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Editorial

Implementation Science for Sustainable School Physical Activity Across Education Systems

Ciencia de la implementación para una actividad física escolar sostenible en diversos sistemas educativos

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Key points

- School physical activity mandates require implementation support to achieve equitable and sustained participation.
- Evaluation should address reach, adoption, fidelity, adaptation, cost, equity, and maintenance alongside effectiveness.
- Scalable approaches need clearly defined core functions, context-responsive delivery, local leadership, and actionable feedback.
- Chile's 60-minute law offers a policy case for international learning about whole-of-school physical activity.

Physical inactivity among children and adolescents is a global implementation problem. In 2016, 81.0% of school-going adolescents aged 11-17 years did not meet recommended activity levels, and comparative report cards from 57 countries continue to show weak performance and marked variation across indicators and settings^{1,2}. Research therefore addresses only part of the policy challenge when it focuses on whether a school-based intervention can work. Education systems also need to know whether schools adopt it, whether staff can embed it in routine practice, whether it reaches students who face the greatest barriers, what support and resources it requires, and whether it continues after initial funding ends.

Schools are uniquely placed to address this problem because they reach diverse populations every day and bring together educational, health, and community actors. The World Health Organization therefore recommends a whole-of-school approach that combines quality physical education, active recess, classroom movement, active travel, extracurricular opportunities, supportive school policies, and community engagement³. Evidence, however, is heterogeneous. A meta-analysis of school-based interventions with accelerometer-measured outcomes found no significant increase in whole-day moderate-to-vigorous physical activity, whereas a review of school policies identified favourable effects for classroom activity, recess, the physical environment, and active travel^{4,5}. This variation shows that real-world effects depend on exposure, contextual fit, and implementation quality.

Reviews of school-based physical activity interventions have linked implementation levels to outcomes and identified persistent problems with adoption, fidelity, and, especially, sustainability under routine practice conditions^{6,7}. Even when interventions are delivered at scale, reporting on representativeness, the characteristics of adopting and non-adopting settings, and long-term maintenance remains inconsistent⁸. Without implementation data, an intervention may appear ineffective because it

was not delivered at the intended dose, or successful while reaching only schools with greater organisational capacity.

Implementation science examines methods and strategies that promote the systematic uptake of evidence-informed interventions, programmes, and policies in routine practice⁹. Its outcomes include acceptability, adoption, appropriateness, feasibility, fidelity, cost, and sustainability¹⁰. The Consolidated Framework for Implementation Research (CFIR) identifies determinants related to the innovation, individuals, inner and outer settings, and the implementation process¹¹. The Reach, Effectiveness, Adoption, Implementation, and Maintenance (RE-AIM) framework structures evaluation across those five dimensions, while the PRACTical planning for Implementation and Scale-up (PRACTIS) guide prompts teams to characterise the system, engage stakeholders, and anticipate barriers before scaling^{8,12}. These frameworks are not universal recipes. Their value lies in making critical implementation questions explicit before effectiveness outcomes are interpreted.

Cross-system transfer requires viewing each school as an organisation nested within a broader education system. What can be implemented depends on whether governance and curricula are centralised or decentralised, how staff are prepared and employed, which outcomes are prioritised, and how infrastructure, connectivity, resources, school calendars, and accountability operate. The same programme may therefore require different delivery arrangements across countries and within them. Evaluation should pair a small common set of indicators with contextual evidence that explains why implementation trajectories differ.

An evaluation roadmap for physical activity and nutrition interventions recommends minimum indicators and alignment between evaluation and the stage of a programme's life cycle¹³. This approach supports cross-country comparison without assuming that contexts are equivalent. Adoption, for example, can be measured consistently at the school and staff levels, while the reasons for adoption or non-adoption should be interpreted in relation to local governance, capacity, and resources. Indicators must also be useful to schools and education authorities, rather than collected only for research reports.

Transferability also requires distinguishing core functions from adaptable forms. A core function might be to create frequent and meaningful opportunities for movement during the school day; its delivery form might include active lessons, classroom breaks, recess, active travel, or a locally feasible combination. Guidance on adapting complex population health interventions recommends systematic decisions informed by evidence and stakeholder participation, together with documentation of what changed and why¹⁴. This distinction helps avoid both rigid replication of trial conditions and uncontrolled modification that removes the intervention's mechanism of action. **Table 1** proposes a minimum dataset that school physical activity initiatives can use from design through maintenance. The purpose is to support a learning system with a limited number of timely and actionable measures, not to create additional bureaucracy.

