individualized coaching and motivational counseling telephone calls with study health educator (3 wks, 6 wks, 3 mo, and 5 mo postpartum), invitation to four group-parenting skills training workshops and comprehensive educational materials. Pediatricians were trained on focused negotiation skills based on concepts of motivational intervening and epidemiology of health consequences of excess weight gain. Pediatricians led the group parenting skills training workshops	Health care setting	Live; remote tech non-interactive Multifaceted education counseling	Communication (written and verbal)	Primary care providers and study health educator	6 mo	NR

continued

TABLE E-2 Continued

Trial Name [Country]	Author Last Name, Year	Intervention Description	Intervention Location	Intervention Type	Intervention Mode	Intervention Delivered by	Intervention Duration/Intensity	Theoretical Framework Cited
TARGet Kids! [Canada]	Maguire et al. (2010)	Parents in the intervention group were given a sippy cup and shown how to use it. Parents were also told about the risks of continued bottle use, including tooth decay and iron deficiency (and iron deficiency associated behaviors). Parents were instructed to limit milk consumption to 16 oz a day and discontinue bottle use in the following wk using a stepwise protocol (given in a handout as well). Outcomes measured at 2 yrs of age.	Health care setting	Live; remote tech non-interactive Multi-faceted educational and counseling (individual)	Communication (verbal, written), visuals (handouts)	Nutrition-trained research assistant	9 mo to 2 yrs	NR
— [United States]	Sanghavi (2005)	Participants were first checked in by a clerk, who registered the child via a password-protected Internet form. The parent was then directed to the education kiosk, where he or she logged on a touch-enabled computer using their registration information, completed the instructional tutorial, and then returned to the waiting room. The clerk then printed the report of the visit, which the provider reviewed during his or her visit	Gallup Indian Medical Center	Remote tech non-interactive Multifaceted; educational; counseling	Other: computerized kiosk in waiting area; written materials	Com-puterized kiosk	Number of contacts/duration of visits: 2 times—10 to 20 minutes on average Duration of full intervention: 4 mo	NR

		with the parent and child, and then inserted into the medical record. For the first 2 mo of the 4-mo study period, all parents of healthy 6-wk-old and 4-mo-old infants (the control group) received standard well-child care. Prior to the face-to-face visit, patients were handed a packet of reading materials about well-child care to be reviewed in the waiting room, as was routine practice before the study. After the provider visit, parents were asked to complete a written questionnaire assessing well-child knowledge.						
ECE								
EniM [Spain]	Roset-Salla et al. (2016)	The intervention group received educational lessons that covered both theoretical and practical content on food groups, Mediterranean diet, physical activity and food labels, and progressive introduction to food groups for children. Outcome measures were assessed via questionnaires and other metrics during workshops. Parents in the control group received non-nutrition education classes on a different topic.	ECE/day care centers	Live single intervention: educational (group workshops), other-knowledge assessment	Communication	Nurses trained in nutrition	Number of contacts/ duration of visits (minutes): 4 workshops that lasted 90 minutes each session Duration of full intervention: school yr of 2010–2011	NR

continued

TABLE E-2 Continued

Trial Name [Country]	Author Last Name, Year	Intervention Description	Intervention Location	Intervention Type	Intervention Mode	Intervention Delivered by	Intervention Duration/Intensity	Theoretical Framework Cited
— [United Kingdom]	Ahern et al. (2014)	Children received a 6–8 exposures to a root vegetable purée with added apple purée (flavor–flavor group) alternating with 6–8 exposures to another with nothing added (repeated exposure group) with a third purée group (control). Pre- and post-intervention intake measures of the three purées with nothing added were taken to assess change in intake. Follow-up measures took place 1 mo and 6 mo post-intervention.	Nurseries (ECE)	Live single intervention; tasting opportunities of RE vs FFL	Feeding experiences	Nursery staff or experimenters	Duration of contacts/visits: NR Exposure baseline phase: children received up to 200g (2 separate pots of 100-g purées) of all three vegetable purées on 3 separate days at their usual snack time. Exposure intervention phase: Test days had at least 1 day in between them and no more than 3 and began 2–5 days after baseline. Each child received 6–8 of the root veggie purée with added apple flavor alternating with 6–8 exposures of purée with nothing added. Each exposure included 100 g of purée with an additional 100 g if the child wanted.	NR

							Exposure post-intervention: all three veggie purées offered to children on 3 separate days 2–5 days after intervention with two more intake follow-ups at 1 and 6 mo post-intervention. Duration of full intervention: NR	
— [Belgium]	Verbestel et al. (2014)	Family-based healthy lifestyle intervention aimed at increasing daily consumption of water (instead of soft drinks), milk, fruit and vegetables, increasing daily physical activity and decreasing daily consumption of sweets and savory snacks and daily screen-time behavior. BMI was measured at baseline.	ECE/day care centers	Live and remote tech non-interactive multi-component intervention: educational (individual), other-knowledge assessment	Communication and visuals	Researchers	Number of contacts/duration of visits (minutes): not reported Duration of full intervention: 1 yr	Theories of information processing, the elaboration likelihood model, and the precaution-adoption process model.

continued

TABLE E-2 Continued

Trial Name [Country]	Author Last Name, Year	Intervention Description	Intervention Location	Intervention Type	Intervention Mode	Intervention Delivered by	Intervention Duration/Intensity	Theoretical Framework Cited
— [United Kingdom]	Caton et al. (2013)	Children were randomly assigned to one of three conditions (RE, FFL or flavour–nutrient learning). Each child was offered 10 exposures to their version of a novel vegetable (artichoke). Pre- and post-intervention measures of artichoke purée and carrot purée (control vegetable) intake were taken.	ECE	Live single intervention; tasting opportunities of RE vs FFL vs FNL	Feeding experiences	Nursery staff or experimenters	Duration of contacts/visits: once per wk two pots of artichoke were offered for 3 wks total and this was offered 2 wks from the end of the study. After 5 wks, children were offered two pots of carrot. Exposure baseline phase: first, children received up to 200 g (up to two pots) of puréed artichoke (target vegetable: RE recipe) or two pots (260 g) of puréed carrot (control vegetable); 2–3 d later children were offered the other vegetable, and this was counterbalanced. Exposure intervention phase:	Associative Learning theory

children assigned to 1 of 3 conditions (RE, FFL, FNL) 2-4 days after baseline testing. each child was offered one pot (100 g) of artichoke for 10 exposures.
Exposure post-intervention: children were offered both pots of carrot and artichoke on separate occasions, 2–3 d apart.
Duration of full Intervention: 5 to 6 wks

continued

TABLE E-2 Continued

Trial Name [Country]	Author Last Name, Year	Intervention Description	Intervention Location	Intervention Type	Intervention Mode	Intervention Delivered by	Intervention Duration/Intensity	Theoretical Framework Cited
— [United States]	Clark et al. (2009)	Child care providers evaluated a social learning theory-based website for infant feeding knowledge and attitude and behavior changes after viewing the infant feeding website.	ECEs in Colorado	Remote tech non-interactive Single Other; knowledge assessment	Website	Delivered through survey on website	Number of contacts/Duration of visits (minutes): not reported for number of contacts but the average time take for the online pre/post/follow-up survey took was 20 minutes (range of 16–27 minutes) to complete Duration of full intervention: 3 mo	Social learning-based theory
Cooperative Extension								
NEAT [United States]	Horodynski and Stommel (2005)	Intervention consisted of two components: four group-based lessons and 18 structured reinforcement activities. During the lesson, children were in separate child-care. The lessons included instructor led discussion, videotape viewing, and hands on learning activities. After the activities the toddlers joined the caregivers in food tasting, food	Early Head Start site and home visit	Live; remote-tech non-interactive Multifaceted Education; tasting opportunity; other (knowledge	Communication (verbal), media, activities, feeding experience	Lessons by trained nutrition instructors from county extension programs. Reinforcement by Early Head Start home visitor	Four nutrition lessons (90 minutes) and 18 structured reinforcements over 6 mo	Bandura's self-efficacy theory

		preparation, and family eating time. Reinforcement occurred during home visit by trained Head Start staff. These included content areas such as child development, feeding, nutrition, and parenting. Reinforcement dealt with cognitive and affective activities (e.g., presenting caregiver with scenario).		reinforcement)				
WIC								
SMS Intervention [United States]	Macchi et al. (2022) Gibby et al. (2019) Palacios et al. (2018)	The intervention SMS focused on reinforcing WIC messages on breastfeeding, prevention of overfeeding, delaying introduction of solids, and delaying/reducing baby juice consumption. SMS were sent automatically using web-based SMS messaging platform from the time the participant was enrolled until 4 mo later.	Phone/text	Remote tech non-interactive Single Other (knowledge reinforcement)	Communication (text message)	Researcher-designed text messages developed with WIC staff input	18 messages (1 per wk for 4 mo) Each message was 35–50 words	Trans theoretical model of health and behavior change

continued

TABLE E-2 Continued

Trial Name [Country]	Author Last Name, Year	Intervention Description	Intervention Location	Intervention Type	Intervention Mode	Intervention Delivered by	Intervention Duration/Intensity	Theoretical Framework Cited
— [United States]	Scheinmann et al. (2010)	Women received a free copy of an English/Spanish DVD that covered content derived from anticipatory guidance sources such as USDA and AAP. The goal was to encourage breastfeeding and increase maternal knowledge of appropriate infant feeding practices.	Waiting room of WIC center they received the DVD. Watched DVD at home.	Remote tech non-interactive Single Education	Video media	Researcher-designed video	Duration: Women were provided a 25-min educational DVD to watch at home consisting of five "chapters": 0–6 mo; 6–12 mo; 12–18 mo; 18–24 mo; food and behavior. (No information provided on whether mothers watched it or how often) There was a 3- and 6-mo follow-up	NR
Home Visit								
Sleep SAAF [United States]	Hernandez et al. (2022)	A responsive parenting intervention delivered by community research associates at infant age 3 and 8 wks. The intervention content provided messaging on responsive parenting in the context of feeding, crying, sleeping, and interactive play.	Home visit	Live Single One-on-one counseling	Communication (verbal)	Trained community research associates from the Center for Family Research at the University of Georgia	Intervention content was delivered at the 3-wk visit (90–120 min on average). Booster training at the 8-wk visit (which lasted 45–60 min on average).	NR

INSIGHT [United States]	Harris et al. (2020) Hohman et al. (2020) Savage et al. (2018) Hohman et al. (2017) Savage et al. (2016)	Nurses provided intervention curricula (on responsive parenting [RP]) with obesity prevention messages delivered each home visit. The RP curriculum focused on four infant behavior states: drowsy, sleeping, fussy, and alert. Specific messages on feeding taught parents to recognize hunger and satiety cues, offer age appropriate foods, portion size, repeated exposure, not to use food as a reward, etc.	Home visits	Live; remote tech non-interactive Multifaceted Education (instruction and guidance) Counseling	Communication (verbal) Video media (of calming strategies—not related to feeding)	Research nurses	Wks 3–4, 16, 28 and 40 after birth nurses visited participants homes.	Parenting sensitivities and responsive feeding/parenting
Babys First Bites [Netherlands]	Van Vliet et al. (2022)	Repeated exposure to target vegetable/fruits for first 19 days of weaning, plus phone calls or home visit to motivate parents Repeated vegetable exposure (RVE): exposure to green beans or cauliflower as target vegetable. Five phone calls at child age 4–6, 8, 13, and 16 mo Video-feedback Intervention to promote Positive Parenting-Feeding Infants (VIPP-FI): exposure to fruits and a sweet vegetable. Five home visits using video-feedback at child age 6, 8, 13, 16 mo Combination of RVE and VIPP-FI	Home (visits and phone calls)	Live; remote-live; remote tech non-interactive Multifaceted RVE: tasting opportunities and one-on-one counseling VIPP-FI/combo: tasting opportunities, one-on-one counseling, education	All: feeding experiences, communication (phone and in person) and printed overview VIPP-FI/combined: video media	Researchers	19 days of food exposure and 1 yr of 5 calls/home visits	NR

continued

TABLE E-2 Continued

Trial Name [Country]	Author Last Name, Year	Intervention Description	Intervention Location	Intervention Type	Intervention Mode	Intervention Delivered by	Intervention Duration/Intensity	Theoretical Framework Cited
Family Spirit Nurture [United States]	Rosenstock et al. (2021)	Built off Family Spirit (congressionally legislated home-visit strategy to promote maternal and child health/well-being) and uses the same format/delivery system. 6 lessons focusing on optimal infant feeding practices, responsive feeding, optimal complementary feeding practices, whole family eating practices, and avoiding sugar-sweetened beverages.	Home visits	Live; remote tech non-interactive Multifaceted; One-on-one education; counseling; Other (referrals). Content incorporated cultural teachings	Communication (verbal and written summary handouts); activities (interactive activities, goal setting)	Navajo paraprofessionals	Six lessons every 2 wks from 3–6 mo postpartum	NR
Delta Healthy Sprouts [United States]	Tussing-Humphreys et al. (2019)	Parents as Teachers (PAT) includes one-on-one home visit lessons (perinatal educational curriculum), optional monthly group meetings, developmental screenings, and a resource network for families. Parents as Teachers (PAT) curriculum lessons aim to increase parental knowledge and practices. Parents as Teachers Enhanced (PATE) is built upon the PAT curriculum by adding maternal weight management and early	Home	Live; remote tech non-interactive Multifaceted Education, group counseling, other (resource network)	Communication, activities, videos, goal setting	Parent educators (college-educated women residing in target communities who completed PAT training program)	Duration: 18 mo Number of lessons: not reported, but each PAT lesson was 60–90 minutes and PATE lesson was 90–120 minutes	PATE: guided by social cognitive theory and transtheoretical model of behavior change

		childhood obesity prevention components, including diet and physical activity.						
— [United States]	LoRe et al. (2019)	Parents in the intervention group received a 6-mo computer-based curriculum designed to promote healthy eating and physical activity. The curriculum consisted of 12 modules that were implemented in sequence during home visits and facilitated by a research assistant in one-on-one educational sessions. The content of the modules was built upon AAP Bright Futures recommendations. For each module the home visitor and parent discussed a specific topic promoting a healthy lifestyle, reviewed certain practices or activities that could be easily implemented, and developed goals for diet and activity.	Home/ online	Live; remote tech non-interactive Multifaceted Education; counseling	Website, communication (verbal)	Computer-based curriculum and research assistant facilitated educational sessions	6 mo—12 modules	Theory of behavior change
ECHO [United States]	Cloutier et al. (2018)	Visitation program (Nurturing Families Network, NFN) or an enhanced program (NFN+) that incorporated behavioral change strategies (e.g., goal setting, problem solving) and focused on six obesity-associated behaviors (breastfeeding, juice/sugar-sweetened beverages, solids, infant sleep, TV/screen time, and soothability) with linkages to community resources.	Home visitation	Live; remote tech non-interactive Multi-component: education	Communication, visuals	NFN home supervisors and visitors	Number of contacts/ duration of visits (minutes): 60-min visits for 2 mo and then biweekly home visits by NFN home visitors Duration of full intervention: Nov 2013–Dec 2014	Chronic care model

continued

TABLE E-2 Continued

Trial Name [Country]	Author Last Name, Year	Intervention Description	Intervention Location	Intervention Type	Intervention Mode	Intervention Delivered by	Intervention Duration/Intensity	Theoretical Framework Cited
BLISS [New Zealand]	Morison et al. (2018) Williams Erickson et al. (2018) Taylor et al. (2017)	The intervention group receives well-child care plus additional parent contacts for support and education. BLISS advice received through a home visit at 5.5 mo, 7 mo, and 9 mo providing individualized advice on supporting introduction of complementary foods using BLISS approach. Staff encourage responsive feeding, attention to hunger and satiety cues, suggest parents offer "easy foods,", and provide age-appropriate recipes. Additional support available if requested. BLISS resources provided include recipe books, every-day food lists, and safety information—follow baby led weaning philosophy but address concerns of inadequate iron intake, choking, and growth faltering.	Home visit	Live; Remote tech non-interactive Multifaceted: education; counseling	Communication (written and verbal) [recipes and every day food list]; visuals	BLISS researchers (experienced lactation consultant and research staff supervised by a team of dietitians, pediatricians, and speech therapists)	12 mo total (3rd trimester to 9 mo of age) 3rd trimester to 6 mo—lactation consultation BLISS advice and resources—at least three contacts with a trained researcher (5.5, 7, 9 mo)	NR

POI [New Zealand]	Fangupo et al. (2015)	Three intervention groups and one control group. The intervention groups received support and education according to group allocation in addition to usual care. 1. Food activity and breastfeeding (FAB) intervention consisted of 8 additional parent contacts for education and support (only 4 of the 8 are related to the food intervention, while the others are related to breastfeeding and physical activity). Trained research staff discussed nutrition messages (e.g., offer 2 different fruits each day, limit intake of high sugar foods etc.) provided written and visual resources during individual face-to-face sessions. 2. Sleep intervention received 2 additional parent contacts providing resources on sleep habits. 3. Combination group received FAB and Sleep contacts	Hospital and home visit	Live; remote tech non-interactive Multi-faceted: education/counseling (one-on-one and group)	Written and visual resources	Trained research staff under supervision of nutritionists and pediatricians	FAB: Eight additional face-to face contacts. Seven are individual sessions and one group session (18 mo). Four are relevant to food (4, 7, 13, and 18 mo) Sleep: two additional contacts (one antenatal session [note FAB has antenatal too] and one individual home visit at 3 wks) Combined: Nine intervention visits in total	NR

continued

TABLE E-2 Continued

Trial Name [Country]	Author Last Name, Year	Intervention Description	Intervention Location	Intervention Type	Intervention Mode	Intervention Delivered by	Intervention Duration/Intensity	Theoretical Framework Cited
— [France]	Remy et al. (2013)	The study was designed in six periods: pre-exposure, exposure, postexposure test, follow-up tests at 2 wk, 3 mo, and 6 mo. Three experimental groups: basic (RE), sweet (FFL), and energy-dense (FNL). During exposure period infants in each group were exposed 10 times to artichoke purée (based on group assignment). Parents received instructions from trained experimenter at home visit and instructed to choose lunch or dinner and remain consistent. Parents reported observations 2–3 times per wk.	Home	Live Single Tasting opportunity	Feeding experience	Trained researcher	Exposure period lasted ~41 days 10 exposures Pre- and post- exposure test before exposure period	NR
— [Australia]	Wen et al. (2011)	At each visit, the nurse addressed four key areas: infant feeding practices, infant nutrition and active play, family physical activity and nutrition, and social support. Appropriate resources were also made available to mothers.	Home-based visitation	Live; remote-live Multi-component: educational (individual)	Communication	Community nurses	Number of contacts/ duration of visits (minutes): 1 home visit at 30 to 36 wks gestation and 5 home visits at 1, 3, 5, 9, and 12 mo after birth with each visit lasting 1–2 hrs between nurse and mother with infant	NR

							Duration of full intervention: entire RCT was 3 yrs long (Jan. 2007–Dec. 2010), but this study reports the 12 mo results	
— [United Kingdom]	Watt et al. (2009)	The intervention consisted of offering practical and non-judgmental support and advice on infant feeding practices (types of foods and drinks to give, when to stop using a bottle, etc.). Monthly home-based support visits were offered from 3 mo of infant age until 12 mo.	Home visits	Live Multifaceted Education Counseling (support/ listening to challenges) Other (knowledge reinforcement)	Communication (verbal)	27 trained volunteers (both mothers and paraprofessionals). Training involved a 12-session program delivered over 4 wks	On average five volunteer home visits (range: 1–10) lasting on average 60 min	Social support theory
Other								
— [United States]	Harris et al. (2022)	The intervention group was assigned to view two sugary drink counter-marketing videos. The videos presented information to counteract common misperceptions about children's fruit drinks and toddler milks in a positive and entertaining manner.	Home	Remote tech, non-interactive Single Other (counter marketing)	Video media	Researcher-developed videos	Groups assigned to watch two videos, each less than 60 seconds	NR

continued

TABLE E-2 Continued

Trial Name [Country]	Author Last Name, Year	Intervention Description	Intervention Location	Intervention Type	Intervention Mode	Intervention Delivered by	Intervention Duration/Intensity	Theoretical Framework Cited
— [New Zealand]	Rapson et al. (2022)	intervention at the start of complementary feeding (CF) with the primary endpoint assessed at 9 mo of age; infants received either vegetables only (veg-only) or a combination of fruit and vegetables (control) for a duration of 4 wk, starting from the first day of CF at about 4–6 mo of age. The primary outcome measure was intake of target vegetables (broccoli, spinach) provided by the study at 9 mo of age and secondary was daily intake of vegetables at 9 mo with infant's iron (serrum ferritin) status measured at all time points	Home	Live; remote tech non-interactive Multi-faceted- tasting opportunities and counseling	Communication (verbal), feeding experiences, media (video)	Mother	At 9 mo of age, mothers were provided 3 foods (rehydrated weight 80 g each) of broccoli, spinach, and pear over 3 consecutive days. Mothers were asked to feed at the same time as during the initial 4 wk intervention (feeding lasting within 1 hr) Duration of full intervention: 4 wks	NR
— [United States]	Cauble et al. (2021)	The intervention involved six weekly group-based phone counselling sessions starting in late pregnancy. The didactic lessons included topics such as Introduction to Breastfeeding, Breastfeeding Basics, Pumping 101, Back to Work, Introducing Solids, and Nutrition and Physical Activity for Breastfeeding. Each lesson encouraged group participation by incorporating participant questions, discussion, and assigned tasks for the next week.	Home/ telephone conference calls	Remote-live; remote tech non-interactive Multi-faceted group counseling, education	Phone communication, written/printed manual	Certified lactation consultant and registered dietitian	Six weekly 60-min group-based phone counselling sessions	NR

