

SUPPLEMENT ARTICLE

Overweight and obesity prevention for and with adolescents: The “Confronting obesity: Co-creating policy with youth” (CO-CREATE) project

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Summary

The CO-CREATE project focuses on the need for research on obesity prevention in adolescents to move away from studies of single interventions, toward the investigation of systems-based research incorporating youth involvement. This paper provides an overview of the project, presenting the objectives, design, and novel methodologies applied, as well as findings to date and anticipated outcomes. Adolescents (16–18 years old) in five European countries participated. Methods applied in the project include monitoring and benchmarking of policies, systematic literature

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reviews, epidemiological surveillance, linking observed overweight and obesity trends to observed policy landscapes, group model building to identify perceived drivers of obesity, alliance building with adolescents, dialog with stakeholders, and system dynamics modelling to explore the potential impact of policy options. Outcomes include tools for developing policy ideas and investigation of prevention strategies with adolescents, including policy databases, system maps of drivers of obesity, protocols for organizing youth alliances, an intergenerational policy dialog tool, and system dynamic models exploring the impacts of cocreated policy ideas. These outcomes make an important contribution to building a pan-European infrastructure for designing and evaluating policies and for providing youth with the opportunity to make their voices heard in the development and implementation of obesity prevention measures.

KEYWORDS

adolescents, policies, primary prevention

1 | BACKGROUND

The prevalence of overweight and obesity among children and adolescents is a major public health challenge.^{1,2} According to the World Health Organization (WHO) European Regional Obesity Report 2022, nearly one in three children has overweight or obesity (29% of boys and 27% of girls) in the WHO European Region.³ Adolescents of lower socioeconomic position are more likely to have overweight or obesity compared with those living in more affluent circumstances.⁴ Many societal and environmental factors contribute to overweight and obesity rates in any given society, and actions to prevent overweight and obesity take place within complex systems where multiple elements tend to adapt in response to changes that are introduced.⁵ Research investigating the effects of upstream policies, and the responses of complex adaptive systems to such policies, is needed.⁶

Obesity prevention represents a long-established field of research. However, although adolescents are an important priority population for overweight and obesity prevention policies, there are few examples of adolescents themselves being included as active agents in formulating, implementing, or evaluating the effectiveness of such prevention strategies.^{7,8} Securing youth involvement is important for several reasons. Only young people know what it is like to be young today, and their experience and fresh perspectives are valuable in and of themselves. Furthermore, youth involvement in policy development is important for youth empowerment and for our democracies,⁹ and it is their human right to participate in decisions that affect them.¹⁰

In the project “Confronting obesity: Co-creating policy with youth (CO-CREATE; www.co-create.eu)” (2018–2023), we set out to address this gap. The project gives a voice to adolescents (age 16–18 years) and provides fora for them to express their perceptions of overweight and obesity-related factors influencing them and their peers. It engages them in the design of policies, acknowledging the

complex adaptive systems driving the problem, we aim to contribute to reduce overweight and obesity rates, as well as the social inequality in these rates. Underpinning the CO-CREATE project is a focus on the need for research on overweight and obesity prevention in young people to move away from studies of single interventions, toward the investigation of systems-based research that incorporates youth involvement. This requires a shift from a primary focus on individual-level downstream determinants of dietary behaviors and physical activity (including sedentary behaviors and physical inactivity), and subsequent overweight and obesity risk, toward more “upstream” or structural drivers of these behaviors. These upstream drivers include the food and physical activity environments, that is, the social, cultural, physical, economic, and political environments in which European adolescents live. These environments shape the availability, accessibility, affordability, and social acceptability of healthy and unhealthy diets, as well as opportunities for engaging in sedentary behaviors or being physical active. In addition to the powerful influence of commercial interests, these environments are strongly influenced, supported, and/or sustained by local (i.e., city, municipality, or county), national, and European (i.e., EU level) policies.

