



Quest

ISSN: (Print) (Online) Journal homepage: www.tandfonline.com/journals/uqst20

Rethinking Schools as a Setting for Physical Activity Promotion in the 21st Century—a Position Paper of the Working Group of the 2PASS 4Health Project

E. García Bengoechea, C. B. Woods, E. Murtagh, C. Grady, N. Fabre, L. Lhuisset, G. Zunquin, A. Aibar, J. Zaragoza Casterad, L. Haerens, M. Verloigne, K. De Cocker, S. Hellebaut, J. Ribeiro, L. Bohn, J. Mota & J. E. Bois also on behalf of the Erasmus + Promoting Physical Activity in Secondary schools for health project

To cite this article: E. García Bengoechea, C. B. Woods, E. Murtagh, C. Grady, N. Fabre, L. Lhuisset, G. Zunquin, A. Aibar, J. Zaragoza Casterad, L. Haerens, M. Verloigne, K. De Cocker, S. Hellebaut, J. Ribeiro, L. Bohn, J. Mota & J. E. Bois also on behalf of the Erasmus + Promoting Physical Activity in Secondary schools for health project (21 Mar 2024): Rethinking Schools as a Setting for Physical Activity Promotion in the 21st Century—a Position Paper of the Working Group of the 2PASS 4Health Project, *Quest*, DOI: [10.1080/00336297.2024.2318772](https://doi.org/10.1080/00336297.2024.2318772)

To link to this article: <https://doi.org/10.1080/00336297.2024.2318772>



© 2024 The Author(s). Published with license by Taylor & Francis Group, LLC.



Published online: 21 Mar 2024.



[Submit your article to this journal](#)



Article views: 778






[View related articles](#)



[View Crossmark data](#)

Rethinking Schools as a Setting for Physical Activity Promotion in the 21st Century—a Position Paper of the Working Group of the 2PASS 4Health Project

E. García Bengoechea ^{a,b}, C. B. Woods^a, E. Murtagh^a, C. Grady ^a, N. Fabre^c, L. Lhuisset^c, G. Zunquin^c, A. Aibar^d, J. Zaragoza Casterad^d, L. Haerens^e, M. Verloigne^f, K. De Cocker^e, S. Hellebaut^e, J. Ribeiro^g, L. Bohn^g, J. Mota ^g, and J. E. Bois^c also on behalf of the Erasmus + Promoting Physical Activity in Secondary schools for health project

^aPhysical Activity for Health Research Centre, Health Research Institute, Department of Physical Education and Sport Sciences, University of Limerick, Limerick, Ireland; ^bResearch & Innovation Unit, Sport Ireland, Dublin, Ireland; ^cSciences et Techniques des Activités Physiques et Sportives, Laboratoire Mouvement, Equilibre, Performance, Santé, University of Pau and Pays de l'Adour, Tarbes, France; ^dEFYPAF Research Group, Faculty of Human Sciences and Education, University of Zaragoza, Zaragoza, Spain; ^eDepartment of Movement and Sports Sciences, Ghent University, Ghent, Belgium; ^fDepartment of Public Health and Primary Care, Ghent University, Ghent, Belgium; ^gFaculty of Sport, University of Porto Placido da Costa St, Porto, Portugal

ABSTRACT

Schools are ideal settings to promote adolescent physical activity (PA), yet school-based interventions have shown limited long-term impact. This position paper presents key issues surrounding school-based PA interventions. Collaborative conceptual thinking drawing on multi-author expertise and available evidence advanced our understanding and opinion. Key arguments: 1) the adoption of a systems approach, which maximizes partnership action and leverages policy, is crucial for understanding the complexities of implementing whole-school programs; 2) a reorientation to an assets perspective optimizes existing strengths and resources allowing greater emphasis on the full range of physical, cognitive, emotional and social benefits that PA provides, and 3) a move beyond traditional positivist research designs to advance our knowledge of what works better, for whom and in what context is needed for greater progress. We provide suggestions, specifically advocating for systems approaches, as a realistic way to improve how we support PA in schools in the future.

KEYWORDS

Adolescents; whole-school programs; systems approach; partnerships; policy; health assets; evaluation; research design

Introduction

The benefits of physical activity (PA) are widely understood in the research community. Regular engagement in PA affords multiple physical, cognitive, emotional and social benefits (Pesce et al., 2016). Yet, despite an increasing body of research output, worldwide progress to increase PA has been slow, largely due to lack of awareness and investment (World Health Organisation [WHO], 2018). Proportions of school-aged children meeting guidelines of on average 60 min of moderate-to-vigorous PA daily remain persistently low,

CONTACT C. B. Woods  Catherine.Woods@ul.ie  Physical Activity for Health Research Centre, Health Research Institute, Department of Physical Education and Sport Sciences, University of Limerick, Limerick V94 T9PX, Ireland.

© 2024 The Author(s). Published with license by Taylor & Francis Group, LLC.

This is an Open Access article distributed under the terms of the Creative Commons Attribution-NonCommercial-NoDerivatives License (<http://creativecommons.org/licenses/by-nc-nd/4.0/>), which permits non-commercial re-use, distribution, and reproduction in any medium, provided the original work is properly cited, and is not altered, transformed, or built upon in any way. The terms on which this article has been published allow the posting of the Accepted Manuscript in a repository by the author(s) or with their consent.

with no meaningful progress being made for girls or boys across low-, middle- and high-income countries (Aubert et al., 2018; Guthold et al., 2020).

Schools are settings, in theory, ideally placed to provide children and adolescents with opportunities during, before, and after school hours to meet a substantial part of current international PA guidelines, while also giving them the necessary tools to be autonomously active across the lifespan (van Sluijs et al., 2021). Evidence about the suitability and promise of schools as settings for the promotion of PA has grown in the last two decades (Bassett et al., 2013; Dobbins et al., 2013; Naylor & McKay, 2009; Nettlefold et al., 2011; Sevil et al., 2019; Woods et al., 2021). Fittingly, based on available best evidence, school-based programming and promotion is internationally recognized as one of eight investments that work for PA (International Society for Physical Activity and Health, 2020). To this end, a whole-school approach is currently recommended as the gold standard of practice, consistent with the principles of the WHO and United Nations Educational, Scientific and Cultural Organization initiative *Making Every School a Health Promoting School* (World Health Organization, & United Nations Educational Scientific and Cultural Organisation, 2020). A whole-school approach involves prioritizing and promoting PA to the entire school community through supportive policies, environments and opportunities (Milton et al., 2021). Schools are seen as a universal context to access and influence all children, however, the potential of school-based interventions to positively impact children's PA behavior remains unfulfilled or uncertain at best (Love et al., 2019; Rodrigo-Sanjoaquin et al., 2022; van Sluijs et al., 2021).

In the context of an Erasmus+ Sport project called Promoting PA at Secondary Schools for Health (2PASS-4Health; project number 622,733-EPP-1-2020-1-FR-SPO-SCP) we used the following process to elaborate this position paper. Using collaborative conceptual thinking, we drew upon multi-author expertise and available evidence from the literature that 2PASS 4Health project members brought to the table in an iterative process involving multiple discussions during online and in-person meetings over the two-year project period. Through these ongoing discussions, we developed common understandings, advanced our opinion on the topics under consideration, and finally reached consensus on the main ideas and arguments forwarded in this position paper. These ideas and arguments, initially put together by EGB in manuscript draft form, were subsequently discussed at one of the scheduled in-person meetings of the project members and refined through several rounds of feedback and successive drafts, led by University of Limerick project members (EGB, CW, CG, EM), until all authors agreed on a final version. As a result of this group reflection, we propose that greater attention to key issues is needed to fully realize the potential of schools as an ideal PA promotion setting. These issues, which we see as related and complementary, include 1) a systems approach, including the role of partnerships and policy, 2) an assets perspective, and 3) the nature of evidence required to bridge the evidence and implementation gap, sustain and scale-up school-based innovations and solutions to address inactivity. We provide case study examples of school-based interventions across three European countries that align, in part, to our first key and overarching argument about using a systems approach.