— [United States]	Johnson et al. (2021b)	Caregivers and children participated in a videorecorded laboratory visit during which infants were offered four versions of puréed kale: plain, 1.2% or 1.8% added sugar, or 0.2% added salt. Caregivers rated their children's liking for each kale version. Videos were coded for the number of tastes accepted and for children's behaviors and acceptance of each kale version.	Research lab	Live; remote tech non-interactive Multi-faceted-tasting op-por-tunities, educational	Communication (verbal), feeding experiences, media (video)	Experimenter and research assistant	Number of contacts/duration of visits: At the lab, caregivers and infants/toddlers attended a single laboratory visit lasting about 90 min Duration of full intervention: 1 day	NR
— [Germany]	Kalhoff et al. (2021)	After written consent (at the latest by the age of 4 mo) the families were randomized into 2 groups, the intervention group (IG) and the control group (CG). During the 3 mo intervention, the IG received the newly developed frozen products. Parents were advised on the general recommendations for infant nutrition in Germany and were asked to feed the study food at least 5 days per wk. Acceptance of a menu containing a known and an unknown vegetable was evaluated by measuring the amount consumed and assessing the infants liking by the mother at the beginning (T1) and at the end (T2) of the intervention.	Home	Live; remote tech non-interactive Multi-faceted-tasting op-por-tunities	Communication (verbal), feeding experiences, media (video)	Researchers gave supplies, and mothers implemented intervention at home.	Starter phase: parents fed products to child at least 5× a wk. Mothers fed their infants the two different menus (known, unknown order randomized) on 2 different days (approximately 7 days apart). First acceptance test (T1): two feeding sessions (several days in 1 wk). After 90 days of individual intervention, a second acceptance test (T2) was conducted. The procedure was the same as for T1 Duration of full intervention: 3 mo	NR

continued

TABLE E-2 Continued

Trial Name [Country]	Author Last Name, Year	Intervention Description	Intervention Location	Intervention Type	Intervention Mode	Intervention Delivered by	Intervention Duration/Intensity	Theoretical Framework Cited
— [South Korea]	Ra (2021)	Mobile-based maternal feeding education program for overweight prevention of infants. Themes/content of the program included breastfeeding, hunger/satiety cues, not providing sweet beverages or high calorie snacks, etc. The education program was provided to the experimental group through mobile from 38 wks gestation to 6 mo after childbirth. Researchers encouraged mothers to access website at least once every 2 days.	Mobile-based education	Remote tech non-interactive Single Education	Website	Developed by researchers and clinicians	38 wks gestation to 6 mo after childbirth Encouraged to access website once every 2 days	Social cognitive theory
Food4 Toddlers [Norway]	Roed et al. (2021) Roed et al. (2020)	Food4toddlers was developed using basic steps from the Model of Planned Promotion for Population Health. The eHealth intervention included a website with four main elements: modules (2–4 lessons) covering an introduction and seven topics promoting healthy food and eating environments, recipes, a discussion forum, and highlighted information about food and beverages.	Home (eHealth module)	Live; remote tech non-interactive Multi-faceted Education; counseling	Website; media; communication (written and verbal)	Researcher-developed website	6 mo access to the website	Social cognitive theory

		In addition, when a person accessed the website, a video appeared with information about the study and its focus on how important just a small weekly increase in vegetable consumption is for the child. Participants received weekly emails each with a link to a new lesson expanding content of the intervention.						
— [France]	Tournier et al. (2021)	Infants were enrolled at 7.5 mo old. At 8 mo old, they participated in two lab sessions (measurements before intervention); then parents were randomly allocated to either intervention group (IG) or control group (CG). IG received French recommendations and individualized counseling on food texture introduction combined with the provision of infant textured foods. At 15 mo old (end of the intervention period), children participated again in two lab sessions.	Research lab	Live; remote-live; remote tech non-interactive Multi-faceted- education and counseling (individual), food provision	Communication (verbal), phone, visuals (booklet)	Researchers Follow-up-research: Dietician individualized advice and support in the lab at 8 mo and by phone for the following mo	Two experimental sessions—An interval between the last meal/snack and the session was set at approximately 2 h. During the session, 3 trials of each food were run. Each food was first shown to the child in a transparent bowl for 10 seconds and then offered. Duration of full intervention: 7 mo with follow-up at 8 and 15 mo	NR

continued

TABLE E-2 Continued

Trial Name [Country]	Author Last Name, Year	Intervention Description	Intervention Location	Intervention Type	Intervention Mode	Intervention Delivered by	Intervention Duration/Intensity	Theoretical Framework Cited
— [Australia]	Wen et al. (2020)	The intervention consisted of staged information booklets mailed to the intervention groups, each followed by either a nurse-led telephone support session or SMS intervention, antenatally and at 1, 3, 5, 7, and 10 mo after birth.	Home	Live-remote; remote tech non-interactive Single Education	Written material, communication (verbal/phone call or SMS)	Nurses	1 yr duration: 3rd trimester to 10 mo of age 5 SMS or phone calls (30–60 minutes each) contacts and mailed booklets	Health belief model
Early Food for Future Health [Norway]	Helle et al. (2019b) Helle et al. (2019a)	A webpage with monthly age-appropriate videos addressing infant feeding topics together with corresponding cooking films/recipes, were offered to participants in the intervention group. Video clips were 3–5 minutes long and focused on feeding related aspects (appropriate food, textures, taste preferences, etc.)	Email with link to educational webpage	Remote tech non-interactive Single Education	Media, website	Unsure	6 mo of monthly video clips of 3–5 min duration each (n=7) plus monthly cooking films with recipes	Attachment theory, social cognitive theory, and anticipatory guidance

OTIS [Sweden]	Johansson et al. (2019)	The intervention group food choices were made based on the New Nordig Food Manifesto. (Reduced protein intake and systematic introduction of fruit and vegetables with repeated exposures during first weeks of complementary food introduction). Each group (when infant ready) commenced 24 days of systematic taste portions (portions made by parents using given recipes). The intervention group was also invited to participate in a closed Facebook group to inspire and support parents through images, videos, messages, and other recipes.	Home	Live; remote tech non-interactive Multifaceted Tasting opportunity; education	Feeding experience; visuals; media; website; communication (written)	Researcher dietician, research nurses and a doctoral student	24-day taste program	NR

continued

TABLE E-2 Continued

Trial Name [Country]	Author Last Name, Year	Intervention Description	Intervention Location	Intervention Type	Intervention Mode	Intervention Delivered by	Intervention Duration/Intensity	Theoretical Framework Cited
— [United States]	Owen et al. (2018)	Parents were randomly assigned to "fruit book," "vegetable book" or control. Upon recruitment parents were asked to specify one fruit and one vegetable they wanted their child to eat but the child refused. If none, parents asked to identify an unfamiliar fruit or vegetable. Each book contained six pages presenting information as "farm to fork." Parents were asked to look at the book with their children for 5 minutes each day for 14 days. Parents then asked to offer their child a taste of both target foods every day.	Home	Remote tech non-interactive Single Educational (individual)	Communication (written: book)	Books developed by researchers	14 days—5 minutes a day of book exposure. Then 15 days of taste exposure.	NR
— [Norway]	Beinert et al. (2017)	The first day course focused on introduction of solid foods to infants (regular meals, iron rich foods, fruit purées, etc.) Participants were informed about the importance of introducing new food items before 2 yrs to prevent food neophobia. The second day dinner meals were demonstrated (purées of carrots, potatoes, cauliflower, avocado, etc.) Purées with vegetables and chicken/tuna dishes were also introduced.	Unclear	Live Multi-faceted Education; tasting opportunity	Communication (verbal); Feeding experience	Unclear	Two days, 4-hr sessions	NR

	Øverby et al. (2017)	Courses gave parents nutritional information and instructions on how to prepare nutritious and varied dishes. The first course day focused on food typically eaten for breakfast and lunch in Norway, and participants prepared various purées, porridges, breads and spreads. The second day focused on dinners. Participants were given written pamphlets with recipes.	University kitchen laboratories	Live; remote tech non-interactive Single Education (group cooking classes)	Communication (verbal and written);	Home economics teacher and master's student	Two course days which lasted 4 hrs	NR
— [United States]	Mennella et al. (2017)	Mothers were randomized to drink vegetable juices at different times during lactation/breastfeeding (0.5–1.5 mo, 1.5–2.5 mo, 2.5–3.5 mo).	Home	Live Single Tasting opportunity	Feeding experience	Researchers explained procedure to mothers	7–8 mo	NR

continued

TABLE E-2 Continued

Trial Name [Country]	Author Last Name, Year	Intervention Description	Intervention Location	Intervention Type	Intervention Mode	Intervention Delivered by	Intervention Duration/Intensity	Theoretical Framework Cited
— [United Kingdom]	Hethering-ton et al. (2015)	Each group followed a 35-day complementary feeding intervention. Intervention group infants received 12 daily exposures to vegetable purée added to milk (days 1–12), then 12 × 2 daily exposures to vegetable purée added to baby rice at home (days 13–24), then the next 11 days exposure to veggie purée. Mothers were given a 35-day diary to record infant food intake at home and other notes immediately after feeding using a scale that measured infant's reaction to feeding, similar feeding, and rating of feeding occurred in the lab with a video to capture data and review for analyses.	Research lab; home	Live; remote tech non-interactive Multi-faceted: tasting opportunities, educational	Communication (verbal), feeding experiences, media (video)	Researcher	Number of contacts/duration of visits: 12 daily exposures to veggie purée added to milk then 12 × 2 daily exposures of the veggie purée + baby rice at home, then an 11-day exposure to only veggie purée; 5 total lab days Duration of full intervention: 35 days	

— [United Kingdom]	Coulthard et al. (2014)	Infants that had been introduced to complementary food early (before 5.5 mo) or late (after 5.5 mo) were randomly assigned to single taste or variety exposure. The single-taste group were given carrot purée (Ca) every day for 9 consecutive days, and infants in the variety group were given parsnip (Pa), courgette (Co) and sweet potato (Sp) with daily changes for 9 consecutive days (1 purée pot per day). The exposure phase ran from days 2 to 10 of the study. Half of the infants in each group were early introduction of foods and later introduction of foods based on when they were beginning complementary feeding.	Home visit	Live Single Tasting opportunity	Feeding experience	Researchers	Two days of testing (Day 1 and Day 11) in which the researcher visited the home Days 2–10 were exposure days	NR

continued

TABLE E-2 Continued

Trial Name [Country]	Author Last Name, Year	Intervention Description	Intervention Location	Intervention Type	Intervention Mode	Intervention Delivered by	Intervention Duration/Intensity	Theoretical Framework Cited
— [Netherlands]	Barends et al. (2014)	At two follow-up time-points (12 and 23 mo), mothers were given one spoon to feed their child and another spoon for the child to self-feed from a bowl with 2 emptied jars of purée. The mothers fed their children at their usual pace until the spoon was rejected 3 consecutive times by the children. Children had to taste at least 3 spoons. Mothers also rated how much their child enjoyed the purée.	In lab	Live Multi-faceted Other: taste preferences	Feeding experience	Mother with testing food supplied by research staff	Number of contacts/duration of visits: three times in the lab *(baseline, 12 mo, 23 mo)* Duration of full intervention: 23 mo *(baseline to 12 mo, 12–23 mo)*	NR
	Barends et al. (2013)	Mother–infant pairs participating in this first part of the study were randomly assigned to one of four treatment groups. After being fed rice flour porridge for 5 days to get used to solid foods, two groups received exclusively vegetable purées consisting of either green beans or artichoke on every other day during 18 consecutive days. The other two groups received exclusively fruit purées consisting of either apple or plums every other day. On the other 9 days, the vegetable groups received other types of vegetables, and the fruit groups other types of fruits,					Number of contacts/duration of visits: On days 1, 2, 17, 18 and 19, the vegetables or fruits were given in one of the two laboratories. On days 3–16 the mothers fed their infant the vegetable or fruit purées at home Duration of full intervention: 19 days	

		selected by the researcher, to bring variety in the diet. On day 19, the vegetable groups received their first fruit and the fruit groups their first vegetable purée. On days 1, 2, 17, 18, and 19, the vegetables or fruits were given in one of the two laboratories. On days 3–16 the mothers fed their infant the vegetable or fruit purées at home.						
— [France, Germany]	Maier et al. (2008)	Breast- or formula-fed infants received their first vegetable (carrot purée) and, over the next 9 days, either carrots every day; 3 vegetables changed every 3 days; or 3 vegetables changed daily. On the 12th and 23rd days they received new vegetable purées, zucchini tomato, then peas. Several weeks later, they received two more new foods, meat, and fish. Acceptance of new foods was measured by quantities eaten and by liking ratings. Delivered in 3 phases: Phase A, days 1–12: veggie introduction and test of a first new veggie B, days 13–23: repeated exposure and test of second new veggie C: test of meat and fish consumption	Research lab; home	Live Multi-faceted- tasting opportunities	Communication (verbal), feeding experiences	Researchers; mothers (at home)	Phase A: 12 days total of in-lab feeding (duration of each visit not reported) Phase B: 10 days of at home feeding and Day 23 (last day) in the lab Phase C: first day in lab, next 11 day feeding at home, and then next 2 days in the lab Duration of full intervention: about 1 mo	NR

continued

TABLE E-2 Continued

Trial Name [Country]	Author Last Name, Year	Intervention Description	Intervention Location	Intervention Type	Intervention Mode	Intervention Delivered by	Intervention Duration/Intensity	Theoretical Framework Cited
— [United States]	Mennella et al. (2008)	Study 1 (fruits): evaluated infants' acceptance of pears on days 1 and 11 and green beans on days 2 and 12. During the home exposure period, one group fed only pears at the target meal (pear group), whereas the other group fed a fruit that was different than the one experienced during the previous 2 days (BM group) Study 2 (veggies): evaluated infants' acceptance of green beans on days 1 and 11 and alternating spoonful of carrots and spinach on days 2 and 12. The infants in the green bean group were fed only the target vegetable, green beans, whereas those in the between-meal variety group (BM vegetable variety group) and the between-meal and within-meal variety group (BM–WM) were fed a variety of vegetables. The BM vegetable variety group was fed only one vegetable each day and green and orange vegetables were alternated daily, whereas the BM–WM variety group was fed two vegetables each day (one green,	Research center; home	Live; remote-live Multi-faceted- tasting opportunities	Communication (verbal), phone, feeding experiences	Researchers; mothers (at home)	Each mother–infant dyad went to the research center 2 days before (days 1 and 2) and after (days 11 and 12) the 8-day home exposure period. The exposure occurred during a target meal that occurred at the same time of day as research center exposure sessions and the 8 consecutive days of the home exposure period Duration of full intervention: 8 days	NR

		one orange). In the latter group, the pair of vegetables varied from day to day, but one of the pair was experienced the prior day.						
— [United States]	Forestell and Mennella (2007)	Two groups of mother-infant dyads were randomly assigned to the green bean group or green bean + peach group. Sensory lab portion: mothers fed their child until they rejected the food three consecutive times or finished two jars of food. Right after feeding sessions, mothers rated how much they thought their infant liked the food. Mothers went into the research lab two days before and after an 8-day home-exposure feeding period. Home exposure period: mothers received jarred purée food contents of one jar of puréed green beans until the infant either refused the food on three consecutive occasions or finished the contents of the jar. Infants in the comparative group received a jar of peaches 1 hr after the green beans.	Research lab; home	Live Multi-faceted Other: taste preferences	Feeding experiences	Mothers with testing food supplied by research staff	Number of contacts/duration of visits: 4 at the lab, 8 at home—infants determined pace and duration of feeding Duration of full intervention: 12 days	NR

continued

TABLE E-2 Continued

Trial Name [Country]	Author Last Name, Year	Intervention Description	Intervention Location	Intervention Type	Intervention Mode	Intervention Delivered by	Intervention Duration/Intensity	Theoretical Framework Cited
— [Germany]	Koehler et al. (2007)	Intervention was various modes (four groups total) of nutrition counseling for mothers. IG1: mothers were offered a telephone hotline three times per wk, open 2 hrs each IG2: Mothers received the telephone hotline and additional written information on dietary schedule recommended by German Pediatric Society, distributed in 3 parts. IG3: Mothers received the telephone hotline, written information, and offered additional personal telephone counseling.	Home (telephone and written materials)	Live; remote tech non-interactive Single Counseling	Communication (written and verbal)	Counselor from study center	10 mo (2 mo of age to 12 mo of age)	NR
— [United States]	Krebs et al. (2006)	Infants were assigned to meat (puréed beef) and cereal as first complementary food at least 6 mo of age. The infants remained on the assigned food (plus fruits and vegetables as desired) until 7 mo of age when they were allowed to liberalize their diet to all age-appropriate foods, including the alternative study food.	Home	Live Single Provision of test food	Feeding experience	Researchers explained procedure and provided test foods	2 mo (starting approximately 5 mo of age stopped at 7 mo of age)	NR

— [Canada]	Verrall et al. (2006)	Assessments and interviews were done to identify preferences and values to focus communication strategies on. The results were provided to the community through radio shows, community display, and an information booklet sent to all mothers who participated in initial interviews. Key messages were to promote awareness around iron deficiency anemia and promote iron-rich infant food and support breastfeeding. Interpersonal communication method conveyed information to target audience about making homemade baby food.	Mass media and interpersonal communication	Remote tech non-interactive Multi-faceted: education; other (social marketing)	Communication (written); visuals; media; other (activities)	Researcher-developed communication through community program	6 mo total but time varied depending on activity Cooking workshop: two 2-hr sessions Radio: four dialogues played 4 times a wk at various times during the day.	Two basic underlying concepts of current cognitive– behavioral theories/models guided the project: Knowledge is a mediating factor for behavior and knowledge alone is insufficient to change behavior.
	Verrall and Gray-Donald (2005)	Time 2 mothers (November 2002–2003). Through needs assessment, four intervention objectives were identified: increase awareness of iron deficiency anemia, promote optimal iron-rich complementary food, promote benefits of homemade baby food, support breastfeeding. Ten key messages (with images) were developed and disseminated within the community through mass media and interpersonal communication strategies (infant food cooking activities, posters, newsletters).	Mass media and interpersonal communication	Remote tech non-interactive Multi-faceted: education; other (social marketing)	Communication (written); visuals; media; other (activities)	Researcher-developed communication	6 mo total, but time varied depending on activity Cooking workshop: two 2-hr sessions Radio: four dialogues played 4 times a wk at various times during the day.	NR

TABLE E-3 Outcomes

Trial Name [Country]	Author Last Name, Year	What-to-Feed Topics Covered	Impact on Outcomes Related to What to Feed	How-to-Feed Topics Covered	Impact on Outcomes Related to How to Feed	Impact on Health-Related or other Feeding-Related Outcomes	Tools Used	Notes on Statistical Methods*	Committee Comments
Health Care									
INFANT [Australia]	Zheng et al. (2022)	Sweet snacks, water, fruits, vegetables, other—non-core drink.	Caregiver-focused Intervention group had a lower "discretionary consumption: than the control. No evidence of between-group differences was found for the fruit, vegetables pattern score.	Healthy parental monitoring of eating, division of responsibility for child feeding, provision of fruits and veggies at meal and snack times.	NR	NR	Dietary intake: Assessed by a 68-item quantitative FFQ Lifestyle patterns: PCA analyses	(1) Yes (2) Yes (3) Yes (4) Yes	Robust multi-component intervention based on anticipatory guidance, parenting skills, and peer support frameworks. Intervention design considered the health care system structure and practices in Melbourne, Australia. Intervention had an impact on "less consumption of unhealthy food + TV watching" (PCA analysis pattern) at >3 yrs. Study was done with White, well-educated families in a health care system that is different from the one currently in place in the United States. No impact on fruit and vegetable intake pattern, which is inconsistent with what they reported in other papers based on different dietary modeling analyses.