CO-CREATE has taken a systems approach to analyzing and describing the complexity of overweight and obesity during adolescence, working in close collaboration with adolescents themselves, including those from diverse backgrounds. Specifically, the project has engaged with young people across Europe to ascertain what they perceive as the drivers of their physical activity and dietary behaviors, identify potential actions to improve health outcomes, consult on their feasibility with policymakers and other stakeholders, and ultimately investigate the potential responses of the system to interventions using a system dynamics model.

An important step in achieving this is to map out the elements of the system that are of most relevance. The best-known example of this is the system map produced for the United Kingdom's 2007

Foresight report, “Tackling Obesities.”¹¹ That map lists more than a hundred factors affecting energy balance, and thus weight status, in four main domains: physical activity, nutrition, physiology, and psychological and related factors. By illustrating the personal and environmental drivers of weight status, and the wide-ranging interactions between them, the Foresight map has changed the way in which obesity is understood and has inspired and helped identify meaningful approaches to addressing it.

Since the publication of the Foresight report on obesity,¹¹ there has been a growing consensus that traditional, linear models of causation are inadequate for formulating effective responses to a problem as complex as the global obesity epidemic.⁶ The widespread rhetoric of complex systems thinking around overweight and obesity has, however, not yet been matched by the research or policy response. A central innovation of CO-CREATE is the application of systems approaches throughout the multiple streams of work. This systems approach drives the investigation into how policies and practice shape the food and physical activity environments which in turn drive unhealthy energy-balance related behaviors (EBRB) and consequent adolescent overweight and obesity prevalence.

In the CO-CREATE project, by engaging adolescents in the design of policies and acknowledging the complex, adaptive systems that influence their behaviors, we have aimed to develop tools and knowledge that will contribute to reducing overweight and obesity rates. Furthermore, we believe these efforts will contribute to reducing the social inequality related to overweight and obesity. This paper provides an overview of the approach we have taken in the CO-CREATE project, presenting the objectives, design, and novel methodologies applied, as well as findings to date and anticipated outcomes.

2 | AIM AND OBJECTIVES OF THE CO-CREATE PROJECT

The overall aim of the CO-CREATE project is to reduce the prevalence of overweight and obesity among adolescents in Europe through policies to promote healthier food and physical activity environments. To contribute to this ambitious goal, the project addresses two main aims: (1) to develop novel methods for monitoring, benchmarking, and evaluating relevant policies and (2) to collaborate with adolescents across Europe in developing novel policy options that will contribute to upstream overweight and obesity prevention and reducing inequalities in overweight and obesity. The overarching approach that guided working with adolescents was to engage them fully in the process of identifying the nature of the systems driving obesity and in developing potential policy responses.

The specific CO-CREATE objectives are the following:

Monitoring, benchmarking, and policy evaluation:

- To develop valid, reliable, and easily accessible and applicable methodology for monitoring and benchmarking policies which directly or indirectly can influence EBRB;

- To review the existing research evidence regarding effective policies to prevent overweight and obesity among adolescents;
- To investigate changes in overweight and obesity rates and EBRB across countries over time and specifically in relation to relevant European and national policies; and
- To explore the relation between implemented policies, overweight prevalence rates, and socioeconomic backgrounds of adolescents.

Cocreating policies in partnership with adolescents:

- To identify upstream drivers of overweight and obesity as perceived by adolescents themselves;
- To collaborate with adolescents aged 16 to 18 years from diverse socioeconomic backgrounds and integrate scientific research and their experiential knowledge to develop novel and context-specific policy options;
- To establish and evaluate policy Dialog Forums between adolescents and public and private sector stakeholders, including policy-makers, to discuss policies and identify appropriate action;
- To use system dynamics modelling to assess and explore the potential impacts of selected evidence-based and cocreated policy options for obesity prevention, including the socioeconomic distribution of any such impact; and
- To address and mitigate potential ethical challenges arising when working with adolescents in a field with multiple actors and often strong vested interests and power dynamics.

