


Trends in prevalence of childhood overweight and obesity in a community-based programme: The VIF Programme

Jérémy Vanhelst¹  | Valérie Deken² | Gaëlle Boulic³ | Sandrine Raffin⁴ | Alain Duhamel² | Monique Romon⁵

¹Univ. Lille, Inserm, CHU Lille, U1286–INFINITE—Institute for Translational Research in Inflammation, Lille, France

²Univ. Lille, CHU Lille, ULR 2694–METRICS: Evaluation des technologies de santé et des pratiques médicales, Lille, France

³Association FLVS, Saint-André, France

⁴LinkUp, Social Marketing, Levallois-Perret, France

⁵Professeur émérite, Univ. Lille, CHU Lille, ULR 2694–METRICS: Evaluation des technologies de santé et des pratiques médicales, Lille, France

Correspondence

Jérémy Vanhelst, Antenne pédiatrique du CIC, Hôpital Jeanne de Flandre, CHU de Lille, Avenue Eugène Avinée, 59000 Lille Cedex, France.
Email: jeremy.vanhelst@chru-lille.fr

Summary

Background: Obesity in children is considered the main childhood health problem.

Objective: To assess the impact of 7-year community-based interventions on the trend prevalence of overweight and obesity in French preschool children and primary school children between 2008 and 2015.

Methods: Two cross-sectional studies were performed in the last grade of every pre-school and primary schools of 6 cities in 2008 and 2015. In 2008 and 2015, 3387 children and 3415 children (aged 5 and 11 years old) participated in the 2 surveys. Interventions consisted to promote physical activity, healthy diet, sleep habits and well-being. Prevalence of overweight and obesity were defined according to age- and sex-specific BMI cut-off points. Priority education area of the schools was also recorded.

Results: Prevalence of overweight and obesity decreased significantly between 2008 and 2015 in children from pre-schools (18.1% vs 13.0%) and primary schools (20.9% vs 16.9%) ($P < 0.05$). No effects of priority education area and sex were found related to the decrease of prevalence in overweight and obesity.

Conclusions: Our results show that over 7 years period, the community-based intervention has a positive impact on the overweight and obesity prevalence in childhood. These results are promising and encouraging in addressing obesity and related issues in French young boys and girls.

KEYWORDS

intervention, obesity, programme, youth

1 | INTRODUCTION

Obesity in children is considered the main childhood health problem in European countries. Indeed, the prevalence of obesity has tripled in European countries in the last 30 years, especially in young people.¹ In a recent systematic review and meta-analysis, it was shown that the prevalence of overweight and obesity in children and adolescents was very high, although trends have stabilized in most European countries, especially in France.² Many studies have demonstrated that paediatric obesity has a number of health consequences for physical, social and psychological parameters in children and adolescents.³

Equally alarming is that 40 to 70% of children with obesity will remain obese in adulthood. In addition, this persistence of paediatric obesity into adulthood can lead to developing important risk factors for type 2 diabetes, coronary heart diseases, some types of cancers and increased early mortality.⁴ All these consequences lead to considerable long-term health and economic burden.⁵

Studies have elucidated the role of dietary and lifestyle factors in obesity, especially sugar-sweetened beverages, poor diet quality, physical inactivity, prolonged screen time, short sleep duration or shift work and built environment characteristics.^{3,6–11} Many intervention studies taking into account these variables for the treatment of

overweight and obesity in children and adolescents have been performed, although with limited success.¹²

Because the prevalence of childhood overweight and obesity remains high, and intervention effectiveness has shown low success in the short and long term, prevention is now widely pinpointed as crucially important in the treatment of obesity. For some years, an original strategy has been emerging, based on multilevel, community-based approaches to addressing childhood obesity prevention,¹³⁻¹⁷ which is considered to be more effective.¹⁸ However, data about this type of intervention are still scarce.¹⁹ Moreover, available data in France are old; for example, Romon et al reported a substantial and significant decrease in the prevalence of overweight in children between 1992 and 2000 in two towns in northern France.¹⁶

With children spending an increasing time in sedentary activities in the last two decades, and a prevalence of obesity that is stable but high, there is a real need to pursue the development of prevention programmes throughout France and to assess the current effectiveness of these interventions. Therefore, the aim of this study was to assess the changes in the prevalence of overweight and obesity in French preschool children and primary school children between 2008 and 2015.