(Hesketh et al., 2020)	Child-focused Caregiver-focused At the first follow-up, children who had received the intervention had more favorable dietary intakes across all outcomes than their peers in the control condition. The strongest impacts were seen for fruit, vegetable, water, sweet snacks, and vegetable variety but diminished magnitude of effect at second follow-up for all the above except for non-core drinks and sweet snacks. At 3.6 yrs and 5 yrs of age, children whose parent participated in the study had more favorable diets than their peers. Stronger dietary effects were seen at the first follow-up (2 yrs post-intervention) than the second follow-up (3.5 yrs post-intervention).	NR	At 3.6 yrs and 5 yrs of age, children whose parent partici-pated in the study had similar adiposity outcomes across both IG and CG groups.	Child diet: 3× 24-hour diet recalls Sedentary activity: Acceler-ometry Anthropo-metrics: BMI z-scores	(1) Yes (2) Yes (3) Yes (4) Yes	Robust multi-component intervention based on anticipatory guidance, parenting skills and peer support frameworks. Impact on sugary snacks and unhealthy drinks. Intervention design considered the health care system structure and practices in Melbourne Australia. Long-term impact at >3 yrs on healthier dietary patterns. Illustrates importance of long-term post-intervention follow-ups. Study was done with White, well-educated families in a health care system that is different from the one currently in place in the United States. No impact on child adiposity.

continued

TABLE E-3 Continued

Trial Name [Country]	Author Last Name, Year	What-to-Feed Topics Covered	Impact on Outcomes Related to What to Feed	How-to-Feed Topics Covered	Impact on Outcomes Related to How to Feed	Impact on Health-Related or other Feeding-Related Outcomes	Tools Used	Notes on Statistical Methods*	Committee Comments
	(Spence et al., 2014)		Child-focused Maternal dietary intake was associated with child diet quality but was not a mediator.		Caregiver-focused Post- intervention, lower use of foods as rewards was found to mediate the direct intervention effect on child diet quality.	Post- intervention, higher maternal feeding knowledge was found to mediate the direct intervention effect on child diet quality. Self-efficacy was associated with child diet quality but alone was not a mediator. Health related: NR	Maternal mediators: self-completed question-naire post-intervention Maternal knowledge of feeding behaviors: Purpose-designed 12-item tool Maternal self-efficacy: Assessed using a combination of seven previously developed items and two purpose-designed items Maternal feeding practices: 6 subscales from the Comprehensive Feeding Practices Questionnaire	(1) Yes (2) Yes (3) Yes (4) Yes	Robust multi-component intervention based on anticipatory guidance, parenting skills and peer support frameworks. Intervention design considered the health care system structure and practices in Melbourne, Australia. Mediation analysis useful for untapping potential "mechanisms" for intervention effects, in this instance maternal knowledge and not using food as a reward (responsive feeding). Also identifies maternal self-efficacy as a determinant of child dietary quality (but not a mediator of impact of intervention). Study was done with White, well-educated families in a health care system that is different from the one currently in place in the

Maternal diet (modeling): FFQ previously validated among a sample of Australian women Child dietary index: 3 unscheduled telephone multipass method 24-hr recalls post-intervention where parents received a purpose-designed food measurement booklet to aid in food quantity estimation OPDI used for measuring child dietary targets	United States. Unclear validity or value added of OPDI scores.

continued

TABLE E-3 Continued

Trial Name [Country]	Author Last Name, Year	What-to-Feed Topics Covered	Impact on Outcomes Related to What to Feed	How-to-Feed Topics Covered	Impact on Outcomes Related to How to Feed	Impact on Health-Related or other Feeding-Related Outcomes	Tools Used	Notes on Statistical Methods*	Committee Comments
	(Cameron et al., 2014)		Child-focused Maternal education moderated the effect of the intervention on vegetable consumption, sweet snacks, and water; Maternal age moderated the effect of the intervention on vegetable consumption and water intake; a significant intervention effect only for mothers with a university degree for the consumption of vegetables and sweet snacks; highly significant intervention effect		NR	Collected BMI but did not report on outcomes.	Infant diet: 3× telephone administered multipass 24-hour recall Physical Activity: ActiGraph accelerometers	(1) No (2) Yes (3) Yes (4) Yes	Robust multi-component intervention based on anticipatory guidance, parenting skills and peer support frameworks. Intervention assessed through a robust cluster randomized trial design. Effect modification analysis addressed equity issues as they found different results on impact of intervention on unhealthy dietary behaviors as a function of maternal education. Intervention design considered the health care system structure and practices in Melbourne, Australia. Study was done with White, well-educated families in a health care system that is different from the one currently in place in the United States. No impact on BMI.

	was observed in infants with younger mothers (<32 yrs) for increasing vegetable and water consumption.					
(Spence et al., 2013)	Child-focused Three dietary patterns were identified by PCA; however, the scores did not substantially differ between the intervention and control arms.	NR	OPDI scores were higher in the intervention group compared to the com-parator group.	Dietary data: A 5-pass, computer-assisted, standardized recall process was developed and utilized based on the method validated by the USDA Diet quality: Obesity Protective Dietary Index (OPDI) and Dietary patterns: Principal components analysis (PCA)	(1) No (2) Yes (3) Yes (4) Yes	Robust multi-component intervention based on anticipatory guidance, parenting skills, and peer support frameworks. Confirms impact of intervention on healthier dietary patterns. Intervention design considered the health care system structure and practices in Melbourne, Australia. Study was done with White, well-educated families in a health care system that is different from the one currently in place in the United States. Unclear validity or value added of OPDI scores.

continued

TABLE E-3 Continued

Trial Name [Country]	Author Last Name, Year	What-to-Feed Topics Covered	Impact on Outcomes Related to What to Feed	How-to-Feed Topics Covered	Impact on Outcomes Related to How to Feed	Impact on Health-Related or other Feeding-Related Outcomes	Tools Used	Notes on Statistical Methods*	Committee Comments
	(Campbell et al., 2013)		Child-focused Caregiver-focused Reductions in sweet snack consumption in 20-month-old children; at mid-intervention (9 mo), intervention group children had lower non-core-drink intake than control group children. No significant differences between groups at end of study for other dietary outcomes (fruit, vegetables, water, noncore savory snacks).		NR	No difference in BMI between groups.	Child diet: 3× 24-hour diet recalls Sedentary activity: Accelerometry Anthropo-metrics: BMI z-scores	(1) Yes (2) Yes (3) Yes (4) Yes	Robust multi-component intervention based on anticipatory guidance, parenting skills and peer support frameworks. Impact on sugary snacks and unhealthy drinks. Intervention design considered the health care system structure and practices in Melbourne, Australia. Study was done with White, well-educated families in a health care system that is different from the one currently in place in the United States. No impact on fruit, vegetable, water and savory snacks intake, and BMI.

— [Italy]	(de Franchis et al., 2022)	MedDiet foods	Child-focused At the third follow-up visit (36 mo), the MedDiet group had a higher percentage of parents reporting that their children with good adherence to the MedDiet (higher KidMed score). Of the 16 items asked on the KidMed questionnaire, there were 6 significant differences between groups. [the MedDiet group children had parents reporting higher regular consumption of fresh and cooked vegetables, fish, and nuts and reporting that they were less likely to eat fast food, baked goods or pastries for breakfast, sweets].	NR	NR	No difference In BMI between groups.	Adherence: KidMed questionnaire and adult questionnaire.	(1) Yes (2) No (3) No (4) Yes	Child well clinic waiting area computer/kiosk based. Good potential for WIC counseling/education. Anticipatory guidance. Native Americans. High completion rate (95%). Very strong impact on child nutrition knowledge improvements. Duration and intensity not described well; control group may not be generalizable.

continued

TABLE E-3 Continued

Trial Name [Country]	Author Last Name, Year	What-to-Feed Topics Covered	Impact on Outcomes Related to What to Feed	How-to-Feed Topics Covered	Impact on Outcomes Related to How to Feed	Impact on Health-Related or other Feeding-Related Outcomes	Tools Used	Notes on Statistical Methods*	Committee Comments
GeliS [Germany]	(Hoffmann et al., 2021)	*Introduction of complemen-tary food (specifics not provided).*	Caregiver-focused A higher proportion of parents of infants in the intervention group reported providing whole grain products compared to control. Other solid foods did not differ between groups. The intervention group introduced complementary food later than control.	*RF: Infant hunger and satiety (specifics not provided).*	NR	Infant weight was lower in the inter-vention group from birth to 4 mo, similar to control at 6 mo, then higher at 12 mo.	Infant feeding practices: Questions adapted from "German Health Interview and Examination Survey for Children and Adolescents" (KiGGS)	(1) Yes (2) Yes (3) Yes (4) Yes	Large sample size, well designed intervention. Study primarily designed to assess maternal outcomes. Not a weakness but of note: (1) groups differed little with respect to infant outcomes; and (2) weight was higher at 12 mo among intervention infants, raising possibility of unintended consequences.
BBOFT [Netherlands]	(Vlasblom et al., 2020)	Difference of home-made food and food in jars. Sweets/food not used to reinforce.	Child-focused At 6 mo, fewer children in the BBOFT+ group consumed sweet beverages compared to control. No significant dif	Do not use food as a reward, family meals, no watching TV while eating.	Child-focused No significant difference in daily breakfast between BBOFT+ and control at any time point.	No difference in BMI at 6, 14, or 36 mo.	Questionnaires with questions adapted from Dutch questionnaires used in previous studies.	(1) Yes (2) Yes (3) Yes (4) No	Appropriate number of clusters and participants within clusters, statistical analyses appropriately accounted for clustering, detailed description of intervention provided. Less generalizable to U.S. populations because intervention conducted in the

	Snacks: water or diluted juice, bread crust or crackers. Prevention of extra food and used healthy alternatives.	ference at 14 or 36 mo.					context of Youth Health Care centers, a distinct feature of the health care ecosystem in the Netherlands.
(van Grieken et al., 2017)	Less SSB	Child-focused At 36 mo, children in the intervention group with normal weight mothers had less sweetened beverages per day.	Breakfast daily	Child-focused Signifi-cantly more male children in the inter-vention group ate daily breakfast at 36 months.	No difference in BMI at 36 mo of age.	(1) Yes (2) Yes (3) Yes (4) Yes	Appropriate number of clusters and participants within clusters, statistical analyses appropriately accounted for clustering, detailed description of intervention provided. Less generalizable to U.S. populations because intervention conducted in the context of Youth Health Care centers, a distinct feature of the health care ecosystem in the Netherlands. Low overall rates of obesity further reduce generalizability to the United States. Obesity at 36 mo was very low: 4 to 6% Largely a study of negative results. Study professionals and parents were not blinded.

continued

TABLE E-3 Continued

Trial Name [Country]	Author Last Name, Year	What-to-Feed Topics Covered	Impact on Outcomes Related to What to Feed	How-to-Feed Topics Covered	Impact on Outcomes Related to How to Feed	Impact on Health-Related or other Feeding-Related Outcomes	Tools Used	Notes on Statistical Methods*	Committee Comments
Starting Early Program [United States]	(Messito et al., 2020)	Healthy first foods, homemade baby food purées.	Caregiver-focused At 10 mo, more intervention mothers were less likely to have introduced juice, given juice in a bottle, or cereal in a bottle.	Recognizing infant feeding cues, non-feeding soothing techniques, signs infant is ready for solids, responsive feeding, interacting during meals, family meals, self-feeding, cup introduction, allowing infant to decide how much to eat, how much to feed, and healthy meal and snack routines.	Caregiver-focused The inter-vention group was more likely to have daily family meals and had higher knowledge scores. The inter-vention group exhibited lower subscale scores in pressuring/controlling, indulgent and laissez-faire domains compared to controls.	Increasing number of NPSG sessions attended was correlated with giving breast milk as the only milk source, giving less cereal in the bottle, higher knowledge scores, and lower pressuring with cereal. Health related: NR	Feeding practices: Infant feeding practices study II questions. Feeding knowledge: 8 questions generated from StEP curriculum. Feeding styles: Infant Feeding Style Questionnaire (validated).	(1) Yes (2) Yes (3) Yes (4) Yes	Hispanic/Latino study sample, high proportion with less than high school education, intervention fidelity and adherence assessed and described, intensive intervention (prenatal and frequently in the first year) by registered dieticians represents potential maximum achievable in this manner. Outcomes described were all obtained by parent report, methods state that medical records were reviewed but no outcomes from medical records (e.g., anthropometry) are reported.

— [Israel]	(Globus et al., 2019)	Solid foods, iron and vitamin D supplementation.	NR	Infant hunger/satiety cues, emotional feeding, responsive feeding.	Both caregiver-focused and child-focused Maternal behaviors are modifiable for first-time mothers, leading to better feeding interactions at age 12 mo, as based on evaluations of filmed feeding interactions. Mothers from the intervention group were more attentive to infants' cues, enabling them to initiate inter-actions, control the pace, amount of food, and ending of the meal.	NR	Mother/infant or toddler interactions: Chatoor Feeding Scale (CFS); blinded video tapings of mother-infant feeding interaction done at 12 mo.	(1) Yes (2) Yes (3) Yes (4) Yes	Blinded videotaping to assess how to feed. Not randomized; feeding environment not assessed. Highly educated mothers; funds insufficient to complete videotaping of all infants in control group.

continued

TABLE E-3 Continued

Trial Name [Country]	Author Last Name, Year	What-to-Feed Topics Covered	Impact on Outcomes Related to What to Feed	How-to-Feed Topics Covered	Impact on Outcomes Related to How to Feed	Impact on Health-Related or other Feeding-Related Outcomes	Tools Used	Notes on Statistical Methods*	Committee Comments
PROBIT [Italy]	(Morandi et al., 2019)	Encouraged alternating protein sources correctly. Discouraged adding sugar to foods or beverages, and giving the child beverages other than milk or water.	Child-focused There was no difference in SSB consumption at 2 yrs between groups.	Encouraged breast-feeding, feeding on demand, responsive feeding, timely complementary feeding, giving ns based on the child's appetite and playing active games with the child. Discouraged pressing the child to eat more, reward-ing or punishing the child with food.	Caregiver-focused Feeding on demand was more prevalent in the intervention arm at 3 mo. There were no group differences in outcomes at 6 and 12 mo.	No significant difference in BMI between groups at 2 yrs.	Pediatrician completed data collection forms (yes/no questions).	(1) Yes, although it was methodologically unsound (assumed an ICC similar to an individually-randomized trial). (2) Yes (3) Yes (4) No	Leverages existing clinical provider. Participant recruited by pediatricians who were aware of group assignment, outcome assessment was not blinded.

LIMT [Australia]	(Dodd et al., 2018)	Fruits, vegetables, saturated fat, refined carbohydrates, fiber, dairy.	Child-focused NR	Provision of different meals for children; family mealtime; food encouraging behaviors; bottle at bed time.	Caregiver-focused NR	No effect of an antenatal dietary intervention on child growth or adiposity at 18 mo of age. No difference in prevalence of child BMI z-scores >85th percentile for children born to women in the intervention group	Prevalence of child BMI z-scores >85th percentile: Using skinfold thickness measurements with a strict protocol. Child neurodevelopment: Ages and Stages Questionnaire Child dietary intake: questionnaire based on an Australian Longitudinal Study.	(1) Yes (2) Yes (3) Yes (4) Yes	Intervention focuses on prenatal period which is believed to be key for life course approach to childhood obesity prevention. No data on impact of prenatal intervention on maternal dietary patterns during pregnancy. Hence not possible to know why intervention had no impact on childhood obesity risk factors. Very little information on implementation aspects of study provided.

continued

TABLE E-3 Continued

Trial Name [Country]	Author Last Name, Year	What-to-Feed Topics Covered	Impact on Outcomes Related to What to Feed	How-to-Feed Topics Covered	Impact on Outcomes Related to How to Feed	Impact on Health-Related or other Feeding-Related Outcomes	Tools Used	Notes on Statistical Methods*	Committee Comments
	(Dodd et al., 2014)		NR		NR	No significant difference in the risk of infants born large for gestational age in the lifestyle advice group compared with standard care group. Infants born to women allocated to lifestyle advice, however, were less likely to weigh above 4,000 g compared to standard care group. In a post hoc analysis, there was no difference in total gestational weight	NR	(1) Yes (2) Yes (3) Yes (4) Yes	Intervention focuses on prenatal period which is believed to be key for life course approach to childhood obesity prevention. No data on impact of prenatal intervention on maternal dietary patterns during pregnancy. Hence not possible to know why intervention had no impact on childhood obesity risk factors. Very little information on implementation aspects of study provided.

gain in the lifestyle advice group vs standard care group. For women, no significant differences between the two treatment groups in the proportion of women whose weight gain was below, within, or exceeded the IOM recommen dations based on BMI in early pregnancy.

continued

TABLE E-3 Continued

Trial Name [Country]	Author Last Name, Year	What-to-Feed Topics Covered	Impact on Outcomes Related to What to Feed	How-to-Feed Topics Covered	Impact on Outcomes Related to How to Feed	Impact on Health-Related or other Feeding-Related Outcomes	Tools Used	Notes on Statistical Methods*	Committee Comments
Grow2 Gether [United States]	(Fiks et al., 2017)	Avoiding juice and other SSB.	Child-focused SSB introduction was not different between groups.	Responsive feeding, feeding styles and responsiveness to infant cues, bonding with baby and understanding cues.	Caregiver-focused At 9 mo, mothers in the intervention group had higher IFSQ feeding behavior scores and were less likely to report pressuring their children to finish food.	There were no significant differences in weight-for-length z-scores between groups.	Behavioral outcomes: Self-report in survey. Maternal infant feeding practices: 10 questions from Infant Feeding Style Questionnaire (IFSQ) [previously published]	(1) Yes (2) Yes (3) No (4) No	Social media intervention has increasing relevance for dissemination of information. The participant population in this study was entirely low income. Sample size was small; social media platform used is dated.
NOURISH [Australia]	(Magarey et al., 2016)	Nutritional requirements of healthy infants.	Child-focused At 5 yrs of age (follow-up) there were no group or time by group differences in dietary outcomes or CDQ scores. There were no time by group	Solid feeding including variety and texture, neutral repeated exposure to healthy foods, neutral limited	Child-focused Children in the intervention group were reported by parent to have lower food	NR	Weight and length, Infant food intake: 24-hour food records and one phone 24-hour recall. Infant food prefer ence: Wardle tool adapted to Austra lian target foods.	(1) Yes (2) Yes (3) Yes (4) No	Theoretically informed intervention; clearly described; intensive intervention. High intensity and duration of the intervention may be a barrier to scalability.

differences in child food preferences. The intervention children liked a higher proportion of specified fruits, but preferences for vegetables and discretionary foods did not differ by group.	exposure to non-core foods and realistic expectations of the growth. Positive feeding environment and managing toddler eating behavior in the context of increasing autonomy and transition to eating with the family and in wider social settings. Encourages a structured food choice and eating pattern, positive role modelling and avoidance of coercion, use of rewards, and emotional feeding.	responsiveness and higher satiety responsiveness. There was a time effect for child eating behavior.	Infant feeding behavior: Childrens Eating Behavior Questionnaire Maternal feeding style and practices: Infant Feeding Questionnaire, Child Feeding Questionnaire, Parental Feeding Style Questionnaire (PFSQ). Parenting skills: 4 scales from Longitudinal Study of Australian Children.

continued

TABLE E-3 Continued

Trial Name [Country]	Author Last Name, Year	What-to-Feed Topics Covered	Impact on Outcomes Related to What to Feed	How-to-Feed Topics Covered	Impact on Outcomes Related to How to Feed	Impact on Health-Related or other Feeding-Related Outcomes	Tools Used	Notes on Statistical Methods*	Committee Comments
	(Daniels et al., 2015)		NR		Caregiver-focused At 5 years of age (follow-up) Significant group effects were seen for 6 of 9 scales, with intervention mothers reporting less non-responsive feeding. In response to children's refusal of food they normally eat, mothers in the intervention group used	Time was significantly associated with BMI z-score but no timexgroup interaction.		(1) Yes (2) Yes (3) Yes (4) No	

fewer non-responsive strategies (3 of 6 items) and more responsive strategies (2 of 2 items). In response to child refusal of unfamiliar foods (neophobia), mothers in the intervention group were less likely to disguise the food and more likely to continue to reoffer new foods (2 of 4 items).

continued

TABLE E-3 Continued

Trial Name [Country]	Author Last Name, Year	What-to-Feed Topics Covered	Impact on Outcomes Related to What to Feed	How-to-Feed Topics Covered	Impact on Outcomes Related to How to Feed	Impact on Health-Related or other Feeding-Related Outcomes	Tools Used	Notes on Statistical Methods*	Committee Comments
	(Daniels et al., 2014)		Caregiver-focused: Intervention group was reported by parent to like more fruits and to have been exposed to a wider variety of vegetables and were more limited in the reported number of "liked" and "tried" beverages. Child-focused: Proportion of intervention vs control children consuming specified foods on 24-hr recalls were in desirable direction but not statistically different.		Child-focused The intervention group children were rated higher by parents on satiety responsiveness, lower on emotional overeating, fussiness, and food responsiveness.	NR		(1) Yes (2) Yes (3) Yes (4) No	

(Daniels et al., 2013)	NR		Caregiver-focused There were significant differences by group in the expected directions on 6 of 9 sub-scales from the CFQ23 and PFSQ24 and on 11 of 12 individual items assessing responses to food refusal.	Fewer (but not significant) intervention children were classified as overweight or obese.		(1) Yes (2) Yes (3) Yes (4) No

continued

TABLE E-3 Continued

Trial Name [Country]	Author Last Name, Year	What-to-Feed Topics Covered	Impact on Outcomes Related to What to Feed	How-to-Feed Topics Covered	Impact on Outcomes Related to How to Feed	Impact on Health-Related or other Feeding-Related Outcomes	Tools Used	Notes on Statistical Methods*	Committee Comments
	(Daniels et al., 2012)		NR		Caregiver-focused Intervention mothers reported a slightly higher awareness of cues than control mothers and were more likely than those in the control group to report it was mostly/only their child who decides how much the child eats. There were no group differences in the mothers' perceptions of their child's feeding behavior.	Rapid weight gain less common in intervention infants. No group differences between groups length z-scores.		(1) Yes (2) Yes (3) Yes (4) No	

