

SUPPLEMENT ARTICLE

Position guidelines and evidence base concerning determinants of childhood obesity with a European perspective

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Summary

Childhood obesity is one of the most pressing global public health issues, with rates increasing fastest in countries at low levels of income. Obesity occurring during childhood is likely to persist throughout the life course, and it is a cause of increased disease risk from the early years of life. This supplement is the result of collaborations involving a large and multidisciplinary group of researchers that were established in the context of the ongoing European Horizon 2020 project Science and Technology in childhood Obesity Policy (STOP). The aim, as in the entire STOP project, is to generate evidence that can support better policies to tackle the problem of childhood obesity in Europe and elsewhere. Quality of life and health well-being concerning children needs to consider personalized, population, and planetary facets to tackle childhood obesity at early stages of life, for in-deep phenotyping, integrating personalized medicine and precision public health interventions at global levels. This supplement contributes to this aim.

KEYWORDS

childhood, determinants, obesity, STOP project

1 | THE DETERMINANTS OF CHILDHOOD OBESITY: A GROWING EVIDENCE BASE

Childhood obesity is one of the most pressing global public health issues, with rates increasing fastest in countries at low levels of income. Thus, estimated prevalence rates of overweight and obesity in children aged 5–19 are of up to 65% in the Pacific islands, 39% in the United States, and up to 31% in European countries.¹ Obesity occurring during childhood is likely to persist throughout the life

course, and it is a cause of increased disease risk from the early years of life.² Childhood obesity is also a hindrance to human capital development with the potential to cause disadvantage in education, which in turn may affect future labor market and social participation outcomes.³

A living environment characterized as increasingly “obesogenic,” because of the powerful influences it exerts on behaviors linked with body weight, has been blamed for the escalating prevalence of obesity in children of all ages. However, until recently, research has shed

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limited light on the specific mechanisms and pathways leading to childhood obesity.

This supplement is the result of collaborations involving a large and multidisciplinary group of researchers that were established in the context of the ongoing European Horizon 2020 project Science and Technology in childhood Obesity Policy (STOP). The project has started in 2018 and has brought together a wide range of organizations, from universities to the civil society, from international organizations to national public health agencies. Among foundational goals, STOP endeavors to elucidate key causal pathways to childhood obesity by leveraging new biomarkers and their potential role as mediators of the effects of specific determinants. The aim, as in the entire STOP project, is to generate evidence that can support better policies to tackle the problem of childhood obesity in Europe and elsewhere. The systematic reviews included in this supplement stretch beyond the formal boundaries of the STOP project and are the result of the voluntary efforts of researchers in the STOP consortium, for which the authors deserve special praise.

The findings exemplified in this supplement represent important contributions to the evidence base on the determinants of childhood obesity and open new opportunities to identify suitable entry points for intervention as well as to design effective policies to disrupt the pathways that lead to childhood obesity enabling to mitigate the impacts of obesogenic influences on children's behaviors and health outcomes.

2 | WHAT ARE WE LEARNING FROM THE SYSTEMATIC REVIEWS IN THIS SUPPLEMENT?

Indeed, the current special issue is complementary to an also previously published supplement in *Obesity Reviews* (2021) about *Policies for Preventing and treating Obesity in Childhood* edited by T. Chambers and F. Sassi, with an introductory document about "How to tackle childhood obesity? Evidence and policy implications from a STOP series of systematic reviews,"⁴ which contained the following manuscripts:

- *Interventions using behavioral insights to influence children's diet-related outcomes: A systematic review*
- *Improving the school food environment for the prevention of childhood obesity: What works and what doesn't*
- *What is the impact of food reformulation on individuals' behavior, nutrient intakes and health status? A systematic review of empirical evidence*
- *Comparative effectiveness of school-based interventions targeting physical activity, physical fitness, or sedentary behavior on obesity prevention in 6- to 12-year-old children: A systematic review and mesa-analyses*
- *Social disparities in obesity treatment for children aged 3-10 years: A systematic review*