2 | METHODS

2.1 | Study design and participants

This study used data from the VIF (Vivons en Forme, “live healthy”) Programme. The VIF organization is a continuation of the obesity prevention scheme previously called EPODE (Ensemble Prévenons l'Obésité des Enfants), a community-based prevention programme aimed at promoting healthier lifestyles amongst children and their families, involving municipal services in charge of child education and care.²⁰ Actions included in the VIF intervention scheme aim at improving eating and physical activity habits amongst children. In addition, the VIF Programme includes also an approach based on a social marketing framework to improve our targeted behavioural intervention programmes.^{21,22} The community-based intervention based on VIF methodology leads to the mobilization of four complementary levels of implementation: central and local organizations, the local setting and the child lifestyle level. The VIF Programme has been described in detail elsewhere.^{20,23,24} Mobilizing these local stakeholders within a co-creation process, the intervention is organized around pluri-annual themes of focus, such as considering the food portion size,²² indulging product management or enhancing water consumption, or how to be more physically active via extra-curricular activities and at home. Each theme is built up according to a full social marketing methodology.²⁵ Hence, the approach is designed to empower in a sustainable manner the local relays thanks to comprehensive training programmes carried out by the VIF teams. The final objective is to train the instructors to host practical workshops involving children and families, thereby benefiting from the dedicated tool-kits based on the identified constraints and motivation levers linked to each behaviour change. For this

methodology, a personal from the VIF association formed local project managers designed in each community by the mayor. The role of the local project manager is to mobilize a wide diversity of local stakeholders, especially in schools, pre-schools, extracurricular organizations and any social network of associations, which are key settings to implement activities with children and families. Topics addressed during this health prevention program were dietary intake and physical activity to promote the healthy lifestyle. Several thematics were discussed with children: (i) breakfast, (ii) morning snack, (iii) snacking, (iv) importance of hydration, (v) food groups, (vi) fruits, (vii) daily physical activity. In addition, workshops have been set up on several occasions with children, but also with parents.

All cities in France were invited to participate to the program, with each mayor deciding whether to participate or not. If the invitation was accepted, the VIF methodology was implemented in the town, as previously described. For the present analysis, two cross-sectional surveys in French preschool children and primary school children were conducted in 2008 and 2015 in six towns (Beauvais, Meyzieu, Royan, Douchy-les-Mines, Saint-Quentin and Vitré). Five of these same towns (except Vitré) were included in the last grade of preschool, and all six towns for the last grades in primary school. All schools were enrolled in the VIF Programme. For this present analysis, all school children aged 5 to 6 years (ie, the last grade of preschool) and 10 to 11 years (ie, the last grade of primary school) who were living in the towns that participated in 2008 and 2015 were included. A total of 7264 children took part in the two surveys, amongst whom there were 6802 children with complete data for height, body weight, age and sex and were thus included in the present analysis. In 2008 and 2015, 3387 children (1756 boys, 1631 girls) and 3415 children (1750 boys, 1665 girls) participated, respectively. Sample characteristics are shown in Table 1.

All data obtained from this program were anonymized, and declared and approved by the Commission Nationale de l'Informatique et des Libertés (National Commission on Informatics and Liberty). The program was explained to both children and their parents living in the participating town, after which the children or their parents could accept or decline record anonymously their information technology data. Data were recorded by the responsible of the town and to communicate to the VIF association by an electronic data system. An audit of the complete dataset was performed, and aberrant data were excluded.