					Proportion of mothers reporting their child was easy to feed, picky or fussy eater, or unwilling to eat unfamiliar food.				
Growing Leaps and Bounds [United States]	(Schroeder et al., 2015)	Cereal, vegetables, SSBs, milk.	Caregiver-focused Intervention group was less likely to use cereal or stage one vegetable (purées) as first complementary food. Intervention group offered less soda, sweet tea, punch, cow's milk than control.	NR	Caregiver-focused Parents in the intervention group significantly exerted more dietary restriction on their child, and were more active in monitoring child feeding, than those in the control group.	No effect of intervention on BMI, height, weight or BMI z-score at 24 mo.	Child feeding practices: Tips on Parenting Study instrument; Child feeding questionnaire (CFQ). Dietary assessment: Authors developed a FFQ for this study.	(1) No (2) Yes (3) Yes (4) Yes, infant weight by SNAP participants	Intervention group included the low-income urban site. 48% Black participants, intervention in pediatric office was intensive and might represent the maximum of what could be achieved in a pediatric office, included written materials that could be scalable. Randomization occurred by cluster and there were only 4 clusters which greatly limits power. Statistical analysis did not describe accounting for clustering and ICC was not reported, suggesting that statistical analysis did not appropriately account for clustering.

continued

TABLE E-3 Continued

Trial Name [Country]	Author Last Name, Year	What-to-Feed Topics Covered	Impact on Outcomes Related to What to Feed	How-to-Feed Topics Covered	Impact on Outcomes Related to How to Feed	Impact on Health-Related or other Feeding-Related Outcomes	Tools Used	Notes on Statistical Methods*	Committee Comments
— [United Kingdom, Greece, Portugal]	(Fildes et al., 2015)	Vegetables, fruit; offering variety of vegetables.	Child-focused No significant effect of the intervention on vegetable intake, controlling for the effect of country. No group differences in fruit intake or liking were observed in the taste test in any of the three countries.	Introducing vegetables early in the weaning process, recognition of infant facial features in response to feeding (responsive feeding), exposure feeding.	NR	Infant food preferences—UK intervention infants ate significantly more unfamiliar vegetable and were rated by both mothers and researchers as liking the vegetable more compared to infants in the control group 1 mo after solid foods were introduced, no significance was found in Portugal and Greece. Health related: Maternal BMI *(self-reported)*	Feeding method: Assessed with one question in questionnaire completed pre- and post-intervention.	(1) Yes (2) Yes (3) Yes (4) Yes	Addresses key question on veggies as first foods to facilitate subsequent acceptance of novel veggies. Included objective measures of veggie intake and acceptance assessed through direct observation. High study retention. Positive findings in one but not all countries suggest importance of contextual factors (ex. lower veggie intake among infants in the UK) [lower fidelity/compliance in Portugal could not be ruled out]. Study was conducted in three European countries with different health care systems and to some extent pediatric nutrition recommendations than the United States. Very limited RE-AIM implementation information. If this intervention were to work in the United States, it could have strong nutrition counselling implications for the WIC program.

— [United States]	(French et al., 2012)	Fruits, veg- etables, milk, SSB. Other: fast food.	Caregiver- focused MOMS group had more fruits and vegetables given to infants compared to the BF group.	Meal/ snack frequency, responsive feeding.	Caregiver- focused The moth- ers in both interven- tion groups (MOMS and OP) had healthier child feed- ing habits than those in the BF con- trol group. Providing mothers with information aimed at changing their own eating patterns showed posi- tive differ- ences in reported infant feeding behaviors.	By age-12 mo, the OP group of mothers re- ported fewer family meals than MOMS and BF. Health re- lated: NR	Maternal nutri- tional intake: Questions from the Behavior Risk Factor Surveillance Fruit and Veg- etable module.	(1) Yes (2) Yes (3) Yes (4) Yes	Well-designed comprehen- sive anticipatory guidance intervention that included how and what to feed the infant (as well as maternal nutrition). U.S. based. Only 57% completers (unclear why) did not test group-based model. May have implications for improving design of WIC nutrition counseling and education.

continued

TABLE E-3 Continued

Trial Name [Country]	Author Last Name, Year	What-to-Feed Topics Covered	Impact on Outcomes Related to What to Feed	How-to-Feed Topics Covered	Impact on Outcomes Related to How to Feed	Impact on Health-Related or other Feeding-Related Outcomes	Tools Used	Notes on Statistical Methods*	Committee Comments
First Steps for Mommy and Me [United States]	(Taveras et al., 2011)	NR	Child-focused Infants in the IG practices were less likely than infant in the CG to be introduced to solid foods before 4 mo of age (Note: there are no relevant outcomes to what to feed for our purposes—timing of introduction).	Maternal responsiveness to satiety cues, maternal use of feeding to soothe practice.	No differences at 6 mo on breastfeeding duration or exclusivity. No differences in maternal responsiveness to infant satiety cues or use of feeding to sooth (Note: duration of breastfeeding not relevant outcome for us).	There were no group differences in maternal postpartum weight retention (PPWR) at 6 mo comparing the IG with the CG. Change in WL z-scores from birth to 6 mo appeared lower among IG infants compared to CG infants but not statistically significant. There was a trend toward fewer IG infants being in the highest quartile of WL z-scores at 6 mo of age.	Mother's dietary intake: Brief FFQ. Fast food intake: Question adapted from another source used in cohorts of adults and adolescents. SSB intake: Validated questions associated with adult BMI. Breastfeeding: Birch questionaires. Infant feeding behaviors and timing of solid foods: Infant feeding questionnaire. Infant BMI: Seca scale (weight) and Shorr boards (height).	(1) No (2) Yes (3) Yes (4) Yes, some quartile comparisons	Pilot study Limited to highly educated population; there were no significant findings relevant to what to feed or how to feed; mother's self-report; no randomization, power analysis for outcomes; very small numbers in comparator group.

TARGet Kids! [Canada]	(Maguire et al., 2010)	Juice, cow's milk.	Child-focused Both the IG and CG had similar intake of cow's milk and juice.	Age at bottle-weaning, breastfeeding, cup-use, age at breast-weaning, bottle-use in bed.	Child-focused Children in the IG were less likely to be using a bottle during the day at 2 yrs and less likely to be using a bottle in bed. Children in the IG started using a cup 3 mo earlier and were weaned from the bottle 4 mo earlier than children in the CG. There were significant absolute risk differences in bottle use in the IG compared to CG during the day and in bed at 2 yrs. 86% of parents of children using bottle said there was continued bottle use	No difference in iron depletion at 2 yrs of age for children in either the IG or CG.	Iron depletion: Ferritin testing via Siemens Immulite 2500 analyzer. BMI: SECA, stadiometer and scale.	(1) Yes (2) Yes (3) Yes (4) Yes	86–89% college educated. Earlier introduction of cup only positive effect: How to feed-relevant to our report. Blinding information: Staff, pediatricians, and lab personal were blinded to group assignments. Parents were not blinded to allocation group, sippy cups were masked when delivered.

continued

TABLE E-3 Continued

Trial Name [Country]	Author Last Name, Year	What-to-Feed Topics Covered	Impact on Outcomes Related to What to Feed	How-to-Feed Topics Covered	Impact on Outcomes Related to How to Feed	Impact on Health-Related or other Feeding-Related Outcomes	Tools Used	Notes on Statistical Methods*	Committee Comments
					because the child "likes the bottle better than the cup" and 25% responded that the child "does not drink enough using a cup."				
— [United States]	(Sanghavi, 2005)	Formula, milk, other: solid foods, honey, breast milk.	NR	Knowledge of sleeping with bottle and formula/breast milk, weaning bottle by 12 mo of age.	NR	Parents in the intervention group compared to the control group scored higher on questions testing their knowledge of nutrition. Health related: NR	Knowledge assessment: Included infant nutrition along with multiple unrelated nutrition topics using a 21-item questionnaire.	() No (2) No (3) No (4) No	Child well clinic waiting area computer/kiosk based. Good potential for WIC counseling/education. Anticipatory guidance. Native Americans. High completion rate (95%). Very strong impact on child nutrition knowledge improvements. Only focused on knowledge about what to feed. Limited information on RE-AIM implementation aspects.

ECE								
EniM [Spain]	(Roset-Salla et al., 2016)	Dietary fats (Med Diet), other-fiber, CHO type.	Child-focused Adherence to the Med Diet improved in the intervention group compared to the control group. No significant differences were observed between the two groups of children for food and nutrient intakes.	*Not included in intervention delivered but breastfeeding was assessed as a comparative factor between the IG and CG.*	NR	For parents: significant improvement in Med Diet adherence and consumption of vegetables, fish, olive oil and vitamins C and D for the intervention group compared to the control group, with a subsequent decrease in the intake of butter, margarine, and industrial bakery product for the intervention group. Health related: NR	Med Diet adherence: Kidmed test (children), MDQI 14-item test (adults) Child macro-micronutrient intake: FFQ adapted from adult FFQ BMI-weight/height.	(1) No (2) Yes (3) Yes (4) Yes	Design and results - educational intervention in parents in ECE setting during the time 1–2-yr-olds added to the family table can improve healthy eating. study participants have high education level

continued

TABLE E-3 Continued

Trial Name [Country]	Author Last Name, Year	What-to-Feed Topics Covered	Impact on Outcomes Related to What to Feed	How-to-Feed Topics Covered	Impact on Outcomes Related to How to Feed	Impact on Health-Related or other Feeding-Related Outcomes	Tools Used	Notes on Statistical Methods*	Committee Comments
— [United Kingdom]	(Ahern et al., 2014)	Vegetable consumption	Child-focused Children consumed more swede veggie compared to the other 2 veggies offered; older children (>24 mo) ate less veggie purée immediately post-intervention than the younger children (<24 mo); significant increase in intake by exposure 3 but no further significant increase found after 3rd exposure.	Repeated exposure to vegetables through flavor-flavor learning for children.	Child-focused No main effects on condition (repeated exposure, flavor-flavor learning, control), but statistically significant interaction between exposure and condition; post-intervention intake and change in intake was significantly correlated with all three conditions.	Significant increase in intake by exposure 3 but no further significant increase found after 3rd exposure. Intake of the FFL purée also increased from pre- to post-intervention, when no longer paired with the sweet tasting fruit purée (associative learning indicator), but both FFL and RE conditions increased veggie consumption with no clear advantages of FFL over RE.	Leicester SMSSE portable stadiometer for child height and Seca digital scales for child weight; purée measured at before serving but not details on how it was measured.	(1) No (2) Yes (3) Yes (4) No	Overall student support current literature on frequent exposure increasing acceptance. The timing of intervention and age children resulted in the younger children not participating in the 6 mo follow up- biased sample per researchers. Lack of participant characteristics, attrition of the study participants at 6 mo, small sample size make it challenging to assess scalability.

						Measured anthropometrics of children (BMI).			
— [Belgium]	(Verbestel et al., 2014)	Water, SSB, fruits, vegetables, Other: sweets and savory snacks.	Child-focused The intervention was not effective in increasing parental-reported increasing daily consumption of water, unsweetened milk, fruit and vegetables, consumption of soft drinks, sweetened milk, sweets and savory snacks.	Meal/snack frequency	NR	There was a significant time-by-condition interaction indicating that the intervention had a positive effect on BMI z-score. BMI z-score decreased in both groups but decreased more in the IG than the CG.	Child dietary intake: 24-item FFQ taken by parents at home. BMI: height/weight (Seca scales).	(1) No (2) Yes (3) Yes (4) Yes	Family based healthy lifestyle in ECE can lead to healthier weight outcomes in toddlers. Negative development of lifestyle behaviors over 1 year of time.

continued

TABLE E-3 Continued

Trial Name [Country]	Author Last Name, Year	What-to-Feed Topics Covered	Impact on Outcomes Related to What to Feed	How-to-Feed Topics Covered	Impact on Outcomes Related to How to Feed	Impact on Health-Related or other Feeding-Related Outcomes	Tools Used	Notes on Statistical Methods*	Committee Comments
— [United Kingdom]	(Caton et al., 2013)	Vegetable consumption	Child-focused Intakes of both vegetables increased significantly from pre- to post-intervention; changes in intake for artichoke increased more than carrot even after controlling for increased carrot intake at baseline.	Repeated exposure to vegetables through flavor-flavor learning and flavor-nutrient learning for children.	Child-focused RE, FNL and FFL were equally effective at promoting the intake of a novel vegetable (artichoke) in pre-K children.	A significant time by condition interaction was observed, demonstrating elevated intake in the RE condition at post-test and follow-up. Measured anthropometrics of children (BMI).	Child height: Leicester SMSSE portable stadiometer Child weight: Seca digital scales Purée measured at before serving but not details on how it was measured; for purée, all pots were weighed before and after to determine grams of purée served.	(1) No (2) Yes (3) Yes (4) Yes	Study design that separated investigation into 2 age cohorts: 23 mo and younger and 24 mo and older; selected ECE centers to account for SES and balanced ethnic backgrounds. Environmental/home/cultural factors not studied. Also further studies needed to examine the effect of RE with foods in their pure form. Results showing RE can be a simple technique that can be applied in both home and ECE settings.

— [United States]	(Clark et al., 2009)	Milk, breast milk, formula, water.	Caregiver-focused Intervention group- respondents perceived that breast milk provided the most benefits to infants.	Responsive feeding, Other: breastfeeding.	Caregiver-focused Intervention group: respondents perceived that breast-feeding provided the most benefits to infants; did not feed infants every 2 hours compared to control group.	Intervention group met more of the breast-feeding– friendly center criteria (e.g., offering mothers water to drink, private spaces to breast-feed) At follow-up, no significant differences in knowledge attitude and behavior changes were found among the 3 time periods. Health related: NR	Pre/post/follow-up survey with 42 closed-and open-ended questions asking providers about their knowledge, attitudes, and behaviors toward feeding breast milk, formula, and solid food to the infants through the INFAnet Nutrition for Child Care Providers.	(1) No (2) Yes (3) Yes (4) Yes	Thoughtful conceptual design; bilingual resources included though not used. First of its kind study with inconclusive results. More research needed.

continued

TABLE E-3 Continued

Trial Name [Country]	Author Last Name, Year	What-to-Feed Topics Covered	Impact on Outcomes Related to What to Feed	How-to-Feed Topics Covered	Impact on Outcomes Related to How to Feed	Impact on Health-Related or other Feeding-Related Outcomes	Tools Used	Notes on Statistical Methods*	Committee Comments
Cooperative Extension									
NEAT [United States]	(Horodynski and Stommel, 2005)	Introducing new foods, parental concerns about what to feed.	NR	Adult modeling positive behavior, addressing parents' concerns about how to feed, and parenting skills.	Child-focused: No significant difference in toddler feeding self-regulation between groups. Caregiver-focused: Caregiver knowledge was greater in the intervention group (note baseline knowledge of intervention group was slightly lower than control). Caregiver self-efficacy increased slightly in both groups,	NR	Toddlers feeding self-regulation: Child-Parent Mealtime Behavior Questionnaire (CPMBQ) which was adapted from the Children's Eating Behavior Inventory (CEBI). Parental knowledge: Facts on feeding children tool developed for this study. Feeding self-efficacy questionnaire	(1) No (2) Yes (3) Yes (4) No	Focus on low-income families who tend to be at high risk; high participation rate (100% classes, 91% for 18 reinforcement activities), included process evaluation positive, use of existing Cooperative Extension + Early Head Start services, included 4 wk and 6 mo f/u measures. Mostly white sample, all self-reported measures, no behavior changes documented, unclear if adequately powered. Feasible collaboration between Cooperative Extension + Early Head Start with high participation rates by parents; authors suggest that more tailored reinforcement activities would be helpful.

					but not significantly different between groups. Proportions of families observed with TV on during meal time visit decreased, but not significantly, in the intervention group over time.				
WIC									
SMS Intervention [United States]	(Macchi et al., 2022)	Breastfeeding, delaying solids, delaying and reducing baby juice consumption.	Child-focused At baseline, infant nutrient consumption was the same between groups. At the end of the study, the intervention group had significantly higher intakes of calcium, protein, zinc, and grains. Milk consumption was the same between groups.	Prevention of overfeeding, recognizing satiety cues, readiness for introductory foods, when to feed solids.	NR	NR	Infant feeding practices: Validated FFQ. Behavior change: Qualitative interview delivered by trained interviewer.	(1) Yes (2) Yes (3) Yes (4) No	WIC-based texting campaign is highly implementable; fairly low-dose, low-cost with high acceptability yet low impact; ethnically diverse WIC study sample. Method could be implemented across settings within and outside of WIC.

continued

TABLE E-3 Continued

Trial Name [Country]	Author Last Name, Year	What-to-Feed Topics Covered	Impact on Outcomes Related to What to Feed	How-to-Feed Topics Covered	Impact on Outcomes Related to How to Feed	Impact on Health-Related or other Feeding-Related Outcomes	Tools Used	Notes on Statistical Methods*	Committee Comments
	(Gibby et al., 2019)		NR		Caregiver-focused Most participants reported that the messages led them to make changes in the way they fed their infants, such as talking to their infant during feedings and observing hunger cues. However, some participants made no changes in feeding	Focus was on acceptability of text messages, reported high acceptability of text messages. Health related: NR		(1) Yes (2) Yes (3) Yes (4) No	

(Palacios et al., 2018)	Caregiver-focused No statistically significant difference between introduction of juice between groups at the end of the study.	Caregiver-focused Feeding practices were not different between groups, but there was a trend for a greater proportion of caregivers in the intervention group stopping the feeding when infants showed signs of being full compared to controls.	Child-focused No significant differences in weight status at the end of the trial.	(1) Yes (2) Yes (3) Yes (4) Yes, by those who were breastfeeding initially vs not.

continued

TABLE E-3 Continued

Trial Name [Country]	Author Last Name, Year	What-to-Feed Topics Covered	Impact on Outcomes Related to What to Feed	How-to-Feed Topics Covered	Impact on Outcomes Related to How to Feed	Impact on Health-Related or other Feeding-Related Outcomes	Tools Used	Notes on Statistical Methods*	Committee Comments
— [United States]	(Scheinmann et al., 2010)	*Age appropriate feeding messages derived from anticipatory guidance sources from USDA (not described).*	Caregiver-focused Knowledge of age appropriate infant feeding practices; Of the 9 questions, one [size of baby's stomach] demonstrated increased knowledge in the video group [note: control had higher baseline knowledge of this]. Three questions had greater knowledge in control group at 3- or 6-mo follow-up.	*Age appropriate feeding messages derived from anticipatory guidance sources from USDA (not described).*	Caregiver-focused Of the 7 behavior questions asked, only knowledge on "age to introduce solids" was higher in the video group.	NR	Questionnaire adapted from Bright Futures Nutrition Series.	(1) No (2) Yes (3) No (4) No	Highly implementable intervention (DVD to take home); foreign-born Latina sample. Unclear how caregivers used the DVD intervention and what other follow-up might have been offered/reminders to watch, questions about what was learned, etc. Low dose intervention perhaps even more achievable today with social media/online videos (rather than DVDs) that achieved small but measurable impacts. Could be integrated across settings.