2.1 | Project design

The CO-CREATE project was initiated in 2018 and is designed around several activities, each one addressing or being directly related to the stated project objectives. Figure 1 presents a model illustrating the link between the monitoring, benchmarking, and policy evaluation arm of the project and the engagement of adolescents resulting in novel policy options.

An important design aspect of CO-CREATE is the composition of partners in the project consortium. To secure youth and stakeholder involvement from the planning stage and throughout the project, several nongovernmental organizations are partners in CO-CREATE. These include youth organizations such as PRESS (the youth organization of Save the Children Norway) and international organizations such as EAT (a science-based global platform for food system transformation), the World Cancer Research Fund International, and the World Obesity Federation.

3 | METHODS

The core fieldwork for the CO-CREATE project was conducted in the five European countries of the Netherlands, Norway, Poland, Portugal, and the United Kingdom, providing a variety of social and policy-related environments. Using innovative methods drawing on

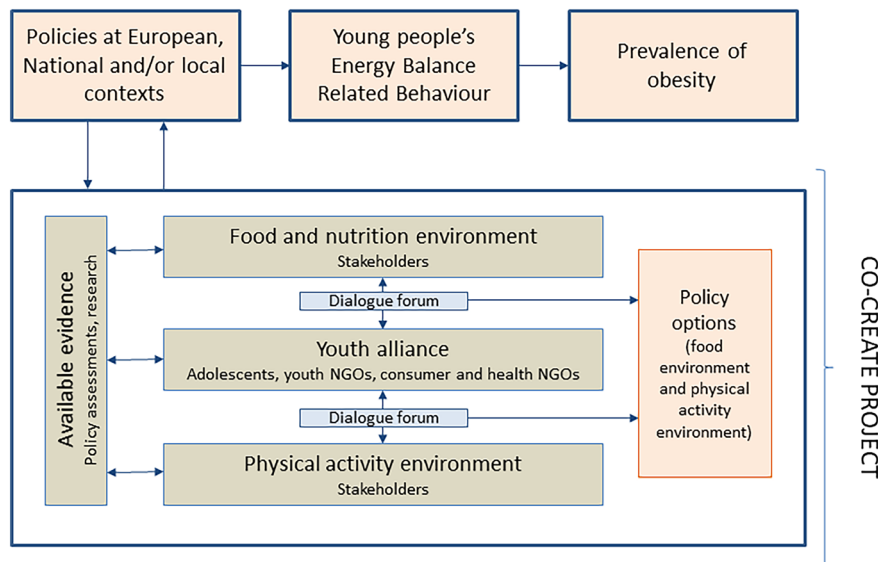


FIGURE 1 A model describing the link between the CO-CREATE project and policies, adolescents' behaviors, and prevalence of obesity

both qualitative and quantitative data, we have identified, monitored, and benchmarked policies to promote healthier eating and physical activity and to prevent overweight and obesity across Europe. Existing research evidence pointing to effective policy interventions has been systematically reviewed,¹² and comprehensive secondary data analyses were applied to identify evidence-based obesity prevention policies. The project also includes a South African partner, with additional fieldwork conducted there. This aspect of the work has been described elsewhere¹³ and is thus not discussed in this paper.

3.1 | Monitoring, benchmarking, and policy evaluation

3.1.1 | Monitoring and benchmarking policies

The NOURISHING framework, developed by the World Cancer Research Fund International, describes 10 policy areas across three domains—food environment, food system, and behavior change communication—in which governments can take action to promote healthy diets.¹⁴ The framework is accompanied by a regularly updated database, providing an extensive overview of implemented government policy actions from around the world.

Based on a review of physical activity literature and policy guidance including the WHO Global Action Plan on Physical Activity,¹⁵ CO-CREATE investigators have developed a complementary framework for assessing physical activity policies.¹⁶ The new MOVING physical activity policy framework consists of key themes categorized into policy areas and subpolicy areas organized into the MOVING acronym to support communication.

