

Nursing Strategies To Encourage Healthy Snacking Habits In Early Childhood Care Settings

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Abstract

Early childhood is a critical period for establishing lifelong dietary patterns, with snacking contributing significantly to daily nutritional intake. Nurses in community and childcare settings are pivotal in shaping these habits through targeted interventions. This systematic review aimed to synthesize and evaluate the evidence for nurse-led or nurse-designed strategies that promote healthy snacking in children aged 2-5 within formal care environments. A comprehensive search was conducted across PubMed, CINAHL, PsycINFO, and ERIC for studies published between 2013 and 2023. The methodology focused on identifying interventions implemented in daycare, preschool, and kindergarten settings that targeted fruit, vegetable, or healthy snack consumption, with explicit nursing involvement in their design, delivery, or evaluation. Out of 1,250 identified records, 15 studies met the inclusion criteria. The results consistently demonstrated that structured, multi-component interventions led by trained personnel, including nurses, significantly increase children's willingness to try, preference for, and consumption of healthy snacks. Key effective strategies identified include repeated exposure to target foods, positive role modelling by adults and peers, gamified nutrition education, and environmental modifications like convenient access to fruit bowls. The conclusion affirms that nurses are highly effective agents of change in early childhood nutrition. Success is maximized when interventions are participatory, integrated into standard childcare routines, and supported by parallel education for parents and staff to ensure consistency between the care setting and home. Future work should focus on the long-term sustainability and broad implementation of these evidence-based nursing practices.

Keywords: Pediatric nutrition, nursing intervention, healthy snacking, early childhood, health promotion, childcare settings

INTRODUCTION

The early childhood period, encompassing ages two to five, represents a critically formative window for establishing foundational dietary patterns that can persist throughout an individual's life. This stage is characterized by rapid physical growth, significant cognitive development, and the crucial formation of taste preferences and eating behaviors (Nicklaus, 2016). Within the daily dietary landscape of a young child, snacks are far from incidental; they constitute a substantial component of total energy and nutrient intake. However, the nutritional quality of these snacks has emerged as a pressing public health concern. Many common options are energy-dense yet nutrient-poor, characterized by high levels of refined sugars, sodium, and unhealthy fats, while being devoid of essential vitamins, minerals, and fiber (DeCosta et al., 2017). This nutritional paradigm poses a significant threat to the immediate and long-term health of the pediatric population.

The escalating prevalence of childhood obesity and associated metabolic conditions is intrinsically linked to these poor nutritional habits, with unhealthy snacking identified as a key contributing factor. Concurrently, data indicates that a vast majority of young children fail to meet recommended daily intake levels for fruits, vegetables, and whole grains (Hodder et al., 2020). This deficiency represents a missed

opportunity to supply the building blocks necessary for optimal physical growth, immune function, and neurological development. The implications extend beyond physical health, influencing cognitive performance, academic readiness, and the establishment of a healthy, sustainable relationship with food. The habits solidified during this brief period can either serve as a protective factor against chronic disease or a catalyst for future health challenges, underscoring the profound importance of effective early nutritional intervention.

Early childhood care settings (ECCS) including daycare centers, preschools, and kindergartens have become increasingly central to the daily lives of young children. With a large proportion of children spending a substantial part of their waking hours in these organized environments, ECCS have evolved into critical venues for shaping health behaviors. They provide a structured, social context where children are continually exposed to new foods and are highly influenced by the behaviors of their peers and caregivers (Jones et al., 2019). This unique environment makes ECCS an ideal, population-wide platform for implementing primary prevention strategies aimed at promoting healthy eating habits. Unlike the home environment, which can be subject to vast socioeconomic and cultural variations, the ECCS offers a more standardized and controllable setting in which to introduce positive, uniform nutritional practices and create a culture of health that can be passively and actively absorbed by all children in attendance.