A systems approach to PA promotion in schools

The Global Action Plan for PA (GAPPA) advocates for a systems approach, indicating that a comprehensive, integrated and inter-sectoral effort is needed to increase population levels of PA (WHO, 2018). The social ecological model points to a multi-level response that addresses personal, environmental, and policy factors acknowledging the interconnectedness between the individual and their environment (Sallis et al., 2006). In brief, no single solution has been effective in addressing the physical inactivity challenge to date, consequently a complex systems model of public health which conceives issues such physical inactivity, irrespective of context, as requiring multiple interdependent factors within a connected whole may hold promise (Rutter et al., 2017). This approach acknowledges the complexity and non-linearity of PA behavior, its multiple influences and the importance of the connections, interactions and feedback between intervention levels and components (Allender et al., 2015; Peters, 2014; Rutter et al., 2017, 2019). This approach would aim to corral key stakeholders relevant to the school setting to make their actions and efforts coherent in a way that addresses the complexity of PA promotion for all children in their school.

Much of the work that is undertaken in schools to promote PA does not take a systems approach, rather most of the intervention literature describes single-component interventions (e.g. changing aspects of physical education only or focusing only on change at the individual level) (Borde et al., 2017; Jones et al., 2020). Many of these interventions operate within a reductionist and deficit paradigm, aiming to change certain elements of the system (e.g., they may be pertinent to first year students only, or they may focus on individuals reducing sedentary behavior over a 6-week period). This fragmented approach relies on isolated, often topic- and target group-specific activities/strategies in the school setting. A systems approach, we believe, provides another lens within which to analyze the inactivity challenge among school children. It provides a framework to help examine the factors involved in the problem, recognizing that actions should be integrated across political, societal, cultural, economic and scientific domains (Rutter et al., 2019), and that these domains are inherently linked to each other. We believe this enhanced understanding of the context within which school-based interventions take place is crucial to overcoming current limitations in this area.

Different frameworks that align with the systems-based approach exist in the literature and are available for those who want to promote PA through a systems-based rather than a fragmented approach. The Health Promoting Schools (HPS) approach emerged as a holistic intervention strategy aligned with the principals of the Ottawa Charter for health promotion (World Health Organization [WHO], 2017). The HPS approach stands in contrast to the fragmented approach and works best when developed from within schools and the educational system (Dadaczynski et al., 2020). Similarly, the “whole-school approach” provides another example of a framework for action that identifies the multiple levels and components required to establish schools as a complex sub-system (Milton et al., 2021). This facilitates comprehensive, coordinated PA intervention design and implementation by engaging all relevant stakeholders to co-create supportive social, physical and policy environments and drive change at the system level (Gamble et al., 2017). Daly-Smith et al. (2020) developed the Creating Active Schools (CAS) framework using a systems

approach to provide clarity on the components of a whole-school concept. This framework conceptualizes the school as a complex adaptive system where an “active school” is central to the school’s beliefs, customs, and practices that drive school policy. Conceptually and operationally similar to the whole-school approach, the U. S. based Comprehensive School Physical Activity Program (CSPAP) is a framework for planning and organizing activities in a manner consistent with the broader Whole School, Whole Community, Whole Child (WSCC) model (Centers for Disease Control and Prevention, 2023). Specifically, a CSPAP is a multi-component approach that encourages and supports school districts and schools to use all opportunities for students to be physically active, meet the recommended PA guidelines, and develop the knowledge, skills, and confidence to be physically active for a lifetime (SHAPE America (n.d.)).

However, the application of systems science principles in school settings is not without its challenges. It is necessary to have a sufficient understanding of systems thinking and the process of generation and application of new knowledge to foster system improvement (Rosas, 2017). This requires understanding contextual factors relevant to the school system. All individuals within the school setting and in a role that either directly or indirectly influences PA are important to a systems approach. In addition, information on the schools’ demographic profile, its built and policy environments, its facilities, equipment and level of staff training, the interest of students and the schools’ priorities in relation to PA are all important parts of a systems approach. To understand how the different parts of, and people within the system may relate to one another, Allender et al. (2015) recommended developing a “system map” or a visual depiction of the system. This would involve engaging all key stakeholders in the process, and through an iterative approach, build and revise maps to understand better the system and its web of relationships and networks within their school. This can lead to improved communication between, and an enhanced understanding of, the different actors and actions and their reciprocal interactions relevant to the promotion of PA within a school setting (Rutter et al., 2019). This approach can also help stakeholders understand why the school system functions as it does to promote PA (or to maintain physical inactivity), and to identify modifiable points within the system, key levers for change, that if amended could lead to better opportunities for increasing population levels of PA throughout the whole school. A recent scoping review of complex systems methods used in population PA research determined that these methods can be broadly grouped under three categories, i.e. system mapping, simulation modeling, social network analysis (Baugh Littlejohns et al., 2023). Fittingly, the authors of the review concluded that system mapping methods appeared to align best with a whole system approach to PA promotion because they aimed to understand complex systems, examined interactions and feedback among variables, and used participatory approaches to involve relevant stakeholders in the process. The WHO has recently published comprehensive guidance to bring systems approaches into practice for noncommunicable disease prevention through a variety of methods applicable in a variety of settings, considering factors such as part of the policy cycle targeted, benefits intended and level of resources available (World Health Organization [WHO], 2022). These methods include, but are not limited to, qualitative research with a systems lens and case study research, concept and cognitive mapping, system maps and causal loop diagrams, group model building, agent-based modeling, system dynamics modeling, and network analysis.

At the school level, to facilitate system improvement, school health promotion initiatives require consistent leadership and management structures, internal and external supports, adequate resources, opportunities for professional development, and supportive policies (Rosas, 2017). In the following two sub-sections, given their particular relevance to a systems approach, we highlight some issues relative to leadership and management structures (including partnerships) and to school-based policies for the promotion of PA.

The importance of leadership and partnerships to PA promotion in schools

The sustainability of a systems-based approach to PA promotion, in particular, requires appropriate governance (Milton et al., 2021). In schools, a key governance factor contributing to the extent of PA implementation, or other health initiatives, is the presence of visible, competent and supportive leaders, which in some cases need to be appointed and trained for such purposes (McMullen et al., 2022; Webster et al., 2015). Storey et al. (2016) found that supportive school principal involvement for the implementation of a comprehensive school health approach included prioritizing the initiative in the school's agenda, actively serving on the implementation team, and being an advocate and role model for the initiative. How to get administrator "buy in" and support for school-based PA promotion initiatives, including how to change the school "ethos" (Lee & Welk, 2019), should be a priority on researchers' agenda (Haerens et al., 2007).

However, consistent leadership and management structures alone are insufficient to achieve a systems approach. Partnerships, both within and outside of the school community, working in complementary, synergistic ways are necessary to improve the system and ultimately increase levels of PA for children in the school setting. One of the guiding principles of the GAPPa incorporates a call for "partnerships for action" to foster collaboration across and between stakeholders at all levels of the systems and sub-systems involved in the vision of achieving the multiple benefits of a physically active world (WHO, 2018). Similarly, the International Society for PA and Health's (ISPAH) "Eight Investments that Work for PA" (Milton et al., 2021) and their "Toronto Charter for PA" (Global Advocacy Council for Physical Activity [GAPA], & International Society for Physical Activity and Health [ISPAH], 2010) urge PA promotion actors to move away from isolated interventions in their respective silos, to collaborative, cross-sectoral efforts e.g., schools, health, transport, sport, community services and so on. The creation of a system map (described earlier) will help to clarify who should be involved and delineate roles and responsibilities for program success.

The role of policy for PA promotion in schools

Among the wide range of potential solutions that have been identified to address the inactivity challenge, there is increasing recognition of the importance of upstream or policy responses (Lakerveld et al., 2020). Fittingly, the role of policy is to change systems rather than individuals, to create supportive contexts in which programs and environments jointly promote health. Policy interventions should not be confounded with other types of program or environmental interventions; rather, policy interventions create the framework where programs or environmental changes are tendered, developed, funded, or implemented (Gelius et al., 2020). Several strategic documents advocate for the use of policy as an instrument to promote health within the school setting, while providing a useful conceptual starting point for understanding the

potential direct and indirect effects of policy on PA. Recently, Woods et al. (2021) provided the first systematic attempt at reviewing and assessing the evidence for the impact of school policy on PA outcomes. The policy areas for which the authors found evidence of impact on PA were physical education (PE), school sport, classroom-based PA, active school breaks, and shared use agreements. However, they pointed out that the range of policy options implemented and evaluated in the school setting remains limited and requires additional research attention (Woods et al., 2021). Providing children and adolescents with meaningful opportunities to be physically active through policies implemented in the school setting is an area ripe for applied and conceptual work.

