NURSE-LED INTERVENTIONS IN PREVENTING OVERWEIGHT AMONG PRESCHOOL CHILDREN: A NARRATIVE REVIEW

Lantin Sulistyorini[1], Annis Catur Adi[2], Yuni Sufyanti Arief[3]
[1]Doctoral Program in Public Health Science, Faculty of Public Health, Universitas Airlangga, Indonesia
[2]Faculty of Public Health, Universitas Airlangga, Indonesia
[3]Faculty of Nursing, Universitas Airlangga, Indonesia

Corresponding Author:Doctoral Program in Public Health Science, Faculty of Public Health, Universitas Airlangga, Indonesia lantin.sulistyorini-2023@fkm.unair.ac.id

ABSTRACT

Overweight and obesity during early childhood are increasingly prevalent and pose serious health risks, including the early onset of metabolic and cardiovascular conditions. Preschool children (aged 0–5 years) are at a critical developmental stage where prevention strategies can have long-lasting effects. Nurses, due to their frequent interactions with children and families in various settings, are strategically positioned to lead interventions aimed at preventing overweight in this population. This narrative review aims to explore and synthesize evidence on nurse-led interventions that target overweight prevention among preschool-aged children across diverse settings. The review identified four major thematic areas: (1) school-based interventions such as nutritional education and physical activity promotion; (2) community-based approaches including home visits and culturally tailored family programs; (3) primary care and clinical interventions involving BMI screening and lifestyle counseling; and (4) digital and telehealth strategies like mobile health and online coaching. Effectiveness varied across settings, with key success factors including family engagement, nurse training, and interprofessional collaboration. Barriers included limited resources, inconsistent parental involvement, and a lack of policy support. Nurse-led interventions demonstrate significant potential in preventing overweight among preschool children, especially when integrated into family-centered, community-based, and digital health frameworks. Sustainable implementation requires capacity building, supportive health policies, and intersectoral collaboration to overcome existing barriers and enhance intervention reach and impact.

Keywords: childhood obesity, nursing, nutrition, narrative review

Introduction

Overweight and obesity in early childhood, particularly among preschool-aged children (0–5 years), have become alarming global public health issues (Di Cesare et al., 2019; Singhal, 2020). The prevalence of childhood overweight and obesity has been rising globally. For instance, the number of overweight children under five years old was estimated to be over 42 million in 2013, with a significant portion living in developing countries (Khodaee & Saeidi, 2016). By 2020, the prevalence had increased further, with regions like Asia and Africa having the highest numbers of affected children (Muyulema et al., 2025). Asia had a lower prevalence but a higher number of affected children, with 18 million in 2010 (de Onis et al., 2010). These figures reflect a significant increase in childhood weight-related problems over the past few decades, especially in low- and middle-income countries where nutritional transitions are rapid and unbalanced. Overweight in preschool children is associated with multiple short- and long-term health consequences, including insulin resistance, hypertension, orthopedic problems, and poor motor development (Juonala et al., 2011). Psychologically, it can also affect a child's emotional regulation and self-esteem, even at an early age (Puder & Munsch, 2010).

Early childhood is a critical period for shaping lifelong habits related to nutrition, physical activity, and general health behaviors. During these formative years, children's health choices are largely influenced by parents, caregivers, and early childhood educators. This makes early prevention efforts particularly effective in minimizing obesity risk and promoting healthy growth trajectories (Birch & Ventura, 2009). Interventions targeting this age group must be developmentally appropriate, family-centered, and embedded within the daily routines and environments of young children, such as homes, daycare centers, and community settings.

Nurses, especially those working in pediatric, maternal-child health, and community health roles, have unique access to children and families during this early stage of life. They often encounter young children during routine immunizations, well-child visits, growth monitoring sessions, and home visits. These contact points offer valuable opportunities to deliver preventive health messages, model healthy behaviors, and support parental practices related to feeding, activity, and screen time (Baxter et al., 2022; Clément & Tereno, 2023; Lin et al., 2020). Nurse-led interventions, defined as structured health promotion activities designed, led, and delivered primarily by nurses, are increasingly recognized as a promising strategy for preventing overweight in early childhood.

Such interventions may include individualized counseling, group-based education, motivational interviewing, behavioral coaching, and environmental modifications, among others. Importantly, nurse-led programs often emphasize family engagement, cultural sensitivity, and

ongoing support, which are essential elements for successful behavioral change in young children (Amelia et al., 2025; Mado et al., 2021; Santoso et al., 2021). Several studies have demonstrated the effectiveness of nurse-led approaches in promoting healthy eating patterns, reducing sedentary behaviors, and improving growth indicators in children under five (Fernández-Ruiz et al., 2021; Whitehead et al., 2021; Wright et al., 2013). Nurses are also often perceived as trusted and accessible health professionals by parents, which enhances program acceptability and compliance (Ozaras & Abaan, 2018; Sedighi et al., 2025).