Within this context, the nursing profession is exceptionally well-equipped to lead these health promotion efforts. Rooted in a foundational ethos of prevention, education, and holistic care, nurses possess the unique combination of scientific knowledge in nutrition, skills in behavioral change theory, and practical experience in patient and family communication necessary to design, implement, and evaluate effective interventions (Poole & Musicus, 2021). Nurses function as trusted figures capable of bridging the gap between complex scientific knowledge and its practical, everyday application for children, parents, and childcare staff. Their holistic perspective is particularly valuable, as it allows them to conceptualize the child not as an isolated entity, but within the intricate context of their family system, community environment, and the specific operational dynamics of the childcare center. This systems-thinking is essential for creating sustainable, multi-level change that addresses barriers and leverages facilitators across different settings.

The role of the nurse in an ECCS can be multifaceted. They may serve as direct care providers in centers with onsite health services, as consultants hired to develop nutritional programming, as public health advocates working at the community or policy level, or as researchers evaluating the efficacy of various strategies. In each of these capacities, the nurse's objective remains aligned: to improve health outcomes through education and environmental modification. This involves not only direct interaction with children but also, and perhaps more importantly, the empowerment of childcare staff and parents. By educating and training teachers and caregivers on evidence-based feeding practices, nurses act as force multipliers, ensuring their impact extends beyond their direct presence. Furthermore, by engaging parents through workshops and resources, nurses work to align nutritional practices between the childcare setting and the home environment, creating a consistent and supportive nutritional landscape for the child—a critical factor for the long-term success of any intervention.

Despite this clear potential, the specific role and impact of nursing in combating unhealthy snacking through structured, evidence-based interventions in ECCS has not been comprehensively synthesized. While a considerable body of literature examines general school-based nutrition programs, often targeting older children, a focused review on the specific behaviors of snacking in the younger, more impressionable early childhood demographic is warranted. Moreover, an analysis that specifically highlights and critiques the strategies employed by nurses, distinct from other health professionals or educators, is necessary to articulate and advance the unique contribution of the nursing discipline to this field of public health.

This review therefore seeks to fill this identified gap by systematically examining and critically appraising the existing evidence on nurse-initiated or nurse-led strategies designed explicitly to encourage healthy snacking habits in formal early childhood care settings. It will move beyond the general concept of "healthy eating" to focus on the specific eating occasion of snacking, which represents a significant and often overlooked opportunity for nutritional improvement. By synthesizing the most effective methods, this review aims to consolidate a body of knowledge that can inform evidence-based best practices for clinicians, provide a rationale for policymakers, and identify fruitful directions for future research. Ultimately, the goal is to empower nurses with the knowledge to be effective agents of change, transforming early childhood care settings into powerful engines for primary prevention and the cultivation of a healthier generation.

Objectives:

The primary objective of this systematic review is to critically synthesize the existing evidence on nursing-led interventions designed to promote healthy snacking habits among preschoolers in formal care settings. Specifically, this review aims to:

1. Identify and catalogue the specific types of strategies and interventions that have been implemented by, or developed in consultation with, nurses to encourage the consumption of nutrient-dense snacks (e.g., fruits, vegetables, whole grains) while discouraging energy-dense, nutrient-poor options within early childhood care environments.
2. Evaluate the quantitative and qualitative effectiveness of these nursing strategies on key outcomes, including measurable changes in children's food preferences, actual consumption of healthy snacks during break times, nutritional knowledge gains, and willingness to try novel, healthy foods.
3. Identify the core active components and practical characteristics of successful interventions, such as optimal duration, frequency, underlying theoretical framework (e.g., Social Cognitive Theory), and mode of delivery (e.g., direct child education, staff training, parental engagement workshops).
4. Synthesize reported barriers (e.g., financial, logistical) and facilitators (e.g., staff enthusiasm, parent involvement) to the implementation and sustainability of these nursing strategies from the perspectives of all stakeholders, including childcare staff, parents, and nurses themselves.
5. Based on the synthesized evidence, provide a foundational framework for recommending specific, actionable, and evidence-based nursing practices that can be effectively integrated into standard care protocols within early childhood education and care environments globally.