Examples of upstream policy responses are observed across many countries, including the five 2PASS-4Health countries. In the Portuguese secondary school system for example, PE is a mandatory core subject, has a minimum duration (timetabled for 150-minutes per week), key curricular content – two team-sports, one gymnastic, one expressive rhythmic activity and two of athletics, skating or rackets and others – and contributes to accessing University. There are three levels for each curricular content: Introductory, Elementary and Advanced. Students shift from the Introductory to the Advanced level in all the sports taught from the 10th- 12th years building their knowledge related to the interpretation and participation in social structures and phenomena outside school in which PA is carried out.

Case study examples of a systems approach in action

To illustrate some of the previous considerations, in this section we introduce three case studies of school-based PA interventions in three different geographical and cultural contexts. We use the Action Scales Model (ASM), developed by Nobles et al. (2021), as an analytical framework to highlight strengths and areas for improvement regarding the application of a systems approach in the context of the interventions. The ASM provides a user-friendly tool to help stakeholders conceptualize, identify and evaluate actions for change within complex adaptive systems. In brief, the ASM describes four levels of influence on how a system functions: events, structures, goals and beliefs. Within these levels, leverage points on which to intervene to change the system can be identified. The deeper levels – goals, beliefs- provide greater challenge but also more potential to achieve real change in how the system functions and in turn, the main outcomes of the system. *Events* describe the observable behaviors and outcomes that result from the system working as designed. In our case, students may spend considerable time sitting and being insufficiently active as part of their regular school day. Physical (e.g., built environment), relational (e.g., relationships, rules) and informational (e.g., information flows) *structures*, in turn, cause events to occur. For example, lack of appropriate facilities combined with inefficient communication regarding the existence and importance of policies to support PA through the school day may hinder efforts to increase the time students are physically active during regular school hours. *Goals* describe the targets that the system aims to achieve, influencing how the system is structured and, consequently, how it works and the outcomes it produces. Back to our example, the explicit goal of an “active” school may be to provide sufficient opportunities for students to be physically active throughout the school day. However, the school may not be taking the necessary steps to realize these aspirations, underlying the important distinction between “stated” goals and “observable” goals (Nobles et al., 2021). The final level of the ASM, *beliefs*, captures the values, norms or attitudes of individuals within the

Table 1. Case study examples of school-based programs utilizing a systems approach broken down into the four levels of the action scales model (Nobles et al., 2021).

		Level of ASM (example provided by Nobles et al., 2021, p. 333)	
Initiative (Age Range)	Location	Level 1: Event	Level 2: Structures
Active School Flag for Second Level (12–18 year olds)	Ireland	<p>Behaviours and outcomes that can be observed e.g. Provide cycling training to school children)</p> <p>Whole school survey (maximizes student voice and directs actions).</p> <p>Whole-of-school events (e.g. Active School Week with multiple PA opportunities and events).</p> <p>An active school walkway developed and implemented.</p>	<p>(Underlying structures and patterns that cause events to occur e.g. Assess and improve the physical infrastructure for walking and cycling to school)</p> <p>A timetabled ASF class for students to facilitate programme implementation.</p> <p>2 ASF school coordinators (teachers)</p> <p>A wider ASF staff implementation team.</p> <p>ASF national team consisting of multi-sectoral stakeholders.</p>
		<p>Level 1: Event Schools must meet a pre-set criterion on number of events carried out each year, type of event is flexible. Successful completion required to progress to next stage of ASF.</p> <p>This is on a continuous scale from minimum (Try-it-out; stage 1) to maximum (Flag; stage 3). This is evaluated on an annual basis by the ASF national team and steering group.</p>	<p>Level 2: Structures Schools must meet a pre-set criterion on infrastructure prior to commencing ASF.</p> <p>This is on a continuous scale from minimum (Try-it-out; stage 1) to maximum (Flag; stage 3). This is evaluated on an annual basis by the ASF national team and steering group.</p>
		<p>Level 3: Goals (Goals, targets ambitions that the system wants to achieve e.g. Schools work with parents and the community to set a shared goal to reduce short care journeys by 20% in next 5 years)</p> <p>The aim of the ASF programme is to create more opportunities for adolescents to be physically active, to empower student voice and enable student leadership over a 3–5-year period.</p>	<p>Level 3: Goals Schools must meet a pre-Action Plan unique to their school, with specific aims, targets etc. to increase PA opportunities in their school</p> <p>The ambition of the goal/targets increases on a continuous scale from minimum (Try-it-out; stage 1) to maximum (Flag; stage 3). This is evaluated on an annual basis by the ASF national team and steering group.</p>
		<p>Level 4: Beliefs (Deeply held beliefs, norms, attitudes and values of individuals, organizations within the systems e.g. Create a working group to champion and promote active transport to school to senior leaders in the council).</p> <p>Readiness to engage with the ASF programme is assessed with Senior Management, School Implementation Teams, and resources/training provided to maximize this prior to undertaking the programme.</p> <p>“Try-it-Out” opportunities prior to full programme implementation provided to maximize commitment.</p> <p>Evaluation: Schools must meet criteria to determine their readiness to engage with the ASF programme, each school needs to meet the criteria to progress to the next stage of the programme.</p> <p>The “beliefs,” re: ASF increase from minimum (Try-it-out; stage 1) to maximum (Flag; stage 3). This is evaluated on an annual basis by the ASF national team and steering group.</p> <p>A qualitative inquiry into the beliefs and values of the systems architects and those affected by systems change should be conducted.</p>	<p>Level 4: Beliefs Schools must meet criteria to determine their readiness to engage with the ASF programme, each school needs to meet the criteria to progress to the next stage of the programme.</p> <p>The “beliefs,” re: ASF increase from minimum (Try-it-out; stage 1) to maximum (Flag; stage 3). This is evaluated on an annual basis by the ASF national team and steering group.</p> <p>A qualitative inquiry into the beliefs and values of the systems architects and those affected by systems change should be conducted.</p>

(Continued)



Table 1. (Continued).

		Level of ASM (example provided by Nobles et al., 2021, p. 333)	
Sigue La Huella (Follow your Footsteps)	Spain	<p>The multisectoral group of experts constitute the main structure of the intervention.</p> <p>Different working groups of students, teachers and parents also participate into the design of the intervention.</p> <p>Active school week</p> <p>Participation in programs or special events out of the school.</p>	<p>The objective of Sigue La Huella is to empower student voice and enable them to auto-organize and active lifestyle.</p> <p>Different stakeholders are involved in Sigue la Huella. A multisectoral group participates in periodical meetings to provide advice on programme design and implementation. These include representatives from city and regional agencies and services in the areas of health, education, youth, physical activity and sports. Researchers from the University and school actors are essential actors in this adaptive system.</p>
Mouv à l'école (Move your way)	France	<p>Evaluation: The school conducts an evaluation of adolescent's PA levels during the final global active school week.</p> <p>5 workshops to children, 1 workshop to the parents.</p> <p>Researchers train teachers on active classrooms, sedentary breaks activities.</p> <p>Researchers educated teachers on the challenges of PA and sedentary behavior.</p> <p>Researchers proposed changes to the city hall to improve daily PA and reduce ST (changes in lunchtime, drawings in the schoolyards).</p> <p>Workshops were held with city PE teachers to ensure sustainability and repeatability of the intervention.</p>	<p>Evaluation: A qualitative inquiry into the beliefs and values of the systems architects should be conducted.</p> <p>The representation of the different stakeholders on PA and ST levels, the importance of PA and the link between PA, attention and academic success were challenged and led to evolve. Researcher workshops with city hall members helped technicians and local policymakers to develop a common view of challenges and issues dealing with PA and sedentary behavior.</p> <p>Workshop with teachers helped them to realize they could effectively be a part of the solution and enhanced their own confidence in changing their class habits.</p>
		<p>Evaluation: The school conducts an evaluation of adolescent's perceptions from a quantitative and qualitative point of view.</p> <p>The aim of "Mouv" à l'école" is to enable the different stakeholders (teachers, school direction, students, parents, PE teachers, lunch service, afterschool carers) to create the conditions to increase PA and decrease ST in a sustainable way within a school context.</p> <p>Teachers assisted by researchers organize the implementation within each of the schools. The formation and the implication of the PE teachers allow the extension of this intervention to other schools of the city (i.e. they become the leaders of it).</p> <p>Doctoral student as supervisor of the project</p> <p>Principal, teachers, doctoral student as committee to define which change could be done in school</p>	<p>Evaluation: A qualitative evaluation of teachers' opinions of the intervention effects and efficacy. This qualitative evaluation could be extended to different stakeholders</p>
		<p>Evaluation: number of schools ready to engage in this project. Within the school, number of actions engaged to increase PA and decrease ST as well as their degree of sustainability</p>	<p>Evaluation: The project should be evaluated through a process evaluation</p>
		<p>Evaluation: Attendance at workshops, quantitative evaluation of PA and ST levels as well as physical fitness and motor skills evaluation pre and post intervention as well as long term</p>	

system, particularly those with influence and power, which are in turn reflected in the system goals. In our example, goals related to PA and sitting time may not be sufficient ambitious because the school leadership may not consider PA, and student health, as important enough in the context of other school priorities. Table 1 provides details on the application of the ASM to present three case studies across three European countries – Ireland, Spain and France- as examples of interventions consistent with the systems approach with varying levels of evidence and alignment to this approach.

