

School And Obesity

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Introduction

Overweight and obesity have become a global health problem both in low and middle income countries and high income countries affecting all socioeconomic and age groups [1]. Given the severe consequences on both physical and psychosocial health [2,3], prevention of overweight/obesity in children and adolescents is warranted. Several health behaviour models and frameworks (i.e., socio-ecological model, ANGELO framework, theory of planned behaviour, social-cognitive theory) emphasized the significant influence of the environment on children's health behaviours [4-10]. Therefore, this chapter aims to contribute to the understanding of the role and importance of the school as institute related to obesity prevention starting with a focus on the negative outcomes of childhood overweight and obesity in a school context. Secondly, the influence of the school environment on childhood obesity will be presented followed by the assets of the school setting as a prevention setting. To conclude, an in depth overview of the role of parents in school-based obesity prevention will be given.

The negative outcomes of childhood obesity in a school context

Next to the physical health consequences, excess weight in children and adolescents causes serious psychosocial complications. Overweight children and adolescents often experience feelings of depression and anxiety [11-12], poor self-esteem [13-17], and social stigma [13,18-21] which subsequently affects the quality of life (QOL) [16,18,22]. The low QOL and psychosocial wellbeing in obese children and adolescents is comparable to that of children with a chronic disease such as cancer, diabetes, and gastrointestinal disorders [23,24]. Buttitta and colleagues [23] conducted a literature review on QOL assessment in overweight and obese children and adolescents and found lower QOL scores for school functioning (i.e., limitations in schoolwork; lower child's perceptions of own cognitive capacity, learning and concentration; negative feelings about school; difficulties and anxiety at school; negative impact on school activities) and the social dimension (i.e., limitations in activities with friends; difficult interpersonal functioning in peer relations; negative impact on social activities; negative perception of the consideration in the social environment and the ability to develop friendships) in overweight and obese youth compared to normal weight children and adolescents. Earlier research has indicated that obesity is related to lower academic achievement and educational attainment [18,25,26]. However, no consistent evidence associates obesity to cognitive skills or scholastic abilities [27,28]. Some evidence suggests that reduced school achievements can be attributed to the social stigma of obesity [18,29]. Obese children and adolescents are more often the victims of bullying, discrimination, and bias than non-obese children [13,18]. Richardson and colleagues [20] explored stereotypical judgements of childhood obesity through an experiment in which 10- to 11-year-olds rated drawings of children with a range of disabilities: 1) no disability, 2) with crutches, 3) with wheelchair, 4) with no left hand, and 5) with obesity, and found that children liked the drawing of the obese child least because obese children are thought to be highly responsible for their condition. Latner & Stunkard [21] replicated this experiment hypothesizing that the high increase in overweight/obesity prevalence during the last 40 years caused a greater acceptance of obesity. However, the study showed that the stigmatization of childhood obesity was even stronger in 2001 than in 1961 [21]. Other studies mirrored these findings and moreover indicate a steady rise in the stigma of obesity over the developmental stages [18,30-32]. These findings highlight the importance of anti-bullying policies at school.

Based on the perspectives of Cooley's looking glass self [33] and Goffman's social stigma [34], the stigmatization of obesity can create a climate of negative social feedback – either real or perceived- for obese youth which can cause emotional and behavioural problems leading to low self-efficacy and subsequently poor academic performance [18,29,35]. It should be noted that schools can play an important role in the intensity of this stigma. Schools can develop -with their complex systems of norms and values including those related to physical appearance- a school culture in which obesity is more acceptable among youth [26]. Several health behaviour models and frameworks such as Social Ecological models [5-7] and the Environmental Research framework for weight Gain (EnRG) [36] highlight the importance of examining environmental influences on health behaviours since a supportive environment is crucial for an individual's health. Moreover, the contribution of the obesogenic environment in the expansion of the obesity epidemic is of major significance [37,38]. Therefore, the following section focuses on the influence of the school environment on childhood obesity.