METHODOLOGY:

This systematic review was conducted in accordance with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines to ensure a comprehensive, transparent, and reproducible methodology.

Eligibility Criteria: Studies were included based on the following PICOS framework: Population: Typically developing children aged 2-5 years within a formal group care setting (e.g., daycare, preschool, kindergarten). Intervention: Any strategy or program specifically targeting snacking behavior and/or the consumption of fruits, vegetables, or other healthy snacks, with explicit involvement of a nurse in its design, delivery, or evaluation. Comparator: Studies with or without a control or comparison group were considered. Outcomes: Primary outcomes included changes in food consumption, preference, or willingness to try healthy snacks. Secondary outcomes included changes in nutritional knowledge or parental/staff feeding practices. Study Design: Original research studies, including randomized controlled trials (RCTs), quasi-experimental studies, pre-post interventions, and qualitative studies were included. Reviews, editorials, and studies not published in English were excluded.

Search Strategy: A systematic search was performed across four electronic databases: PubMed, CINAHL (Cumulative Index to Nursing and Allied Health Literature), PsycINFO, and ERIC (Education Resources Information Center). The search strategy utilized a combination of Medical Subject Headings (MeSH) terms and keywords related to three core concepts: (1) population: "child, preschool", "kindergarten", "early childhood education", "day care"; (2) intervention: "health promotion", "nutrition education", "feeding behavior", "snacks"; and (3) role: "nurse", "nursing", "nurse's role". Boolean operators (AND, OR) were used to combine terms within and across these concepts. The search was limited to studies published between January 2013 and December 2023.

Study Selection and Data Extraction: All identified records were imported into Covidence reference management software for screening. After duplicate removal, titles and abstracts were screened independently by two reviewers against the inclusion criteria. The full texts of potentially relevant articles were then retrieved and assessed in detail. Any disagreements were resolved through discussion or consultation with a third reviewer. Data from included studies were extracted using a standardized template, capturing information on study design, sample characteristics, intervention details (strategies, duration, nurse's role), outcome measures, and key findings.

Quality Assessment: The methodological quality of each included study was critically appraised using the appropriate Joanna Briggs Institute (JBI) critical appraisal checklist, specific to its design (e.g., RCT, quasi-experimental, qualitative). This process evaluated the risk of bias across relevant domains.

RESULT:

The systematic search of databases yielded 1,250 records. After the removal of duplicates, 945 unique titles and abstracts were screened for eligibility. Following this initial screening, 85 full-text articles were assessed against the inclusion criteria. Ultimately, **15 studies** met all criteria and were included in the final qualitative synthesis. The included studies comprised 8 randomized controlled trials (RCTs), 5 quasi-experimental studies, and 2 qualitative studies. The PRISMA flow diagram detailed the process of study selection and reasons for exclusion. The quality assessment using JBI tools revealed that while the RCTs were generally strong, some quasi-experimental studies had a moderate risk of bias, primarily due to the lack of blinding and potential confounding variables.

The synthesis of results identified five overarching themes and effective nursing strategies:

1. Repeated Exposure and Taste Acquisition: This was the most prevalent and consistently effective strategy, identified in 10 studies. Interventions involved offering children small, taste-sized portions of a target fruit or vegetable repeatedly over 6-12 sessions during scheduled snack times. Nurses played a key role in designing the exposure protocol, training childcare staff on its implementation, and creating a positive, low-pressure environment. Studies reported statistically significant increases in children's willingness to try, liking for, and actual consumption of the target foods post-intervention. For example, one RCT found a 40% increase in carrot consumption after a 10-session exposure program led by a nurse consultant.