In Ireland, the second level *Active School Flag* (ASF; <https://activeschoolflag.ie/>) program aims to increase adolescent PA by creating an active school through providing opportunities for student voice and leadership in PA (ages 12–18 years) (Ng et al., 2019). ASF is an initiative of the Department of Education and was developed using a co-designed approach with students, teachers, parents and the local community. The multi-level, multi-component program is led by senior students in their fourth year (aged 16 years) who are guided by two ASF coordinators (teachers) and a whole-of-school approach (Figure 1). Each school completes a needs assessment (survey) at the start of the school year, and the results are used to inform the schools action plan to promote PA for that year. There are three stages to achieving the ASF: i) Try it out (assesses readiness to engage with the program), ii) Certificate (focus on improving PA within the school environment) and iii) Flag (focus on improving PA in the community). A set of criteria is used to determine

Whole School Process



Figure 1. Diagram showing the key stakeholders involved in the ASF programme with the implementers at the center.

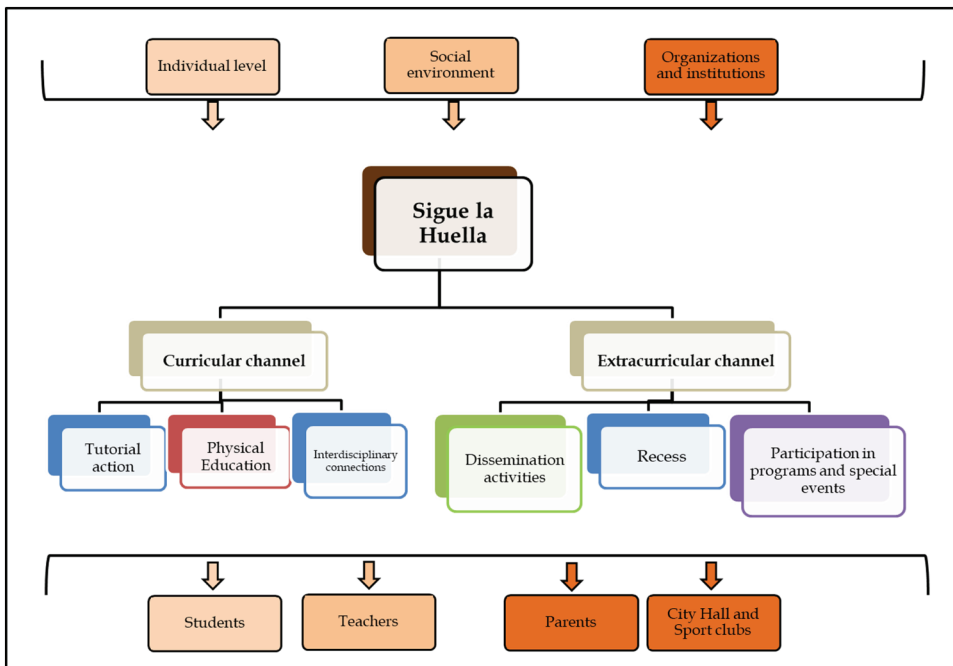


Figure 2. Diagram of the key stakeholders and components of the Sigue la Huella intervention.

a schools' progression from one stage to the next stage, and currently 28 secondary schools are engaged in ASF. The process of completion of the ASF program and awarding of the flag can take from 3–5 years but is ultimately flexible to the schools' requirements.

The *Sigue la Huella* (Follow the Footsteps) intervention in Spain seeks to involve all school actors (e.g., students, administrators, teaching and non-teaching staff, parents) in the creation of favorable environments for PA and empowering students to become actively involved in the design and implementation of activities and manage their own PA behavior (Figure 2) (Murillo Pardo et al., 2019). A multisectoral advisory group, including all main actors involved in PA promotion in the city, provided feedback on the intervention. A member of the research team (facilitator) led and coordinated the intervention. The facilitator fostered a collaborative approach in which working groups of students, teachers, and parents participated in the design, implementation and evaluation of the intervention. Intervention strategies adopted curricular and extracurricular channels. The curricular channel included weekly hourly tutorial action sessions in the classroom and during PE classes. The extracurricular channel involved information dissemination activities for the broader community and participation in programs and special events sponsored by institutions or organizations outside the schools.

The French *Mouv'à l'école* (Move at School) intervention aims to evaluate the effectiveness of a school-based intervention designed to promote PA and reduce sedentary time of children (6–10 years old) from two schools recruited in a disadvantaged neighborhood (Bernal et al., 2021). This multi-level, multi-component intervention offered five workshops to children to help them understand the intervention.

Researchers also trained the teachers on active classrooms, sedentary breaks and educated them to the challenges regarding PA and sedentary behavior. Researchers proposed to the city hall some changes to improve the daily PA and reduce sedentary time levels (changes in lunchtime, drawings in the school yards). Workshops with city sport educators were also conducted so that interventions can be sustainable and duplicated in other schools.

An asset-based perspective to PA promotion in schools

Approaches to the promotion of health are often based on a deficit or risk model, emphasizing patterns of ill-health and diseases, their prevalence and how to treat and/or avoid the diseased condition through the design of effective interventions (McCuaig et al., 2013). Applied to the school context, this approach involves emphasizing the harms of physical inactivity and how inactive our children are. Conversely, salutogenic health theory, first proposed by Antonovsky in the late 1970's (Antonovsky, 1996), is an asset approach where the focus is on resources for health and well-being. This perspective suggests that a strong sense of coherence – shaped by life experiences – helps one mobilize resources available (Mittelmark & Bauer, 2017). A salutogenic approach aims to focus on all people in the system (and not only those at risk), while addressing and promoting “salutary” factors (and not only remove risks) (Boonekamp et al., 2021). A health asset is defined as any identifiable factor or resource that enhances the ability of individuals, groups, communities, organizations/institutions and/or social systems to promote health and well-being and to help to reduce health inequities (Morgan & Ziglio, 2007). These assets operate at the level of individuals, groups, communities and/or populations to protect against life's stresses. In contrast to deficit models, assets models tend to accentuate capability to identify problems and generate solutions. They also provide mechanisms to ensure that policies and programs to address health inequities account for the positive attributes existing within individuals and communities (Morgan & Ziglio, 2007). Translated to the school setting, in the context of PA promotion, an assets approach involves helping students and staff recognize and focus on their available resources, including their abilities, experiences, places, and networks of support with respect to being active (Boonekamp et al., 2021).

Arguably, this approach has not been sufficiently maximized in research and policy to date in the PA promotion space and more specifically in school-based contexts (Sagy, 2014). Evidence for the potential of asset-based approaches for school PA promotion is both indirect and direct. As the findings from a qualitative meta-synthesis of studies show, asset-based approaches provide strategies that enhance the participation of children, youth, and schools in health promotion initiatives, with initiatives displaying the highest level of adherence to asset-based principles also having the highest level of participation (Agdal et al., 2019). In addition, in the last decade, asset-based studies that have investigated the effects of developmental relationships in the form of encouraging, supportive and inspiring connections, both in school and out-of-school, have consistently found a positive impact of these relational assets on youth development outcomes (Houltberg et al., 2023). Direct evidence of the benefits of asset-based approaches for school PA promotion comes from evaluation of Safe Routes to School programs. Such programs focus on leveraging existing assets within communities and schools, such as

infrastructure and community engagement, to promote active and safe transportation. Studies have shown an increase in walking and cycling to school through Safe Routes to School programs and related projects (McDonald et al., 2014; Stewart et al., 2014). Given variation in terminology and approaches in asset-based studies, a new framework developed by Martin-Kerry et al. (2023) has demonstrated potential to help researchers and decision makers to determine how much of an intervention is asset-based (versus deficit-based) and identify the elements of the intervention that lead to change. Based on this framework, the three interventions highlighted in the previous section on the systems approach incorporate also elements of an asset-based approach (e.g., reframing toward and recognizing assets, making connections to mobilize assets). Thus, these interventions contribute as well to the growing evidence base regarding the suitability of asset-based approaches for comprehensive PA promotion in school settings.