The influence of the school environment on childhood obesity

Swinburn and colleagues [10] developed the ANGELO- (ANalysis Grid for Environments Linked to Obesity) - framework, a conceptual model for understanding the obesogenicity of environments, and included four distinct types of environmental influences (i.e. physical, economic, political, and sociocultural). Two systematic reviews used this framework to identify environmental factors related to energy balance-related behaviours in children and adolescents. Ferreira and colleagues [39] focused in their review on environmental factors related to physical activity (PA) and found that school-related PA policies (i.e. time allowed from free play; time spent outdoors; and number of field trips) were associated with PA. van der Horst and colleagues [40] explored the environmental factors linked to dietary behaviours but found no consistent associations. According to the abovementioned reviews [39,40], few studies are available that examine environmental influences on children's and adolescents' diet and PA in a school setting. Furthermore, a recent systematic review of reviews [41] confirmed these findings. De Vet and colleagues [41] did not find consistent associations between school factors and dietary behaviours. However, this review of reviews did show the importance of school facilities (i.e., instruction on sport/health benefits; school physical education programmes/school sport; equipment school play areas; and time allowed for free play/field trips) on PA in youth. However, Harrison & Jones [42] conducted a systematic review investigating associations between the physical school environment and diet, physical activity, and adiposity and found some evidence for the influence of the physical school food environment on children's and adolescents' food consumption [42]. 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 lead to a higher consumption of unhealthy foods, a lower intake of fruit, vegetables and milk products and greater odds of obesity. In addition, Harrison & Jones [42] found that intervention components altering food provision in school appear to be successful but modifications to the physical environment have a higher likelihood to be effective when combined with supportive social and educational changes. Furthermore, this review affirmed the importance of the physical school environment on PA [42]. Based on the abovementioned reviews, it appears that the role of the school environment on dietary behaviours is not yet fully understood. Thus future research should provide more insight into the impact of school environmental factors on dietary behaviours. Nevertheless, it needs to be acknowledged that schools do not stand-alone as organization but are imbedded into broader macro-environmental settings including communities,

health systems, governments and food industries [10]. According to the Social Ecological models, an individual's health behaviour is affected by, and effecting, various environmental levels of influence (including family, social networks, organizations, communities and societies) [4-7]. Obesity prevention efforts therefore need to target these different environmental types at multiple levels to significantly curb the obesity epidemic.

Obesity prevention in the school setting

Since children spend a large amount of their time at school and schools have many opportunities to conduct health promotion (i.e. health education lessons, the creation of a PA promoting playground; provision of healthy school meals); the school environment is recognized as a good setting to address children's dietary, PA and sedentary behaviour (SB) [43,44]. The WHO started a Global School Health Initiative in 1995 which aimed to mobilise and strengthen health promotion and education activities at the local, national, regional and global levels and to improve the health of students, school personnel, families and other members of the community through schools. The main goal of this initiative was to increase the number of health promoting schools (HPS), i.e. schools that constantly strengthens its capacity as a healthy setting for living, learning and working [45]. Several studies indicate that nutrition promotion programs using the HPS approach are promising in improving dietary behaviours [46].

Interventions targeting both dietary, PA and SB in children and adolescents have largely taken place in school settings. A range of outcomes have been targeted including healthy dietary patterns, increasing PA and decreasing SB and reducing weight status/weight gain. Some interventions used single components such as nutrition education or environmental changes, however, most interventions combined multiple components to influence energy balance-related behaviours (EBRBs) and weight status. Several systematic reviews found that well-designed and well-implemented school-based interventions have positive effects on children's nutrition and PA behaviours. In addition, school-based interventions that combine both educational and environmental components and focus on both sides of the energy balance, are most likely to be effective. Nevertheless, to date, school-based interventions have had only limited success on behavioural outcomes and did not show any effects in reducing overweight prevalence, especially on the longer term [47-52].