2.2 | Measurements

Physical measurements including weight, height and body mass index (BMI) were performed by school physicians and/or school nurses. Body weight was measured to the nearest 0.1 kg using an electronic scale with the participant wearing light clothes and without shoes. Height was measured without shoes to the nearest 0.1 cm using a standard physician's scale. BMI was calculated as weight/height squared (kg/m^2). Obesity and overweight prevalence were calculated according to International Obesity Task Force (IOTF) cut-offs.²⁶

TABLE 1 Characteristics of the population studied (3296 girls and 3506 boys)

	2008 (n = 2253)	2015 (n = 2242)	ASD, %
<i>Last grade of pre-school</i>			
Boys, n (%)	1149 (51.0)	1144 (51.0)	0.05
Age (yr)	5.7 ± 0.5	5.6 ± 0.4	22.3
Height (cm)	115 ± 6	114 ± 6	13.5
Body mass (kg)	21.1 ± 3.6	20.4 ± 3.3	20.7
BMI (kg m ⁻²)	15.97 ± 1.93	15.65 ± 1.73	17.7
Priority education area, n (%)	943 (41.9)	960 (42.8)	1.9
<i>Last grade of primary school</i>			
Boys, n (%)	607 (53.5)	606 (51.7)	3.7
Age (yr)	10.8 ± 0.2	10.8 ± 0.3	5.5
Height (cm)	143 ± 8	144 ± 7	10.3
Body mass (kg)	37.9 ± 8.0	37.4 ± 8.5	6.7
BMI (kg m ⁻²)	18.30 ± 3.03	17.80 ± 2.99	17.4
Priority education area, n (%)	399 (35.2)	396 (33.8)	3.0

Note: Values are mean ± SD unless otherwise as indicated. ASD indicates absolute standard difference.

TABLE 2 Comparisons in prevalence of overweight and obesity between 2008 and 2015 in last grade of pre- and primary-school, overall and according to key-subgroups

	2008 (n = 2253)	2015 (n = 2242)	OR (95% CI)	P	P Het ^a
<i>Last-grade Pre-school</i>					
Overall	407/2253 (18.1)	291/2242 (13.0)	0.67 (0.57 to 0.79)	0.0001	
Priority education area					
No	222/1310 (17.0)	161/1282 (12.6)	0.69 (0.55 to 0.86)	0.0009	0.70
Yes	185/943 (19.6)	130/960 (13.5)	0.64 (0.50 to 0.82)	0.0005	
Gender					
Girls	219/1104 (19.8)	155/1098 (14.1)	0.66 (0.53 to 0.83)	0.0003	0.87
Boys	188/1149 (16.4)	136/1144 (11.9)	0.68 (0.53 to 0.86)	0.0014	
<i>Last-grade Primary-school</i>					
Overall	237/1134 (20.9)	198/1137 (16.9)	0.78 (0.63 to 0.96)	0.021	
Priority education area					
No	143/735 (19.5)	120/777 (15.4)	0.78 (0.59 to 1.02)	0.07	0.99
Yes	94/399 (23.6)	78/396 (19.7)	0.78 (0.55 to 1.10)	0.15	
Gender					
Girls	122/527 (23.1)	104/567 (18.3)	0.77 (0.57 to 1.03)	0.08	0.89
Boys	115/607 (19.0)	94/606 (15.5)	0.79 (0.58 to 1.07)	0.13	

Note: Values are no./total no. (%). OR indicates odds ratio of overweight/obesity associated with 2015 using 2008 as reference, calculated using a mixed logistic regression model including city as random effect to account the clustering effect.

^aP Het: P-value for Heterogeneity.

2.3 | Statistical analysis

Results are expressed as means, SDs for continuous variables, and frequencies and percentages for categorical variables. Children's main characteristics were described according to the survey year (2008 vs 2015). The magnitude of the between-survey differences was assessed by calculating the absolute standardized differences; an absolute standardized difference > 20% was interpreted as meaningful. Comparisons in combined and individual prevalences of

overweight and obesity between the two surveys (2008 vs 2015) were carried out using a mixed logistic regression model by including towns as random effect to account for the clustering effect. Odds ratios (ORs) were derived from models as effect size. Analyses were performed in preschool and primary school grades separately and key subgroup analyses on priority education area (ie, socio-economic environment: low or high) and sex were conducted. Heterogeneity in between-period difference across subgroups was tested by including the corresponding interaction term into the mixed logistic regression

model. All statistical tests were two-sided and performed at the 0.05 level. Data were analysed with SAS version 9.4 (SAS Institute, Cary, NC, USA).

