

School and Obesity

<https://ebook.ecog-obesity.eu/chapter-psychological-assesment-disturbances/school-obesity/>



Tiffany Naets, Wendy Van Lippevelde, Caroline Braet

University of Ghent

Ghent, Belgium

How to Use This Article

You're free to **use, share and copy this content by quoting this article as follows:**

Naets T, Van Lippevelde W, & Braet C (2024). School and Obesity. In M.L. Frelut (Ed.), The ECOG E-Book on Child and Adolescent Obesity. Retrieved from ebook.ecog-obesity.eu

Also make sure to **give appropriate credit** when using this content. Please visit ebook.ecog-obesity.eu for more information.



Introduction

For understanding and forcing back obesity in youth, focusing on the context of children's and adolescents' health behaviours is warranted. From a socioecological perspective, the school context is one of the most important environments to tackle for preventing and decreasing overweight and obesity in youth (Langford et al., 2015). This chapter summarizes some important challenges. First, this chapter will describe how children and adolescents' weight issues might be related to school performance, and put an emphasis on the detrimental consequences of weight stigma. Second, we will elaborate on the socioecological perspective on obesity, and the importance of the school context in tackling overweight and obesity in youth. Third, this chapter focuses on the possibilities of obesity prevention strategies. To conclude, light is shed on the school-parent partnership in obesity prevention and what future research should focus on towards achieving it.

The negative consequences of childhood obesity in a school context: academic performance and stigma

Besides the well-known negative biopsychosocial consequences of childhood obesity (WHO, 2020), one often neglected is the impact on academic performance within the school context. A lot of uncertainties remain about the exact relationship between weight problems and academic performance in youth, merely because of a lack of empirically sound longitudinal studies as well as a large heterogeneity in both age and conceptualizing performance (Santana et al., 2017).

Nonetheless, it could be hypothesized that stigmatization, more than scholastic capability, plays a crucial role in the association between obesity and academic performance (Langford et al., 2022). After all, although a few studies report lower executive functioning in you with obesity – an important process regarding academic performance – (e.g. Naets et al., 2020), no consistent evidence associates obesity to scholastic abilities in children or adolescents (Afzal & Gortmaker, 2015). The connection between stigmatization and academic performance, however, is well established. Lessard et al. (2021) found that in adolescents with high body weight, especially those who experience weight-biased victimization (i.e. mainly mistreatment from peers), had lower grades. The study of Livermore and colleagues (2020) showed that children with obesity tend to label their school performance as low to mediocre in comparison to peers and that the perception of “deviating from the right weight” can predict lower academic success. Monzonis-Carda and colleagues (2021) demonstrated that weight status can affect the association between depressive feelings – also an important factor to consider in paediatric obesity (Van Vlierberghe et al., 2009) – and low academic performance in adolescents. The presence of stigmatisation cannot be underestimated. Youth with weight problems are at great risk of being stigmatized (Fields et al., 2021; Gmeiner & Warschburger, 2020; Puhl et al., 2018), mainly because obesity is mistakenly perceived as a result of controllable unhealthy choices instead of the result of the complex interplay between biopsychological factors (Haqq et al., 2021). Based on the perspectives of Cooley's looking glass self (Cooley, 2017) and Goffman's social stigma (Goffman, 2009), the stigmatization of obesity can create a climate of negative social feedback – either real or perceived – that can fester low academic performance

because of its connection with low self-efficacy, emotional and behavioural problems (Crosnoe, 2007; Haqq et al., 2021; Palad et al., 2019; Puhl & King, 2013).

The school environment is an important context in which stigmatization can occur (Lessard et al., 2021; Nutter et al., 2019), as well as in which several determinants of health behaviour can be tackled to curb childhood obesity. Health behaviour models and frameworks such as Social Ecological models (McLeroy et al., 1988; Sallis et al., 2015; Stokols, 1992) and the Environmental Research framework for weight Gain (EnRG) (Kremers et al., 2006) highlight the importance of environmental influences on health. These models are crucial for understanding today's "obesity epidemic", as the contribution of the obesogenic environment in that epidemic is of major significance (Hill et al., 2003; Organization, 2003; Rendina et al., 2019). Therefore, the following section focuses on the influence of the school environment on childhood obesity.