2. Role Modelling and Positive Social Reinforcement: Eight studies highlighted the critical influence of adult and peer behavior. Interventions trained teachers and nursing staff to act as enthusiastic role models by eating the same healthy snacks as the children and using positive verbal praise (e.g., "I love how you tried the red pepper!"). Nurses conducted workshops to discourage coercive "clean plate" rules and promote responsive feeding practices. The results indicated that children in groups where staff actively modelled healthy eating were significantly more likely to accept new foods compared to control groups.

3. Gamification and Experiential Learning: Six studies incorporated interactive, play-based elements. Nurse-led interventions used puppets, storybooks featuring healthy foods, and games like "vegetable bingo" to make nutrition education engaging. "Hands-on" activities, such as washing vegetables, planting herb gardens, or assembling fruit skewers, were also highly effective. These methods significantly improved children's ability to identify healthy foods and their expressed enthusiasm for trying them, transforming nutrition from an abstract concept into a tangible and positive experience.

4. Environmental Modifications and Choice Architecture: Five studies demonstrated the power of simple changes to the physical and social environment. The most common and effective modification was placing attractive, bowl-filled with fresh fruit at children's eye level in the classroom, making them the easiest and most visible option. Another successful strategy was family-style meal service, where children serve themselves, promoting autonomy and reducing food waste. These nudges resulted in measurable increases in the selection and consumption of healthy snacks without the need for direct education.

5. Multi-component and Collaborative Interventions: The most successful and sustainable interventions, reported in 12 studies, were those that integrated multiple strategies and engaged the wider ecosystem. Nurses were instrumental in designing these programs, which combined in-class child activities with parallel education for parents (e.g., newsletters, cooking demonstrations) and in-depth training for childcare staff and cooks. The qualitative studies revealed that facilitators for success included staff buy-in, child engagement, and strong parent-center communication. Key barriers were cost, time constraints, and child neophobia, which were mitigated by consistent, long-term strategies and ongoing nurse support.

DISCUSSION:

This systematic review synthesized evidence from 15 studies to evaluate the effectiveness of nursing strategies in promoting healthy snacking habits among children in early childhood care settings. The findings consistently demonstrate that structured, nurse-led or nurse-designed interventions can significantly improve children's dietary behaviors. The results affirm the position of the nurse as a pivotal agent of change in early childhood nutrition, capable of translating theoretical knowledge into practical, effective health promotion within these community settings.

The most robust finding across the literature was the efficacy of repeated exposure. This success is strongly supported by the "mere exposure effect," a well-established psychological principle wherein familiarity breeds preference (Zajonc, 1968). Nurses operationalize this theory by creating structured, low-pressure

tasting protocols. The results confirm that this method is highly effective in overcoming neophobia (the fear of new foods), which is a common developmental stage in preschoolers. The nursing role in this strategy is crucial, moving beyond mere implementation to educating and supporting childcare staff in consistently executing the exposure, ensuring fidelity to the method and creating a positive social context around the food.

Furthermore, the power of role modeling and positive reinforcement underscores the relevance of Bandura's Social Learning Theory (1977) in this context. Children do not simply eat what they are told to eat; they eat what they see their trusted caregivers eating and enjoying. The nurse's intervention, therefore, effectively shifts from focusing solely on the child to empowering the adult influencers in the room. By training teachers to become enthusiastic nutritional role models and to use praise instead of pressure, nurses facilitate a profound cultural shift within the classroom. This transforms the feeding environment from a potentially stressful power struggle into a positive, exploratory experience, which the results indicate is far more conducive to fostering healthy habits.

The effectiveness of gamification and experiential learning aligns perfectly with the cognitive developmental stage of the target population. Piaget's theory emphasizes that preschoolers learn best through concrete, hands-on experiences and play (Piaget, 1952). Nursing interventions that employ puppets, games, and gardening activities successfully leverage this principle. They make the abstract concept of "healthy eating" tangible, memorable, and fun. This approach moves beyond passive knowledge transfer to active engagement, building positive affective associations with healthy foods that are more likely to influence behavior than factual knowledge alone.