3 | RESULTS

Table 1 shows the characteristics of the population studied in 2008 and 2015 for both school grades (preschool and primary school). Excepted for age and body mass in last grade preschool group (ASD > 20%), there is no meaningful differences in main study population characteristics. In last grade of preschool, the study population in 2008 have a higher age (~0.1 years on average) and body mass (~0.7 kg) compared to 2015. Comparisons of the prevalence in overweight and obesity between 2008 and 2015 for both school grades are presented in Table 2. By applying recommended international standards, it can be seen that the combined prevalence of overweight and obesity decreased significantly between 2008 and 2015 in preschool children (18.1% vs 13.0%; OR, 0.67; 95% CI, 0.57 to 0.79). This decrease was observed in children in priority education areas (OR, 0.64; 95% CI, 0.50 to 0.82) as well as in children not in priority education areas (OR, 0.69; 95% CI, 0.55 to 0.86; *p* for heterogeneity = 0.70). Similarly, there is no evidence of a difference in decrease from 2008 to 2015 according to sex (Table 2; *p* for heterogeneity = 0.87). When overweight and obesity were differentiated, a decrease in prevalence was observed for both overweight (12.6% vs 9.2%, OR, 0.70; 95% CI, 0.58 to 0.84) and obesity (5.5% to 3.8%; OR, 0.67; 95% CI, 0.50 to 0.89).

Similar results were found for primary school children (Table 2) with a combined prevalence of overweight and obesity of 20.9% in 2008 and 16.9% in 2015 (OR, 0.78; 95% CI, 0.63 to 0.96). The specific prevalence of overweight was 16.6% in 2008 compared with 13.0% in 2015 (OR, 0.77; 95% CI, 0.61 to 0.97) and the specific prevalence of obesity was 4.3% in 2008 vs 3.8% in 2015 (OR, 0.88; 95% CI, 0.58 to 1.33).

4 | DISCUSSION

The study assessed the effects of a 7-year community-based intervention on the trend in prevalence of overweight and obesity in French children. Findings from our study are important because studies have shown that childhood overweight and obesity are associated with a number of social, psychological and physical health problems.²⁷

Short- and long-term health outcomes associated with overweight and obesity in children and adolescents are important issues influencing public health policy. There is now a growing body of data on the intervention and prevention of childhood obesity in many countries worldwide. Indeed, in recent decades, the number of studies aiming to reduce the prevalence of obesity and overweight in youth that target their intervention towards daily physical activity and sedentary and dietary behaviours has increased significantly.¹² That said, most of these studies have shown limited effectiveness of interventions, which may be explained by the large variation in study design,

intervention duration and study quality (methodological bias).¹² A potential major bias concerns follow-up times, which vary considerably from one study to another. Indeed, in most cases, the length of time for which interventions were conducted was too short to obtain a positive result on obesity or weight status, and without follow-up in subsequent years. Some studies have shown encouraging results but with a specific approach towards the prevention of childhood obesity and overweight.¹³⁻¹⁷ It has been noted by some health professionals and researchers that successfully addressing childhood-onset obesity requires multilevel (individual, community and governmental) and multi-agency collaboration.¹⁸ As central institutions for the socialization of children and as a hub of community-wide activities, schools are ideal locales for organizing obesity-prevention programmes. The VIASANO community-based programme aimed to reduce the prevalence of overweight in two pilot towns in Belgium amongst children aged 3 to 4 and 5 to 6 years.¹⁵ The preliminary results of the 3-year follow-up (2007-2010) showed a decrease in the prevalence of overweight (-2.1%) and obesity including overweight (-2.4%).¹⁵ An earlier study in France, with a 12-year follow-up (1992-2004) included two towns with an intervention following a community-based approach and two other towns with no intervention.¹⁶ After 12 years, it was shown that the prevalence of overweight was significantly lower (8.8%) in the two towns receiving the intervention compared with those with no intervention (17.8%). Thus, the results from the present study concord with previous findings.¹³⁻¹⁷ In our study, with its multi-level, community-based approach to childhood obesity prevention over 7 years, the combined prevalence of overweight and obesity in youth decreased significantly between 2008 and 2015 in preschool children (18.1% vs 13.0%) and primary school children (20.9% vs 16.9%). Our results also indicated a decrease in prevalence rates separately of overweight and obesity for each age range (ie, preschool and primary school). Compared with national data on the prevalence of childhood overweight and obesity during the same period, the towns included in the prevention programme had prevalence rates that were lower than in other towns without such programmes.²⁸