The school environment and childhood obesity

Since the 1970s, the obesogenic environment has been recognized as an important factor in explaining the presence and increase of obesity, and several models were created to conceptualize this ecological perspective (Cabrera, 2024; Jia, 2021). For example, the ecological model of Bronfenbrenner (Bronfenbrenner, 1992) focused on several systems or "layers" surrounding the child with obesity (i.e. the micro, meso, exo and macrosystem). Later, Swinburn and colleagues (Swinburn et al., 1999) developed the ANGELO- (ANalysis Grid for Environments Linked to Obesity) - framework, and included four distinct types of environments that combine these layers and identify important social determinants of health behaviour and obesity. The (1) physical determinant refers to the availability of (un)healthy food and opportunities to be physically active, the (2) economic determinant refers to the cost of health behaviours and the promotion of (un)healthy products via marketing, the (3) political determinant refers to health rules, laws and political ideologies, and (4) the socio-cultural determinant refers to social norms, expectations and influence on health behaviour (Swinburn et al., 1999). The ANGELO framework can be complemented with individual health behaviour models (Figure 1), including an individual's (1) physical and psychosocial capability and (2) reflective and automatic motivation. This framework has been used frequently to identify and change determinants to curb childhood obesity (Cabrera, 2024; Jackson et al., 2021). The systematic review of Jackson and colleagues (Jackson et al., 2021) found that worldwide, most guidelines to prevent childhood obesity consistent with the ANGELO model are well-aligned with research evidence, most frequently in the physical (e.g. limiting sedentary behaviour or engaging children in active play) and socio-cultural environment (e.g. promoting the benefits of physical activity or educating parents about proper sleep).



Figure 1: Behaviour Wheel (Flanders Institute for Healthy Living, 2020)

Especially through a socioecological perspective, schools are recognized as one of the most important contexts in which these determinants cultivate. The food environment and physical activity are very important in supporting or discouraging health behaviours.

First, Harrison and Jones (2012) conducted a systematic review investigating associations between the physical school environment and diet, physical activity, and adiposity and found evidence for the influence of the physical school food environment on children's and adolescents' food consumption (Harrison & Jones, 2012). According to the authors, the availability and accessibility of unhealthy foods (i.e., sugar-sweetened drinks; low nutrient energy dense snacks; unhealthy la carte lunch programs) from school canteens and vending machines contribute to a higher consumption of unhealthy foods, a lower intake of fruit, vegetables and milk products and greater odds of obesity. Ohri-Vachaspati and colleagues (Ohri-Vachaspati et al., 2023) concluded that an unhealthy food environment of the school and its surrounding community is associated with a higher number of children suffering from obesity, and contributes to an increase in obesity rates over time.

Next, Ferreira et al. (2005) showed in their review that school-related PA policies (i.e. time allowed from free play; time spent outdoors; and number of field trips) were associated with differences in children's weight. de Souza et al. (2024) identified a significant relationship between children's weight and the amount and intensity of physical education classes, break duration and the availability of indoor sport courts. Especially adolescents are at risk, as physical activity tends to decrease in comparison to primary schools (Li et al., 2024).

Of course, it needs to be acknowledged that schools are imbedded into broader macro-environmental settings including communities, health systems, governments and food industries (Bronfenbrenner, 1992; Cabrera, 2024; Swinburn et al., 1999). Nonetheless, schools are an important context factor in the life of children and adolescents, and obesity prevention at this level is an important pathway to curb the obesity epidemic

Obesity prevention in the school environment

Given the importance of the school context and that children and adolescents spend a lot of time there, schools also have a large responsibility in health promotion (i.e. health education lessons, the creation of a PA promoting playground; provision of healthy school meals) (Dietz & Baur, 2022; Story et al., 2006). The WHO started a Global School Health Initiative in 1995 to facilitate health promotion via the implementation of health promoting schools (HPS), aiming at schools that continuously foster health behaviour in children as well as in personnel (WHO, 2021). Although most studies investigating the effectiveness of HPS in the past were of rather low quality (McHugh et al., 2020), we can state that nutrition promotion programs using the HPS approach remain promising in improving dietary behaviours (McHugh et al., 2020).