Therefore, prevention strategies should be expanded to other settings in which children live, in order to reach and impact a majority of children at a substantial and meaningful level. As children spend another significant amount of their time at home with their parents, and moreover, parents and their parenting has a significant influence on children's energy balance-related behaviours and obesity development [53-56], 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. 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

A large range of systematic reviews investigated the effectiveness of parental involvement in school-based obesity prevention on behavioural and/or anthropometrical outcomes. Nevertheless, no conclusive evidence was found for the added value of parental participation in school-based obesity prevention. On the one hand, earlier research found some evidence for the effectiveness of engaging parents in school-based healthy diet and PA promoting and obesity preventing programs in children and/or adolescents [57-62]. However, none of the reviews exclusively included studies wherein the parent component in the school-based intervention was separately evaluated. Thus the contribution of parental involvement to intervention effectiveness could not be determined. These reviews only stated that school-based interventions with a family component appear to be more effective than those programs that did not. In contrast, some systematic reviews reported inconsistent findings. Both Kahn et al. [63] and Thomas et al. [60] reported no added value of parental participation in, respectively, school-based PA promotion and general obesity prevention interventions. Doak and colleagues [64] compared intervention components of effective and non-effective childhood overweight prevention programs and found that the effective studies were less likely to include parents in their interventions. Additionally, two meta-analyses [65,66] tested the hypothesis that obesity prevention programs with parental involvement would have larger effects than those without. Stice and colleagues [66] found that parental participation did not significantly increase interventions' effectiveness whereas Katz et al. [65] concluded that parental involvement may be valuable. To date, only few intervention studies are developed that are solely parent-based or include an extra comparison group for testing the family component effectiveness. Most efforts to involve parents are components of more comprehensive interventions [67]. Van Lippevelde and colleagues [68] conducted a systematic review solely including school- and family-based intervention studies with such a design that the added value of the parental intervention component could be determined. However, since 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. In addition, the included studies did not provide detailed information about intervention content, dose and reach of the parental component thus no statements could be made about the most effective parental intervention strategies. Notwithstanding, parental interventions that included a range of strategies and focused on several parenting practices (i.e., monitoring, having rules, role-modeling) appeared to have a higher likelihood to be successful. Similar results were found by Golley and colleagues [69] who found that family-based interventions were more likely to be effective when more behaviour change techniques were used to target parents and their practices.

Hingle and colleagues [67] and O'Connor and colleagues [70] reviewed the literature regarding what type of parental involvement was most effective in changing dietary and PA outcomes in children, respectively. Stronger evidence was found for direct methods/strategies to reach and involve parents such as parental attendance at education sessions, parent training sessions, family behaviour counseling face-to-face or through telephone contact. These parental intervention strategies were more likely to result in positive changes in dietary and PA behavioural outcomes compared with those studies that used more indirect methods (e.g. educational information materials). Furthermore, indirect parental strategies related to nutrition in which parents were engaged through their children (i.e. homework assignments) were also more likely to have positive findings. However, this was not the case for PA promoting family

intervention strategies as O'Connor and colleagues [70] found no positive results for family PA or exercise programs together with their child. However, both reviews found that indirect methods were most commonly used to engage parents [67,70]. This was supported by Roseman and colleagues [71] who provided an overview of the most common methods and strategies to reach the home environment. The most used strategy to educate and remind parents about the importance of healthy dietary patterns was sending home newsletters. Other methods such as sending brochures and videotapes emphasizing modelling of desired behaviours were alternatives. Common strategies to actively involve parents were the organization of parent-teacher meetings, family counseling about diet, parent forum/website, parent-child homework, provision of cookbook/recipes of food to prepare at home [71]. Nevertheless, only limited conclusions can be drawn from the reviews of Hingle and colleagues [67] and O'Connor and colleagues [70] regarding the best method to involve parents given the variability in study design, and used outcomes and measurements. Similarly, Golley and colleagues [69] investigated whether intervention content and behaviour change techniques used in family-based interventions are associated with intervention effectiveness. They found that family-based interventions had a higher likelihood of being effective if they included most of the following characteristics: parents were responsible for intervention participation and implementation (rather than the child), a higher degree of meaningful parental involvement targeting energy intake/density or food choices, use of more behaviour change techniques and use of particular techniques (environmental restructuring, specific goal setting, monitoring, and barrier identification). Intervention effectiveness also increased if the use of behaviour change techniques spanned a behaviour change process [69].