Morgan and Ziglio (2007) assets model holds considerable promise to advance theory and practice regarding the use of asset-based approaches as it outlines a systematic approach to asset-based public health that can provide scientific evidence and best practice on how to maximize the available resources necessary for promoting PA and health. Complementing the deficit model, the approach adds value to the former by identifying the range of protective and health promoting factors that contribute to support health and wellbeing and the policy options required to build and sustain these factors equitably. In brief, this model can be used to 1) build an evidence base that identifies the most important health promoting and/or protective factors and the actions needed to create the necessary conditions for health and wellbeing, 2) assess how to effectively implement the actions required to create these conditions, and 3) develop appropriate indicators, measures, and evaluation frameworks to assess the effectiveness of these actions. Of particular relevance for the purposes of this position paper, is a set of processes featured in the assets model known as “asset mapping.” Co-developing assets maps, in particular, provides a starting point for taking action in a way that builds trust between professionals (e.g., researchers) and local communities and organizations (e.g., schools). Health and PA promoters working in collaboration with relevant stakeholders can potentially combine asset maps with systems maps outlined in the previous section to gain a more comprehensive understanding of already existing strengths at all the levels of the system under consideration. Jointly with other ways of assessing need, asset mapping can provide health and PA promoters with an understanding of how best to create the conditions required to maximize the potential for health and encourage PA. Asset mapping also helps us to conceptualize what is health enhancing in the contexts of people’s proximal and distal environments. In doing so, it begins the process of identifying the most appropriate asset indicators for the evaluation of strategies aiming to create the conditions for health and wellbeing (Morgan & Ziglio, 2007).

Linked to this strength-based approach to health promotion, is the perspective that PA should be viewed as a right. Children’s right to play – and be physically active – is enshrined in the UN Convention on the Rights of the Child (UNCRC) (United Nations & Children’s Rights Alliance, 2013) and indeed is considered as one of the most innovative aspects of the UNCRC (Davey & Lundy, 2011). Pesce et al. (2017), echoing a Swahili proverb, eloquently argue that we should “hitch the plow of PA promotion to the child’s right to play and to be physically active;” and that this should not merely be operationalized as health-enhancing

amount of PA, but as “thoughtful moving” implemented within multi-sectoral contexts as enjoyable free play and deliberate activity.

Nature of evidence needed to bridge the implementation gap, sustain and scale up innovations and solutions

Currently, only a small portion of evidence-based PA interventions are implemented in practice, let alone translated into policy (Wolfenden, Mooney, et al., 2022). Furthermore, even when implemented in practice, PA interventions rarely achieve the same or similar effects than those found under more controlled conditions, which emphasizes the need for continued research to identify effective implementation strategies in real-world settings (Koorts et al., 2018; Wolfenden, McCrabb, et al., 2022). To this end, considering the realities of the educational system is paramount to the successful implementation of evidence-informed PA interventions in schools (van Sluijs et al., 2021). To date, the evidence behind responses to public health challenges, like physical inactivity, have largely been generated by methods that were developed to answer questions about the effectiveness of clinical interventions, and as such are grounded in linear models of cause and effect not necessarily sensitive to context nor complexity (Rutter et al., 2017). While existing approaches and models to generate and use evidence in public health remain necessary, a shift in thinking is required to consider the conditions that drive system change. From this perspective, the focus shifts from whether interventions work to fix problems, to how they contribute to reshaping a system in intended ways and to establishing the conditions in which change can emerge (Nobles et al., 2021; Rosas, 2017; Rutter et al., 2017). This requires rethinking research design, methods, tools and application.

Greatest progress in addressing population inactivity levels is likely to occur through interventions that are effective in promoting PA, implemented at scale considering local circumstances, and fully embedded or institutionalized in existing structures or systems that ensure their maintenance and sustainability (Reis et al., 2016). Successful scaling up of PA interventions can be facilitated by the systematic use of appropriate planning and translational frameworks, such as RE-AIM (Glasgow et al., 2019). This framework, which, as the acronym suggests, incorporates elements of reach, effectiveness, adoption, implementation and maintenance, has been recommended to improve the applicability (external validity) of the results of evaluations of PA interventions in terms of generalizability and translatability (McGoey et al., 2016; Reis et al., 2016). Scaling up can also be assisted by drawing on the best available evidence from both the traditional evidence-based practice (i.e., researcher-led interventions where randomized control trials are deemed to yield “definitive” evidence) and the practice-based evidence (i.e., evidence from evaluations of practitioner-developed real-world interventions) pathways (Ogilvie et al., 2020; Reis et al., 2016). In fact, the latter, in the form of natural experiments, is often the only way to generate meaningful evidence regarding population health and complex interventions (e.g., whole-of-school programs, public policies). Natural experimental designs should be embraced along with diverse types of qualitative and quantitative evidence from pragmatic, yet robust, evaluations of interventions/programs that can help adjust the compass bearing of existing policy by reducing critical uncertainties about what can be done to influence population behavior patterns (Ogilvie et al., 2020). The UK Medical Research Council has published guidance for developing and evaluating complex interventions which recognizes the wide range of useful

designs beyond randomized controlled trials (Skivington et al., 2021). When using this guidance, it is important to keep in mind that evaluation designs should be informed by the intervention itself (Jago et al., 2023). The guidance is consistent with the notion that the complex evidence needed to guide public health action is not necessarily the same as that needed to provide an unbiased estimate of an effect size (Ogilvie et al., 2020). For example, considerations relative to the feasibility, acceptability and translatability of an intervention, as well as those stemming from cost-benefit analyses, are likely to be taken into consideration by decision makers, alongside those pertaining to the evidence for effectiveness, when deciding whether to allocate funds to the intervention or not.

Realist evaluation and synthesis principles and techniques have shown promise to help us understand not only if interventions/programs work, but also how, for whom and in what circumstances (Cardon & Salmon, 2020; Jagosh, 2019). Central to this theory-driven approach is the focus on identifying causal linkages between context (the necessary conditions for an intervention to trigger mechanisms), mechanisms (what is it about a particular intervention that leads to a particular outcome in a given context) and outcomes (the practical effects produced by causal mechanisms being set off in a given context). Evaluators identify context-mechanism-outcome configurations to test and refine an emerging theory to explain whether an intervention works and how/why it works (Pawson & Tilley, 1997). Therefore, realist evaluation methods are well suited to help us understand context, a key and largely ignored contributing factor to the effectiveness of school-based PA interventions that has multiple interactive impacts (Jago et al., 2023). Realist principles could be used in combination with several mixed methods strategies to integrate quantitative and qualitative data which offer researchers “a world of possibilities” to understand in greater depth the often-complex topics under study (Pluye et al., 2018). Finally, a co-creation approach in which there is an equitable partnership between the target group, stakeholders and researchers is also believed to take the complex influence of real-world factors into account to bridge the implementation gap. Currently, in line with an assets model previously highlighted, researchers are advancing in providing principles and recommendations on how to apply co-creation in health promotion research (Leask et al., 2019) and in developing an evidence-based co-creation methodology (Verloigne et al., 2023), which will be beneficial for school PA research as well.

Conclusions

There is consensus that urgent action is needed to address the inactivity pandemic that affects children around the world, and that schools represent an ideal setting for intervention as they reach the majority of children, who spend a substantial amount of time in this setting. We believe that the greatest progress is likely to occur through interventions that are effective in changing the system, rather than focusing on the individual, and leveraging existing strengths and available resources. In this paper, we argue that a systems approach, in combination with an asset-based perspective, provides a useful conceptual foundation for the design of effective school-based PA interventions, support for their implementation at scale, and a framework for evaluation that is sensitive to context. Yet, evidence of this is limited. Overreliance on traditional research methods and designs will not yield the evidence required to advance the field. To improve the status quo, we offer several recommendations. These include focusing on the conditions that drive

system change; drawing on the best available evidence from both evidence-to-practice and practice-to-evidence methods; using appropriate planning and translational frameworks; adopting a realist view aiming to understand what works, for whom and under what contextual circumstances, and why; and engaging with relevant stakeholders, including the students, by means of participatory co-creation strategies. A paradigm shift from the fragmented intervention to a whole-of-school approach is also necessary to achieve meaningful change over the next decades.