The current *Obesity Reviews* issue focus on *Determinants of Childhood Obesity* deeming the causal implications and contributing roles of (1) low birth weight and small for gestational age, (2) perinatal exposure to antibiotics, (3) prenatal persistent organic pollutants (POPs), (4) gut microbiota and intestinal dysbiosis, (5) compliance with Mediterranean dietary patterns paying attention to staple foods, (6) dairy consumption, (7) ultraprocessed foods, (8) physical inactivity and sedentarism with emphasis on (9) environmental/urban factors such as transport use and air pollution, (10) obesogenic-related behaviors, depending on neighborhood walkability, availability and accessibility of parks and playgrounds including associations of traffic-related nitrogen dioxide and nitrogen oxides exposure, (11) metabolomic signatures on blood, urine, umbilical cord blood, and saliva, and (12) genetic predisposition or epigenetic factors entailing gene-environment interactions. The abovementioned factors likely play conjointly major interdependent roles and complement previous concepts, models, and evidence.^{5,6}

In the last two decades, the European Union has launched and funded a number of projects related to childhood obesity,⁷ involving aspects related to energy balance (ENERGY: European energy balance research to prevent excessive weight gain among youth), eating habits and behavior, (I.FAMILY: Determinants of eating behavior in European children, adolescents and their parents and HABEAT: Determining factors and critical periods in food habit formation and breaking in early childhood: a multidisciplinary approach) or promoting healthy foods intake (FEALFI: Fun, healthy and safe finger food for babies and children) as well as research about physiological, metabolic or microbiota interactions involving energy utilization (MYNEWGUT: Microbiome influence on energy balance and brain development-function put into action to tackle diet-related diseases and behavior).

Furthermore, other approved projects focused on investigating the role of genetics and personal signatures (BETA-JUDO: Beta-cell function in juvenile diabetes and obesity) or genetics (Child-MHO: Genetics of metabolically healthy obesity and metabolically unhealthy normal weight in children) or developmental metabolic programming origins (CHOPIN: Childhood obesity: early programming by infant nutrition or EARLYNUTRITION: Long-term effects of early nutrition on later health).

Also, some projects were devoted to understand the role of nutrition and dietary components (energy, protein, or fiber) on childhood obesity (PREVIEW: PREvention of diabetes through lifestyle Intervention and population studies in Europe and around the World) or physical activity (PAPA: Promoting Adolescent health through an intervention aimed at improving the quality of their participation in Physical Activity) as well as children and adolescents lifestyles (IDEFICS: Identification and prevention of dietary- and lifestyle-induced health effects in children and infants and HELENA: Healthy Lifestyle in Europe by Nutrition in Adolescence), Other financed project aimed to prevent childhood obesity (Co-CREATE: Confronting Obesity; Co.creating policy with youth).

Finally, a group of projects were developed to understand and implement precision public health actions (RICHE: a platform and inventory for child health research in Europe or CHICOS: Developing

a Child Cohort Research Strategy for Europe) or just to promote instrumental tools to personalize obesity management or design epidemiological populational instruments (TOYBOX: Multifactorial evidence based approach using behavioral models in understanding and promoting fun, healthy food, play and policy for the prevention of obesity in early childhood, BigO: Big data against childhood Obesity, or OCARIoT: Smart childhood Obesity CARing solution using IoT potential).

3 | CONCLUSIONS

Overall, quality of life and health well-being concerning children needs to consider personalized, population, and planetary facets to tackle childhood obesity at early stages of life, for in-deep phenotyping, integrating personalized medicine and precision public health interventions at global levels. This supplement contributes to this aim.

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AUTHOR CONTRIBUTIONS

All authors contributed equally, drafting the manuscript, and revising the manuscript, approving the final version.

CONFLICT OF INTEREST

The authors have no conflict of interests to report.

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