Thus, our study updates findings and information from previous work.^{15,16} Indeed, our results show homogeneity in the effectiveness of the prevention programme in the two age groups, with a decrease in both boys and girls, as well as in children in priority education areas and not in priority education areas. These results are encouraging and suggest that the VIF Programme may be a good strategy for reducing the rates of prevalence of childhood overweight and obesity over an extended period of time.

However, findings from this study need further assessment including on longer-term impacts on health. Indeed, a major limitation of the intervention and prevention programmes to treat overweight and obesity concerns the follow-up assessment over a period of time. In addition, in our study, the final point of measurement was when children were 10 years old, that is, before puberty and adolescence. This issue is important because adolescence is a crucial period in life that includes multiple physiological and psychological changes that have a considerable effect on physical activity and dietary habits, and consequently on weight status.^{29,30} Low habitual physical activity in

adolescents and children—characteristic of modern sedentary living—may be the dominant factor in increasing obesity.³¹ Therefore, it would be valuable to continue the programme in participating towns into adolescence and adulthood to gain a complete picture of the impact of these school and community-based interventions. It has been suggested that long-term results may be achieved through ongoing support from society as a whole, including parents, schools and government agencies, but this notion needs to be examined.³²

Finally, by applying recommended international standards, it can be seen that the prevalence of combined childhood overweight and obesity was higher in girls compared with boys (in preschool and/or primary school) (21.5% vs 17.7% for girls and boys, respectively). Our data thus reflect previous investigations carried out in France and other countries that reported prevalence rates of overweight and obesity that were significantly higher in girls compared with boys.^{2,28,33,34}

The current study has both strengths and limitations. The main strength is the model and implementation scheme of the intervention programme. Our study was developed as a cross-cutting community-based prevention programme involving municipal services in charge of child education and care (ie, schools, preschools, local sports and parents' associations, catering structures, health professionals, elected representatives, and local stakeholders from the public and private sectors). Another strength involves the study's large, diverse sample of children from across France with sex-specific information, and the harmonization and standardization of assessment of anthropometric measurements. However, although the present data derive from a large country-wide sample, this study did not use a stratified sample design. Therefore, it is not possible to assume that the studied cohort is fully representative of the populations of French children and adolescents. We did not also excluded the confusion bias between the two study periods regarding the study population characteristics. Another limitation concerns the absence of a control group. Because there was no randomized control group (school or town control), our results should be interpreted with caution. Indeed, we cannot attribute all of the reductions to obesity to the intervention against background trends of reductions in obesity in routine surveys. We must consider that the findings are preliminary, although encouraging.

In summary, the results of a 7-year community-based intervention are promising for addressing obesity and related issues in French youngsters, regardless of sex or socio-economic environment. Thus, the VIF Programme may potentially play a role in the prevention of childhood overweight and obesity.

ACKNOWLEDGEMENT

The authors thank all participating, cities, school physicians and nurse, youths, directors and teachers of the schools for their collaboration in the study.

CONFLICT OF INTEREST

The authors do not have any competing interests. This study is made possible by contributions of participating cities to the VIF programme, and by private financial supports established within a rigorous ethical framework of the “Ferrero, Assurance prevention, Fondation Nestlé

France and Fondation Roquette”. The content of this paper reflects only the authors' views, and “Ferrero, Assurance prevention and Fondation Roquette” are not liable for any use that may be made of the information contained therein.