Despite the growing body of literature on childhood obesity prevention, the specific role of nurse-led interventions targeting preschool-aged children remains underrepresented in many systematic reviews, which tend to focus on school-aged populations or multidisciplinary interventions without clearly delineating the nursing contribution. Furthermore, the diversity of intervention designs, target settings, and outcome measures poses challenges for synthesis and implementation.

A narrative review is therefore suitable to explore the breadth and depth of existing nurse-led efforts in preventing overweight among young children. Unlike systematic reviews that require homogeneity of study designs and interventions, narrative reviews allow for a more flexible and comprehensive analysis of varied studies. This approach is valuable for identifying common themes, effective strategies, contextual factors, and research gaps, as well as for informing future practice and policy.

The purpose of this narrative review is to examine and critically synthesize the evidence on nurse-led interventions for preventing overweight in preschool children aged 0 to 5 years. Specifically, this review aims to describe the types and characteristics of nurse-led interventions targeting overweight prevention in early childhood. By addressing these aims, this review contributes to a deeper understanding of how nurses can play a central role in early-life obesity prevention and how their efforts can be supported through training, policy frameworks, and interprofessional collaboration. In addition, strengthening nurse-led initiatives can help reduce the long-term burden of obesity and promote healthier futures for children around the world.

School-Based Interventions

Although preschool settings differ significantly from traditional schools, early childhood education centers (ECECs) and kindergartens have increasingly become important environments for health promotion. Nurse-led interventions within these settings typically focus on nutritional education, physical activity, and establishing healthy habits.

Several studies reported that nurses played a central role in nutrition education programs targeting preschoolers and their caregivers. For instance, Nurses have been shown to effectively promote nutritional awareness among children using interactive

methods such as puppet shows and flashcards. These methods have been found to significantly improve children's nutritional knowledge and attitudes compared to traditional lecture-based programs(Abdelrahman et al., 2025). This highlights the importance of training nurses in interactive and visual teaching strategies to enhance children's health education.

School nurses are crucial in addressing childhood obesity and promoting healthy eating habits. They design, implement, and evaluate nutrition and physical activity programs tailored to the needs of the school community. These programs often involve the whole school community and aim to create a supportive environment for healthy behaviors (Bejster et al., 2020; Blessing & Mendonca, 2019).

In addition to dietary education, nurse-coordinated physical activity initiatives have been piloted in preschool institutions. Programs like the Coordinated Approach to Child Health Early Childhood (CATCH EC) have demonstrated significant improvements in children's physical activity levels, particularly in increasing indoor vigorous activity (Chuang et al., 2018). These findings underscore the potential of structured, nurse-led interventions in promoting physical activity among preschoolers.

Despite these successes, integrating nurses into the daily routines of preschools can be logistically challenging. Limited nurse availability, role ambiguity, and lack of coordination with educators may hinder the sustainability of school-based efforts. Nonetheless, these interventions underscore the potential of ECECs as viable platforms for obesity prevention, provided that collaborative relationships are established between educators and health professionals.

Community-Based Interventions

The home and broader community environment plays a decisive role in shaping children's early-life behaviors. Nurse-led home visit programs have shown considerable promise in promoting healthy growth trajectories among young children.

Programs like the Nurse-Family Partnership (NFP) have shown improvements in child development, maternal health, and economic self-sufficiency (Catherine et al., 2016). These interventions often involve growth monitoring, parental counseling on feeding practices, and anticipatory guidance on screen time and play (Beatson et al., 2021; Catherine et al., 2016; Lin et al., 2020).

Culturally tailored programs have shown significant effectiveness in improving maternal feeding styles and reducing sugar-sweetened beverage (SSB) consumption among toddlers in diverse communities. These programs are particularly impactful due to their alignment with the unique feeding beliefs and parenting practices of different cultural groups. Previous studies show that an obesity prevention program for immigrant Chinese American families showed increased odds of no SSB intake at both 6 and 12 months, indicating the effectiveness of culturally adapted interventions in reducing SSB consumption

(Duh-Leong et al., 2024). The Vida Saludable program, designed for low-income Hispanic mothers, successfully reduced children's SSB consumption, highlighting the importance of cultural relevance in intervention design (Bender et al., 2014).