There seems to be a lot of variety between the strategies schools adopt to install healthy lifestyle habits in order to prevent obesity (Smit et al., 2023), in terms of single or multicomponent strategies (i.e. nutrition education only or combined with other interventions) and outcome (i.e. intake, physical activity, weight status, etc.). That is at least one of the reasons why recent meta-analyses were not able to show robust effects, such as in studies of Smit and colleagues (2023), Nury et al. (2022) and Sal and Bektas (2022) finding no long-term effects of primary and secondary school-based obesity prevention strategies on weight. Nonetheless, school-based obesity prevention remains a cost-effective strategy (Ananthapavan et al., 2020; Xu et al., 2020) as a lot of studies found that well-designed and well-implemented school-based interventions have positive effects. For example, Nury et al. (2022) did show a moderate improvement in fruit and vegetable intake after preferably multicomponent nutritional interventions. The systematic review of Pineda et al. (2021) showed significant effects on weight status and fruit consumption of interventions changing the food environment within and around schools. The multicomponent “Health Buddies” program in Canada of Nickel and colleagues (2021) was effective in reducing weight circumference, dietary intake, healthy living knowledge and self-efficacy. On a long term, Bere et al. (2014) showed that offering free fruit in primary schools in Norway was related to a decrease in weight status 4 years later. Jurić et al. (2023) implemented a real-world population-scaled physical activity intervention at schools (adding weekly physical education lessons) for children between 6 and 14 years old in Slovenia, and found significant effects on weight status after 3 and 5 years. Nonetheless, several well-designed studies fail to find substantial improvements, such as that of Lloyd et al (2018) in the UK finding no effects on body weight and circumference or dietary intake. Pineda et al. (2021) formulated some lessons learned and advised (1) to use clear and precise dietary guidelines and standards according to the most recent scientific insights, (2) to monitor interventions and pay attention to implementation barriers and facilitators, (3) to realize that fruit intake might be easier to change than vegetable intake, and (4) to properly address social inequalities.

Of course it should be noted that children also spend a significant amount of their time at home with their parents, and it is likely that engaging parents and focusing on these parenting practices in obesity prevention interventions will enhance the long-term impact and sustainability of obesity prevention efforts (Okely & Hammersley, 2018). Consequently, parents should be actively involved in obesity prevention efforts too. In the following section,

an overview of the current knowledge is provided concerning parental involvement in school-based obesity prevention including evidence about effectiveness of parental involvement, used strategies to involve parents and target parenting practices, and characteristics of participating parents in school-based obesity prevention.

The role of parents in school-based obesity prevention

The Lancet stated that partnerships between schools and families at home can be the missing piece in obesity prevention (Okely & Hammersley, 2018), as parents are equally indispensable when curbing obesity in youth (Aleid et al., 2024). Unfortunately, two problems arise.

First, methodologically sound research anno 2024 on specific parental involvement in obesity prevention is rather scarce, as most studies and reviews (e.g. Nury et al., 2022; Peters et al., 2009; Sal & Bektas, 2022; Smit et al., 2023) do not differentiate between parental and school involvement and do not examine the specific added value of parental influence (Kovács et al., 2022). Most efforts to involve parents are part of more comprehensive interventions (Hingle et al., 2010). The umbrella review of Tomayko et al (2021) incorporated systematic reviews and meta-analyses of interventions (both preventive as curative) that described parental involvement and found 14 studies ranging from high to low quality. They concluded that including a parent component can be beneficial, but defining parental involvement remains challenging and further research on the specific added value is crucial. One exception, the study of Lippevelde and colleagues (2012), investigated the added value of the parental component in obesity prevention. Not surprising, only five studies could be extracted and because the identified studies had inconsistent findings, this review could not provide conclusive evidence about the specific contribution of parental involvement to the effectiveness of school-based obesity prevention (Van Lippevelde et al., 2012).

Second, earlier studies emphasized the attrition challenge; e.g. the difficulty to involve parents adequately in school-based interventions (Gentile et al., 2009; Posey-Maddox & Haley-Lock, 2020). Parental adherence remains an issue, but cannot be blamed to unwillingness and is rather explained by factors such as readiness to make behavioural and parenting changes (Schmied et al., 2023). One of the important factors to evolve towards parental engagement in schools is parental attitude and self-efficacy (Goodall & Montgomery, 2023). Clarke et al. (2015) qualitatively investigated parent perceptions of school-based obesity prevention in the UK. Parents acknowledged the importance of school-based interventions, but they felt that parents remain the main ones responsible for their children's healthy lifestyle and simultaneously faced several barriers (e.g. time, financial means) delivering that responsibility (Clarke et al., 2015). Some parents were also worried about whether the time invested in health promotion at school might interfere with the time spent on education, and they were also concerned about whether a focus on healthy habits might induce eating disordered ways of thinking (Clarke et al., 2015). The authors advice to educating and empowering parents, supported by the school. Van Lippevelde and colleagues (Van Lippevelde et al., 2011) also investigated strategies to increase involvement of parents in school-based obesity prevention. They conducted focus group research in four European countries with parents of 10- to 12-year-olds to get more insight into parents' perspectives about parental involvement in school-based obesity