Home Visit									
Sleep SAAF [United States]	(Hernandez et al., 2022)	Avoid adding infant cereal to a bottle.	Caregiver-focused Around half of the mothers in both groups reported adding cereal to the infants' bottles. No difference between groups on introduction of solids.	Recognize hunger and satiety cues, feeding expectations.	Caregiver-focused Mothers in the responsive parenting group used significantly less pressure to finish/soothe and reported less pressure with cereal (not statistically significant). This group reported higher endorsement of the statement "I let my baby decide how much to eat." Most mothers in each group used milk/formula to soothe. The responsive parenting group were significantly less likely to soothe with other beverages.	Feeding mode (breast or formula) and maternal age moderated the group effect on use of pressure to finish/soothe. Health related: NR	Introduction of solids/bevegages: Maternal self-report Pressure based feeding practices: IFSQ Food to soothe: Babys Basic Needs Questionnaire	(1) Yes (2) Yes (3) Yes (4) No	African-American target population; 2 home-based sessions (90-120 min at 3 wks; 45–60 min at 8 wks). Assessed a very high number of outcomes (18) with only 3 significant; low-dose/low-impact. But promising in terms of embedding responsive feeding interventions in HV programs and targeting African-American families.

continued

TABLE E-3 Continued

Trial Name [Country]	Author Last Name, Year	What-to-Feed Topics Covered	Impact on Outcomes Related to What to Feed	How-to-Feed Topics Covered	Impact on Outcomes Related to How to Feed	Impact on Health-Related or other Feeding-Related Outcomes	Tools Used	Notes on Statistical Methods*	Committee Comments
INSIGHT [United States]	(Harris et al., 2020)	Vegetables, fruits, SSB and high fat snacks.	NR	Recognize hunger and satiety cues, to offer age-appropriate foods and portion sizes, to use food for hunger only and not as a reward or punishment soothe a distressed but not hungry child, and to use repeated exposure to promote acceptance of foods, the impor	Caregiver-focused Mothers who received the responsive parenting intervention reported using less food to soothe at 18 mo and perceived their child to have lower emotional overeating at 30 mo.	NR	Infant dietary intake: FFQ Mothers self reported feeding behavior: Babys Basic Needs Questionnaire Feeding beliefs and behavior: IFSQ Child emotional overeating (*Harris at 30 months*): Childrens eating behavior questionnaire Feeding mode: Infant Feeding Practice Study 2 FFQ from the CDC Anthropometry: Maternal pre-pregnancy weight collected from	(1) Yes (2) Yes (3) Yes (4) No	Conducted a mediation analysis, conducted multiple imputation to account for missing values.

tance of modeling healthy eating behaviors, shared feeding responsi-bility, and establish-ment of routines and limits.	medical records; maternal height collected from either/or medical records or Shorr portable stadi-ometer whereby BMI was calcu-lated from the height and weight measures; infant recumbent length and weight mea-sured with Shorr stadiometeres and Seca digital scales; conditional weight gain measured by calculating scores from standardized residuals from the linear regression of weight for age at 28 wks on weight for age at birth.

continued

TABLE E-3 Continued

Trial Name [Country]	Author Last Name, Year	What-to-Feed Topics Covered	Impact on Outcomes Related to What to Feed	How-to-Feed Topics Covered	Impact on Outcomes Related to How to Feed	Impact on Health-Related or other Feeding-Related Outcomes	Tools Used	Notes on Statistical Methods*	Committee Comments
	(Hohman et al., 2020)		Child-focused Second-borns from RP group families had greater frequency of vegetable intake (and vegetable variety) than second-borns in the control group.		NR	Mothers reported having introduced a greater total number of foods to their second born child than they did for the first born. *Further differences in combined first vs second born described in paper*. Health related: NR		(1) Yes (2) Yes (3) Yes (4) No	Adjusted for multiple comparisons; unique that it looked at potential impact of intervention on second child without additional intervention. Impact on only one outcome of many examined (second born vegetable intake)—but vegetable intake is probably one of the harder outcomes to impact. Scalability—appealing to potentially intervene with first time mothers and to continue to have impact.
	(Savage et al., 2018)		Caregiver-focused: Mothers in the responsive feeding group were more likely to introduce vegetables as a first complementary food (both groups began		Caregiver-focused: At 8, 20, and 32 wks, mothers in the RP group were less likely to report that they encouraged their child	NR		(1) Yes (2) Yes (3) Yes (4) Yes, by breast vs formula fed.	Reported some effect sizes—medium to large effects on "pressure" related outcomes (pretty impressive for a nutrition education related intervention—usually small effect sizes are expected). Looked at many outcomes and did not adjust for multiple comparisons—

complementary feeding around 4–6 mo). Child-focused: At 1 yr, there were few differences between groups in dietary intake as measured by the FFQ. The RP group reported their children consumed less snacks than the control and more vegetables daily, but no difference in exposure to fruit juice, SSB, fried foods, or fruit.	to finish the bottle if their infant stopped drinking before the milk was gone. At 28 wks, mothers in the RP group had lower scores on all three pressure subscales of the IFSQ (pressure to finish, pressure to soothe, and pressure with cereal) than mothers in the control group; there was no difference on restriction or responsive satiety. At 52 wks, mothers in the RP group reported lower use of pressure to eat and greater use of the two structure-based feeding scales, limiting exposure to unhealthy foods, and consistent feeding routines.		many p-values (0.03–0.05) probably no longer considered significant if they adjusted for multiple comparisons.

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TABLE E-3 Continued

Trial Name [Country]	Author Last Name, Year	What-to-Feed Topics Covered	Impact on Outcomes Related to What to Feed	How-to-Feed Topics Covered	Impact on Outcomes Related to How to Feed	Impact on Health-Related or other Feeding-Related Outcomes	Tools Used	Notes on Statistical Methods*	Committee Comments
	(Hohman et al., 2017)		Child-focused At 9 months, RP group infants were less likely than control to be in the Formula, low variety class or Formula, high energy density class relative to the Formula, fruits and veggies class. No differences in class membership by intervention group were noted for the Breastfed, low variety and breastfed, fruits and veggies classes.		NR	Child-focused Infants who were predominantly breastfed with low fruit/veg and high energy dense food intake had significantly higher BMIs than breastfed or formula fed infants that had adequate intake of fruit/veg and other appropriate complementary foods. Breastfed or formula fed infants with high fruit/veg/appropriate comp food		(1) Yes (2) Yes (3) No (4) No	Adjusted for multiple comparisons; nurse that measured height and weight was blinded to study group; long-term follow-up (2 years). Health outcome associated with dietary pattern vs study group. Scalability: main impact of the intervention was on increasing quality of diet in infants that were primarily formula fed at 9 months (maybe has high relevance in the United States).

				pattern had significantly lower BMI percentiles/ scores than other dietary patterns. Intervention increased proportion of infants in the formula fed with high fruit/veg/ appropriate comp food pattern.		
INSIGHT [United States]	(Savage et al., 2016)	NR	NR	RP infants gained weight more slowly than control group infants; Infants in the RP group also had lower mean weight for-length percentiles at 1 yr than infants in the control group and less likely to be overweight at 1 yr.	(1) Yes (2) Yes (3) Yes (4) Yes	Follow-up to one yr, adequate study size, limited dropout, important health concern (rapid weight gain), intensive intervention with multiple home visits. Population was demographically lower risk, unclear what proportion that were invited agreed to participate, substantial staff time for delivering intervention.

continued

TABLE E-3 Continued

Trial Name [Country]	Author Last Name, Year	What-to-Feed Topics Covered	Impact on Outcomes Related to What to Feed	How-to-Feed Topics Covered	Impact on Outcomes Related to How to Feed	Impact on Health-Related or other Feeding-Related Outcomes	Tools Used	Notes on Statistical Methods*	Committee Comments
	-								OVERALL: U.S. Based; focus on responsive feeding with some parts of curriculum similar to one already used by some state WIC agencies (Baby Behavior); fairly low dropout (14%); comparator used equivalent educational intervention [contact time] on different topic (reduce issues related to Hawthorne effect); nurse-delivered (trained professional); assessed fidelity of message delivery (moms/nurses noted messages delivered at each session); used validated questionnaires. Many outcomes self-reported by moms (social desirability bias); primiparous moms only (limits generalizability); moms were older, English-speaking, mostly white, highly educated/higher income (limits generalizability).

									Scalability—challenge: many home visiting programs are not staffed by nurses (and getting more and more challenging to staff home visiting programs with nurses with nursing shortage—many have moved to paraprofessional model); strength: intensity (4 sessions) probably very reasonable for most home visiting programs to deliver.
Babys First Bites [Netherlands]	(Van Vliet et al., 2022)	Study states: repeated vegetable exposure to promote vegetable intake, acceptance, and liking.	Child-focused No difference in vegetable intake between groups at 18 mo or 24 mo.	RVE: repeated vegetable exposure VIPP-FI: enhance sensitive parenting during feeding (recognize hunger and satiety cues and increase sensitive feeding and autonomy support).	Child-focused: There was no difference in self-regulation skills between groups. Caregiver focused: Of the 8 (Figure 1 + Table 2) behaviors assessed, Combined and VIPP-FI mothers had higher levels of responsiveness at	Child-focused: No differences in BMI z-score between groups.	Purée intake: Weighed jars post feeding. Vegetable intake: 24 hr dietary recall using online Compl-eat program (using Dutch food composition database) data processed by dietitian. Self-regulation: Eating in the absence of hunger experiment (published)	(1) Yes (2) Yes (3) Yes (4) No	Rigorous study design. Very highly educated white population receiving a fairly intensive intervention yet minimal impact. Most promising impact on increasing maternal sensitivity on HOW to feed. Blinding information: Researchers coding data were blinded. Participants were not blinded.

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TABLE E-3 Continued

Trial Name [Country]	Author Last Name, Year	What-to-Feed Topics Covered	Impact on Outcomes Related to What to Feed	How-to-Feed Topics Covered	Impact on Outcomes Related to How to Feed	Impact on Health-Related or other Feeding-Related Outcomes	Tools Used	Notes on Statistical Methods*	Committee Comments
					18 mo (not 24). VIPP-FI mothers marginally demonstrated more sensitive behavior during mealtime (at 18 mo) than AC.		Mother report of child feeding behavior: CEBQ-T Maternal feeding behavior: Researcher observed and coded, self-reported.		
Family Spirit Nurture [United States]	(Rosenstock et al., 2021)	Added sugar, SSB, traditional Navajo diet.	Caregiver- and Child-focused Less reported SSB consumption at 6 mo (immediate post), 9 mo (3 mo post-intervention) and 12 mo postpartum.	Role modeling healthy habits, division of responsibility, responsive feeding, hunger/satiety cues.	Caregiver-focused More responsive feeding behaviors at 9 mon (3 mo post-intervention) and 12 mo postpartum (not statistically significant).	Lower BMI z-scores in intervention vs control group at 9 mo (3 mo post-intervention) and 12 mo postpartum (not statistically significant).	Interviews (developed by study team), maternal self-report, study staff observations, and medical records. Infant SSB consumption: PreSchool Beverage Intake Questionnaire	(1) Yes (2) Yes (3) Yes (4) No	Co-designed with community; comparator used fairly equivalent educational intervention [6 sessions intervention vs 3 sessions control contact time] on different topic (reduce issues related to Hawthorne effect); post-intervention time points assessed and impact demonstrated; impact on both caregiver reported

Responsive feeding: Maryland Infant Feeding Study Infant feeding history: Adapted BEVQ-PS Infant height/weight: Extracted from medical charts.	(SSB, responsive feeding) and objective outcomes (BMI z-scores); corrected for multiple comparisons; effects demonstrated for population with many economic and environmental challenges with accessing healthy foods (almost the whole Navajo Nation is a food desert) and high health risk (high prevalence of maternal obesity and diabetes) Extracted infant height/weight from medical charts (vs measuring using research grade equipment and protocols); conducted at single site; follow-up only until 12 mo. Scalability—strengths: culturally sensitive; many HV programs now use trained paraprofessionals; intensity (6 sessions) probably reasonable for most home visiting programs to deliver.

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TABLE E-3 Continued

Trial Name [Country]	Author Last Name, Year	What-to-Feed Topics Covered	Impact on Outcomes Related to What to Feed	How-to-Feed Topics Covered	Impact on Outcomes Related to How to Feed	Impact on Health-Related or other Feeding-Related Outcomes	Tools Used	Notes on Statistical Methods*	Committee Comments
Delta Healthy Sprouts [United States]	(Tussing-Humphreys et al., 2019)	Toddler friendly meals	Child-focused: Nutrient intake compared to the recommendation—no treatment or covariates were significant. Nutrient intake increased as age increased in both groups (no treatment affect, but time affect). Caregiver-focused: The largest treatment difference was seen between not introducing SSB before 12 mo (not significant). Knowledge: Could not compare PAT to PATE due to	Infant feeding cues, introduction of solids, toddler feeding, managing rejection and demands.	NR	NR	Infant dietary intake: 24-hr dietary recall Participant knowledge/belief: true/false statements (appears to be designed for this study)	(1) Yes (2) Yes (3) Yes (4) Yes	African-American target population. Study retention very low and numbers in results section vs figures do not match; baseline differences in the groups made it difficult to study impact of intervention. PAT vs PATE with no true control group means we are only looking at potential added benefit of added curriculum around maternal weight management and child obesity prevention (PATE) over the standard PAT intervention.

			baseline differences, but all maternal knowledge response changes (baseline to end of study) were in the positive direction (i.e., increased knowledge).						
— [United States]	(LoRe et al., 2019)	Incorporate 5 food groups into diet, cook fresh food at home, maximize healthy nutrients, select healthy restaurant options, food preparation safety, allergies and choking, limit sugary drinks.	NR	Positive food socialization behaviors while introducing new foods.	Caregiver-focused Parents in the intervention group had significantly higher knowledge than control post-intervention.	NR	Parental knowledge: questionnaire designed for study	(1) Yes (2) Yes (3) No (4) No	RCT with pairs matched on child age, intervention tailored to low-income families who tend to be at high risk. Whether all subjects had all home visits and completed all modules not mentioned, sample primarily African American limiting generalizability, no long-term follow-up and no behavior change measures after intervention completed but this is planned as is a 5-year study. Online modules could be scaled up but unclear whether parents will complete modules in the absence of home visits.

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TABLE E-3 Continued

Trial Name [Country]	Author Last Name, Year	What-to-Feed Topics Covered	Impact on Outcomes Related to What to Feed	How-to-Feed Topics Covered	Impact on Outcomes Related to How to Feed	Impact on Health-Related or other Feeding-Related Outcomes	Tools Used	Notes on Statistical Methods*	Committee Comments
ECHO [United States]	(Cloutier et al., 2018)	SSB, juice, solids, fruit, vegetables	Caregiver-focused Those who completed the ECHO program were less likely to have introduced juice/SSB at 6 mo and when introduced, introduced juice at an older age compared to those who did not complete the program. Fruit and vegetable intake did not differ between groups. *Those who stayed in the NFN+ program longer also breastfed for a longer time at 12 mo.*	Cup use, Other-breastfeeding	NR	Infants of completers had a higher BMI than infants of non-completers at birth but a lower BMI at 6 and 12 mo. Infants whose mothers completed ECHO had a lower WFL z-score at 12 mo compared with those who did not complete the program.	Maternal diet intake: Self-report Breastfeeding and feeding behaviors: Questionnaire Adiposity: BMI and WFL	(1) No (2) Yes (3) Yes (4) Yes	Use of an existing evidenced-based home visiting program to deliver intervention. Small sample size, high dropout rate, behavior changes not sustained.

BLISS [New Zealand]	(Morison et al., 2018)	Provision of three foods types at each meal: iron-rich food, energy rich food, fruit or vegetable; offer easy foods during illness and recovery; age appropriate foods.	Child-focused: At 7 mo, BLISS group had grater total food variety, with greater intake of dairy, grains and milk, snacks and beverages, meats and proteins. No significant difference was seen for fruit and vegetable consumption. Differences in food preferences between groups was not significant Caregiver-focused: Children were offered savory vegetables and savory non-meat high protein foods and lumpy foods more often than control at 12 mo.	Resources to avoid choking; responsive feeding; baby led weaning.	NR	Adjusting for time of introduction of complementary food strengthened some of these relationships. Health related: NR	Infant energy self regulation: Tan created 8-item scale (questionnaire) Infant eating behavior: Childrens Eating Behaviour Questionnaire by Wardle. Infant feeding questionnaire: Toddler-Parent Mealtime Behavior Questionnaire Dietary assessment: 3 day weighed diet record	(1) Yes (2) NR (3) Yes (4) No	No comments listed

continued

TABLE E-3 Continued

Trial Name [Country]	Author Last Name, Year	What-to-Feed Topics Covered	Impact on Outcomes Related to What to Feed	How-to-Feed Topics Covered	Impact on Outcomes Related to How to Feed	Impact on Health-Related or other Feeding-Related Outcomes	Tools Used	Notes on Statistical Methods*	Committee Comments
	(Williams Erickson et al., 2018)		Child-focused At 7 mo BLISS infants ate more fat and sodium than controls. Other nutrients were similar to control. Nutrient intakes were similar at 12 and 24 mo. At 7 mo, grains and cereals contributed more energy in the BLISS group, as did meats milk and miscellaneous foods compared to controls. At 2 yr, more dietary variety in fruits and vegetables than controls.		NR	NR		(1) Yes (2) NR (3) Yes (4) No	More CF variety in Rx compared to controls?

(Taylor et al., 2017)	Child-focused No significant difference in energy intake at 12 or 24 mo.		Child-focused: BLISS infants were more likely to feed themselves most or all of their food than control infants at every age. Caregiver-focused: Mothers of BLISS infants rated their infants as significantly less fussy or picky about food, whether measured by the CEBQ or TMBQ at 12 but not 24 mo. Parents indicated that BLISS infants were less satiety responsive than control infants at 24 mo.	No significant difference in BMI z-scores at 12 or 24 mo.		(1) Yes (2) NR (3) Yes (4) No	Novel intervention, blinded assessment of outcome, 1- and 2-yr follow-up, considered both reported infant eating behaviors and BMI. 20% attrition at 24-mo follow-up, limited study size for some outcomes, very demanding protocol.

continued

TABLE E-3 Continued

Trial Name [Country]	Author Last Name, Year	What-to-Feed Topics Covered	Impact on Outcomes Related to What to Feed	How-to-Feed Topics Covered	Impact on Outcomes Related to How to Feed	Impact on Health-Related or other Feeding-Related Outcomes	Tools Used	Notes on Statistical Methods*	Committee Comments
POI [New Zealand]	(Fangupo et al., 2015)	Food-based what to feed guidance (fruit, vegetables, treats, beverages).	Child-focused At 24 mo, Absolute intake of foods (meat, vegetable, sweet drinks, etc.) and energy/nutrient intake were not statistically significantly different between those who received the FAB intervention and those who did not receive the intervention.	Appropriate parenting styles (repeated exposure, responsive parenting) Food-based (portion size, family meals)	Child-focused: Infant eating behavior was not significantly different between groups. Caregiver-focused: At 18 mo, of the 16 parental feeding practices assessed, only child control was greater in the FAB group. At 24 mo, the only significant difference was that the FAB group was more likely to report that they encourage nutrient-dense foods.	NR	Baseline questionnaire: questions same as New Zealand census, self-report Infant eating behaviors: Parental self-report responses to questions and home inventory by Fulkerson et al. Parental feeding practices: Subscales from the Comprehensive Feeding Practices Questionnaire and Murashima's Feeding Control Instrument Infant Dietary intake: EAT FFQ	(1) No (2) Yes (3) Yes (4) No	Well-designed intervention, intervention clearly described, trial conduct clearly described. Outcomes assessed by parent report. Not a study weakness but worth noting: intervention is time-intensive and few differences found between the groups despite intensive intervention. Stratified block allocation was used to control for SES Modified ITT analysis not described in further detail. Blinding information: Nurses were blinded during assessment of anthropometric outcomes but not FFQ or questionnaire outcomes. Statistical analysis was blinded.