Acknowledgements

The authors would like to acknowledge the contributions of the following members of the 2PASS-4Health team: Lionel Dubertrand, Sonia Asún-Dieste, Hisham Bachouri, Nathan Fattoretti, Eduardo Generelo. Furthermore, we would like to acknowledge the case study examples provided in this position paper: Sigue la Huella, Mouv'à l'école and the Active School Flag.

Disclosure statement

No potential conflict of interest was reported by the author(s).

Funding

Promoting Physical Activity at Secondary Schools for Health (2PASS-4Health), Erasmus+ Sport Project N°622733-EPP-1-2020-1-FR-SPO-SCP

ORCID

E. García Bengoechea  <http://orcid.org/0000-0003-2899-8047>

C. Grady  <http://orcid.org/0000-0002-9411-9066>

J. Mota  <http://orcid.org/0000-0001-7571-9181>

References

- Agdal, R., Midtgård, I. H., & Meidell, V. (2019). Can asset-based community development with children and youth enhance the level of participation in health promotion projects? A qualitative meta-synthesis. *International Journal of Environmental Research and Public Health*, 16(19), 3778. <https://doi.org/10.3390/ijerph16193778>
- Allender, S., Owen, B., Kuhlberg, J., Lowe, J., Nagorcka-Smith, P., Whelan, J., Bell, C., & Carpenter, D. O. (2015). A community based systems diagram of obesity causes. *Public Library of Science One*, 10(7), e0129683. <https://doi.org/10.1371/journal.pone.0129683>
- Antonovsky, A. (1996). The salutogenic model as a theory to guide health promotion1. *Health Promotion International*, 11(1), 11–18. <https://doi.org/10.1093/heapro/11.1.11>
- Aubert, S., Barnes, J. D., Abdeta, C., Abi Nader, P., Adeniyi, A. F., Aguilar-Farias, N., Andrade Tenesaca, D. S., Bhawra, J., Brazzo-Sayavera, J., Cardon, G., Chang, C. K., Delisle Nyström, C., Demetriou, Y., Draper, C. E., Edwards, L., Emeljanovas, A., Gába, A., Galaviz, K. I., , and Tremblay, M. S. (2018). Global matrix 3.0 physical activity report card grades for children and youth: Results and analysis from 49 countries. *Journal of Physical Activity & Health*, 15(s2), S251–S273. <https://doi.org/10.1123/jpah.2018-0472>

- Bassett, D. R., Fitzhugh, E. C., Heath, G. W., Erwin, P. C., Frederick, G. M., Wolff, D. L., Welch, W. A., & Stout, A. B. (2013). Estimated energy expenditures for school-based policies and active living. *American Journal of Preventive Medicine*, 44(2), 108–113. <https://doi.org/10.1016/j.amepre.2012.10.017>
- Baugh Littlejohns, L., Near, E., McKee, G., Rasali, D., Naiman, D., & Faulkner, G. (2023). A scoping review of complex systems methods used in population physical activity research: Do they align with attributes of a whole system approach? *Health Research Policy and Systems*, 21(18). <https://doi.org/10.1186/s12961-023-00961-3>
- Bernal, C., Lhuisset, L., Fabre, N., & Bois, J. (2021). Promouvoir l'activité physique à l'école primaire pour les enfants de milieux défavorisés: enjeux, constats et propositions de leviers d'intervention efficaces. *Recherches & Éducatives [En ligne]*, 22, mis en ligne le, consulté le 26 février 2024. <https://doi.org/10.4000/rechercheseducations.11053>
- Boonekamp, G. M., Dierx, J. A., & Jansen, E. (2021). Motivating students for physical activity: What can we learn from student perspectives? *European Physical Education Review*, 27(3), 512–528. <https://doi.org/10.1177/1356336X20970215>
- Borde, R., Smith, J. J., Sutherland, R., Nathan, N., & Lubans, D. R. (2017). Methodological considerations and impact of school-based interventions on objectively measured physical activity in adolescents: A systematic review and meta-analysis. *Obesity Reviews: An Official Journal of the International Association for the Study of Obesity*, 18(4), 476–490. <https://doi.org/10.1111/obr.12517>
- Cardon, G., & Salmon, J. (2020). Why have youth physical activity trends flatlined in the last decade? Opinion piece on “Global trends in insufficient physical activity among adolescents: A pooled analysis of 298 population-based surveys with 1.6 million participants” by Guthold et al. *Journal of Sport and Health Science*, 9(4), 335–338. <https://doi.org/10.1016/j.jshs.2020.04.009>
- Centers for Disease Control and Prevention. (2023). Whole School, Whole Community, Whole Child (WSCC).
- Dadaczynski, K., Jensen, B. B., Viig, N. G., Sormunen, M., von Seelen, J., Kuchma, V., & Vilaça, T. (2020). Health, well-being and education. *Health Education*, 120(1), 11–19. <https://doi.org/10.1108/HE-12-2019-0058>
- Daly-Smith, A., Quarmby, T., Archbold, V. S. J., Corrigan, N., Wilson, D., Resaland, G. K., Bartholomew, J. B., Singh, A., Tjomsland, H. E., Sherar, L. B., Chalkley, A., Routen, A. C., Shickle, D., Bingham, D. D., Barber, S. E., van Sluijs, E., Fairclough, S. J., & McKenna, J. (2020). Using a multi-stakeholder experience-based design process to co-develop the creating active schools framework. *The International Journal of Behavioral Nutrition and Physical Activity*, 17(1), 13. <https://doi.org/10.1186/s12966-020-0917-z>
- Davey, C., & Lundy, L. (2011). Towards greater recognition of the right to play: An analysis of article 31 of the UNCRC. *Children & Society*, 25(1), 3–14. <https://doi.org/10.1111/j.1099-0860.2009.00256.x>
- Dobbins, M., Husson, H., DeCorby, K., & LaRocca, R. L. (2013). School-based physical activity programs for promoting physical activity and fitness in children and adolescents aged 6 to 18. *Cochrane Database of Systematic Reviews*, 2013(2), Cd007651. <https://doi.org/10.1002/14651858.CD007651.pub2>
- Gamble, A., Chatfield, S. L., Cormack, M. L., Jr., & Hallam, J. S. (2017). Not enough time in the day: A qualitative assessment of in-school physical activity policy as viewed by administrators, teachers, and students. *The Journal of School Health*, 87(1), 21–28. <https://doi.org/10.1111/josh.12464>
- Gelius, P., Messing, S., Goodwin, L., Schow, D., & Abu-Omar, K. (2020). What are effective policies for promoting physical activity? A systematic review of reviews. *Preventive Medicine Reports*, 18, 101095. <https://doi.org/10.1016/j.pmedr.2020.101095>
- Glasgow, R. E., Harden, S. M., Gaglio, B., Rabin, B., Smith, M. L., Porter, G. C., Ory, M. G., & Estabrooks, P. A. (2019). RE-AIM planning and evaluation framework: Adapting to new science and practice with a 20-year review. *Frontiers in Public Health*, 7, 64. <https://doi.org/10.3389/fpubh.2019.00064>