However, the scalability of such programs remains a challenge. Community-based interventions often require significant investment in nurse training, transportation, and ongoing family engagement (Grow et al., 2013; Schwartz et al., 2012). Multicultural health workers (MHWs) and community engagement were identified as critical components in the success of culturally tailored programs, as they help bridge cultural divides and ensure the relevance of the interventions (Vaughan et al., 2018).

Primary Care and Clinical Settings

Nurses in primary care settings frequently interact with parents and young children during well-child visits, immunizations, and growth monitoring. These routine appointments offer ideal opportunities for BMI screening and lifestyle counseling, which are essential components of early overweight prevention.

Several nurse-led programs have utilized brief intervention models during clinical visits. For example, Motivational Interviewing (MI) is a counseling method aimed at facilitating behavior change through person-centered strategies. It has been shown to be effective in various settings, including primary care and community health (Schlottmann et al., 2019). While the intervention showed promise in the short term, its long-term effectiveness was modest. This is consistent with findings from other studies where MI-based interventions did not result in significant long-term changes in children's weight-related measures (Enö Persson et al., 2018).

More intensive interventions involve collaborative care models, where nurses work alongside pediatricians and dietitians. In such models, specific training for nurses in obesity management includes methods for treating obesity, educating patients and families, and motivating patients to adhere to treatment plans (Barrea et al., 2021). Nurse-managed obesity clinics embedded in pediatric practices have demonstrated reductions in BMI z-scores and improvements in parental self-efficacy in managing feeding routines. These clinics provide a structured environment for ongoing support and follow-up (Nowicka et al., 2007; Onyegasi et al., 2023).

However, primary care nurses often report barriers such as limited time, lack of training in obesity counseling, and low parental receptivity to weight-related discussions (Warren & Hunt, 2017). To address these challenges, institutional protocols and continuing education on childhood obesity prevention are essential to empower nurses in their role as primary health educators (Gibson, 2016). By addressing these barriers through institutional support and continuous education, primary care nurses can be better equipped to tackle childhood obesity effectively.

Digital and Telehealth Approaches

Digital health platforms have emerged as innovative tools for expanding the reach of nurse-led interventions, particularly in the wake of the COVID-19 pandemic. Mobile health (mHealth) applications, text-messaging programs, and video consultations have been used to deliver nutrition advice, monitor growth, and support parental behavior change.

The example is an mHealth application that significantly enhanced maternal knowledge about child growth, development, and feeding practices in a study conducted in Yogyakarta, Indonesia. The intervention group showed consistent improvements in knowledge scores over time (Siswati et al., 2024). The REDUCE program, a family-based intervention, showed significant reductions in the consumption of unhealthy snacks among children, indicating the effectiveness of such interventions in modifying dietary behaviors (Ahmad et al., 2020). Another one, the iByte4Health program, targeting low-income families, included components on reducing sugary drinks and unhealthy snacks, and was well-received by participants, suggesting potential for behavior change (Tripicchio et al., 2021). These programs leverage technology to provide accessible, tailored content and support behavior change through reminders, tips, and goal-setting tools. Nurses played a key role in monitoring app interactions and providing individualized feedback.

Online coaching provides a convenient alternative for parents who cannot attend in-person sessions due to geographical, time, or financial constraints. This is particularly beneficial for families in rural areas or those with low income (Hails et al., 2025). A major barrier to the adoption of online coaching is the varying levels of digital literacy among parents. Low digital literacy can hinder the effective use of online platforms, particularly among low-income and low-literacy populations (Summers et al., 2018). Providing digital literacy support and training can help bridge the gap for parents with low digital skills. This can include tutorials, help desks, and community support programs (Tirado-Morueta et al., 2018).

While online coaching for families led by pediatric nurses offers a promising solution for engaging parents, addressing barriers such as digital literacy and internet access is essential. By implementing strategies to overcome these challenges, online coaching can become a more effective and inclusive tool for supporting families in diverse settings.

Discussion

Nurse-led interventions aimed at preventing overweight among preschool-aged children (0–5 years) demonstrate considerable promise across a range of settings. These interventions are uniquely positioned to leverage nurses' accessibility, trustworthiness, and frequent contact with families during critical windows of child development. However, despite encouraging outcomes, the literature reveals a complex interplay of factors that influence the overall effectiveness and sustainability of these interventions.

Effectiveness of Nurse-Led Interventions

The reviewed studies highlight that nurse-led interventions can produce positive outcomes in modifying risk factors associated with childhood overweight. Interventions that begin early in life, particularly during infancy or toddlerhood, appear to be more effective than those initiated later. Programs focusing on anticipatory guidance, such as appropriate feeding practices, portion control, sleep hygiene, and limiting screen time, have been shown to reduce rapid weight gain in early childhood (Baxter et al., 2022; Clément & Tereno, 2023; Duh-Leong et al., 2024). These outcomes are especially evident when interventions are delivered through structured home visits or embedded into routine well-child check-ups, which capitalize on moments when parents are most receptive to preventive advice.