Despite of all the current knowledge about the most effective family-based intervention strategies targeting EBRBs, the previous reviews reported that most intervention studies did not include data about how many and which parents participated. Moreover, earlier studies emphasized the difficulty to involve parents in school-based interventions since parents are often not eager to participate in school-based interventions and, moreover, they have little spare time next to their work and household [72,73]. In order to explore possible strategies to involve and influence parents via school-based obesity prevention, Van Lippevelde and colleagues [74] 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. Parents proposed interactive and practical activities together with their child as the best way to involve them 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 tutoring 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.

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Scientific Rewards

Royal Academy for Medicine – Price Dr. Luc Broeckaert and Mrs Annie Depreeuw for preventive medicine 2012

Skills

Languages:

Dutch: Native

English: Fluent

French: Adequate

German: Notions

Soft ware:

SPSS: Very good

MLwIN: Very good

STATA: Good

QSR N6 / NVivo: Very good

Exell: Very good

Word: Very good

Powerpoint: Very good

Overview of publications – A1

Maes L, Van Cauwenberghe E, Van Lippevelde W, Spittaels H, De Pauw E, Oppert JM, Van Lenthe FJ, Brug J, De Bourdeaudhuij I. Effectiveness of workplace interventions in Europe promoting healthy eating: a systematic review. *Eur J Public Health*. 2012 Oct;22(5):677-83. Epub 2011 Jul 23. Review. (impact factor: 2.516)

Van Lippevelde W, Verloigne M, De Bourdeaudhuij I, Bjelland M, Lien N, Fernández- Alvira JM, Moreno LA, Kovacs E, Brug J, Maes L. 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*. 2011 Nov 23;11:881. doi: 10.1186/1471-2458-11-881. (impact factor: 1.997)

Van Lippevelde W, van Stralen M, Verloigne M, De Bourdeaudhuij I, Deforche B, Brug J, Maes L, Haerens L. Mediating effects of home-related factors on fat intake from snacks in a school-based nutrition intervention among adolescents. *Health Educ Res*. 2012 Feb;27(1):36-45. doi: 10.1093/her/cyr110. Epub 2011 Dec 8. (impact factor: 1.615)

Verloigne M, Van Lippevelde W, Maes L, Brug J, De Bourdeaudhuij I. Family- and school- based correlates of energy balance-related behaviours in 10-12-year-old children: a systematic review within the ENERGY (European Energy balance Research to prevent excessive weight Gain among Youth) project. *Public Health Nutr*. 2012 Aug;15(8):1380-95. doi: 10.1017/S1368980011003168. Epub 2012 Jan 24. Review. (impact factor: 2.250)

Van Lippevelde W, Verloigne M, De Bourdeaudhuij I, Brug J, Bjelland M, Lien N, Maes L. Does parental involvement make a difference in school-based nutrition and physical activity interventions? A systematic review of randomized controlled trials. *Int J Public Health*. 2012 Aug;57(4):673-8. doi: 10.1007/s00038-012-0335-3. Review (impact factor: 1.993).

De Coen V, De Bourdeaudhuij I, Vereecken C, Verbestel V, Haerens L, Huybrechts I, Van Lippevelde W, Maes L. Effects of a 2-year healthy eating and physical activity intervention for 3-6-year-olds in communities of high and low socio-economic status: the POP (Prevention of Overweight among Pre-school and school children) project. *Public Health Nutr*. 2012 Sep;15(9):1737-45. doi: 10.1017/S1368980012000687. Epub 2012 Mar 8. (impact factor: 2.250)

Verloigne M, Van Lippevelde W, Maes L, Yıldırım M, Chinapaw M, Manios Y, Androustos O, Kovács E, Bringolf-Isler B, Brug J, De Bourdeaudhuij I. Levels of physical activity and sedentary time among 10- to 12-year-old boys and girls across 5 European countries using accelerometers: an observational study within the ENERGY-project. *Int J Behav Nutr Phys Act*. 2012 Mar 31;9:34. doi: 10.1186/1479-5868-9-34. (impact factor: 3.577)

Singh AS, Chinapaw MJ, Uijtdewilligen L, Vik FN, van Lippevelde W, Fernández-Alvira JM, Stomfai S, Manios Y, van der Sluijs M, Terwee C, Brug J. Test-retest reliability and construct validity of the ENERGY-parent questionnaire on parenting practices, energy balance-related behaviours and their potential behavioural determinants: the ENERGY- project. *BMC Res Notes*. 2012 Aug 13;5:434. doi: 10.1186/1756-0500-5-434.