Implementation should not depend on individual teacher motivation. Reviews report recurring barriers related to time, resources, competing priorities, skills, and organisational support¹⁵. Evidence also supports combining senior leadership with a school-based champion or facilitator¹⁶. Yet appointing a champion without protected time, legitimacy, or access to decision-makers merely relocates responsibility. Leadership must be shared among education authorities, school leaders, teachers, support staff, students, and community partners in ways that reflect each system's governance.

Policy mandates can create legitimacy, expectations around time, and accountability, but legal strength alone does not ensure delivery. Across jurisdictions, school physical activity policies differ in scope and enforcement, and their effects vary by setting and policy component⁵. Systems risk symbolic compliance when they count planned minutes, distributed materials, or available spaces without establishing whether students participate regularly, safely, and meaningfully. The distinction between

policy adoption and implementation is relevant wherever governments introduce daily activity requirements or whole-of-school strategies.

Table 1. Minimum implementation dataset for school physical activity initiatives.

Dimension	Key question	Minimum indicator	Implementation response
Reach and equity	Who participates and who is missed?	Schools, classes, students, and relevant subgroups reached; reasons for exclusion	Disaggregate by sex and gender, disability or SEN, socioeconomic position, language or ethnicity, grade, and geography; address barriers to access
Adoption	Which organisations and staff initiate delivery?	Proportion and profile of authorities, schools, classes, and staff adopting the initiative	Reduce start-up burden, align with policy and curricular priorities, and secure leadership commitment
Fidelity and adaptation	What is delivered and what is changed?	Frequency, duration, delivery of core functions, adaptations, and reasons for change	Distinguish core functions from adaptable forms, document modifications, and use formative implementation feedback
Feasibility, cost, and experience	Can it be delivered acceptably and affordably?	Student and staff experience, time, training, infrastructure, support, and cost per school or student	Match support to local capacity; provide accessible, offline, or low-technology options when needed
Maintenance and scale	Does it continue and become routine?	Use at 6 and 12 months; integration into plans, roles, budgets, and support systems	Build local capacity, institutionalise review and budgeting, and plan a sustainable level of external support

Notes: SEN = special educational needs.

Chile's Law No. 21,778 provides a timely case. It promotes at least 60 minutes of games, physical activity, or sport throughout the school day from early childhood education to the end of secondary school. Implementation will begin in 2027 for early childhood education and Grades 1-4, followed in 2028 by Grades 5-12. These minutes do not replace physical education, and the law requires equal participation and necessary accessibility adjustments for students with disabilities, students on the autism spectrum, or those with special educational needs¹⁷. Because the mandate covers public and private institutions across a geographically and socially diverse country, it creates an important policy-learning opportunity. Its broader value will depend on documenting how implementation varies across territories, governance arrangements, resource levels, and student groups.

Lessons are most transferable at the level of implementation functions rather than specific delivery models. National and regional authorities need clear guidance, stable financing, training infrastructure, and improvement-oriented monitoring. Intermediate organisations, such as districts, municipalities, local education services, or school trusts, should coordinate implementation support and facilitate learning across schools. At the school level, physical activity needs to be embedded in management and curricular plans, with clearly assigned responsibilities and a feasible combination of strategies. Measurement burden should remain proportionate, particularly in resource-constrained settings. Where connectivity or access to devices is limited, digital tools should be complemented by accessible low-technology alternatives, alongside appropriate safeguards for privacy, data protection, and technical continuity.

Clases Activas, developed in Chile, illustrates one possible delivery model. It uses curriculum-linked, video-guided active breaks lasting 5-7 minutes, delivered twice daily for 12 weeks and accompanied by teacher orientation, a manual, and teaching materials. Its multicentre trial protocol has been published, and one analysis reported improved motor competence among schoolchildren with special educational needs^{18,19}. These findings establish programme-specific evidence in Chile; they do not by themselves establish transferability to other education systems.

The next phase should examine which schools and staff adopt the programme, how often it is used, which adaptations occur, who participates less, what support is required, how much implementation costs, and which conditions sustain use. Comparative pilots should test curricular and linguistic adaptation, cultural acceptability, accessibility, and digital and offline delivery in urban and rural settings. The implementation model should specify core functions and adaptable forms and include an initial diagnosis, brief repeatable training, a local champion, light-touch monitoring, actionable feedback, peer learning, and decision-oriented reports for schools.