Moreover, family-centered approaches have proven particularly effective. Programs that actively engage caregivers, especially mothers, in setting goals, monitoring behavior, and problem-solving have consistently reported better adherence and health outcomes (Abebe et al., 2016; Yeganeh et al., 2018). Nurse-led programs that incorporate motivational interviewing and behavior change theories tend to outperform those relying solely on didactic education, as they enhance parental self-efficacy and support sustainable lifestyle changes.

Importantly, nurse-led interventions that are culturally tailored to meet the specific beliefs, language, and practices of target populations have shown significant success. This is especially critical in diverse communities, where feeding norms and perceptions of child weight vary widely. For instance, bilingual nurse interventions have reduced sugar-sweetened beverage intake and increased vegetable consumption among preschoolers by addressing culturally specific dietary habits (Bender et al., 2014; Duh-Leong et al., 2024; Hails et al., 2025).

However, while short-term improvements in knowledge, attitudes, and behavior have been documented, the long-term impact on BMI or overweight prevalence remains mixed. Several studies report only modest reductions in BMI z-scores, and some fail to sustain effects beyond the intervention period (Chen et al., 2022; Ruder & Lohse, 2024). This suggests that while nurse-led interventions can initiate positive changes, ongoing reinforcement and support may be necessary to maintain them.

Barriers to Nurse-Led Interventions

Despite their potential, several barriers limit the full realization and scalability of nurse-led overweight prevention programs. One of the most frequently cited barriers is resource constraints. Many nurses report insufficient time during routine appointments to conduct in-depth counseling on feeding, activity, and sleep. Furthermore, there is often a lack of financial and institutional support to deliver structured programs, particularly in low-resource settings or rural areas. In some countries, nurse-led preventive activities are not reimbursed under national insurance

schemes, making them less feasible in routine practice.

Another challenge is parental resistance or low receptivity, especially when addressing weight concerns in very young children. Many parents underestimate their child's weight status or believe that early childhood "chubbiness" is normal and will resolve with age (Cullinan & Cawley, 2017; Yang et al., 2025). This perception can lead to defensiveness or disengagement when nurses raise weight-related issues, especially if not approached with sensitivity. Nurses often express discomfort or lack of confidence in initiating these conversations, pointing to a need for better communication training.

Additionally, there is a notable gap in training and competencies among nurses regarding pediatric obesity prevention. Many nursing curricula still place limited emphasis on nutrition, physical activity, and behavioral counseling specific to early childhood (Onyegasi et al., 2023). As a result, some nurses feel ill-equipped to provide effective guidance or to tailor interventions to diverse family situations.

Finally, the lack of standardized protocols and policy integration poses systemic challenges. Unlike immunization or growth monitoring, obesity prevention is not always embedded into routine maternal and child health frameworks. This leads to inconsistencies in delivery and follow-up, limiting program fidelity and impact. In some cases, programs are designed as one-off research interventions and are not institutionalized or scaled up after pilot phases.

Implications for Nursing Practice

The findings underscore the essential role of nurses in preventing overweight among preschool-aged children across diverse settings. To enhance the impact and sustainability of nurse-led interventions, the following implications for nursing practice are proposed:

Integration into Routine Child Health Services

Nurses should incorporate overweight prevention strategies into existing maternal and child health services, such as immunization visits, growth monitoring, and home-based care. Embedding interventions into routine practice ensures regular contact with families and facilitates early identification of at-risk children.

Strengthening Nurse Training and Competencies

Pre- and in-service training programs for nurses must include comprehensive content on pediatric nutrition, physical activity promotion, obesity counseling, and behavior change techniques. Special emphasis should be placed on motivational interviewing, culturally competent care, and strategies for engaging resistant or ambivalent parents.

Cultural and Contextual Adaptation

Nurses must be equipped to deliver interventions that are culturally sensitive and tailored to the specific beliefs, practices, and needs of the communities they serve. Utilizing multilingual resources,

involving community health workers, and respecting diverse parenting values can enhance family engagement and effectiveness.

Use of Digital and Telehealth Tools
Nurses should leverage digital health technologies—such as mobile apps, text messaging, and video consultations—to extend the reach of education and counseling efforts. Training in digital literacy and communication is essential to ensure nurses can confidently use these tools and assist families in navigating them.