prevention. In line with the study Clarke et al. (2015), parents considered it to be mainly their own responsibility to provide healthy food and to prevent sedentary behaviour, but this study did show that parents think that schools are equally responsible in terms of promoting physical activity. The parents in the study mentioned interactive and practical activities together with their child as the best way to be involved in school-based interventions, such as cooking, food tasting, and nutrition workshops, walking or cycling tours, sport initiations together with their child. Activities should be cheap, on a convenient moment, focused on their children and not on themselves, not lecturing nor theoretical, and at school or home.

Across all aforementioned studies, authors highlighted that it is difficult to determine whether or not parental involvement positively impacts on outcomes and to identify which strategies to engage parents were most effective. This is due to the heterogeneity in study design, study quality, outcome variables and measurements used to assess outcomes, and the poor description of intervention fidelity, dose, and exposure. Consequently, future research should try to solve this lack of clarity about the importance and effectiveness of parental involvement in obesity prevention by designing studies in such a way that it will be possible to extract the added value of the parental component. However, alternative strategies and channels to effectively target the home environment and parenting practices also need to be explored, i.e., community-based interventions.

References

- Afzal, A. S., & Gortmaker, S. (2015). The relationship between obesity and cognitive performance in children: a longitudinal study. *Childhood Obesity*, 11(4), 466-474.
- Aleid, A. M., Sabi, N. M., Alharbi, G. S., Alharthi, A. A., Alshuqayfi, S. M., Alnefaie, N. S., Ismail, G. M., Allhybi, A. K., Alrasheeday, A. M., & Alshammari, B. (2024). The Impact of Parental Involvement in the Prevention and Management of Obesity in Children: A Systematic Review and Meta-Analysis of Randomized Controlled Trials. *Children*, 11(6), 739.
- Ananthapavan, J., Sacks, G., Brown, V., Moodie, M., Nguyen, P., Veerman, L., Mantilla Herrera, A. M., Lal, A., Peeters, A., & Carter, R. (2020). Priority-setting for obesity prevention—The Assessing Cost-Effectiveness of obesity prevention policies in Australia (ACE-Obesity Policy) study. *PloS one*, 15(6), e0234804.
- Bere, E., Klepp, K.-I., & Øverby, N. C. (2014). Free school fruit: can an extra piece of fruit every school day contribute to the prevention of future weight gain? A cluster randomized trial. *Food & nutrition research*, 58(1), 23194.
- Bronfenbrenner, U. (1992). *Ecological systems theory*. Jessica Kingsley Publishers.
- Cabrera, J. H. (2024). Frameworks of food environments: their scopes and perspectives. *Mexican Journal of Medical Research ICSA*.
- Clarke, J. L., Griffin, T. L., Lancashire, E. R., Adab, P., Parry, J. M., Pallan, M. J., & investigators, W. s. t. (2015). Parent and child perceptions of school-based obesity prevention in England: a qualitative study. *BMC Public Health*, 15, 1-9.
- Cooley, C. H. (2017). *Human nature and the social order*. Routledge.
- Crosnoe, R. (2007). Gender, obesity, and education. *Sociology of education*, 80(3), 241-260.
- de Souza, F. A. N., Bezerra, T. A., Bandeira, P. F. R., Cabral, L. G., Brito, A., Guerra, P. H., Martins, C. M. d. L., & Carvalho, F. O. (2024). Association between the environment