- Global Advocacy Council for Physical Activity, & International Society for Physical Activity and Health. (2010). The Toronto Charter for physical activity: A global call for action. *Journal of Physical Activity & Health*, 7(Suppl 3), S370–385. <https://doi.org/10.1123/jpah.7.s3.s370>
- Guthold, R., Stevens, G. A., Riley, L. M., & Bull, F. C. (2020). Global trends in insufficient physical activity among adolescents: A pooled analysis of 298 population-based surveys with 1.6 million participants. *The Lancet Child & Adolescent Health*, 4(1), 23–35. [https://doi.org/10.1016/S2352-4642\(19\)30323-2](https://doi.org/10.1016/S2352-4642(19)30323-2)
- Haerens, L., De Bourdeaudhuij, I., Maes, L., Cardon, G., & Deforche, B. (2007). School-based randomized controlled trial of a physical activity intervention among adolescents. *The Journal of Adolescent Health: Official Publication of the Society for Adolescent Medicine*, 40(3), 258–265. <https://doi.org/10.1016/j.jadohealth.2006.09.028>
- Houltberg, B. J., Scales, P. C., & Williams, J. (2023). Developmental relationships: The roots of positive youth development - 10 years of youth voice, practitioner wisdom, and research insights—A search institute position paper.
- International Society for Physical Activity and Health. (2020). Ispah's eight investments that work for physical activity.
- Jago, R., Salway, R., House, D., Beets, M., Lubans, D. R., Woods, C. B., & de Vocht, F. (2023). Rethinking children's physical activity interventions at school: A new context-specific approach [Perspective]. *Frontiers in Public Health*, 11. <https://doi.org/10.3389/fpubh.2023.1149883>
- Jagosh, J. (2019). Realist synthesis for public health: Building an ontologically deep understanding of how programs work, for whom, and in which contexts. *Annual Review of Public Health*, 40(1), 361–372. <https://doi.org/10.1146/annurev-publhealth-031816-044451>
- Jones, M., Defever, E., Letsinger, A., Steele, J., & Mackintosh, K. A. (2020). A mixed-studies systematic review and meta-analysis of school-based interventions to promote physical activity and/or reduce sedentary time in children. *Journal of Sport and Health Science*, 9(1), 3–17. <https://doi.org/10.1016/j.jshs.2019.06.009>
- Koorts, H., Eakin, E., Estabrooks, P., Timperio, A., Salmon, J., & Bauman, A. (2018). Implementation and scale up of population physical activity interventions for clinical and community settings: The PRACTIS guide. *The International Journal of Behavioral Nutrition and Physical Activity*, 15(1), 51. <https://doi.org/10.1186/s12966-018-0678-0>
- Lakerveld, J., Woods, C., Hebestreit, A., Brenner, H., Flechtner-Mors, M., Harrington, J. M., Kamphuis, C. B. M., Laxy, M., Luszczynska, A., Mazzocchi, M., Murrin, C., Poelman, M., Steenhuis, I., Roos, G., Steinacker, J. M., Stock, C. C., van Lenthe, F., Zeeb, H., Zukowska, J., & Ahrens, W. (2020). Advancing the evidence base for public policies impacting on dietary behaviour, physical activity and sedentary behaviour in Europe: The policy evaluation network promoting a multidisciplinary approach. *Food Policy*, 96, 101873. <https://doi.org/10.1016/j.foodpol.2020.101873>
- Leask, C. F., Sandlund, M., Skelton, D. A., Altenburg, T. M., Cardon, G., Chinapaw, M. J. M., De Bourdeaudhuij, I., Verloigne, M., Chastin, S. F. M., & on behalf of the GrandStand, S. S., & Teenage Girls on the Move Research, G. (2019). Framework, principles and recommendations for utilising participatory methodologies in the co-creation and evaluation of public health interventions. *Research Involvement and Engagement*, 5(1): 2. <https://doi.org/10.1186/s40900-018-0136-9>
- Lee, J. A., & Welk, G. J. (2019). Association between comprehensive school physical activity program implementation and principal support. *Health Promotion Practice*, 22(2), 257–265. <https://doi.org/10.1177/1524839919862767>
- Love, R., Adams, J., & van Sluijs, E. M. F. (2019). Are school-based physical activity interventions effective and equitable? A meta-analysis of cluster randomized controlled trials with accelerometer-assessed activity. *Obesity Reviews*, 20(6), 859–870. <https://doi.org/10.1111/obr.12823>
- Martin-Kerry, J., McLean, J., Hopkins, T., Morgan, A., Dunn, L., Walton, R., Golder, S., Allison, T., Cooper, D., Wohland, P., & Prady, S. L. (2023). Characterizing asset-based studies in public health: Development of a framework. *Health Promotion International*, 38(2). <https://doi.org/10.1093/heapro/daad015>

- McCuaig, L., Quennerstedt, M., & Macdonald, D. (2013). A salutogenic, strengths-based approach as a theory to guide HPE curriculum change. *Asia-Pacific Journal of Health, Sport and Physical Education*, 4(2), 109–125. <https://doi.org/10.1080/18377122.2013.801105>
- McDonald, N. C., Steiner, R. L., Lee, C., Rhoulac Smith, T., Zhu, X., & Yang, Y. (2014). Impact of the safe routes to school program on walking and bicycling. *Journal of the American Planning Association*, 80(2), 153–167. <https://doi.org/10.1080/01944363.2014.956654>
- McGoey, T., Root, Z., Bruner, M. W., & Law, B. (2016). Evaluation of physical activity interventions in children via the reach, efficacy/effectiveness, adoption, implementation, and maintenance (RE-AIM) framework: A systematic review of randomized and non-randomized trials. *Preventive Medicine*, 82, 8–19. <https://doi.org/10.1016/j.ypmed.2015.11.004>
- McMullen, J. M., Kallio, J., & Tammelin, T. H. (2022). Physical activity opportunities for secondary school students: International best practices for whole-of-school physical activity programs. *European Physical Education Review*, 28(4), 890–905. <https://doi.org/10.1177/1356336X221092281>
- Milton, K., Cavill, N., Chalkley, A., Foster, C., Gomersall, S., Hagstromer, M., Kelly, P., Kolbe-Alexander, T., Mair, J., McLaughlin, M., Nobles, J., Reece, L., Shilton, T., Smith, B. J., & Schipperijn, J. (2021). Eight investments that work for physical activity. *Journal of Physical Activity & Health*, 18(6), 625–630. <https://doi.org/10.1123/jpah.2021-0112>
- Mittelmark, M. B., & Bauer, G. F. (2017). The meanings of salutogenesis. In M. B. Mittelmark, S. Sagy, M. Eriksson, G. F. Bauer, J. Pelikan, B. Lindontrom, & G. Arild Aspnes (Eds.), *The handbook of salutogenesis* (pp. 7–13). Springer.
- Morgan, A., & Ziglio, E. (2007). Revitalising the evidence base for public health: An assets model. *Promotion & Education*, 14(Suppl 2), 17–22. <https://doi.org/10.1177/10253823070140020701x>
- Murillo Pardo, B., Julián Clemente, J. A., García González, L., Bengoechea, E. G., & Generelo Lanaspá, E. (2019). Development of the ‘Sigue la Huella’ physical activity intervention for adolescents in Huesca, Spain. *Health Promotion International*, 34(3), 519–531. <https://doi.org/10.1093/heapro/day005>
- Naylor, P. J., & McKay, H. A. (2009). Prevention in the first place: Schools a setting for action on physical inactivity. *British Journal of Sports Medicine*, 43(1), 10–13. <https://doi.org/10.1136/bjism.2008.053447>
- Nettlefold, L., McKay, H. A., Warburton, D. E., McGuire, K. A., Bredin, S. S., & Naylor, P. J. (2011). The challenge of low physical activity during the school day: At recess, lunch and in physical education. *British Journal of Sports Medicine*, 45(10), 813–819. <https://doi.org/10.1136/bjism.2009.068072>
- Ng, K. W., McHale, F., Cotter, K., O’Shea, D., & Woods, C. (2019). Feasibility study of the secondary level active school flag programme: Study protocol. *Journal of Functional Morphology and Kinesiology*, 4(1), 16. <https://doi.org/10.3390/jfkm4010016>
- Nobles, J. D., Radley, D., & Mytton, O. T. (2021). The action scales model: A conceptual tool to identify key points for action within complex adaptive systems. *Perspectives in Public Health*, 142(6), 328–337. <https://doi.org/10.1177/17579139211006747>
- Ogilvie, D., Adams, J., Bauman, A., Gregg, E. W., Panter, J., Siegel, K. R., Wareham, N. J., & White, M. (2020). Using natural experimental studies to guide public health action: Turning the evidence-based medicine paradigm on its head. *Journal of Epidemiology and Community Health*, 74(2), 203. <https://doi.org/10.1136/jech-2019-213085>
- Pawson R., and Tilley N. (1997). *Realistic evaluation*. Sage.
- Pesce, C., Faigenbaum, A. D., Goudas, M., & Tomporowski, P. (2017). Coupling our plough of thoughtful moving to the star of children’s right to play: From neuroscience to multisectoral promotion. In R. Meeusen, S. Schaefer, P. Tomporowski, & R. Bailey (Eds.), *Physical activity and educational achievement* (pp. 247–274). Routledge.
- Pesce, C., Masci, I., Marchetti, R., Vazou, S., Sääkslahti, A., & Tomporowski, P. D. (2016). Deliberate play and preparation jointly benefit motor and cognitive development: Mediated and moderated effects. *Frontiers in Psychology*, 7, 349–349. <https://doi.org/10.3389/fpsyg.2016.00349>
- Peters, D. H. (2014). The application of systems thinking in health: Why use systems thinking? *Health Research Policy and Systems*, 12(1), 51. <https://doi.org/10.1186/1478-4505-12-51>