Policy and Institutional Support
Healthcare institutions and policymakers should recognize and formalize the role of nurses in early childhood obesity prevention. This includes allocating time during clinical encounters, providing supportive supervision, reimbursing preventive services, and developing standardized protocols to ensure consistency and quality in intervention delivery.

Family-Centered and Strengths-Based Approaches
Nursing practice should emphasize family-centered care, focusing on empowering caregivers through shared goal setting, collaborative decision-making, and positive reinforcement. Nurses must be trained to identify family strengths and build on them to support sustainable lifestyle changes.

Interdisciplinary Collaboration
Nurses should work collaboratively with pediatricians, dietitians, early childhood educators, and public health professionals to deliver coordinated, holistic care. Multidisciplinary teamwork enhances the consistency of health messages and ensures that families receive comprehensive support.

Monitoring and Evaluation
To ensure effectiveness, nurses should engage in systematic monitoring and evaluation of intervention outcomes, including tracking child growth patterns, behavior changes, and caregiver engagement. This data can inform continuous improvement and advocacy for scaling successful programs.

By adopting these strategies, nurses can enhance their capacity to play a transformative role in the early prevention of childhood overweight. Institutionalizing these practices within the broader healthcare and education systems is critical for addressing the global challenge of early-life obesity and promoting lifelong health.

Conclusion

This narrative review highlights the critical role of nurses in preventing overweight among preschool-aged children through a range of interventions implemented across schools, homes, clinical settings, and digital platforms. Nurse-led interventions have demonstrated meaningful improvements in parental knowledge, child health behaviors, and, in some cases, BMI trajectories, particularly when interventions are initiated early, are family-centered, and culturally responsive.

Despite these promising outcomes, several challenges remain. Limited time, inadequate training, resource constraints,

and policy gaps often hinder the sustainability and scalability of nurse-led programs. Moreover, parental misperceptions and low receptivity to weight-related discussions in early childhood further complicate intervention delivery. These findings underscore the need for a systemic approach to supporting nurses through structured training, policy integration, and interprofessional collaboration.

Ultimately, empowering nurses with the necessary skills, tools, and institutional backing can significantly contribute to global efforts in reducing early childhood overweight. Given the unique and trusted position of nurses in child and family health, their leadership in preventive interventions should be recognized and expanded within health systems and early childhood care frameworks.

References

Abdelrahman, M. M., Hashem, R., Abo-Seif, L. M. E.-S., & Elsehrawy, M. G. (2025). The role of nursing in promoting nutritional awareness: insights from interactive educational approaches. *BMC Nursing*, *24*(1), 748. https://doi.org/10.1186/s12912-025-03245-z

Abebe, Z., Haki, G. D., & Baye, K. (2016). Health Extension Workers' Knowledge and Knowledge-Sharing Effectiveness of Optimal Infant and Young Child Feeding Are Associated With Mothers' Knowledge and Child Stunting in Rural Ethiopia. *Food and Nutrition Bulletin*, *37*(3), 353–363. https://doi.org/10.1177/0379572116651209

Ahmad, N., Shariff, Z. M., Mukhtar, F., & Lye, M.-S. (2020). Effect of Family-Based REDUCE Intervention Program on Children Eating Behavior and Dietary Intake: Randomized Controlled Field Trial. *Nutrients*, *12*(10), 3065. https://doi.org/10.3390/nu12103065

Amelia, V., Arief, Y. S., & Sylvia Dwi Wahyuni. (2025). Community-Based Intervention for Malnutrition in Children Under Five: A Scoping Review. *Jurnal Berita Ilmu Keperawatan*, *18*(1), 138–147. https://doi.org/10.23917/bik.v18i1.6192

Barrea, L., Framondi, L., Di Matteo, R., Verde, L., Vetrani, C., Graziadio, C., Pugliese, G., Laudisio, D., Vitale, G., Iannicelli, A., Savastano, S., Colao, A., & Muscogiuri, G. (2021). The role of the nurse in the Obesity Clinic: a practical guideline. *Panminerva Medica*, *63*(4). https://doi.org/10.23736/S0031-0808.21.04540-7

Baxter, K. A., Nambiar, S., So, T. H. J., Gallegos, D., & Byrne, R. (2022). Parental Feeding Practices in Families Experiencing Food Insecurity: A Scoping Review. *International Journal of Environmental Research and Public Health*, *19*(9). https://doi.org/10.3390/ijerph19095604

Beatson, R., Molloy, C., Perini, N., Harrop, C., & Goldfeld, S. (2021). Systematic review: An exploration of core componentry characterizing effective sustained nurse home visiting programs. *Journal of Advanced Nursing*, *77*(6), 2581–2594. https://doi.org/10.1111/jan.14755