The MOVING policy database¹⁷ was developed to create a repository of information about physical activity policy actions, structured around the MOVING framework. MOVING joins World Cancer Research Fund International's existing NOURISHING database of

policy actions that encourage people to eat healthier diets, which has also been redesigned as part of the CO-CREATE project. The NOURISHING and MOVING databases collect policy actions which are currently implemented at a national level.

A systematic search known as the Comprehensive European Scan was conducted across 27 European countries to provide an in-depth picture of policies promoting healthy diets, nutrition, and physical activity, and a necessarily less detailed global scan, which comprises ongoing surveillance, has been conducted for all other areas of the world. Identified policies have been reviewed against inclusion criteria and verified by an in-country government expert.¹⁶

Criteria for benchmarking policies and developing a policy index assessing the overall policy statuses of policies promoting healthy diets and physical activity in Europe have been developed and validated through an external group of experts and youth representatives. The benchmarks are structured around the policy areas of the NOURISHING and MOVING framework, consisting of benchmarks, indicators, and policy attributes. Policies identified in the Comprehensive European Scan will be benchmarked in the remaining months of the project, and the resulting scores will be compiled into a country index.

3.1.2 | Systematic review of existing research evidence

We conducted an overview of systematic reviews to summarize the evidence from up-to-date reviews of the effectiveness of interventions aimed at preventing overweight and obesity in adolescents aged 10 to 19 years. Systematic reviews including the following study designs were included: randomized controlled trials, cluster randomized trials, nonrandomized controlled trials, interrupted time series studies, controlled before–after studies (with at least two intervention and two control sites), and controlled cohort studies. These designs allow an assessment of the effectiveness of interventions to promote a healthy diet and/or physical activity, including (i) structural and

environmental interventions (e.g., nutrient labelling and urban planning policies), (ii) organizational and community interventions (e.g., nutrition literacy programs and physical education curricula at schools), and (iii) interpersonal and individual interventions (e.g., guidance on healthy diet and physical activity).¹²

Overall, only weak to very weak evidence, that is, low certainty of evidence, was found for policy interventions designed to prevent overweight and obesity in adolescents. Evidence related to the impact of population-level, structural interventions on adolescents, to social inequalities and to the involvement of adolescents in prevention efforts was lacking.¹² This placed an even greater importance on considering the views of adolescents on the factors driving obesity, potential policy responses, and interactions between them.

3.1.3 | Policy evaluation and secondary data analyses

Most effectiveness studies of obesity prevention strategies targeting adolescents have been conducted within school settings, with a focus on individual behavior change strategies.¹² There is a lack of effectiveness studies of structural policy measures on adolescents' diet and physical activity and of studies investigating differential effects related to minority status or socioeconomic status. Within European countries, there is a large variation in national policies and strategies designed to foster environments that promote healthier food and physical activity choices, thus providing a setting conducive for investigating the potential impact of such policies and strategies.

As part of CO-CREATE, we are conducting comprehensive and integrated secondary data analyses to establish the available evidence on the effectiveness of present-day policies concerning behavioral nutrition and physical activity and obesity prevention. We have used data from the WHO Child Obesity Surveillance Initiative¹⁸ and the WHO Health Behavior of School-aged Children¹⁹ surveys to analyze the association of the presence or absence, introduction, and maintenance of such policies with changes in dietary and/or physical activity habits and the prevalence of overweight and obesity. Furthermore, WHO Health Behavior of School-aged Children data collection instruments (items and scales) are used in combination with instruments collecting data on adolescents' attitudes and motivation to initiate change.

In collaboration, with WHO Europe, we are analyzing time trends and differences in overweight and obesity rates and EBRBs by socioeconomic status. The ambition is to develop a dietary and physical activity policy monitoring system for the future to be used in evaluation of the impact of national policy actions.