An international research agenda should prioritise pragmatic hybrid effectiveness-implementation studies that examine student outcomes and implementation under routine practice conditions²⁰. Common outcomes can support learning across jurisdictions: physical activity, well-being, classroom climate, and learning should be examined alongside reach and equity, adoption, fidelity and adaptation, costs, and maintenance. Multilevel analyses should account for heterogeneity among schools and systems. Qualitative research can explain why settings with similar resources follow different trajectories, and economic evaluation can show whether the support required for scale is affordable.

The success of school physical activity policy should not be judged by the number of minutes written into law or the number of programmes made available, but by whether education systems create regular, safe, meaningful, inclusive, and sustainable opportunities for students to move. Chile provides a timely policy case, yet the implementation challenges it faces are shared internationally. Combining common implementation measures with context-responsive adaptation can help translate policy commitments into routine practice while creating opportunities for education systems to learn from one another. **Figure 1** synthesizes this implementation science pathway, illustrating how policy and evidence can be translated into sustainable school physical activity through context-responsive implementation, evaluation, and continuous learning.

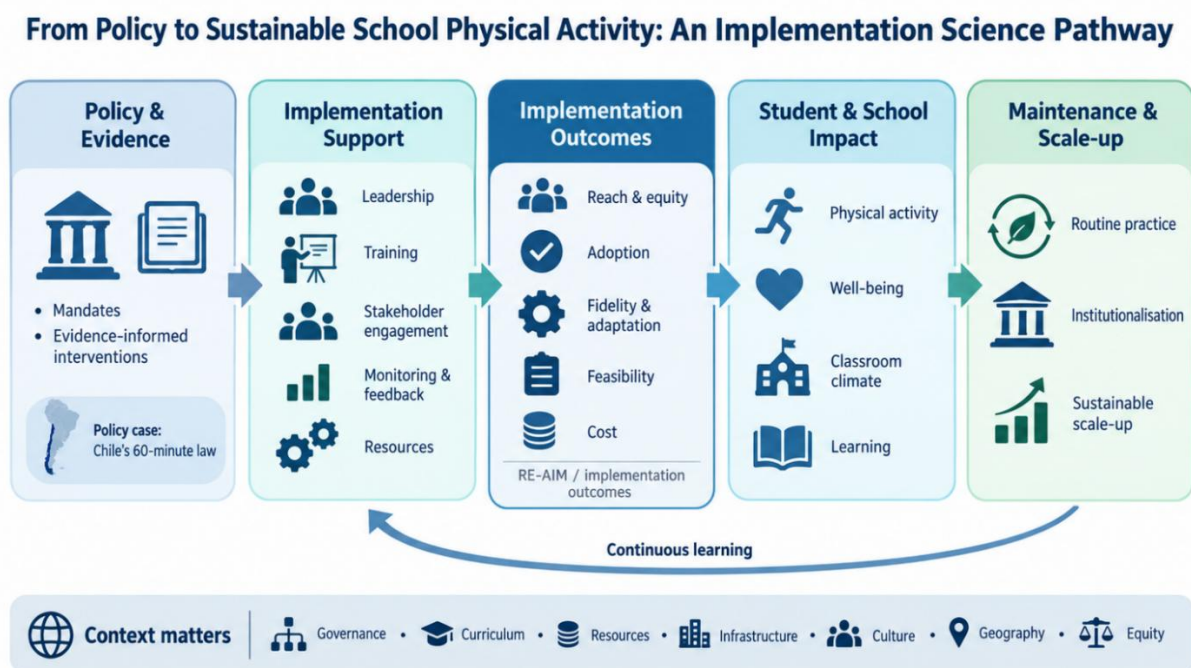


Figure 1. Implementation framework linking school physical activity policies to sustainable outcomes.

Notes: Context-sensitive implementation, continuous monitoring, and feedback support equitable reach, adoption, fidelity, appropriate adaptation, and the sustained integration and scale-up of school physical activity.

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Author Contributions

R.Z.-L. and A.R.-C.: Conceptualisation; Investigation; Writing - original draft; Writing - review and editing; Approval of the final version.

Conflict of Interest

Rafael Zapata-Lamana is the principal investigator and a co-developer of Clases Activas and participates in its technology-transfer process. This relationship could be perceived as an institutional and potentially financial competing interest. The recommendations in this editorial are academic and grounded in the cited literature.

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