Bejster, M., Cygan, H., Stock, J., & Ashworth, J. (2020). Engaging the School Community in a Nutrition and Physical Activity Program: The Role of the 21st-Century School Nurse. *NASN School Nurse*, *35*(5), 260–265.

https://doi.org/10.1177/1942602X20912747

Bender, M. S., Clark, M. J., & Gahagan, S. (2014). Community Engagement Approach: Developing a Culturally Appropriate Intervention for Hispanic Mother–Child Dyads. *Journal of Transcultural Nursing*, *25*(4), 373–382. https://doi.org/10.1177/1043659614523473

Birch, L. L., & Ventura, A. K. (2009). Preventing childhood obesity: what works? *International Journal of Obesity*, *33*(S1), S74–S81. https://doi.org/10.1038/ijo.2009.22

Blessing, S. A., & Mendonca, L. L. (2019). The Healthy Menu Project: Role of the School Nurse: Youth–Adult Shared Partnerships Help Change a School Lunch Menu. *NASN School Nurse*, *34*(6), 335–339. https://doi.org/10.1177/1942602X19852583

Catherine, N. L. A., Gonzalez, A., Boyle, M., Sheehan, D., Jack, S. M., Hougham, K. A., McCandless, L., MacMillan, H. L., & Waddell, C. (2016). Improving children's health and development in British Columbia through nurse home visiting: a randomized controlled trial protocol. *BMC Health Services Research*, *16*(1), 349. https://doi.org/10.1186/s12913-016-1594-0

Chen, M., Yin, W., Sung-Chan, P., Wang, Z., & Shi, J. (2022). The Interactive Role of Family Functioning among BMI Status, Physical Activity, and High-Fat Food in Adolescents: Evidence from Shanghai, China. *Nutrients*, *14*(19). https://doi.org/10.3390/nu14194053

Chuang, R.-J., Sharma, S. V., Perry, C., & Diamond, P. (2018). Does the CATCH Early Childhood Program Increase Physical Activity Among Low-Income Preschoolers?—Results From a Pilot Study. *American Journal of Health Promotion*, *32*(2), 344–348. https://doi.org/10.1177/0890117117700952

Clément, S., & Tereno, S. (2023). Attachment, Feeding Practices, Family Routines and Childhood Obesity: A Systematic Review of the Literature. *International Journal of Environmental Research and Public Health*, *20*(8). https://doi.org/10.3390/ijerph20085496

Cullinan, J., & Cawley, J. (2017). Parental misclassification of child overweight/obese status: The role of parental education and parental weight status. *Economics & Human Biology*, *24*, 92–103. https://doi.org/10.1016/j.ehb.2016.11.001

de Onis, M., Blössner, M., & Borghi, E. (2010). Global prevalence and trends of overweight and obesity among preschool children. *The American Journal of Clinical Nutrition*, *92*(5), 1257–1264. https://doi.org/10.3945/ajcn.2010.29786

Di Cesare, M., Sorić, M., Bovet, P., Miranda, J. J., Bhutta, Z., Stevens, G. A., Laxmaiah, A., Kengne, A.-P., & Bentham, J. (2019). The epidemiological burden of obesity in childhood: a worldwide epidemic requiring urgent action. *BMC Medicine*, *17*(1), 212. https://doi.org/10.1186/s12916-019-1449-8

Duh-Leong, C., Au, L., Chang, L. Y., Feldman, N. M., Pierce, K. A., Mendelsohn, A. L., Perrin, E. M., Sanders, L. M., Velazquez, J. J., Lei, Y., Xing, S. X., & Shonna Yin, H. (2024). Infant Feeding Outcomes From a Culturally-Adapted Early Obesity Prevention Program for Immigrant Chinese

American Parents. *Academic Pediatrics*, *24*(8), 1276–1284. https://doi.org/10.1016/j.acap.2024.06.005

Enö Persson, J., Bohman, B., Tynelius, P., Rasmussen, F., & Ghaderi, A. (2018). Prevention of Childhood Obesity in Child Health Services: Follow-Up of the PRIMROSE Trial. *Childhood Obesity*, *14*(2), 99–105. https://doi.org/10.1089/chi.2017.0117

Fernández-Ruiz, V. E., Solé-Agustí, M., Armero-Barranco, D., & Cauli, O. (2021). Weight Loss and Improvement of Metabolic Alterations in Overweight and Obese Children Through the I ^{2} AO ^{2} Family Program: A Randomized Controlled Clinical Trial. *Biological Research For Nursing*, *23*(3), 488–503. https://doi.org/10.1177/1099800420987303