3.2 | Collaborating with adolescents in developing novel policy options

Three data sources, (i) existing evidence from obesity prevention research, (ii) existing obesity prevention policies, and (iii) systems maps

of the drivers of obesity, all fed into the policy development phase of the project, which was conducted within the youth alliances.

3.2.1 | Identify drivers of overweight and obesity as perceived by adolescents

The complex systems model being used to codevelop obesity prevention policies in CO-CREATE necessitates tools and methods to examine the factors and actors related to adolescent obesity, the relationships between them and changes through time. A key element to successful policy development is to identify the drivers of the problem: In this case, we based this on perceptions of adolescents on the drivers of dietary and physical activity behaviors and thus obesity among their age group. In CO-CREATE, we worked with young people in the five European countries to generate system maps that show the main drivers of dietary and physical activity behavior, from the perspectives of the young people themselves.

To do this, we used a structured technique called “group model building” (GMB) wherein a group of select stakeholders are guided through the process of creating a visual representation—a system map—of factors contributing to that issue. In the case of CO-CREATE, the topic was adolescent obesity. GMB is a well-established process whereby participants are guided through stages to generate a map in the form of a causal loop diagram (CLD).²⁰ A CLD connects factors considered by the participants to be linked causally to each other and to the outcome, which in this case was obesity. As such, a system map of adolescent obesity provides a conceptual model of the factors and processes that drive or constrain the determinants of obesity, as perceived by the participants in the session. The mapping workshops were run in a standardized way across the countries, guided by a common script for the facilitators. GMB is a form of system mapping in the “system dynamics” tradition; as such, it is designed so that the maps can be developed to inform system dynamics simulation models within CO-CREATE.

To generate the CLDs with the adolescent participants in the GMB sessions, we used STICKE software.²¹ The various maps (four from each of the countries) were merged using a novel protocol to generate country-specific maps and one overarching map that depicts the key policy-amenable drivers of adolescent obesity across Europe.²² This previously published merged map²² informed the basis for further work with adolescents in CO-CREATE to identify strategies in which the food and physical activity systems might be reshaped to generate healthier outcomes.

3.2.2 | Participatory research to develop novel and context-specific policy options

Within CO-CREATE, extensive and intensive collaboration with adolescents took place within the so-called Youth Alliances for Overweight Prevention. These alliances were designed to promote and support adolescent participation in the formulation of potential

policies for upstream obesity prevention. In the Alliances, exchanges of knowledge and learning took place among and between adolescents and scientific researchers, integrating adolescents' experiential, scientific, and political knowledge.

The Alliances were designed to closely collaborate with other parts of the CO-CREATE project. To achieve these aims, we developed an approach based on participatory action laid out in a detailed handbook. We based the Alliances on a (youth-led) participatory action approach (Y-PAR). Y-PAR stresses collaboration between young collaborators and other stakeholders, action-oriented research, and training.^{23,24} To our knowledge, CO-CREATE is unique because most PAR projects involve one or a few groups, and we engaged with over 15 projects/Alliances in five European countries (and also in South Africa). In addition, CO-CREATE is somewhat different from many Y-PAR projects because the issue of overweight and obesity was predetermined as the focus of the project (given the EU-funded grant supporting the project).

At the same time, we surveyed the local conditions in all participating countries to tailor the approach to local conditions and built into the approach options that youth can adjust to their own needs. We started our work with an exploration of social and political relations that might influence the Alliance, for example, what was understood by the terms “diversity” or being “marginalized” in each specific setting.

The project engaged a diverse range of young people in three Alliances of around 15 adolescents per country. We aimed for 16- to 18-year olds to be recruited through schools, (youth) organizations, municipalities, or directly/individually. The age group was selected as, in most European countries, they have the competence to provide consent to participate in research projects and the type of activities included in the CO-CREATE project. The first Alliances started in the fall of 2019, and their duration depended on the actual developments within each Alliance. Because CO-CREATE aimed to engage adolescents from a variety of backgrounds, we used our preliminary fieldwork and local area characteristics as a starting point for recruitment.