AUTHORS CONTRIBUTION

Each author of this article significantly contributed to the study, especially:

JV, GB, SR, AD and MR designed research; JV, GB, SR and MR conducted research; VD and AD analysed data; JV, GB, SR, and MR wrote the paper; VD analysed data and performed statistical analysis; MR had primary responsibility for final content. All authors read and approved the final manuscript.

ORCID

Jérémy Vanhelst  <https://orcid.org/0000-0002-0570-1522>

REFERENCES

1. NCD Risk Factor Collaboration (NCD-RisC). Worldwide trends in body-mass index, underweight, overweight, and obesity from 1975 to 2016: a pooled analysis of 2416 population-based measurement studies in 128.9 million children, adolescents, and adults. *Lancet*. 2017; 390(10113):2627-2642.
2. Garrido-Miguel M, Caverro-Redondo I, Álvarez-Bueno C, et al. Prevalence and trends of overweight and obesity in European children from 1999 to 2016: a systematic review and meta-analysis. *JAMA Pediatr*. 2019;173(10):e192430.
3. Hruby A, Manson JE, Qi L, et al. Determinants and consequences of obesity. *Am J Public Health*. 2016;106(9):1656-1662.
4. Llewellyn A, Simmonds M, Owen CG, Woolacoot N. Childhood obesity as a predictor of morbidity in adulthood: a systematic review and meta-analysis. *Obes Rev*. 2016;17(1):56-67.
5. Wang YC, McPherson K, Marsh T, Gortmaker SL, Brown M. Health and economic burden of the projected obesity trends in the USA and the UK. *Lancet*. 2011;378(9793):815-825.
6. Karalexi MA, Mitrogiorgou M, Georgantzi GG, Papaevangelou V, Fessatou S. Non-nutritive sweeteners and metabolic health outcomes in children: a systematic review and meta-analysis. *J Pediatr*. 2018; 197:128-133.
7. Thompson OM, Ballew C, Resnicow K, et al. Food purchased away from home as a predictor of change in BMI z-score among girls. *Int J Obes Relat Metab Disord*. 2004;28(2):282-289.
8. Ludwig DS, Peterson KE, Gortmaker SL. Relation between consumption of sugar-sweetened drinks and childhood obesity: a prospective, observational analysis. *Lancet*. 2001;357:505-508.
9. Saunders TJ, Vallance JK. Screen time and health indicators among children and youth: current evidence, limitations and future directions. *Appl Health Econ Health Policy*. 2017;15(3):323-331.
10. Fatima Y, Doi SA, Mamun AA. Sleep quality and obesity in young subjects: a meta-analysis. *Obes Rev*. 2016;17(11):1154-1166.
11. Arble DM, Bass J, Behn CD, et al. Impact of sleep and circadian disruption on energy balance and diabetes: a summary of workshop discussions. *Sleep*. 2015;38(12):1849-1860.
12. Mead E, Brown T, Rees K, et al. Diet, physical activity and behavioural interventions for the treatment of overweight or obese children from the age of 6 to 11 years. *Cochrane Database Syst Rev*. 2017;6: CD012651.
13. Khambalia AZ, Dickinson S, Hardy LL, Gill T, Baur LA. A synthesis of existing systematic reviews and meta-analyses of school-based behavioural interventions for controlling and preventing obesity. *Obes Rev*. 2012;13(3):214-233.