Gibson, J. S. (2016). Translation of clinical practice guidelines for childhood obesity prevention in primary care mobilizes a rural Midwest community. *Journal of the American Association of Nurse Practitioners*, *28*(3), 130–137. https://doi.org/10.1002/2327-6924.12239

Grow, H. M. G., Hsu, C., Liu, L. L., Briner, L., Jessen-Fiddick, T., Lozano, P., & Saelens, B. E. (2013). Understanding Family Motivations and Barriers to Participation in Community-Based Programs for Overweight Youth. *Journal of Public Health Management and Practice*, *19*(4), E1–E10. https://doi.org/10.1097/PHH.0b013e31825ceaf9

Hails, K. A., McWhirter, A. C., Sileci, A. C. B., & Stormshak, E. A. (2025). Family Check-Up Online effects on parenting and parent wellbeing in families of toddler to preschool-age children. *Early Childhood Research Quarterly*, *70*, 144–153. https://doi.org/10.1016/j.ecresq.2024.09.009

Juonala, M., Magnussen, C. G., Berenson, G. S., Venn, A., Burns, T. L., Sabin, M. A., Srinivasan, S. R., Daniels, S. R., Davis, P. H., Chen, W., Sun, C., Cheung, M., Viikari, J. S. A., Dwyer, T., & Raitakari, O. T. (2011). Childhood Adiposity, Adult Adiposity, and Cardiovascular Risk Factors. *New England Journal of Medicine*, *365*(20), 1876–1885. https://doi.org/10.1056/NEJMoa1010112

Khodaee, G. H., & Saeidi, M. (2016). Increases of Obesity and Overweight in Children: an Alarm for Parents and Policymakers. In *Int J Pediatr* (Vol. 4, Issue 28). http://ijp.mums.ac.ir

Lin, Y. C., Tsai, M. C., Strong, C., Hsieh, Y. P., Lin, C. Y., & Lee, C. S. C. (2020). Exploring mediation roles of child screen-viewing between parental factors and child overweight in Taiwan. *International Journal of Environmental Research and Public Health*, *17*(6). https://doi.org/10.3390/ijerph17061878

Mado, F. G., Sirajuddin, S., Muis, M., Maria, I. L., Darmawansyah, D., & Arifin, M. A. (2021). Intervention empowerment of families in preventing and controlling overweight and obesity in children: A systematic review. In *Journal of Public Health Research* (Vol. 10).

Muyulema, S. L., Carpio-Arias, T. V., Verdezoto, N., Guanga Lara, V. E., Manzano, A. S., Pulgar, H., & Vinueza Veloz, M. F. (2025). Worldwide trends in childhood overweight and obesity over the last 20 years. *Clinical Nutrition ESPEN*, *65*, 453–460.

https://doi.org/10.1016/j.clnesp.2024.12.013

Nowicka, P., Pietrobelli, A., & Flodmark, C.-E. (2007). Low-intensity family therapy intervention is useful in a clinical setting to treat obese and extremely obese children. *International Journal of Pediatric Obesity*, *2*(4), 211–217. https://doi.org/10.1080/17477160701379810

Onyegasi, N., Harris, S., & Holmes, G. (2023). Enhancing Obesity Management Through a Nurse Practitioner-Guided Behavioral Counseling Program. *The Journal for Nurse Practitioners*, *19*(6), 104593. https://doi.org/10.1016/j.nurpra.2023.104593

Ozaras, G., & Abaan, S. (2018). Investigation of the trust status of the nurse–patient relationship. *Nursing Ethics*, *25*(5), 628–639. https://doi.org/10.1177/0969733016664971

Puder, J. J., & Munsch, S. (2010). Psychological correlates of childhood obesity. *International Journal of Obesity*, *34*(S2), S37–S43. https://doi.org/10.1038/ijo.2010.238

Ruder, E. H., & Lohse, B. (2024). The sDOR.2-6y™ Is a Valid Measure of Nutrition Risk Independent of BMI-for-Age z-Score and Household Food Security Status in Preschool Aged-Children. *Nutrients*, *16*(6). https://doi.org/10.3390/nu16060767

Santoso, M. V., Bezner Kerr, R. N., Kassim, N., Martin, H., Mtinda, E., Njau, P., Mtei, K., Hoddinott, J., & Young, S. L. (2021). A Nutrition-Sensitive Agroecology Intervention in Rural Tanzania Increases Children's Dietary Diversity and Household Food Security but Does Not Change Child Anthropometry: Results from a Cluster-Randomized Trial. *Journal of Nutrition*, *151*(7), 2010–2021. https://doi.org/10.1093/jn/nxab052