Alliances consisted of a series of activities which were flexibly implemented, altered, and expanded in line with youth and staff goals: group building, training, Photovoice, systems mapping, policy forms, capacity building, advocacy training, and budgeting. Each Alliance had a budget to test policy idea elements. Each Alliance had one or two cofacilitators: a young adult bridging the gap between young members and the (academic) adult facilitators. The outcome of this extensive work was a set of policy proposals, some of which have been further developed through dialog with wider stakeholders.

3.2.3 | Policy dialog forums between adolescents and public and private sector stakeholders

Conducting public engagement and soliciting stakeholder feedback is an essential part of the policy lifecycle. To integrate these best practices into CO-CREATE and enable youth to discuss and refine their policy ideas with stakeholders across sectors, EAT designed a youth-

centered policy dialog tool. This tool, known as the Dialog Forum, aimed to connect youth, policymakers, business representatives, and other experts to discuss food and physical activity policies developed by youth alliance members. The initial tool was designed in collaboration with a design consultancy and was the product of a 6-month scoping and research phase within which young people were engaged in interviews and workshops so that key insights could inform the design of the tool. This prototype was then tested with young people in various workshop and conference venues such as the EAT Stockholm Food Forum and UNICEF State of the World Children's Report launch. A final prototype of a tool designed to facilitate in-person convenings was available in March 2020. Due to the COVID-19 pandemic, we undertook an additional 6-week iterative design process to create a digital adaptation of the tool.

In the subsequent 2 years, 20 Dialog Fora have been organized at local, national, and international levels, in collaboration with adolescents and CO-CREATE country partners (the Netherlands, Norway, Poland, Portugal, and the United Kingdom). Based on the findings from these Dialog Forums, evaluation survey feedback, and in-depth evaluation workshops, we reengaged the design consultancy to produce the final optimized digital and physical Dialog Forum tools. These tools have been published through an open access license and remain available for the public to use and host their own Dialog Fora, promoting the sustainability of the tool and the CO-CREATE project.

Throughout the process of developing the tool, select principles were integral to its design and the process of planning, executing, and following-up on a Dialog Forum. One key principle was safeguarding against conflicts of interest given the inherent power balance when bringing youth and adults together. Various measures were integrated to ensure youth were protected yet still empowered to play a leading role in the Dialog Fora. Such measures include a 1:1 ratio of youth to adult participants, providing young people the opportunity and training to moderate, assessing stakeholders through a risk assessment table, and other measures (www.co-create.eu). Creating a safe space where youth and adults can discuss ideas and cocreate solutions as equals is central to promoting meaningful youth engagement and reinforcing young people's role in policymaking.

3.2.4 | Evaluating the cocreated policy interventions

The adoption and enactment of the policy ideas generated was beyond the control of the CO-CREATE project, and most potential impacts of such policies on youth obesity rates are likely to occur beyond the project time frame, so a traditional experimental design was not considered appropriate or feasible. Instead, we aimed to (1) develop an adaptable systems dynamics core model for simulating potential effects of the cocreated obesity-related policy interventions and (2) increase local capacity for implementation and evaluation of policies by developing implementation and evaluation plans for selected cocreated obesity-related policy interventions with relevant stakeholders in each country.