— [France]	(Remy et al., 2013)	Vegetable Consumption/acceptance	Child-focused Intake and liking of artichoke purée was greater in FFL and RE than FNL during the exposure period. After the exposure period, comparison between pre and post artichoke acceptance, the greatest increase was seen in RE (liking and intake), intake increased for FFL group, and neither intake or liking increased for FNL. No significant change in artichoke puree intake was observed between post-exposure and the follow-ups. Liking of artichoke decreased at the 6 mo follow-up for all groups. At the 6 mo follow-up carrot liking was greater than artichoke in FNL group only (others groups had similar liking).	Repeated exposure to vegetables, flavor–flavor learning, and flavor-nutrient learning	NR	NR	Infant feeding/intake: Weighed jars Infants liking: Parent self-report using 9 point scale (previously published)	(1) Yes (2) Yes (3) Yes (4) No	Carefully standardized/provided foods for infants to consume; compared three approaches (repeated exposures, flavor–flavor learning, flavor–nutrient learning). French infants (likely different family diet context/approach than the United States); study findings are well-known/well-accepted at this point (repeated exposures are helpful strategy for increasing child vegetable acceptance/intake). Not a scalable intervention, outside context of recommending that caregivers use repeated exposure strategy (already included in some of the other interventions we will probably discuss in more depth). Groups matched for age, gender, and mode of milk feeding.

continued

TABLE E-3 Continued

Trial Name [Country]	Author Last Name, Year	What-to-Feed Topics Covered	Impact on Outcomes Related to What to Feed	How-to-Feed Topics Covered	Impact on Outcomes Related to How to Feed	Impact on Health-Related or other Feeding-Related Outcomes	Tools Used	Notes on Statistical Methods*	Committee Comments
— [Australia]	(Wen et al., 2011)	Water, Other: breast milk	NR	Cup usage, Other: breastfeeding and appropriate timing to introduce solid foods, responsive feeding, weaning.	Caregiver-focused The intervention decreased the proportion of mothers using food for reward by 7% and increased the proportion of children drinking from a cup by 7% as well as reduced the proportion of children having a bottle to go to bed by 9%.	The intervention also decreased the age at which infants started tummy time and increased daily practice of tummy time by 7%. Health-related: NR	Duration of breastfeeding and timing of introduction to solid foods: Short telephone interview Time child spends on their tummy: Survey at 6 mo time period Cup usage, bottle at bedtime, food for reward: Face-to-face interview at 12 mo time period *(questions selected from the New South Wales Child Health Survey and the Childhood Asthma Prevention Study)*	(1) No (2) Yes (3) Yes (4) Yes	Home-based early intervention improved some infant feeding practices. The impact of the study on infant weight gain is not answered and attrition of younger, poorer, and less educated mothers' limits generalizing outcomes.
— [United Kingdom]	(Watt et al., 2009)	Types of foods/drinks—emphasis fruits and vegetables	Child-focused: At the 12 and 18 mo follow-up there was no significant difference between	When to introduce solids; when to stop feeding using a	Caregiver-focused There was no significant difference be-	No significant difference in weight at 18 mo follow-up.	Nutritional data: Self report; 24-hr multiple pass recalls with methods validated in low income population.	(1) Yes (2) No (3) Yes (4) No	Conducted with economically disadvantaged population; based on a theoretical model (social support theoretical model).

vitamin C intake or other micro and macronutrients assessed. At 12 and 18 mo, infants in the intervention were more likely to consume some food types (pears, apples, potatoes, carrots, chips). Caregiver-focused: At 12 mo, infants in the intervention group were significantly less likely to be given goats or soya milks and were more likely to be eating three solid meals per day compared to infants in the control group.	bottle (cup feeding)	tween mothers' knowledge and confidence in following recommendations on how to feed at 12 mo. At 18 mo, mothers had significantly more knowledge on when bottle use should be discouraged.		Dietary intake: FFQ for mother fruit/veg intake. All other outcome data collected through "interviews with mothers" —no details on interview questions, source, etc.	Conducted in the United Kingdom; greater loss to follow-up than other home visiting interventions; description of intervention content is fairly vague (empower women to follow current guidance on later stages of infant feeding practice—when to introduce, types of foods/drinks (emphasis fruits and veg), when to stop using a bottle); no mention of responsive feeding approaches; no mention of fidelity of delivery of the intervention being monitored; looked at lots of outcomes across two time points and did not correct for multiple comparisons—many p-values (0.03–0.05) probably no longer considered significant if they adjusted for multiple comparisons; used only bivariate tests (no modeling). Scalability challenges: greater intensity (9 sessions) than other interventions, which may not be as reasonable given all other topics home visiting programs must cover; strengths: many HV programs now use trained paraprofessionals.

continued

TABLE E-3 Continued

Trial Name [Country]	Author Last Name, Year	What-to-Feed Topics Covered	Impact on Outcomes Related to What to Feed	How-to-Feed Topics Covered	Impact on Outcomes Related to How to Feed	Impact on Health-Related or other Feeding-Related Outcomes	Tools Used	Notes on Statistical Methods*	Committee Comments
Other									
— [United States]	(Harris et al., 2022)	SSB	Caregiver-focused The counter-marketing videos significantly reduced caregivers' overall positive attitudes about fruit drinks and toddler milks, as well as perceptions of product convenience and value. Watching the counter-marketing videos also reduced positive attitudes about food and beverage companies and reduced intention to serve fruit drinks and toddler milks.	NR	NR	NR	Video Experiment Survey (published in supplementary material)	(1) No (2) Yes (3) Yes (4) Yes	RCT with control group watching videos that were similar to intervention videos on likability, believability, inactiveness and relevance, included relevant covariates in analyses, included diverse participants, included screentime survey to disguise study intent. Short-term trial, no behavior outcomes, not powered to assess impact differences among population subgroups. Videos slightly more beneficial in influencing intentions re. serving less sugary drinks than serving more healthy drinks.

— [New Zealand]	(Rapson et al., 2022)	Fruits, vegetables (purées)	Child-focused Overall: Providing vegetables as first foods increased vegetable intake at 9 mo of age. At 9 mo, veg-only infants consumed target vegetables (broccoli and spinach) at a faster rate and showed greater acceptance for target vegetables than the CG. The rate of eating and acceptance of pear was comparable among intervention groups and veg-only infants consumed more vegetables than controls.	NR	NR	Introducing vegetables as the first food was not signitifantly associated with iron status at 9 mo.	Intake of target veggies at home and likeness of food by infant: Weighted food diary Daily intake of veggies: FFQ Food acceptance: Video recordings Liking of vegetables: 5-point mother-rated Likert scale	(1) Yes (2) Yes (3) Yes (4) Yes	Large study, rigorous design with blinding, clear goals. Short-term outcomes only. Blinding information: Were participants or data collectors blinded? Yes

continued

TABLE E-3 Continued

Trial Name [Country]	Author Last Name, Year	What-to-Feed Topics Covered	Impact on Outcomes Related to What to Feed	How-to-Feed Topics Covered	Impact on Outcomes Related to How to Feed	Impact on Health-Related or other Feeding-Related Outcomes	Tools Used	Notes on Statistical Methods*	Committee Comments
— [United States]	(Cauble et al., 2021)	Types of solid food to feed.	NR	How much the infant should be eating, mealtime tips and choking hazards.	NR	No significant difference in breastfeeding rates between group. No differences between groups were found regarding the time for introduction of solids. Health related: NR	Use of solid foods: self-report survey Structured interviews	(1) No (2) No (3) Yes (4) No	Included positive process evaluation (though at least one in-person contact requested), high participation in multiple follow-up assessments (post-intervention during pregnancy as well as at infant ages: 1 and 2 wks, 2, 4 and 6 mo). Mostly white sample, included WIC participants who would have received counseling on infant feeding, self-report measures, pilot to test feasibility so not adequately powered. Limited information for our purposes as very little of intervention addressed what solid foods to introduce, how much infants should eat, and mealtime tips.

— [United States]	(Johnson et al., 2021)	Added sugar, added salt, vegetable	Child-focused Infants 6 to <12 mo accepted more tastes and were rated by caregivers as liking the kale more than older toddlers. The plain kale was more likely to be accepted and the first version offered was more likely to be rejected.	Other: Breastfeeding, self-feeding	Child-focused Older infants (≥18 mo) exhibited more avoidant behaviors, more playing, and more self-feeding than younger infants (6 to <12) mo. Children who were reported to have been breastfed more in the last 7 days were more likely to self-feed.	NR	Children's food acceptance: (1) Maternal perceptions of liking- 9-point hedonic scale (2) successful tastes- feeding protocol measured by experimenter (3) rate of acceptance- video coding scheme Feeding Infants: Behavior and Facial Expression Coding System (FIBFECS) (4) positive/negative behaviors- video with Noldus The Observer XT coding software Caregiver BMI- height with Holtain stadiometer and weight with Seca 634 bariatric scale. Infant BMI: Ellard length boards and Seca 334 Infant scale; WHO growth standards used to calculated BMI z-scores.	(1) No (2) Yes (3) Yes (4) Yes	Precise question, multiple exposure groups. Subjective outcomes, short-term follow-up only, narrow questions. Blinding information: Caregivers and researchers blinded to order of introduction and researchers blinded for coding of videos.

continued

TABLE E-3 Continued

Trial Name [Country]	Author Last Name, Year	What-to-Feed Topics Covered	Impact on Outcomes Related to What to Feed	How-to-Feed Topics Covered	Impact on Outcomes Related to How to Feed	Impact on Health-Related or other Feeding-Related Outcomes	Tools Used	Notes on Statistical Methods*	Committee Comments
— [Germany]	(Kalhoff et al., 2021)	Vegetable, Other: commercialized foods	Child-focused Infants fed vegetable-based frozen meals for 3 mo accepted a new vegetable better than infants fed commercial meals in jars. Infants in the CG group ate significantly less of the unknown than of the known menu, while infants in the IG-group ate similar amounts of both meals.	Other: repeated exposure	NR	The low acceptance of frozen menus before the intervention and the better acceptance 3 mo later may be due solely to the effects of repeated exposure. An additional examination of the consumption of the known menus in both groups confirmed that there was no difference between the amounts eaten either before or after the intervention. Health related: NR	Infant's likeness of food: 9-point scale assessed by mother and video cassettes to assess baby face responses. Infant food intake: Weighed before and after feeding.	(1) Yes (2) Yes (3) Yes (4) Yes	Addresses specific issue in infant taste preferences. Small study, substantial attrition, subjective outcomes. Blinding information: Neither participants nor data collectors were blinded.

— [South Korea]	(Ra, 2021)	Providing solids	NR		Responsive feeding practices; Methods for providing solids	Caregiver-focused Recognition of hunger and satiety cues of infants increased over time, but there was no group difference. There was no group difference in knowledge of providing solid food for overweight prevention.	Breastfeeding self-efficacy and attitude differed by group. Health related: NR	Recognition of hunger and satiety cues: Infant Feeding Questionnaire translated into Korean. Caregiver knowledge: Previously published instrument (Scheinmann).	(1) Yes (but unclear which outcome this was based on and author states statistical power was insufficient in discussion) (2) Yes (3) Yes (4) No	Website content based on literature review, and content validity based on 5 pediatricians and child nursing professors (content validity index calculated but unclear method and meaning), website access checked and if mother did not check for 3 days, sent text message to encourage daily checking. Convenience sample, all primiparas so limited generalizability, unclear which solid foods were encouraged/discouraged for overweight prevention, modest sample size, no pilot testing of website content with participants and no process data on how well liked or used, control group did not receive any web-based education. Not effective for outcomes of interest for our purposes (e.g., recognizing hunger and satiety cues), mothers were encouraged to access the website at least once every 2 days for 6 mo, which may not be sustainable or acceptable for many (4 of 19 women dropped out of intervention).

continued

TABLE E-3 Continued

Trial Name [Country]	Author Last Name, Year	What-to-Feed Topics Covered	Impact on Outcomes Related to What to Feed	How-to-Feed Topics Covered	Impact on Outcomes Related to How to Feed	Impact on Health-Related or other Feeding-Related Outcomes	Tools Used	Notes on Statistical Methods*	Committee Comments
Food4 Toddlers [Norway]	(Roed et al., 2021)	Importance of early eating habits with focus on accessibility, availability and variety of healthy food and beverages; foods appropriate for different ages.	Child-focused There was a larger increase in vegetable intake (frequency and variation) from baseline to follow up 1 in the intervention group (not observed at follow-up 2). No significant differences in fruit intake or discretionary foods.	Repeated exposure, basic tastes and spicy food; self-feeding skills and children's ability to self-regulate food intake; use of food as a reward; family meals; children's participation in cooking.	NR	NR	Infant food intake: Parent-reported FFQ Feeding practices: Food neophobia scale, comprehensive feeding practices, questionnaires from nationwide diet survey, FCQ SCQ, questions developed for this study. Knowledge: Agree/disagree questions about perception of learning.	(1) Yes (2) Yes (3) Yes (4) No	In this study, we observed that giving parents access to an eHealth intervention during toddlerhood increased their children's vegetable consumption frequency. The intervention effect was attenuated and no longer significant 6 mo postintervention. This intervention was from 10–17 mo and then follow up at 2 yrs. The question may be asked as to whether they were then truly on the family diet which does not includes these F&V.
	(Roed et al., 2020)		NR		Caregiver-focused Caregiver learned information from using the intervention website.	NR		(1) Yes (2) No (3) Yes (4) Yes	22 lessons!

— [France]	(Tournier et al., 2021)	Types of purée (smooth vs rough), vegetable, fruit, meat, textured foods.	Child-focused The more children were exposed to textured (i.e., non- puréed) foods, the more they accepted a variety of food textures during lab sessions.	Choking hazards, food textures, responsive feeding.	Caregiver-focused Providing information and monthly counseling to parents about the introduction of food textures to their child's diet resulted in an increase in parents' introduction of small/soft pieces but not on the introduction of more complex textures.	Parents in the intervention group introduced more texture variety of soft/small food pieces than parents in the control group. Being a first-born child was significantly associated with a lower texture exposure score. Food texture acceptance was related to children's appetite traits at 12 mo old: children who had higher scores for food responsiveness and enjoyment of food and a lower score for food fussiness had a higher texture acceptance score. Health related: NR	Food texture exposure: Questionnaire with corresponding food texture exposure scores (TexExp) Food acceptance: Measured with a food acceptance score Children's saliva flow rate and children's chewing performance: Measured using a cotton swab method. Chewing efficiency: Assessed from children's ability to comminute a model gel inserted in a mesh feeder during a standardized duration.	(1) Yes (2) Yes (3) Yes (4) Yes	Novel topic of food texture, long-term follow-up. Narrow question. Blinding information: Mothers aware of study aim but blinded to allocation group.

continued

TABLE E-3 Continued

Trial Name [Country]	Author Last Name, Year	What-to-Feed Topics Covered	Impact on Outcomes Related to What to Feed	How-to-Feed Topics Covered	Impact on Outcomes Related to How to Feed	Impact on Health-Related or other Feeding-Related Outcomes	Tools Used	Notes on Statistical Methods*	Committee Comments
— [Australia]	(Wen et al., 2020)	Timing of solid introduction, breastfeeding	NR	Cup feeding, not using food as reward, family meals, meals together.	Caregiver-focused: At 6 mo, the telephone support group had a greater odds of appropriate timing of introduction of complementary foods, practicing tummy time, and drinking from a cup than control. The SMS group had greater odds of appropriate timing of introduction of solid complementary foods compared to the control group (not significant after Bonferroni	NR	Outcomes: Assessed by questionnaires used for previously published HBT study.	(1) Only for BMI z-score measured at 2 yrs) (2) Only for recruitment site (3) Yes (4) No	Double-blind RCT, nurses received training on motivational interviewing, process data showed 61–87% participated in phone calls (but no process data on opening of mail or use/acceptability of information) and 81% of participants completed follow-up, 2 yr outcomes forthcoming. Self-report outcomes, no control for potential confounders, not powered to compare between intervention groups. Telephone better than SMS for several outcomes (e.g., cup use, family meals, more physical activity), but may be less sustainable as more mothers dropped out of telephone (12%) than SMS (2%) group.

correction). At 12 mo, of the 8 outcomes assessed, the telephone support group had greater odds of children having no bottle at bedtime, having family meal, no screen time, child active >2 hr/d (not significant after Bonferroni correction). The SMS group also had greater odds of no bottle at bedtime and no screen time. No differences in having a meal together (not necessarily eating same foods as parent), no use of food for reward.

continued

TABLE E-3 Continued

Trial Name [Country]	Author Last Name, Year	What-to-Feed Topics Covered	Impact on Outcomes Related to What to Feed	How-to-Feed Topics Covered	Impact on Outcomes Related to How to Feed	Impact on Health-Related or other Feeding-Related Outcomes	Tools Used	Notes on Statistical Methods*	Committee Comments
Early Food for Future Health [Norway]	(Helle et al., 2019b)	Appropriate food types-textures; how taste preferences evolve; how to make home-made food	Child-focused At 12 mo: of the 11 items assessed under child eating behavior, there were group differences in two (food responsiveness and food approach dimension) (intervention group was higher). Of the four child intake categories, at 24 months children in the intervention group had a higher time per day score for fruits and vegetables. In key food variety score, children in the intervention group had higher food variety	Responsive feeding practices	Child-focused: At 12 mo, of the four mealtime habits assessed, three were significantly different by groups (intervention group more likely to report child eating the same dinner as family, less likely to report parents making separate dinner for child, child playing or watching TV while eating). Children in the intervention group	No group differences in anthropometry at 12 mo of age (secondary outcome)	Child feeding behaviors: Wardle et al questionnaire Child's willingness to try new foods: child food neophobia scale Childs food intake: FFQ developed for this study Mealtime routine and parent feeding style: Infant feeding questionnaire (previously published, NOURISH trial)	(1) Yes (2) Yes (3) Yes (4) Yes	RCT, included primiparas and mothers with other children, used validated tools to assess feeding practices, included process evalution at child age 12 mo (video clips: 85% mothers reported watching all/most, 96% said easy to understand, 11% said did not learn something new; Cooking films: 66% watched all/most, 92% easy to understand, 9% did not learn something new; no differences detected by maternal education), included 1 year post-intervention follow-up measures. Well educated sample, all self-report measures except for child BMI, FFQ used to assess child intake, retention rate lower than expected (wanted 500 per group) so power diminished.

score for vegetables, but not fruits.	were more likely to eat breakfast and dinner with their family compared to control (no difference in lunch and snack). Caregiver-focused: No evidence of group differences .	Promising results from what appears to be a scalable intervention assuming internet access after 6 mo of intervention, but effects no longer detectible 1 yr later (albeit power substantially diminished) suggesting need for a life course approach with ongoing interventions across various stages of childhood.

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TABLE E-3 Continued

Trial Name [Country]	Author Last Name, Year	What-to-Feed Topics Covered	Impact on Outcomes Related to What to Feed	How-to-Feed Topics Covered	Impact on Outcomes Related to How to Feed	Impact on Health-Related or other Feeding-Related Outcomes	Tools Used	Notes on Statistical Methods*	Committee Comments
	(Helle et al., 2019a)		Child-focused At 24 mo, of the 11 items assessed under child eating behavior there were group differences for food responsiveness and emotional overeating. There were no significant differences between food category (fruits, vegetables, snacks, soft drinks) between groups or consumption of homemade dinners.		Child-focused: At 24 mo, there was no significant difference in meal-time habits, or meals eaten with family between groups. Caregiver-focused: At 24 mo, of the 6 maternal feeding practices/styles assessed, instrumental feeding was significantly lower in the intervention group.	At 24 mo, no group difference in weight-for-age z-score, while BMI-for-age z-score was significantly higher in intervention compared to control group. This between group difference disappeared after imputing missing 24 mo values and adjusting for baseline values (considered exploratory analysis).		(1) Yes (2) Yes (3) Yes (4) Yes	

OTIS [Sweden]	(Johansson et al., 2019)	Target foods, how to make a feed purées.	Child-focused: No significant differences in energy or fat intake at 6 or 9 mo between the groups. The control group consumed significantly more protein per body weight than the intervention group (6 and 9 mo). At 9 mo, fruit and vegetable intake were greater in the intervention group. Caregiver-focused: Intervention group families served homemade baby food more often.	Enhance parents' willingness to complete taste portion of study.	NR	There were no significant differences in anthropometric outcomes at 9 mo.	Infant dietary assessment—5-day food records (parental report on type of food consumed/ offered and time of day.	(1) Yes (2) Yes (3) Yes (4) Yes	Worth noting what is a Nordic diet: emphasis on intakes of regionally produced fruits, berries, vegetables, tubers, and legumes, higher intakes of whole-wheat, vegetable fats and oils, fish, and egg (apparently less meat not sure what kind). It is interesting that the FBDG for this age include the idea of taste portions that we do not have. In any case, they provided the foods to both groups. All families had means, they note that intervention gave more Nordic F&V whereas control group fed more exotic F&V.