Schlottmann, H., Broome, M., Herbst, R., Burkhardt, M. C., & Mescher, A. (2019). Nurse-Led Telephone Follow-Up to Improve Parent Promotion of Healthy Behaviors in Young Children With Motivational Interviewing Techniques. *Journal of Pediatric Health Care*, *33*(5), 545–554. https://doi.org/10.1016/j.pedhc.2019.02.003

Schwartz, R. P., Vitolins, M. Z., Case, L. D., Armstrong, S. C., Perrin, E. M., Cialone, J., & Bell, R. A. (2012). The YMCA Healthy, Fit, and Strong Program: A Community-Based, Family-Centered, Low-Cost Obesity Prevention/Treatment Pilot Study. *Childhood Obesity*, *8*(6), 577–582. https://doi.org/10.1089/chi.2012.0060

Sedighi, S., Sadeghi, A., Roshanaei, G., & Purfarzad, Z. (2025). The relationship between nurses' caring behaviors and patient loyalty: trust towards nurses as a mediating role. *BMC Nursing*, *24*(1), 568. https://doi.org/10.1186/s12912-025-03207-5

Singhal, A. (2020). *Obesity in Toddlers and Young Children: Causes and Consequences* (pp. 41–51). https://doi.org/10.1159/000511510

Siswati, T. S., Sitasari, A., Paramashanti, B. A., Tjaronosari, T., Nurhidayat, N., Wijanarka, A., & Waris, L. (2024). Effect of mHealth based intervention on Maternal Knowledge and Practices of Child Care: A quasi-experimental study. *Public Health of Indonesia*, *10*(1), 10–20. https://doi.org/10.36685/phi.v10i1.756

Summers, K., Alton, N., Haraseyko, A., & Sherard, R. (2018). *Bridging the Digital Divide: One Smartphone at a Time* (pp. 653–672). https://doi.org/10.1007/978-3-319-91803-7_49

Tirado-Morueta, R., Aguaded-Gómez, J. I., & Hernando-Gómez, Á. (2018). The socio-demographic divide in Internet usage moderated by digital literacy support. *Technology in Society*, *55*, 47–55. https://doi.org/10.1016/j.techsoc.2018.06.001

Tripicchio, G. L., Kay, M., Herring, S., Cos, T., Bresnahan, C., Gartner, D., Sosinsky, L. S., & Bass, S. B. (2021). Development and Preliminary Feasibility of iByte4Health: A Mobile Health (mHealth) Pediatric Obesity Prevention Intervention to Engage Parents with Low-Income of Children 2–9 Years. *Nutrients*, *13*(12), 4240. https://doi.org/10.3390/nu13124240

Vaughan, L., Schubert, L., Mavoa, H., & Fa'avale, N. (2018). 'Hey, We Are the Best Ones at Dealing with Our Own': Embedding a Culturally Competent Program for Māori and Pacific Island Children into a Mainstream Health Service in Queensland, Australia. *Journal of Racial and Ethnic Health Disparities*, *5*(3), 605–616. https://doi.org/10.1007/s40615-017-0406-5

Warren, N., & Hunt, J. (2017). Barriers to addressing childhood weight issues in acute care settings and how to overcome them. *Nursing Children and Young People*, *29*(5), 18–23. https://doi.org/10.7748/ncyp.2017.e813

Whitehead, L., Kabdebo, I., Dunham, M., Quinn, R., Hummelshoj, J., George, C., & Denney-Wilson, E. (2021). The effectiveness of nurse-led interventions to prevent childhood and adolescent overweight and obesity: A systematic review of randomised trials. *Journal of Advanced Nursing*, *77*(12), 4612–4631. https://doi.org/10.1111/jan.14928

Wright, K., Giger, J. N., Norris, K., & Suro, Z. (2013). Impact of a nurse-directed, coordinated school health program to enhance physical activity behaviors and reduce body mass index among minority children: A parallel-group, randomized control trial. *International Journal of Nursing Studies*, *50*(6), 727–737. https://doi.org/10.1016/j.ijnurstu.2012.09.004

Yang, J., Zhou, L., Chen, L., Wu, Y., Wang, Y., Fan, H., Tung, T.-H., Wang, L., & Zhang, M. (2025). Parental Perceptions of Preschool Children's Weight Status in China: A Cross-Sectional Study. *Obesity Facts*, *18*(3), 296–304. https://doi.org/10.1159/000544074

Yeganeh, S., Motamed, N., NajafpourBoushehri, S., & Ravanipour, M. (2018). Assessment of the knowledge and attitude of infants' mothers from Bushehr (Iran) on food security using anthropometric indicators in 2016: a cross-sectional study. *BMC Public Health*, *18*(1), 621. https://doi.org/10.1186/s12889-018-5531-5