The system dynamics core model was developed based on a literature review of system dynamics models addressing obesity in youth, the system maps developed with adolescents,²² and in consultation with experts and relevant literature on submodels within the overall model. The protocol and tools for developing implementation and evaluation plans were developed based on existing tools, reports, and scientific literature on evaluation and implementation of policies. The evaluation was informed by the Institute of Medicine report on how to evaluate policies and interventions to accelerate obesity prevention which suggests how to set up a framework for evaluation—building on assessment by data to describe the problem, surveillance over time to track changes, monitoring of implementation, and summative evaluation to attribute those changes to the preventive actions.²⁵ Furthermore, the evaluation framework for obesity prevention policies and interventions developed by the Center of Excellence for Training and Research Translation was adapted and guided the process.²⁶

In addition to these two evaluation tasks, we included an immediate evaluation of the experiences of youth involved in the youth alliances and of the stakeholders taking part in the dialog forums. An online questionnaire for youth participating in the alliances was developed to assess changes in the two concepts of “readiness for action” and “attitudes toward action to prevent obesity,” and to describe and keep track of the diversity of the participants (by gender, socioeconomic status, ethnicity, and selected dietary habits and physical activity).

3.3 | Conceptual overview of the flow of the youth engagement process of CO-CREATE

Figure 2 provides an illustration of the overall flow of the CO-CREATE project and the relation between the two main objectives: monitoring and youth engagement process, starting with the input from policy

mapping, current research evidence, and adolescent-generated system maps. These maps were made available to the youth alliances to support the formulation of policy ideas and testing of ideas with other stakeholders prior to potential implementation and/or system dynamic modelling of expected results.

3.4 | Ethical considerations

Engaging with adolescents in a large-scale research project to cocreate policy ideas to combat obesity is ethically challenging. Participation in the research must be voluntary and free of coercion, and research with young people requires taking into consideration their specific vulnerability and protecting them from potential harm. Adolescent obesity is associated with social stigma and may be a sensitive topic to address for some young people.²⁷ Power imbalances may arise between stakeholders, such as representatives from the food industry and policymakers and between the researchers and the adolescents.²⁸ The project integrated mechanisms at all stages of the research to address and mitigate potential ethical challenges. Mechanisms, for instance, included a thorough process to inform adolescents about the research objectives and methods, adolescent training in advocacy and research methods, tools for stakeholder selection, and requirements that stakeholders commit to respect the views and opinions of adolescents.

3.5 | Exploitation of results and expected impact of the project

Ensuring that the novel aspects and findings of the CO-CREATE project are disseminated widely has been a key consideration



FIGURE 2 The overall flow of the CO-CREATE project and the relation between the two main objectives: Monitoring and youth engagement process

throughout this project. This includes communication with and to youth, within the obesity community, and other public health areas, through academia and finally to policymakers. Given the different varied needs of different audiences, the CO-CREATE findings have been disseminated through different tools, with particular attention to a variety of formats. The CO-CREATE website (www.co-create.eu) provides access to all parts of the project, and the website “Healthy Voices - Giving young people the power to beat obesity” (www.worldobesity.org/healthy-voices) presents the findings in a youth-friendly way and also presents a range of tools and materials for youth and others to use in their advocacy about obesity, nutrition, physical activity, and youth engagement in public health policy.

The outputs of the project to date include the following:

- Systematic review of evidence of the effectiveness of interventions aimed at preventing overweight and obesity in adolescents¹²;
- The MOVING policy framework¹⁶;
- NOURISHING and MOVING databases representing repositories of diet-related and physical activity policies implemented in Europe¹⁷;
- Tools for monitoring and benchmarking of obesity and EBRB-related policies (NOURISHING for diet-related policy actions and MOVING for physical activity-related policy actions);
- Obesity systems maps depicting the key policy-amenable drivers of adolescent obesity across Europe as perceived by adolescents themselves²²;
- Youth Alliances for Obesity Prevention Policy organization protocols;
- Dialog Forum model (<https://www.fhi.no/en/studies/co-create/the-dialogue-forum-tools-is-available/>);
- System dynamic models for assessment of potential impact of proposed policies on EBRB and obesity;
- Healthy Voices website (www.worldobesity.org/healthy-voices);
- Adolescent-developed policy ideas and cocreated priorities for obesity prevention, including the CO-CREATE Youth Declaration on priority policies;
- Videos, toolkits, and recommendations on youth engagement and support to youth advocacy on obesity and food/physical activity environments;
- Open access to baseline data on adolescents EBRB and attitudes and motivation to initiate change; and
- Policy briefs analyzing the impact of implemented policies on national levels of adolescent overweight and obesity in Europe.