- for physical activity in public schools and childhood obesity: a view in the light of complex systems. *Ciência & Saúde Coletiva*, 29(06), e05162023.
- Dietz, W. H., & Baur, L. A. (2022). The Prevention of Childhood Obesity. *Clinical Obesity in Adults and Children*, 323-338.
- Ferreira, I., Twisk, J. W., van Mechelen, W., Kemper, H. C., & Stehouwer, C. D. (2005). Development of fatness, fitness, and lifestyle from adolescence to the age of 36 years: determinants of the metabolic syndrome in young adults: the Amsterdam growth and health longitudinal study. *Archives of internal medicine*, 165(1), 42-48.
- Fields, L. C., Brown, C., Skelton, J. A., Cain, K. S., & Cohen, G. M. (2021). Internalized weight bias, teasing, and self-esteem in children with overweight or obesity. *Childhood Obesity*, 17(1), 43-50.
- Flanders Institute for Healthy Living. (2020). *Wheel of behaviour*.
- Gentile, D. A., Welk, G., Eisenmann, J. C., Reimer, R. A., Walsh, D. A., Russell, D. W., Callahan, R., Walsh, M., Strickland, S., & Fritz, K. (2009). Evaluation of a multiple ecological level child obesity prevention program: Switch® what you Do, View, and Chew. *BMC medicine*, 7, 1-12.
- Gmeiner, M. S., & Warschburger, P. (2020). Intrapersonal predictors of weight bias internalization among elementary school children: a prospective analysis. *BMC pediatrics*, 20, 1-9.
- Goffman, E. (2009). *Stigma: Notes on the management of spoiled identity*. Simon and schuster.
- Goodall, J., & Montgomery, C. (2023). Parental involvement to parental engagement: A continuum. *Mapping the Field*, 158-169.
- Haqq, A. M., Kebbe, M., Tan, Q., Manco, M., & Salas, X. R. (2021). Complexity and stigma of pediatric obesity. *Childhood Obesity*, 17(4), 229-240.
- Harrison, F., & Jones, A. P. (2012). A framework for understanding school based physical environmental influences on childhood obesity. *Health & place*, 18(3), 639-648.
- Hill, J. O., Wyatt, H. R., Reed, G. W., & Peters, J. C. (2003). Obesity and the environment: where do we go from here? *Science*, 299(5608), 853-855.
- Hingle, M. D., O'Connor, T. M., Dave, J. M., & Baranowski, T. (2010). Parental involvement in interventions to improve child dietary intake: a systematic review. *Preventive medicine*, 51(2), 103-111.
- Jackson, J. K., Jones, J., Nguyen, H., Davies, I., Lum, M., Grady, A., & Yoong, S. L. (2021). Obesity prevention within the early childhood education and care setting: a systematic review of dietary behavior and physical activity policies and guidelines in high income countries. *International journal of environmental research and public health*, 18(2), 838.
- Jia, P. (2021). Obesogenic environment and childhood obesity. *Obesity Reviews*, 22, e13158.
- Jurić, P., Jurak, G., Morrison, S. A., Starc, G., & Sorić, M. (2023). Effectiveness of a population-scaled, school-based physical activity intervention for the prevention of childhood obesity. *Obesity*, 31(3), 811-822.
- Kovács, K., Kovács, K. E., Bacskai, K., Békési, Z., Oláh, Á. J., & Pusztai, G. (2022). The effects and types of parental involvement in school-based sport and health programs still represent a knowledge gap: a systematic review. *International journal of environmental research and public health*, 19(19), 12859.
- Kremers, S. P., De Bruijn, G.-J., Visscher, T. L., Van Mechelen, W., De Vries, N. K., & Brug, J. (2006). Environmental influences on energy balance-related behaviors: a dual-