14. Hollar D, Lombardo M, Lopez-Mitnik G, et al. Effective multi-level, multi-sector, school-based obesity prevention programming improves weight, blood pressure, and academic performance, especially among low-income, minority children. *J Health Care Poor Underserved*. 2010;21(2):93-108.
15. Vinck J, Brohet C, Roillet M, et al. Downward trends in the prevalence of childhood overweight in two pilot towns taking part in the VIASANO community-based programme in Belgium: data from a national school health monitoring system. *Pediatr Obes*. 2016;11(1):61-67.
16. Romon M, Lommez A, Tafflet M, et al. Downward trends in the prevalence of childhood overweight in the setting of 12-year school- and community-based programmes. *Public Health Nutr*. 2009;12(10):1735-1742.
17. Wolfenden L, Wyse R, Nichols M, Allender S, Millar L, McElduff P. A systematic review and meta-analysis of whole of community interventions to prevent excessive population weight gain. *Prev Med*. 2014;62:193-200.
18. Bemelmans WJ, Wijnhoven TM, Verschuuren M, Breda J. Overview of 71 European community-based initiatives against childhood obesity starting between 2005 and 2011: general characteristics and reported effects. *BMC Public Health*. 2014;14:758.
19. Bleich SN, Segal J, Wu Y, Wilson R, Wang Y. Systematic review of community-based childhood obesity prevention studies. *Pediatrics*. 2013;132(1):e201-e210.
20. Borys JM, Le Bodo Y, Jebb SA, et al. EPODE approach for childhood obesity prevention: methods. *Progr Int Dev Obes Rev*. 2012;13(4):299-315.
21. Raffin S. Can social marketing improve health programs' efficiency? *Cahiers de Nutrition et de Diététique*. 2013;48(4):184-190.
22. Gurviez P, Raffin S. Social marketing campaigns for healthier eating habits in France. In: Basil D, Diaz-Meneses G, eds. *Social Marketing Cases around the World*. Cham, Switzerland: Springer International Publishing; 2019.
23. Henley N, Raffin S. Preventing childhood obesity: evidence policy and practice. Social marketing to prevent childhood obesity. In: Waters E, Boyd S, Seidell J, Ricardo U, eds. *BMJ Books*. Hoboken, NJ: Wiley-Blackwell; 2020:243-252.
24. Pettigrew S, Borys JM, du Plessis HR, et al. Process evaluation outcomes from a global child obesity prevention intervention. *BMC Public Health*. 2014;28(14):757.
25. Carins JE, Rundle-Thiele SR. Eating for the better: a social marketing review (2000-2012). *Public Health Nutr*. 2014;17(7):1628-1639.
26. Cole TJ, Lobstein T. Extended international (IOTF) body mass index cut-offs for thinness, overweight and obesity. *Pediatr Obes*. 2012;7(4):284-294.
27. Reilly JJ, Kelly J. Long-term impact of overweight and obesity in childhood and adolescence on morbidity and premature mortality in adulthood: systematic review. *Int J Obes (Lond)*. 2011;35(7):891-898.
28. Vanhelst J, Baudelet JB, Fardy PS, Béghin L, Mikulovic J, Ulmer Z. Prevalence of overweight, obesity, underweight and normal weight in French youth from 2009 to 2013. *Public Health Nutr*. 2017;20(6):959-964.
29. Lake AA, Mathers JC, Rugg-Gunn AJ, Adamson AJ. Longitudinal change in food habits between adolescence (11-12 years) and adulthood (32-33 years): the ASH30 study. *J Public Health*. 2006;28(1):10-16.
30. Corder K, Winpenny E, Love R, Brown HE, White M, Sluijs EV. Change in physical activity from adolescence to early adulthood: a systematic review and meta-analysis of longitudinal cohort studies. *Br J Sports Med*. 2019;53(8):496-503.
31. Prentice AM, Jebb SA. Obesity in Britain: gluttony or sloth? *BMJ*. 1995;311(7002):437-439.
32. Ockene JK, Edgerton EA, Teutsch SM, et al. Integrating evidence-based clinical and community strategies to improve health. *Am J Prev Med*. 2007;32(3):244-252.
33. NCD-RisC. Trends in adult body-mass index in 200 countries from 1975 to 2014: a pooled analysis of 1698 population-based measurement studies with 19.2 million participants. *Lancet*. 2016;387(10026):1377-1396.
34. Rokholm B, Baker JL, Sørensen TI. The levelling off of the obesity epidemic since the year 1999—a review of evidence and perspectives. *Obes Rev*. 2010;11(12):835-846.

How to cite this article: Vanhelst J, Deken V, Boulic G, Raffin S, Duhamel A, Romon M. Trends in prevalence of childhood overweight and obesity in a community-based programme: The VIF Programme. *Pediatric Obesity*. 2020; e12761. <https://doi.org/10.1111/ijpo.12761>