4 | DISCUSSION

Empowerment of and investment in adolescents as European citizens is the core vision of the EU strategy for Youth,⁹ both with regard to developing policy areas that affect adolescents in their daily life and for improving their well-being. However, limited research, resources, advocacy, and policy actions have included the views and input of

adolescents.²⁹ Previous attempts to engage adolescents in designing or implementing obesity-related lifestyle interventions have been few, and those that have taken place have been too heterogeneous to allow robust conclusions as to their effectiveness.⁷

CO-CREATE has worked with adolescents over several years to create a new model for identifying, generating, testing, and supporting the implementation, as well as evaluating obesity and EBRB policies operating at local or national levels. To achieve this, we have employed a range of interlinked innovative scientific methods, including leveraging use of existing available data, development and implementation of methodology for nutrition and physical activity-related policy monitoring and benchmarking, policy and advocacy interventions, systems dynamics, and cocreation and participatory research. This set of approaches has allowed us to explore evidence-based policy options for overweight and obesity prevention that have been generated by affected population groups and further developed to maximize the likelihood of feasibility and political acceptability.

There are several inherent risks in conducting such a large-scale research project with adolescents across several countries. These include, but are not limited to, recruitment challenges and involvement of diverse population groups, securing genuine involvement and treating adolescents as equal partners, and continued engagement over an extended time period. Some such challenges were anticipated, but we had not expected the COVID-19 pandemic in early 2020, just as we were in the midst of the most intensive period of fieldwork, with ongoing recruitment and implementation of the Youth Alliances. As a result of the pandemic, all activities had to be shifted to digital platforms. This change affected various parts of the project differently, provided some exciting opportunities for collaboration across countries, but also made continued recruitment and involvement much more challenging. The impacts of the pandemic on our research expanded the learning from CO-CREATE and will be addressed in further analyses of our results and experiences.

The CO-CREATE project has been conducted at a time when research and innovation on childhood obesity and food environments have been high. The project is complementary to other large-scale European projects being conducted during a similar time period, including “Science and Technology in childhood Obesity Prevention” (www.stopchildobesity.eu/), “Policy Evaluation Network” (www.jpipen.eu/), and “BestReMaP - Healthy Food for a Healthy Future” (www.bestremap.eu/). CO-CREATE's unique offering on both youth engagement and embedding a systems approach provides a valuable addition to our understanding of which policies need to be prioritized and implemented in this age group.

5 | CONCLUSION

The global epidemic of obesity creates an enormous burden in terms of suffering and disease, health care costs, and costs to the wider society. All ages are affected, and although no country has reversed the epidemic, significant effort in terms of both research and action has already been enacted. To date, however, this attention has almost

entirely been focused on young children and adults. Adolescents have been largely ignored in the response across Europe and worldwide, and few interventions have been successful at population level.

CO-CREATE has sought to address this important and damaging omission by placing adolescents, their perspectives, and the factors that shape their health at the very center of our project. A consortium of experts in tackling the problem of obesity, representing academic, governmental, and civil society organizations, has collaborated with participating adolescents. Together, we have developed a set of mechanisms, structures, and opportunities for the young people who have participated in the project, to empower them and work together toward identifying key mechanisms for change that will lead to improvements in the health of young people across Europe.

CO-CREATE represents an exciting opportunity to move beyond existing models of public health knowledge generation and policy development to find new ways to address one of the greatest health, well-being, and economic challenges facing Europe. It has, and will continue to, contribute new insights, new approaches, and new methodological tools that will help to reverse the harmful epidemic of obesity, improving the health of young people in Europe now and for future generations.

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CONFLICT OF INTEREST

No conflict of interest was declared.

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