- process view. *International Journal of Behavioral Nutrition and Physical Activity*, 3(1), 9.
- Langford, R., Bonell, C., Jones, H., Poulou, T., Murphy, S., Waters, E., Komro, K., Gibbs, L., Magnus, D., & Campbell, R. (2015). The World Health Organization's Health Promoting Schools framework: a Cochrane systematic review and meta-analysis. *BMC Public Health*, 15, 1-15.
- Langford, R., Davies, A., Howe, L., & Cabral, C. (2022). Links between obesity, weight stigma and learning in adolescence: a qualitative study. *BMC Public Health*, 22(1), 109.
- Lessard, L. M., Lawrence, S. E., & Puhl, R. M. (2021). Weight-based victimization and school performance in adolescence: Can teachers help reduce academic risks? *School Psychology*, 36(1), 69.
- Li, Y., Xiao, Y., Li, F., Han, Y., Zhang, X., & Gao, L. (2024). School physical activity modes on BMI among adolescents with overweight or obesity: The mediation role of participation willingness. *Public Health Nursing*.
- Livemore, M., Duncan, M. J., Leatherdale, S. T., & Patte, K. A. (2020). Are weight status and weight perception associated with academic performance among youth? *Journal of eating disorders*, 8, 1-10.
- Lloyd, J., Creanor, S., Logan, S., Green, C., Dean, S. G., Hillsdon, M., Abraham, C., Tomlinson, R., Pearson, V., & Taylor, R. S. (2018). Effectiveness of the Healthy Lifestyles Programme (HeLP) to prevent obesity in UK primary-school children: a cluster randomised controlled trial. *The Lancet Child & Adolescent Health*, 2(1), 35-45.
- McHugh, C., Hurst, A., Bethel, A., Lloyd, J., Logan, S., & Wyatt, K. (2020). The impact of the World Health Organization Health Promoting Schools framework approach on diet and physical activity behaviours of adolescents in secondary schools: a systematic review. *Public Health*, 182, 116-124.
- McLeroy, K. R., Bibeau, D., Steckler, A., & Glanz, K. (1988). An ecological perspective on health promotion programs. *Health education quarterly*, 15(4), 351-377.
- Monzonis-Carda, I., Adelantado-Renau, M., Beltran-Valls, M. R., & Moliner-Urdiales, D. (2021). An examination of the association between risk of depression and academic performance according to weight status in adolescents: DADOS study. *Journal of affective disorders*, 290, 157-163.
- Naets, T., Vervoort, L., & Tanghe, A. a. (2020). Maladaptive Eating in Children and Adolescents With Obesity: Scrutinizing Differences in Inhibition. *Frontiers in Psychiatry*, 11. <https://doi.org/10.3389/fpsyt.2020.00309>
- Nickel, N. C., Doupe, M., Enns, J. E., Brownell, M., Sarkar, J., Chateau, D., Burland, E., Chartier, M., Katz, A., & Crockett, L. (2021). Differential effects of a school-based obesity prevention program: A cluster randomized trial. *Maternal & child nutrition*, 17(1), e13009.
- Nury, E., Stadelmaier, J., Morze, J., Nagavci, B., Grummich, K., Schwarzer, G., Hoffmann, G., Angele, C. M., Steinacker, J. M., & Wendt, J. (2022). Effects of nutritional intervention strategies in the primary prevention of overweight and obesity in school settings: systematic review and network meta-analysis. *BMJ medicine*, 1(1).
- Nutter, S., Ireland, A., Alberga, A. S., Brun, I., Lefebvre, D., Hayden, K. A., & Russell-Mayhew, S. (2019). Weight bias in educational settings: A systematic review. *Current obesity reports*, 8, 185-200.