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TABLE E-3 Continued

Trial Name [Country]	Author Last Name, Year	What-to-Feed Topics Covered	Impact on Outcomes Related to What to Feed	How-to-Feed Topics Covered	Impact on Outcomes Related to How to Feed	Impact on Health-Related or other Feeding-Related Outcomes	Tools Used	Notes on Statistical Methods*	Committee Comments
— [United Kingdom]	(Owen et al., 2018)	Vegetables, fruits	Child-focused Liking of the target foods was reported to increase after two wks of daily taste exposure, and this change in liking was maintained for several mo. Changes in liking and intake of targeted vegetables were related to the number of times children tasted the vegetable during the taste-exposure phase. Taste exposure increased reported liking of fruits (but, surprisingly, not intake of fruits) among	Repeated exposure	Child-focused Looking at picture books about vegetables immediately before children are offered repeated tastes of these at home enhances their liking and intake of vegetables relative to children receiving taste exposure alone, with effects lasting several mo.	Child-focused two wks of looking at a picture book about a disliked or unfamiliar vegetable boosts children's liking and consumption of the food over and above the impact of repeated taste exposure. Looking at picture books appears to have disrupted the increases in food neophobia and food fussiness that are character	Questionnaires: Fruit and Vegetable Familiarity and Liking Questionnaire, Child FFQ, Children's Eating Behavior Questionnaire: Food Fussiness subscale, Child Food Neophobia scale	(1) No (2) Yes (3) Yes (4) Yes	No comments left

			all children, regardless of whether they had received a book about the fruit.			istic of children around their second birthday. Health related: NR			
— [Norway]	(Beinert et al., 2017)	Introduction of solid foods: water as thirst quencher, iron rich food, nutritious fruit purées, porridges, bread and toppings (and how to prepare these items)	Child-focused Of the 6 infant consumption outcomes assessed, two were significantly different between groups at 15 mo of age (consumption of commercially or homemade porridge), and none were significantly different at 24 mo of age.	Let infants taste as many new food items as possible.	Child-focused There were no significant differences in reports of children being skeptical to new foods between groups.	NR	Child food consumption: FFQ Food skepticism: one question "to which degree do you feel your child is skeptical when new food is introduced" 1-6.	(1) No (2) No (3) Yes (4) No	They did not say how they encouraged variety, but they recognize that their thinking was general and they did not give specific behavioral advice like repeated exposure. They also recognize that perhaps they over emphasized the home made porridge and did not understand enough about how families feed F&V

continued

TABLE E-3 Continued

Trial Name [Country]	Author Last Name, Year	What-to-Feed Topics Covered	Impact on Outcomes Related to What to Feed	How-to-Feed Topics Covered	Impact on Outcomes Related to How to Feed	Impact on Health-Related or other Feeding-Related Outcomes	Tools Used	Notes on Statistical Methods*	Committee Comments
	(Øverby et al., 2017)	Iron, vitamin D supplementation, diet variety, fruit, whole grains, vegetables, unsaturated fats, meat, dairy.	Child-focused At age 15 mo, the intervention group had lower intakes of ready-made porridge (2.0 vs 5.8 servings per week), lower intake of canned baby food (2.9 vs 6.3 servings per week) and higher intakes of home-made porridge (4.8 servings vs 0.9 servings per week) compared with the control group.	Regular meals (meal timing), home food preparation	NR	Child-focused The intervention group had higher HDL cholesterol concentrations at 2 yrs than the control group, which they attribute to home-made porridge (oatmeal)	Food consumption: FFQ at 6, 15, and 24 mo. BMI: Height and weight d categorized into normal weight, overweight and obese according to the International Obesity Task Force cut-offs at 2 yrs. Weight gain velocity: between 6 and 24 mo of age was calculated by dividing weight gain by the number of mo between the two appointments. Blood serum sample: blood tests at age 15 and 24 mo; 25OH vitamin D3 and 3-epi25OH vitamin D3 in plasma was done with HPLCAPCI-MS/MS. Forty microliters of	(1) No (2) Yes (3) Yes (4) No	This study suggests that teaching parents how to prepare food in the home can increase the frequency of feeding those foods in the diets of children in this group. It seems this was a personalized class as it took 2 years to recruit and they were way under, and has high attrition. Overall the "how to feed" may not be one we are interested in. Blinding information: No blinding of participants or researchers.

							human plasma were diluted with 120 μl isopropanol with deuterium labeled 25OH-vitamin D3 as the internal standard.		
— [United States]	(Mennella et al., 2017)	Vegetables	Child-focused The timing of when mothers drank the vegetable juices affected their infants' acceptance of the carrot-flavored cereal but not of the plain or broccoli-flavored cereals. Infants who had 1 mo of exposure to the vegetable flavors beginning when they were 2 wk of age were more accepting of the carrot-flavored cereal. There were no differences between the groups whose exposure began either at 1.5 or 2.5 mo and the control group. Timing was more important than duration.	NR	NR	NR	Infants' vegetable acceptance: Behavior monitored and videotaped at research center, weighed food before and after.	(1) Yes (2) Yes (3) Yes (4) Yes	No comments listed

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TABLE E-3 Continued

Trial Name [Country]	Author Last Name, Year	What-to-Feed Topics Covered	Impact on Outcomes Related to What to Feed	How-to-Feed Topics Covered	Impact on Outcomes Related to How to Feed	Impact on Health-Related or other Feeding-Related Outcomes	Tools Used	Notes on Statistical Methods*	Committee Comments
— [United Kingdom]	(Hetherington et al., 2015)	Vegetable, milk, water, rice, cereal, breast-milk	Child-focused Overall: early exposure to a rotation of vegetable flavors first added to milk then to cereal increased intake and liking of these vegetables during CF. In the lab: the intervention increased vegetable intake overall, intake increased with time in both groups and carrots were eaten in greater amounts than green beans. Infants in the IG consumed the vegetable purée at a faster rate CG and the rate of eating increased from the	Baby-led weaning, breast-feeding, responsive feeding	NR	Despite differences in ratings by mothers and researchers on perception of infant likeness of food during feeding, liking was significant for all vegetables and all time points *(but researchers were not blinded to group assignment for the study)*. Health related: NR	Maternal diet: FFQ Infant food intake and feeding experiences at home: 35-day food recall diary completed by mother, adapted FFQ and Child Eating Behavior Questionnaire (CEBQ) Infant food intake and feeding experiences in lab: Video analyses	(1) No (2) Yes (3) Yes (4) Yes	Well-defined study question, rigorous approach to data collection and analysis, extended follow-up. Small study size, narrow question. Blinding information: Researchers not blind to group assignments.

first to second exposure; carrot was eaten more rapidly than green bean.

At home: IG ate more overall and carrot was eaten in greater amounts than green bean compared to the CG. At 6 mo, vegetable intake was significantly different by time as expected, since number and portion size of vegetables eaten increased, but no main effect of group

By day 35, no differences in intake were found between the two groups.

continued

TABLE E-3 Continued

Trial Name [Country]	Author Last Name, Year	What-to-Feed Topics Covered	Impact on Outcomes Related to What to Feed	How-to-Feed Topics Covered	Impact on Outcomes Related to How to Feed	Impact on Health-Related or other Feeding-Related Outcomes	Tools Used	Notes on Statistical Methods*	Committee Comments
— [United Kingdom]	(Coulthard et al., 2014)	Vegetables	Child-focused Both groups ate more of the baseline vegetable (carrot) than follow-up vegetable (pea) No effect of carrot or pea intake between early and late exposure or single vs variety. There was an interaction between age of introduction and exposure on pea consumption: among late exposure infants, the variety group ate more pea at follow-up than the single taste group suggesting variety of vegetables introduced	NR	NR	NR	Intake of target vegetable (g): Maternal food diary Infant liking of the vegetable: Maternal rating on 5-point scale	(1) Yes (2) Yes (3) Yes (4) No	Single or variety of vegetables introduced was randomly assigned. Short-term feeding trial; age of introduction was not randomly assigned and could have biased results, vegetables tested also varied in consistency which may have impacted results, all infants breastfed through 6 mo limiting generalizability, short-term (9-day) trial. Limited information for our purposes as focus was on identifying how best to feed infants, not how best to impact recommended feeding practices.

			is helpful for infants introduced solids according to the WHO recommended time of 6 mo.						
— [Netherlands]	(Barends et al., 2014)	Vegetable and fruit	Child-focused Weaning exclusively with vegetables results in a higher daily vegetable consumption until at least 12 mo of age; at 12 and 23 mo of age, fruit (apple) and veggie (green beans) intake did not significantly differ between the groups. Weaning with vegetables led to a 38% higher daily vegetable consumption at home at the age of 12 mo compared to the fruit weaning group. At 23 mo, the green beans intake for both groups had dropped significantly while apple intake was stable.	NR	NR *(see staff notes for Guidelines)*	There was a significant main effect of age in both pickiness and openness of food between 12 and 23 mo of age. Daily energy intake: At 12 mo of age, the groups only differed significantly in the intake of mono- and disaccharides, but energy percentages were not significantly different.	Infants' intake purées at 12 and 23 mo of age: Collected in the laboratory through pre-and-post weighing of bowls and spoons and the difference was used to calculate actual intake. Daily vegetable and fruit intake: 3-day food record and parents weighed all food served at dinner with a provided scale.	(1) No (2) Yes (3) Yes (4) Yes	Rigorous protocol, extended follow-up period to 23 mo. Narrow focus rather than comprehensive program, outcome based on maternal report only. Blinding information: Experimenter blinded, parents not blinded to type of purée received but blinded to knowledge of another comparison group.

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TABLE E-3 Continued

Trial Name [Country]	Author Last Name, Year	What-to-Feed Topics Covered	Impact on Outcomes Related to What to Feed	How-to-Feed Topics Covered	Impact on Outcomes Related to How to Feed	Impact on Health-Related or other Feeding-Related Outcomes	Tools Used	Notes on Statistical Methods*	Committee Comments
	(Barends et al., 2013)	Fruits and vegetables	Child-focused Mean vegetable intake in the vegetable group increased significantly between days 1 and 2 and days 17 and 18. Fruit intake in the fruit group increased significantly. Fruit intake was significantly higher than vegetable intake from the start. The first intake of green beans in the fruit groups at day 19 was as low as the green beans intake in the vegetable groups at the 1st exposure on days 1 or 2. Similarly,	Repeated exposure	Child-focused Repeated exposure to fruit had no effect on the vegetable intake. The mean intake of green beans and plums increased significantly after repeated exposure.	Also measured sensory profiles: taste, after taste, smell, and mouth feel. After the feeding, the mothers rated on a 9-point scale how much the infant liked the purée, just like they did in the lab. Health related: NR	Vegetable and fruit intake: The mother was instructed to empty both jars completely on a plate and to put all what was left over after the feeding, including the vegetable purée that was spilled on the table, floor, bib, child's face, etc., back in the jar and to seal the jar with the lid and put it in the refrigerator.	(1) No (2) Yes (3) Yes (4) Yes	No comments listed

			the first apple intake in the fruit groups on days 1 or 2 did not differ from the first apple intake of the vegetable groups on day 19.						
— [France, Germany]	(Maier et al., 2008)	Veg-etables, formula, breast milk	Child-focused Variety early in weaning increased new food accep-tance. Offering 3 vegetables for 3 consecutive days each did not significantly increase intake of new foods relative to no changes so this regimen was not efficient in increasing ac-ceptance of new foods.	Weaning, Other: breastfeed-ing, flavor variety	Caregiver-focused Breastfeed-ing early in weaning in-creased new food accep-tance but was affected by time where no significant effect found during Phase C (meat and fish con-sumption). Breast-fed infants' liking was rated higher by mothers and observers.	The combina-tion of breast-feeding and high variety produced greatest new food intake. Health re-lated: NR	At-home infant food intake: Infant food diary com-pleted by mother. In lab infant food intake: weighed jar and bib before and after feeding Food likeness: Likert scale rated by mother and observer.	(1) No (2) Yes (3) Yes (4) Yes	Careful measurement of food intake, well-defined study question. Narrow focus subjective outcomes. Blinding information: Mothers not blind to treatment.

continued

TABLE E-3 Continued

Trial Name [Country]	Author Last Name, Year	What-to-Feed Topics Covered	Impact on Outcomes Related to What to Feed	How-to-Feed Topics Covered	Impact on Outcomes Related to How to Feed	Impact on Health-Related or other Feeding-Related Outcomes	Tools Used	Notes on Statistical Methods*	Committee Comments
— [United States]	(Mennella et al., 2008)	Fruits and vegetables	Child-focused First study: 8 days of dietary exposure to pears or a variety of fruits between meals (not including pears) resulted in greater consumption of pears by the infants but this increased acceptance did not generalize to green beans. Second study: 8 days of vegetable variety both between and within meals led to increased acceptance of green beans, carrots and spinach and	Repeated exposure	Child-focused Repeated opportunities (exposure) to taste a particular or a variety of foods may promote willingness to eat fruits and vegetables.	NR	Infant intake at home: Mothers contacted by phone to report daily food intake for infants. Infant intake at lab: Amount of food consumed during each session was assessed by weighing the container of food and the bib immediately before and after each feed on a Mettler PM 15 top-loading balance. The difference in the weight of the bib before and after the feed was subtracted from the weight of the food to account for any food that was spilled.	(1) No (2) Yes (3) Yes (4) Yes	Well-defined study question, included measured intake. Small study size, narrow question.

			those who were solely fed green beans ate more after exposure.				Infant likeness of food: 9-point scale.		
— [United States]	(Forestell and Mennella, 2007)	Vegetable and fruit	Child-focused Breastfed infants were significantly more accepting of fruit (peaches) when first introduced compared to formula-fed infants, as determined by intake, rate of consumption, and facial expressions. Repeated opportunities to taste green beans enhanced similar acceptance in both breastfed and formula-fed infants.	Other: breastfeeding	Child-focused Breastfeeding did not offer an advantage for vegetable (green bean) acceptance, either before or after exposure to the vegetable.	Infant facial expressions were measured to assess liking of foods. Health related: NR	Infant facial expressions: Video analyses using the Observer program and Facial Action Coding System.	(1) No (2) Yes (3) Yes (4) Yes	Considered possible different responses based on history of breastfeeding, rigorous research methods, inclusion of infant facial expression. Small study size, narrow question. Mothers completed questionnaires on their own eating habits and their infant feeding habits; researchers stratified some analyses based on breast-fed vs formula fed infants; 12/45 mothers had college education and 10/45 breastfed their infant.

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TABLE E-3 Continued

Trial Name [Country]	Author Last Name, Year	What-to-Feed Topics Covered	Impact on Outcomes Related to What to Feed	How-to-Feed Topics Covered	Impact on Outcomes Related to How to Feed	Impact on Health-Related or other Feeding-Related Outcomes	Tools Used	Notes on Statistical Methods*	Committee Comments
— [Germany]	(Koehler et al., 2007)	Food-based meal advice almost complying with German reference nutrient intakes. Complementary food starts with vegetables that are subsequently completed to a full meal by addition of potatoes meat and plant oil. Second complementary meal	Child-focused Increasing the intensity of counseling significantly improved 2 of the 4 meal scores and daily nutrition scores. Counseling by written information did not increase compliance with recommendations.	NR	NR	NR	Compliance with recommendations: Standardized telephone interviews; mothers were asked to report actual food and meal consumption of the infant.	(1) No (2) No (3) Yes (4) No	Transition to family foods by 10 mo of age. They were comparing 3 methods of counseling, one being support for problem solving, then anticipatory guidance + problem solving, then as well the cold call, do you want some advice? They really cannot conclude that the support plus information did nothing, but again these were passive whereas the 3rd group was active. Also there dietary metrics do not work for us.

		consists of milk, whole-grain cereals, and fruit juice. Fruit and whole-grain cereals are the main components, excluding milk, of the third meal.							
— [United States]	(Krebs et al., 2006)	Intake and acceptance of target food	Child-focused Acceptance of beef and cereal was similar. Zinc and protein intake was higher in the meat group, iron was higher in the cereal group at 7 mo.	NR	NR	Growth was similar between groups except for head circumference which was greater in the meat group.	Three day diet records for complementary foods completed twice monthly. Parents perception of reaction to assigned weaning food and perception of infants tolerance to assigned food.	(1) Yes (2) Yes (3) Yes (4) Yes	RCT, anthropometry, biochemical, and development measures included with follow-up at infant age 12 mo, included relevant covariates in analyses, important contribution as Zn status not adequately addressed in current complementary feeding guidelines in the United States. Short-term feeding trial, only breastfed infants limiting generalizability. Limited information for our purposes as focus was on identifying how best to feed infants, not how best to impact recommended feeding practices.

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TABLE E-3 Continued

Trial Name [Country]	Author Last Name, Year	What-to-Feed Topics Covered	Impact on Outcomes Related to What to Feed	How-to-Feed Topics Covered	Impact on Outcomes Related to How to Feed	Impact on Health-Related or other Feeding-Related Outcomes	Tools Used	Notes on Statistical Methods*	Committee Comments
— [Canada]	(Verrall et al., 2006)	Iron rich food, homemade baby food	Caregiver-focused Knowledge of what to feed was increased. Sale of infant iron fortified cereal, iron fortified biscuits, meat and broth increased.	NR	NR	NR	Evaluations/ questionnaires were distributed after activities and dialogues	(1) No (2) No (3) No (4) No	No comments listed
	(Verrall and Gray-Donald, 2005)	Iron rich food, juice (SSB) homemade baby food	Child-focused Intake of complementary food iron increased significantly (even after controlling for maternal age) between time 1 and time 2. No significant difference in vitamin C. Consumption in juice decreased significantly from time 1 to 2.	NR	NR	NR	Infant dietary assessment: 24-hr recall (with visual aids)	(1) Yes (2) Yes (3) Yes (4) No	No comments listed

* Notes on statistical methods: (1) Was there any sample size calculation? (2) Considerations for co-variates/co-founding? (3) Correction for testing multiple hypothesis? (4) Within group analysis?

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Appendix F

Scalability Assessments for Informative Studies

This appendix contains the following:

INFANT

TABLE F-1 INFANT TIDieR

Delivery Feature	RCT	Scale-Up
Brief Name:	InFANT: Melbourne Infant Feeding, Activity, and Nutrition Trial (InFANT)—a community-based cluster RCT of an early intervention promoting healthy eating and active play and, in turn, healthy growth from the start of life	INFANT: Infant Feeding, Activity and NutriTion (INFANT)—an early intervention promoting healthy eating and active play and, in turn, healthy growth from the start of life.

continued

TABLE F-1 Continued

Delivery Feature	RCT	Scale-Up
Why: Describe any rationale, theory, or goal	Anticipatory guidance framework Social cognitive theory Parenting support theory	Anticipatory guidance framework Social cognitive theory Parenting support theory COM-B model of behavior
What: Materials (describe any physical or information materials used in the intervention, including given to participants or used in intervention delivery or in the training of providers)	Session delivery • Facilitator session guides Resources provided to participants • Session handouts (one per session) • Topic-specific handouts • Additional brochures from reputable sources (e.g., Australian Dietary Guidelines) • DVD with session videos • Between session newsletters • Tangible tools—water bottle, shopping bag, pedometer Materials for training: • Face-to-face interactive group training sessions • Facilitator session guides used as training guide • Provider-trainer group emails between training sessions for support and troubleshooting	Session delivery • Facilitator session guides Resources provided to participants • Parent INFANT session summary with reference to relevant app sections (optional printout) • Videos via internet/app • Mobile app Materials for training intervention providers • Comprehensive online training via a learning management system • Implementation guide

TABLE F-1 Continued

Delivery Feature	RCT	Scale-Up
What: Procedures (describe each of the procedures, activities, or processes used in the intervention)	Facilitated group discussions, including watching videos Peer support Exploration of barriers Interactive activities (e.g., tummy time with babies together) Reference to and promotion of DVDs and other take-home materials during the sessions Repeated text messages of educational materials sent after sessions are completed	Facilitated group discussions, including watching the videos Peer support Exploration of barriers Interactive activities (e.g., tummy time with babies together) App push notifications, activities (self-completed quizzes for personalized feedback), and parent forum Promotion of the app to parents from their infant's birth. Reference to and promotion of the app during sessions.
Who: Intervention provider (describe their expertise, background, and any specific training given)	Intervention provider: Research dietitian employed by the research team Training of provider: 2-hr face-to-face training meetings prior to each round of INFANT sessions (six in total), facilitated by lead researchers/ interventionists	Intervention provider: Delivered as part of routine practice by practitioners such as dietitians, maternal and child health nurses, health promotion officers, midwives, other parenting support or allied health workers. Training of intervention provider: 8- to 10-hr online training course offered over a 4- to 6-week period (2–4 times per year) facilitated by lead interventionists and implementation experts. Annual 1- to 2-hr online refresher training.
Who: Target population	Parents (including first-time parents) of children ages 3–18 months	Parents
How: Mode of delivery (e.g., face to face; and whether it was individually or in a group)	Face-to-face group sessions DVD and printed materials provided in sessions Printed newsletters sent via text messaging and mail between sessions	Face-to-face group sessions Mobile phone app including notifications

continued

TABLE F-1 Continued

Delivery Feature	RCT	Scale-Up
Where: Location of intervention (including necessary infrastructure or relevant features)	Community facilities close to where first-time parent group sessions were held (e.g., maternal and child health centers, libraries, community halls) Sessions were delivered within existing first-time parent groups led by community maternal and child health nurses as part of free universal healthcare system in Victoria Australia INFANT sessions started with the group directly after the nurses concluded/when parents took over their own management of the groups	Community facilities (e.g., maternal and child health centers, community health organization group rooms, libraries). Sessions not limited to existing first-time parent groups. Organizations have the option to adopt this approach, but it is not essential. Groups may be constructed for the purpose of delivery or embedded into existing groups.
When: Describe the number of times the intervention was delivered over what period of time (including the number of sessions, their schedule and duration, intensity or dose)	Total intervention period: 15 months 6× 2-hr sessions at 3, 6, 9, 12, 15, 18 months of age 5× newsletters sent between sessions	Total intervention period: 18 months 4× 1.5-hr group sessions at 3, 6, 9, 12 months of age Additional support via app, including push notifications and discussion forum between birth and 18 months
Tailoring: Adapted for individuals? (why, what, when, and how)	Group discussions were tailored to participants preferences, concerns, or situations	Group discussions were tailored to participants' preferences, concerns, or situations. The app push notifications are tailored according to the participant's feeding mode (breast, formula, or mixed feeding) and child's age and stage of development.

TABLE F-1 Continued

Delivery Feature	RCT	Scale-Up
How well: Planned (describe how and by whom and if any strategies were used to maintain or improve fidelity)	Standardized session outline for facilitators to improve fidelity Between-session newsletters sent via email and texting to participants to remind of key messages and promote adherence	Standardized session outline for facilitators to improve fidelity Data collection planned for monitoring fidelity includes (1) undertaking fidelity checklists from a subset of implementing sites, (2) facilitator reporting of delivery of intervention in 12-mo post-training survey
How well: Actual (describe the extent to which the intervention was delivered as planned)	Program fidelity was audited via checklists by researchers attending but not delivering the intervention 68% of participants attended four or more of the six sessions	Program implementation and data collection in progress; therefore, fidelity is currently uncertain.
Context: Funding and the broader environment	Lead organization: Deakin University Environment: occurred prior to policy/programs emphasis on pregnancy or early life period Funding: National Health and Medical Research Council Grant	Lead organization: Overseen by Deakin University research interventionists, led by local government areas and services Environment: Occurring in the context of COVID-19 pandemic and Victoria's extensive lockdown periods Funding: Funding to enhance implementation provided by Victorian Department of Health (supports training at no cost to practitioners, seed funding for establishing the program, and implementation support). No additional funding for delivery for local organizations is currently provided. An evaluation of the scale-up is being funded by a 5-yr National Health and Medical Research Council Partnership Grant GNT1161223.