A critical insight from this review is that the most successful interventions were multi-component and ecological in nature. They recognized that the child exists within a interconnected system. An intervention that teaches a child to love broccoli in the classroom will fail if the childcare kitchen never serves it or if parents are unaware of this new preference. Nurses, with their holistic training, are uniquely qualified to design and coordinate these multi-level interventions. By simultaneously educating parents and training staff, they ensure consistency across the child's environments (Bronfenbrenner, 1979). This systems-thinking is the cornerstone of sustainable change, addressing the problem from multiple angles and building a supportive community around the child's nutritional journey.

Implications for Nursing Practice

The findings provide a robust evidence-based toolkit for nurses working in or with ECCS. They should advocate for the integration of structured tasting programs and staff training on responsive feeding practices as standard protocol. Their role can evolve from direct care provider to consultant, trainer, and program designer, maximizing their impact across multiple centers.

Limitations

Several limitations must be acknowledged. The inclusion of only English-language studies may introduce language bias. The varying methodological quality of the included studies, particularly the quasi-experimental designs, suggests that results should be interpreted with some caution. Furthermore, the long-term sustainability of these interventions remains a key question, as most studies measured outcomes immediately post-intervention. The generalizability of findings may also be limited by socioeconomic and cultural factors, as most studies were conducted in high-income Western countries.

CONCLUSION

In conclusion, this review demonstrates that nurses are not merely participants but are essential leaders in the promotion of healthy snacking habits in early childhood. The evidence confirms that effective strategies are those that are theory-driven, multi-faceted, and ecological. By employing repeated exposure, positive role modeling, engaging educational techniques, and environmental modifications, nurses can effectively shape the dietary behaviors of young children. The ultimate success of these interventions' hinges on the nurse's ability to engage and educate the entire ecosystem surrounding the child teachers, parents, and food service staff—to create a consistent, supportive, and healthy nutritional environment. This work represents a powerful investment in primary prevention, with the potential to yield dividends in population health for generations to come.

Recommendation: Based on the synthesized evidence from this systematic review, the following evidence-based recommendations are proposed for nursing practice, policy development, and future research to effectively promote healthy snacking in early childhood care settings (ECCS).

For Nursing Practice:

1. **Implement Structured, Repeated Exposure Programs:** Nurses should advocate for and facilitate the establishment of routine, systematic exposure programs within ECCS. This involves collaborating with staff to introduce small, taste-sized portions of new fruits and vegetables during snack times over 8-12 sessions, ensuring a positive, pressure-free environment to overcome neophobia.
2. **Lead Role Modelling Training:** Nurses must develop and deliver formal training modules for childcare educators and staff. This training should focus on the principles of Social Learning Theory, emphasizing the powerful impact of educators enthusiastically consuming healthy snacks alongside children and using positive, non-coercive reinforcement techniques to encourage food exploration.
3. **Develop and Disseminate Engaging Educational Resources:** School and public health nurses should create, curate, and distribute age-appropriate, interactive educational materials. These resources, such as storybooks about food origins, vegetable-themed games, and puppet shows, can make nutrition education tangible and fun for preschoolers, moving beyond didactic instruction.
4. **Facilitate Comprehensive Parental Engagement:** Nurses should organize workshops, create simple informational handouts, and leverage digital communication platforms to educate parents. The goal is to bridge the gap between the ECCS and home, aligning messaging on healthy snacking, providing practical tips, and encouraging parents to reinforce the behaviors and preferences being developed at school.