- Ohri-Vachaspati, P., Acciai, F., Melnick, E. M., Lloyd, K., Martinelli, S., DeWeese, R. S., DiSantis, K. I., Tulloch, D., DeLia, D., & Yedidia, M. J. (2023). Food environments within and outside of schools play a critical role in curtailing the rise in obesity among school-aged children over time. *The Journal of nutrition*, 153(12), 3565-3575.
- Okely, A. D., & Hammersley, M. L. (2018). School-home partnerships: the missing piece in obesity prevention? *The Lancet Child & Adolescent Health*, 2(1), 5-6.
- Organization, W. H. (2003). *Diet, nutrition, and the prevention of chronic diseases: report of a joint WHO/FAO expert consultation* (Vol. 916). World Health Organization.
- Palad, C. J., Yarlagadda, S., & Stanford, F. C. (2019). Weight stigma and its impact on paediatric care. *Current opinion in endocrinology, diabetes, and obesity*, 26(1), 19.
- Peters, L. W., Kok, G., Ten Dam, G. T., Buijs, G. J., & Paulussen, T. G. (2009). Effective elements of school health promotion across behavioral domains: a systematic review of reviews. *BMC Public Health*, 9, 1-14.
- Pineda, E., Bascunan, J., & Sassi, F. (2021). Improving the school food environment for the prevention of childhood obesity: what works and what doesn't. *Obesity Reviews*, 22(2), e13176.
- Posey-Maddox, L., & Haley-Lock, A. (2020). One size does not fit all: Understanding parent engagement in the contexts of work, family, and public schooling. *Urban education*, 55(5), 671-698.
- Puhl, R. M., Himmelstein, M. S., & Quinn, D. M. (2018). Internalizing weight stigma: prevalence and sociodemographic considerations in US adults. *Obesity*, 26(1), 167-175.
- Puhl, R. M., & King, K. M. (2013). Weight discrimination and bullying. *Best practice & research Clinical endocrinology & metabolism*, 27(2), 117-127.
- Rendina, D., Campanozzi, A., & De Filippo, G. (2019). Methodological approach to the assessment of the obesogenic environment in children and adolescents: A review of the literature. *Nutrition, Metabolism and Cardiovascular Diseases*, 29(6), 561-571.
- Sal, S., & Bektas, M. (2022). Effectiveness of Obesity Prevention Program Developed for Secondary School Students. *American Journal of Health Education*, 53(1), 45-55.
- Sallis, J. F., Owen, N., & Fisher, E. (2015). Ecological models of health behavior. *Health behavior: Theory, research, and practice*, 5(43-64).
- Santana, C. C. A., Hill, J. O., Azevedo, L. B., Gunnarsdottir, T., & Prado, W. L. (2017). The association between obesity and academic performance in youth: a systematic review. *Obesity Reviews*, 18(10), 1191-1199.
- Schmied, E. A., Madanat, H., Chuang, E., Moody, J., Ibarra, L., Cervantes, G., Strong, D., Boutelle, K., & Ayala, G. X. (2023). Factors predicting parent engagement in a family-based childhood obesity prevention and control program. *BMC Public Health*, 23(1), 457.
- Smit, M. S., Boelens, M., Mölenberg, F. J., Raat, H., & Jansen, W. (2023). The long-term effects of primary school-based obesity prevention interventions in children: A systematic review and meta-analysis. *Pediatric obesity*, 18(3), e12997.
- Stokols, D. (1992). Establishing and maintaining healthy environments: Toward a social ecology of health promotion. *American psychologist*, 47(1), 6.
- Story, M., Kaphingst, K. M., & French, S. (2006). The role of schools in obesity prevention. *The future of children*, 109-142.

- Swinburn, B., Egger, G., & Raza, F. (1999). Dissecting obesogenic environments: the development and application of a framework for identifying and prioritizing environmental interventions for obesity. *Preventive medicine*, 29(6), 563-570.
- Tomayko, E. J., Tovar, A., Fitzgerald, N., Howe, C. L., Hingle, M. D., Murphy, M. P., Muzaffar, H., Going, S. B., & Hubbs-Tait, L. (2021). Parent involvement in diet or physical activity interventions to treat or prevent childhood obesity: an umbrella review. *Nutrients*, 13(9), 3227.
- Van Lippevelde, W., Verloigne, M., De Bourdeaudhuij, I., Bjelland, M., Lien, N., Fernández-Alvira, J. M., Moreno, L. A., Kovacs, E., Brug, J., & Maes, L. (2011). What do parents think about parental participation in school-based interventions on energy balance-related behaviours? A qualitative study in 4 countries. *BMC Public Health*, 11, 1-11.
- Van Lippevelde, W., Verloigne, M., De Bourdeaudhuij, I., Brug, J., Bjelland, M., Lien, N., & Maes, L. (2012). Does parental involvement make a difference in school-based nutrition and physical activity interventions? A systematic review of randomized controlled trials. *International journal of public health*, 57, 673-678.
- Van Vlierberghe, L., Braet, C., Goossens, L., Rosseel, Y., & Mels, S. (2009). Psychological disorder, symptom severity and weight loss in inpatient adolescent obesity treatment. *International Journal of Pediatric Obesity*, 4(1), 36-44.
- WHO. (2020). *Fact Sheet: Obesity and overweight*. World Health Organization. <https://www.who.int/news-room/fact-sheets/detail/obesity-and-overweight>
- WHO. (2021). *Making every school a health-promoting school: Implementation guidance*. World Health Organization.
- Xu, H., Li, Y., Du, S., Zhang, Q., Liu, A., Sun, J., & Ma, G. (2020). Cost–utility and cost–benefit analyses of school-based obesity prevention program. *BMC Public Health*, 20, 1-7.