SOURCES: Cameron et al. (2014); Campbell et al. (2013); Hesketh et al. (2020); Marshall et al. (2023); Spence et al. (2013, 2014); Zheng et al. (2022).

TABLE F-2 INFANT ExpandNet Checklist

Questions Related to Potential Scalability	Yes (+)	No (–)	More Information/Action Needed
Is input about the project being sought from a range of stakeholders (e.g., policy makers, program managers, providers, NGOs, beneficiaries)?	+		Scale-up based on inputs from efficacy trial, translational trial, and stakeholders' input
Are individuals from the future implementing agency involved in the design and implementation of the pilot?	+		Scale-up based on inputs from efficacy trial, translational trial, and stakeholders' input
Does the project have mechanisms for building ownership in the future implementing organization?	?		To some extent, ongoing scale-up study likely to provide answers
Does the innovation address a persistent health or service delivery problem?	+		Addressing unhealthy eating habits since early infancy and corresponding obesity risk is a top priority in Victoria
Is the innovation based on sound evidence and preferable to alternative approaches?	+		Based on efficacy trial and sound conceptual frameworks
Given the financial and human-resource requirements, is the innovation feasible in the local settings where it is to be implemented?	?		Ongoing scale-up study may answer this question
Is the innovation consistent with existing national health policies, plans, and priorities?	+		Addressing unhealthy eating habits since early infancy and corresponding obesity risk is a top priority in Victoria
Is the project being designed in light of agreed-upon stakeholder expectations for where and to what extent interventions are to be scaled up?	+		Program already being scaled up with input from stakeholders

TABLE F-2 Continued

Questions Related to Potential Scalability	Yes (+)	No (–)	More Information/Action Needed
Has the project identified and taken into consideration community, cultural, and gender factors that might constrain or support implementation of the innovation?		–	Unclear if and how potential inequities in benefit will be addressed. Disparities/inequities not addressed in scale-up study, although prior effect modification analysis conducted based on maternal education and age
Have the norms, values and operational culture of the implementing agency been taken into account in the design of the project?	?		To some extent, as DOH is engaged and funding training
Have the opportunities and constraints of the political, policy, health-sector, and other institutional factors been considered in designing the project?	?		To some extent; ongoing scale-up study may provide answers
Has the package of interventions been kept as simple as possible without jeopardizing outcomes?	+		Scale-up based on inputs from efficacy trial, translational trial, and stakeholders' input
Is the innovation being tested in the variety of sociocultural and geographic settings where it will be scaled up?	+		Program currently being scaled up and evaluated using sound implementation science methods
Is the innovation being tested in the type of service-delivery points and institutional settings in which it will be scaled up?	+		Program already being scaled up with input from stakeholders, including providers
Does the innovation being tested require human and financial resources that can reasonably be expected to be available during scale-up?	+		Scale-up project currently being funded by DOH and NHMRC
Will the financing of the innovation be sustainable?	?		To some extent, ongoing scale-up study may provide a more concrete answer(s)
Does the health system currently have the capacity to implement the innovation? If not, are there plans to test ways to increase health systems capacity?	+		Program already being scaled up with input from stakeholders, including providers

continued

TABLE F-2 Continued

Questions Related to Potential Scalability	Yes (+)	No (–)	More Information/Action Needed
Are appropriate steps being taken to assess and document health outcomes as well as the process of implementation?	+		Scale-up being carefully assessed with robust implementation study
Is there provision for early and continuous engagement with donors and technical partners to build a broad base of financial support for scale-up?	?		Scale-up being carefully assessed with robust implementation study. However, unclear to what extent long-term funders have been engaged
Are there plans to advocate for changes in policies, regulations, and other health-systems components needed to institutionalize the innovation?	?		To some extent, ongoing scale-up study may provide a more concrete answer(s)
Does the project design include mechanisms to review progress and incorporate new learning into the implementation process?	+		Scale-up being carefully assessed with robust implementation study
Is there a plan to share findings and insights from the pilot project during implementation?	+		Has already happened before adaptations made for ongoing scale-up.
Is there a shared understanding among key stakeholders about the importance of having adequate evidence related to the feasibility and outcomes of the innovation prior to scaling up?	+		Scale-up based on inputs from efficacy trial, translational trial, and stakeholders' input

SOURCES: Cameron et al. (2014); Campbell et al. (2013); Hesketh et al. (2020); Marshall et al. (2023); Spence et al. (2013, 2014); Zheng et al. (2022).

INSIGHT

TABLE F-3 INSIGHT TIDieR

Delivery Feature	RCT Intervention
Brief Name:	Intervention Nurses Start Infants Growing on Healthy Trajectories (INSIGHT)—RCT of an early life responsive parenting intervention to prevent rapid infant weight gain and childhood obesity

TABLE F-3 Continued

Delivery Feature	RCT Intervention
Why: Describe any rationale, theory, or goal	Goal: Prevent childhood obesity Theories: Responsive parenting framework
What: Materials (describe any physical or information materials used in the intervention, including given to participants or used in intervention delivery or in the training of providers)	Session delivery • Nurse-delivered home visits Resources provided to participants: • Preliminary intervention materials mailed • Sleep profile development with feedback • Educational videos Materials for training: • Scripted manuals for training and fidelity monitoring • Detailed manuals of intervention content • Standardized training procedures • Evaluation of research nurse's delivery of curriculum materials • Regular field monitoring
What: Procedures (describe each of the procedures, activities, or processes used in the intervention)	Research nurses delivered the intervention at four home visits Education/guidance and discussions on responsive parenting/obesity prevention messages corresponding to four infant behavior states Specific messages on feeding taught to parents to recognize hunger and satiety cues, offer age-appropriate foods, portion size, repeated exposure, not to use food as a reward, etc. In-person and video demonstrations
Who: Intervention provider (describe their expertise, background, and any specific training given)	Intervention provider: Research nurses Training of provider: Who performed the trainings was not described
Who: Target population	First-time parents (maternal age >20) that delivered full-term singleton newborns at Penn State Milton S. Hershey Medical Center
How: Mode of delivery (e.g., face to face; and whether it was individually or in a group)	Face to face Videos Preliminary materials (not described other than mailed before the start of the intervention)
Where: Location of intervention (including necessary infrastructure or relevant features)	Home visits

continued

TABLE F-3 Continued

Delivery Feature	RCT Intervention
When: Describe the number of times the intervention was delivered over what period of time (including the number of sessions, their schedule and duration, intensity or dose)	Four visits (child age 3–4, 16, 28, and 40 weeks) Length of the home visits was not described Two videos provided
Tailoring: Adapted for individuals? (why, what, when, and how)	Not described
How well: Planned (describe how and by whom and if any strategies were used to maintain or improve fidelity)	Research nurses followed a strict curriculum with routine fidelity assessment
How well: Actual (describe the extent to which the intervention was delivered as planned)	At the end of each home visit fidelity was assessed by the participating mothers [nurses delivered 96%, 88%, 91%, and 97% of outlined content at each of the four visits, respectively]
Context: Funding and the broader environment	Timeframe: 2012–2017 Funding: NIH RO1

SOURCES: Harris et al. (2020); Hohman et al. (2017, 2020); OASH (n.d.); Savage et al. (2016, 2018).

TABLE F-4 INSIGHT ExpandNeT Checklist

Questions Related to Potential Scalability	Yes (+)	No (–)	More Information/Action Needed
Is input about the project being sought from a range of stakeholders (e.g., policy makers, program managers, providers, NGOs, beneficiaries)?		–	Not reported
Are individuals from the future implementing agency involved in the design and implementation of the pilot?		–	Not reported
Does the project have mechanisms for building ownership in the future implementing organization?		–	Not reported; specific future implementing organization(s) not identified
Does the innovation address a persistent health or service delivery problem?	+		Prevention of childhood obesity

TABLE F-4 Continued

Questions Related to Potential Scalability	Yes (+)	No (–)	More Information/Action Needed
Is the innovation based on sound evidence and preferable to alternative approaches?	?		Unclear. Efficacy trial demonstrated impact on some targeted "how to feed" behaviors but had less impact on what children consumed.
Given the financial and human-resource requirements, is the innovation feasible in the local settings where it is to be implemented?	?		Unclear/unknown
Is the innovation consistent with existing national health policies, plans, and priorities?	+		Consistent with Healthy People 2030 goal NWS-04: Reduce the proportion of children and adolescents with obesity.
Is the project being designed in light of agreed-upon stakeholder expectations for where and to what extent interventions are to be scaled-up?	?		Unclear/unknown
Has the project identified and taken into consideration community, cultural, and gender factors that might constrain or support implementation of the innovation?		–	Not reported; study conducted in one community with a homogenous, privileged population
Have the norms, values and operational culture of the implementing agency been taken into account in the design of the project?		–	Not reported; no implementing agency identified
Have the opportunities and constraints of the political, policy, health-sector, and other institutional factors been considered in designing the project?		–	Not reported
Has the package of interventions been kept as simple as possible without jeopardizing outcomes?	+		Four home visits, with some evidence of impact on how to feed and child weight-related outcomes
Is the innovation being tested in the variety of sociocultural and geographic settings where it will be scaled up?		–	Study conducted in one community with a homogenous, privileged population

continued

TABLE F-4 Continued

Questions Related to Potential Scalability	Yes (+)	No (–)	More Information/Action Needed
Is the innovation being tested in the type of service-delivery points and institutional settings in which it will be scaled-up?	+		Being tested in the home-visiting setting and will be delivered in home-visiting setting
Does the innovation being tested require human and financial resources that can reasonably be expected to be available during scale-up?	+		There are many home-visiting models operating in the United States; some use nurses to deliver curriculum
Will the financing of the innovation be sustainable?	?		Unclear, but likely, as there are many funding streams for home visiting in the United States.
Does the health system currently have the capacity to implement the innovation? If not, are there plans to test ways to increase health-systems capacity?	?		NA
Are appropriate steps being taken to assess and document health outcomes as well as the process of implementation?		–	Health outcomes well documented (Savage et al., 2016, 2018: Hohman et al., 2017; Harris et al., 2020), but no strong evidence of process evaluation/rigorous study of implementation process.
Is there provision for early and continuous engagement with donors and technical partners to build a broad base of financial support for scale-up?	?		Unclear to what extent funders have been engaged
Are there plans to advocate for changes in policies, regulations, and other health-systems components needed to institutionalize the innovation?	?		Not reported
Does the project design include mechanisms to review progress and incorporate new learning into the implementation process?		–	No strong evidence of process evaluation/ rigorous study of implementation process
Is there a plan to share findings and insights from the pilot project during implementation?	?		Unclear

TABLE F-4 Continued

Questions Related to Potential Scalability	Yes (+)	No (–)	More Information/Action Needed
Is there a shared understanding among key stakeholders about the importance of having adequate evidence related to the feasibility and outcomes of the innovation prior to scaling up?	?		Unclear/not reported

SOURCES: Harris et al. (2020); Hohman et al. (2017, 2020); OASH (n.d.); Savage et al. (2016, 2018).

FAMILY SPIRIT NURTURE

TABLE F-5 Family Spirit Nurture TIDieR

Delivery Feature	Part 1 RCT Information	Part 2 RCT Information
Brief Name:	Family Spirit Nurture (FSN)—Brief home-visiting approach to reduce childhood obesity in Native American children.	Preventing Early Childhood Obesity, Part 2: Family Spirit Nurture, prenatal through 18 months; home-visiting approach
Why: Describe any rationale, theory, or goal	Goal: reduce childhood obesity Theory: G.R. Paterson's family systems ecological developmental theory Social cognitive theory	Goal: reduce childhood obesity Theory: G.R. Paterson's family systems ecological developmental theory Social cognitive theory
What: Materials (describe any physical or information materials used in the intervention, including given to participants or used in intervention delivery or in the training of providers)	Session delivery: Home-visiting program delivered by Navajo paraprofessional family health coaches Resources provided to participants: FSN content included optimal infant feeding practices, responsive feeding, avoiding SSBs, optimal complementary feeding practices, and whole-family healthy eating practices Materials for training: not described	Session delivery: Home-visiting program delivered by Navajo paraprofessional family health coaches Resources provided to participants: FSN content included optimal infant feeding practices, responsive feeding, avoiding SSBs, optimal complementary feeding practices, and whole-family healthy eating practices Materials for training: not described

continued

TABLE F-5 Continued

Delivery Feature	Part 1 RCT Information	Part 2 RCT Information
What: Procedures (describe each of the procedures, activities, or processes used in the intervention)	Lessons were highly visual, interactive, and incorporated cultural teachings related to infant feeding and nutrition. Each lesson included a hands-on activity (e.g., examination of the actual amount of sugar in specific SSBs) and exercises focused on goal setting and self-esteem. Each session had a warm-up, lesson content and activities, a Q&A period, referral as needed, and summary handouts. Motivational interviewing	Lessons were highly visual, interactive, and incorporated cultural teachings related to infant feeding and nutrition. Each lesson included a hands-on activity (e.g., examination of the actual amount of sugar in specific SSBs) and exercises focused on goal setting and self-esteem. Each session had a warm-up, lesson content and activities, a Q&A period, referral as needed, and summary handouts. Motivational interviewing
Who: Intervention provider (describe their expertise, background, and any specific training given)	Navajo paraprofessionals family health coaches	Navajo paraprofessionals family health coaches
Who: Target population	Navajo mothers ages 13 or older that lived within 50 miles of Northern Navajo Medical Center and had an infant <14 weeks of age	Expectant Navajo and White Mountain Apache mothers ages 14–24 having first or second baby
How: Mode of delivery (e.g., face to face; and whether it was individually or in a group)	Face to face Tablet use Tabletop flip charts (visuals) Verbal question-and-answer period Summary handouts after lessons	Face to face Tablet use Tabletop flip charts (visuals) Verbal question-and-answer period Summary handouts after lessons
Where: Location of intervention (including necessary infrastructure or relevant features)	At home or other private locations	At home or other private locations

TABLE F-5 Continued

Delivery Feature	Part 1 RCT Information	Part 2 RCT Information
When: Describe the number of times the interventions was delivered over what period of time (including the number of sessions, their schedule and duration, intensity or dose)	Six lessons delivered every 2 weeks for 3–6 months post-partum, 45 minutes each lesson	36 one-on-one, up to 60-minute home visits that occur bi-weekly from 28 weeks gestation until birth, weekly from birth to infant age 3 months, bi-weekly from infant age 3 to 6 months, and monthly from child age 6 to 18 months
Tailoring: Adapted for individuals? (why, what, when, and how)	Referrals are given on an as-needed basis during lessons	—
How well: Planned (describe how and by whom and if any strategies were used to maintain or improve fidelity)	Not described	To ensure the fidelity to the intervention and quality of the curriculum delivery for both the intervention and control groups, the FHCs (who only deliver lessons to intervention group) and FHLs (who deliver lessons to control group and administer self-report assessments for both intervention and control) complete a knowledge test for each lesson and complete two role plays. For each lesson before delivering the lesson to a participant. In addition, they are observed in person on a quarterly basis, and all lessons are audio recorded so that a random 10% of recordings can be reviewed and rated for fidelity.
How well: Actual (describe the extent to which the intervention was delivered as planned)	Of the 68 mothers randomized to the Family Spirit Nurture group, 60 received at least one home visit (88%).	—

continued

TABLE F-5 Continued

Delivery Feature	Part 1 RCT Information	Part 2 RCT Information
Context: Funding and the broader environment	Funding: Healthy Eating Research (HER); Navajo Area Indian Health Service (grants HHSI245201501072P and HHSI245201801201P), the Osprey Foundation (grant 132271), the McCune Charitable Foundation, and another private donor	Funding: Eunice Kennedy Shriver National Institute of Child Health and Human Development (5R01HD087407; 1-800-370-2943). Secondary funders include Share Our Strength (90074137); Indian Health Service–Navajo Nation (HHSI245201501072P; HHSI245201801201P); and Johns Hopkins Discovery Award (1605050088)

SOURCES: Ingalls et al. (2019); Rosenstock et al. (2021).

TABLE F-6 Family Spirit Nurture ExpandNET Checklist

Questions Related to Potential Scalability	Yes (+)	(No) (–)	More Information/Action Needed
Is input about the project being sought from a range of stakeholders (e.g., policy makers, program managers, providers, NGOs, beneficiaries)?	+		Family Spirit Nurture parts 1 and 2 were co-designed with community leaders, home visitors, and other stakeholders from Tribal communities.
Are individuals from the future implementing agency involved in the design and implementation of the pilot?	+		Home visitors were involved in co-designing curriculum and testing the intervention.
Does the project have mechanisms for building ownership in the future implementing organization?	?		Unclear, but the Family Spirit home-visiting model is currently being implemented in >130 tribal communities in 21 U.S. states, providing a ready-made network that could rapidly scale-up Family Spirit Nurture.
Does the innovation address a persistent health or service delivery problem?	+		Indigenous children and adults are disproportionately affected by obesity and its cardiometabolic consequences as a result of food and water insecurity and stress resulting from colonization and land loss.

TABLE F-6 Continued

Questions Related to Potential Scalability	Yes (+)	(No) (–)	More Information/Action Needed
Is the innovation based on sound evidence and preferable to alternative approaches?	+		Family Spirit Nurture uses the same format and delivery system as Family Spirit, a national home-visiting model designed by and for Tribal communities that meets HHS criteria to be designated as evidence-based.
Given the financial and human-resource requirements, is the innovation feasible in the local settings where it is to be implemented?	?		Unclear, but likely, as the Family Spirit home-visiting model is currently being implemented in >130 tribal communities in 21 U.S. states, providing a ready-made network that could rapidly scale up Family Spirit Nurture.
Is the innovation consistent with existing national health policies, plans, and priorities?	+		Consistent with Healthy People 2030 goal NWS-04: Reduce the proportion of children and adolescents with obesity.
Is the project being designed in light of agreed-upon stakeholder expectations for where and to what extent interventions are to be scaled-up?	?		Unclear, but likely, as the Family Spirit home-visiting model is currently being implemented in >130 tribal communities in 21 U.S. states (Ingalls at al., 2019; Rosenstock et al., 2021), providing a ready-made network that could rapidly scale up Family Spirit Nurture.
Has the project identified and taken into consideration community, cultural, and gender factors that might constrain or support implementation of the innovation?	+		Family Spirit Nurture parts 1 and 2 were co-designed with community leaders, home visitors, and other stakeholders from Tribal communities (Ingalls et al., 2019; Rosenstock et al., 2021).
Have the norms, values and operational culture of the implementing agency been taken into account in the design of the project?	+		Family Spirit Nurture parts 1 and 2 were co-designed with community leaders, home visitors, and other stakeholders from Tribal communities (Ingalls 2019, Rosenstock 2021).
Have the opportunities and constraints of the political, policy, health-sector, and other institutional factors been considered in designing the project?	?		Unclear

continued

TABLE F-6 Continued

Questions Related to Potential Scalability	Yes (+)	(No) (–)	More Information/Action Needed
Has the package of interventions been kept as simple as possible without jeopardizing outcomes?		–	Number of home visits increased from 6 (Family Spirit Nurture part 1) to 36 (Family Spirit Nurture part 2).
Is the innovation being tested in the variety of sociocultural and geographic settings where it will be scaled-up?	+		Family Spirit Nurture part 2 was conducted with two Navajo communities and one White Mountain Apache community [Fort Apache Indian Reservation].
Is the innovation being tested in the type of service-delivery points and institutional settings in which it will be scaled up?	+		Being tested in the home-visiting setting and will be delivered in home-visiting setting
Does the innovation being tested require human and financial resources that can reasonably be expected to be available during scale-up?	+		The Family Spirit home-visiting model is currently being implemented in >130 tribal communities in 21 U.S. states, providing a ready-made network that could rapidly scale up Family Spirit Nurture.
Will the financing of the innovation be sustainable?	?		Unclear, but likely, as there are many funding streams for home visiting in the United States.
Does the health system currently have the capacity to implement the innovation? If not, are there plans to test ways to increase health-systems capacity?	?		NA
Are appropriate steps being taken to assess and document health outcomes as well as the process of implementation?		–	Health outcomes well-documented in two RCTs (Ingalls et al., 2019: Rosenstock et al., 2021) but no strong evidence of process evaluation/rigorous study of implementation process.
Is there provision for early and continuous engagement with donors and technical partners to build a broad base of financial support for scale-up?	?		Unclear to what extent funders have been engaged

TABLE F-6 Continued

Questions Related to Potential Scalability	Yes (+)	(No) (–)	More Information/Action Needed
Are there plans to advocate for changes in policies, regulations, and other health-systems components needed to institutionalize the innovation?	?		Unclear to what extent existing Family Spirit model programs would need to change to implement Family Spirit Nurture
Does the project design include mechanisms to review progress and incorporate new learning into the implementation process?		–	No strong evidence of process evaluation/rigorous study of implementation process
Is there a plan to share findings and insights from the pilot project during implementation?	?		Unclear
Is there a shared understanding among key stakeholders about the importance of having adequate evidence related to the feasibility and outcomes of the innovation prior to scaling up?	?		Unclear/not reported

SOURCES: Bleiweiss-Sande et al. (2022); Ingalls et al. (2019); OASH (n.d.); Rosenstock et al. (2021).