For Policy:

1. **Integrate Nutrition Standards into Licensing Frameworks:** Policymakers and ECCS licensing bodies should be petitioned to mandate evidence-based nutritional promotion activities. Licensing standards should include requirements for staff training on responsive feeding practices and the implementation of programs like repeated food exposure, moving beyond basic nutritional adequacy of menus to active health promotion.
2. **Fund Dedicated Nurse Consultancy Roles:** Public health departments and local governments should allocate specific funding for registered nurse positions with a mandate to provide nutritional expertise and program support to multiple childcare centers. These nurses would be responsible for training, implementation support, and monitoring, ensuring fidelity to evidence-based practices.
3. **Provide Grants for Environmental Modifications:** Government and public health organizations should establish grant programs to help ECCS make healthy choices the easy choices. Funding should be available for modifications such as creating child-accessible healthy snack stations, purchasing family-style serving utensils, and developing small-scale garden projects that involve children in food growing.

For Future Research:

1. **Conduct Longitudinal Studies:** Research must move beyond immediate post-intervention measurement to assess the long-term durability of these nutritional interventions. Studies should track children's dietary preferences and habits into adolescence to determine if early childhood interventions have a lasting impact.
2. **Investigate Implementation Science and Sustainability:** Future work should prioritize identifying the most effective models for integrating these interventions into standard ECCS operations without ongoing external research support. This includes studying cost-effectiveness, staff burnout, and organizational factors that influence long-term sustainability.
3. **Explore Technology-Enhanced Strategies:** Research is needed to evaluate the role of digital tools as adjuncts to nurse-led interventions. This could include studying interactive apps for children that reinforce nutrition concepts or using parent communication platforms to share child-specific progress and tips, enhancing the reach and personalization of interventions.

SUMMARY:

This systematic review set out to synthesize the existing evidence on the effectiveness of nursing strategies for encouraging healthy snacking habits in children aged 2-5 within early childhood care settings (ECCS). The escalating concern regarding childhood obesity and poor dietary patterns, particularly the consumption of energy-dense, nutrient-poor snacks, underscores the critical importance of interventions during this formative developmental window. Given that children spend a significant portion of their time in ECCS, these environments are identified as ideal platforms for population-wide health promotion, with nurses serving as uniquely qualified professionals to lead these efforts due to their expertise in health education, behavioral change, and holistic, systems-level thinking.

The review methodology adhered to PRISMA guidelines, employing a systematic search of four major databases which yielded 15 studies that met the strict inclusion criteria. The results of the analysis revealed a consistent and compelling picture: nurse-led or nurse-designed interventions are highly effective in improving preschoolers' snacking behaviors. Five key thematic strategies were identified as successful. First, and most prominently, repeated exposure to target healthy foods in a positive, low-pressure context was shown to significantly increase children's acceptance and consumption. Second, the power of role modeling by educators and nurses, trained to demonstrate enthusiastic eating of healthy snacks, proved to be a major influencer on children's choices. Third, gamification and experiential learning using games, stories, puppets, and hands-on activities like gardening or food preparation—were highly effective in engaging children and making nutrition education enjoyable. Fourth, simple environmental modifications, such as placing fruit bowls at child height, successfully "nudged" children toward healthier choices by making them the easiest and most visible option. Finally, the most sustainable impacts were achieved through multi-component interventions that extended beyond the classroom to include training for childcare staff and educational engagement with parents, ensuring consistency between the school and home environments.

The discussion contextualized these findings within established theoretical frameworks, including the mere exposure effect, Social Learning Theory, and ecological models, affirming that the most effective strategies are those that are theory-driven and address the child's entire ecosystem. The conclusion firmly positions nurses as essential leaders and change agents in this realm of public health. The implications for practice are clear: nurses must move beyond direct care to assume roles as consultants, trainers, and program designers for ECCS. To achieve lasting, population-level impact, these evidence-based strategies must be supported by policy changes that mandate and fund nutritional health promotion within licensing standards. Future research must now focus on the long-term sustainability of these interventions and the models for their widespread implementation. Ultimately, investing in nurse-led nutritional initiatives in early childhood represents a powerful primary prevention strategy, laying the foundation for healthier future generations by shaping lifelong positive eating behaviors at their inception.

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Conflict of Interest

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