- Pluye, P., Bengoechea, E. G., Granikov, V., Kaur, N., & Tang, D. L. (2018). A world of possibilities in mixed methods: Review of the combinations of strategies used to integrate qualitative and quantitative phases, results and data. *International Journal of Multiple Research Approaches*, 10(1), 41–56. <https://doi.org/10.29034/ijmra.v10n1a3>
- Reis, R. S., Salvo, D., Ogilvie, D., Lambert, E. V., Goenka, S., & Brownson, R. C. (2016). Scaling up physical activity interventions worldwide: Stepping up to larger and smarter approaches to get people moving. *The Lancet*, 388(10051), 1337–1348. [https://doi.org/10.1016/s0140-6736\(16\)30728-0](https://doi.org/10.1016/s0140-6736(16)30728-0)
- Rodrigo-Sanjoaquín, J., Corral-Abós, A., Aibar Solana, A., Zaragoza Casterad, J., Lhuisset, L., & Bois, J. E. (2022). Effectiveness of school-based interventions targeting physical activity and sedentary time among children: A systematic review and meta-analysis of accelerometer-assessed controlled trials. *Public Health*, 213, 147–156. <https://doi.org/10.1016/j.puhe.2022.10.004>
- Rosas, S. R. (2017). Systems thinking and complexity: Considerations for health promoting schools. *Health Promotion International*, 32(2), 301–311. <https://doi.org/10.1093/heapro/dav109>
- Rutter, H., Cavill, N., Bauman, A., & Bull, F. (2019). Systems approaches to global and national physical activity plans. *Bulletin of the World Health Organization*, 97(2), 162–165. <https://doi.org/10.2471/blt.18.220533>
- Rutter, H., Savona, N., Glonti, K., Bibby, J., Cummins, S., Finegood, D. T., Greaves, F., Harper, L., Hawe, P., Moore, L., Petticrew, M., Rehfuss, E., Shiell, A., Thomas, J., & White, M. (2017). The need for a complex systems model of evidence for public health. *The Lancet*, 390(10112), 2602–2604. [https://doi.org/10.1016/s0140-6736\(17\)31267-9](https://doi.org/10.1016/s0140-6736(17)31267-9)
- Sagy, S. (2014). Preventing drug abuse among children and adolescents: Where does the salutogenic approach direct us? *Health*, 6(7), 8, Article 43640. <https://doi.org/10.4236/health.2014.67073>
- Sallis, J. F., Cervero, R. B., Ascher, W., Henderson, K. A., Kraft, M. K., & Kerr, J. (2006). An ecological approach to creating active living communities. *Annual Review of Public Health*, 27(1), 297–322. <https://doi.org/10.1146/annurev.publhealth.27.021405.102100>
- Sevil, J., García-González, L., Abós, Á., Generelo, E., & Aibar, A. (2019). Can high schools Be an effective setting to promote healthy lifestyles? Effects of a multiple behavior change intervention in adolescents. *Journal of Adolescent Health*, 64(4), 478–486. <https://doi.org/10.1016/j.jadohealth.2018.09.027>
- SHAPE America. (n.d.). *Comprehensive school physical activity program. What is CSPAP?* <https://www.shapeamerica.org/MemberPortal/cspap/what.aspx#:~:text=A%20CSPAP%20reflects%20strong%20coordination,and%20family%20and%20community%20engagement>
- Skivington, K., Matthews, L., Simpson, S. A., Craig, P., Baird, J., Blazeby, J. M., Boyd, K. A., Craig, N., French, D. P., McIntosh, E., Petticrew, M., Rycroft-Malone, J., White, M., & Moore, L. (2021). A new framework for developing and evaluating complex interventions: Update of medical research council guidance. *BMJ: British Medical Journal*, 374, n2061. <https://doi.org/10.1136/bmj.n2061>
- Stewart, O., Moudon, A. V., & Claybrooke, C. (2014). Multistate evaluation of safe routes to school programs. *American Journal of Health Promotion: AJHP*, 28(3 Suppl), S89–96. <https://doi.org/10.4278/ajhp.130430-QUAN-210>
- Storey, K. E., Montemurro, G., Flynn, J., Schwartz, M., Wright, E., Osler, J., Veugelers, P. J., & Roberts, E. (2016). Essential conditions for the implementation of comprehensive school health to achieve changes in school culture and improvements in health behaviours of students. *BMC Public Health*, 16(1), 1133. <https://doi.org/10.1186/s12889-016-3787-1>
- United Nations., & Children's Rights Alliance. (2013). *The United Nations convention on the rights of the child*. The United Nations convention on the Rights of the Child, University of Wales Press.
- van Sluijs, E. M. F., Ekelund, U., Crochemore-Silva, I., Guthold, R., Ha, A., Lubans, D., Oyeyemi, A. L., Ding, D., & Katzmarzyk, P. T. (2021). Physical activity behaviours in adolescence: Current evidence and opportunities for intervention. *The Lancet*, 398(10298), 429–442. [https://doi.org/10.1016/s0140-6736\(21\)01259-9](https://doi.org/10.1016/s0140-6736(21)01259-9)
- Verloigne, M., Altenburg, T., Cardon, G., Chinapaw, M., Dall, P., Deforche, B., Giné-Garriga, M., Lippke, S., Papadopoulos, H., Pappa, D., Sandlund, M., Schreier, M., Wadell, K., & Chastin, S.

- (2023). Making co-creation a trustworthy methodology for closing the implementation gap between knowledge and action in health promotion: The health CASCADE project. *Perspectives in Public Health*, 143(4), 196–198. <https://doi.org/10.1177/17579139221136718>
- Webster, C. A., Beets, M., Weaver, R. G., Vazou, S., & Russ, L. (2015). Rethinking recommendations for implementing comprehensive school physical activity programs: A partnership model. *Quest*, 67(2), 185–202. <https://doi.org/10.1080/00336297.2015.1017588>
- Wolfenden, L., McCrabb, S., Barnes, C., O'Brien, K. M., Ng, K. W., Nathan, N. K., Sutherland, R., Hodder, R. K., Tzelepis, F., Nolan, E., Williams, C. M., & Yoong, S. L. (2022). Strategies for enhancing the implementation of school-based policies or practices targeting diet, physical activity, obesity, tobacco or alcohol use. *Cochrane Database Systematic Reviews*, 8(8), Cd011677. <https://doi.org/10.1002/14651858.CD011677.pub3>
- Wolfenden, L., Mooney, K., Gonzalez, S., Hall, A., Hodder, R., Nathan, N., Yoong, S., Ditton, E., Sutherland, R., Lecathelinais, C., & McCrabb, S. (2022). Increased use of knowledge translation strategies is associated with greater research impact on public health policy and practice: An analysis of trials of nutrition, physical activity, sexual health, tobacco, alcohol and substance use interventions. *Health Research Policy and Systems*, 20(1), 15. <https://doi.org/10.1186/s12961-022-00817-2>
- Woods, C. B., Volf, K., Kelly, L., Casey, B., Gelius, P., Messing, S., Forberger, S., Lakerveld, J., Zukowska, J., & Bengoechea, E. G. (2021). The evidence for the impact of policy on physical activity outcomes within the school setting: A systematic review. *Journal of Sport and Health Science*, 10(3), 263–276. <https://doi.org/10.1016/j.jshs.2021.01.006>
- World Health Organization. (2017). *The double burden of malnutrition*. <https://who.int/publications/i/item/WHO-NMH-NHD-17.3>
- World Health Organization. (2018). *Global action plan on physical activity 2018–2030: More active people for a healthier world*. <https://iris.who.int/bitstream/handle/10665/272722/9789241514187-eng.pdf?sequence=1>
- World Health Organization. (2022). *Systems thinking for noncommunicable disease prevention policy: Guidance to bring systems approaches into practice*. WHO Regional Office for Europe. <https://iris.who.int/bitstream/handle/10665/357174/WHO-EURO-2022-4195-43954-61946-eng.pdf?sequence=1>
- World Health Organization, & United Nations Educational Scientific and Cultural Organisation. (2020). *Report of the first virtual meeting of the External Advisory Group (EAG) for the development of global standards for health promoting schools and their implementation guidance*. <https://www.who.int/publications/i/item/9789240011069>