Verloigne M, Bere E, Van Lippevelde W, Maes L, Lien N, Vik FN, Brug J, Cardon G, De Bourdeaudhuij I. The effect of the UP4FUN pilot intervention on objectively measured sedentary time and physical activity in 10-12 year old children in Belgium: the ENERGY- project. *BMC Public Health*. 2012 Sep 18;12:805. doi: 10.1186/1471-2458-12-805. (impact factor: 1.997)

Verloigne M, Van Lippevelde W, Maes L, Yildirim M, Chinapaw M, Manios Y, Androutsos O, Kovács É, Bringolf-Isler B, Brug J, De Bourdeaudhuij I. Self-reported TV and computer time do not represent accelerometer-derived total sedentary time in 10 to 12-year-olds. *Eur J Public Health*. 2013 Feb;23(1):30-2. doi: 10.1093/eurpub/cks047. Epub 2012 Apr 27. (impact factor: 2.516)

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Van Lippevelde W, te Velde SJ, Verloigne M, De Bourdeaudhuij I, Manios Y, Bere E, Jan N, Fernández-Alvira JM, Chinapaw MJ, Bringolf-Isler B, Kovacs E, Brug J, Maes L. Associations between home- and family-related factors and fruit juice and soft drink intake among 10- to 12-year old children. The ENERGY project. *Appetite*. 2013 Feb;61(1):59-65. doi: 10.1016/j.appet.2012.10.019. Epub 2012 Nov 12. (impact factor: 2.541)

De Bourdeaudhuij I, Verloigne M, Maes L, Van Lippevelde W, Chinapaw MJ, Te Velde SJ, Manios Y, Androutsos O, Kovacs E, Dössegger A, Brug J. Associations of physical activity and sedentary time with weight and weight status among 10- to 12-year-old boys and girls in Europe: a cluster analysis within the ENERGY project. *Pediatr Obes*. 2013 Oct;8(5):367-75. doi: 10.1111/j.2047-6310.2012.00117.x. Epub 2012 Dec 13. (impact factor: 2.276)

Van Lippevelde W, Te Velde SJ, Verloigne M, Van Stralen MM, De Bourdeaudhuij I, Manios Y, Bere E, Vik FN, Jan N, Fernández Alvira JM, Chinapaw MJ, Bringolf-Isler B, Kovacs E, Brug J, Maes L. Associations between family-related factors, breakfast consumption and BMI among 10- to 12-year-old European children: the cross-sectional ENERGY-study. *PLoS One*. 2013 Nov 25;8(11):e79550. doi: 10.1371/journal.pone.0079550. (impact factor: 3.730)

Lea Maes



Lea Maes is doctor in the medical sciences (public health). She is full professor in the Department of Public Health, Faculty of Medical and Health Sciences, University of Ghent, Belgium.

She is coordinating the master of health promotion and leading the research group on health promotion.

The team focuses on the health behaviour of young people and on development and evaluation of health promotion interventions.

The research group published articles on the influence of proximal (social class, education, social networking) and distal (welfare indicators, policy) social factors on the eating habits and tobacco use of young people.

Also several evaluation studies of interventions has been published.

Caroline Braet



Professor in the Department of Developmental, Personality, and Social Psychology at Ghent University in Belgium.

Her research domain and the topics of here lessons were all characterised by a developmental psychopathology approach. She also serves as supervisor for different clinics. Caroline Braet received her Ph.D. from the University of Ghent in 1993, with a specialization in the investigation of psychological aspects of childhood obesity. She is the author or co-author of over 100 scientific publications.

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