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Co-creation of the logic model for a health-promoting school program in vulnerable areas in a Brazilian capital: *ProMOVE Escolas + Saudáveis*

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Abstract

Background Although the World Health Organization recommends the Health-Promoting School (HPS-WHO) as a fundamental strategy for health promotion, school-based public health programs grounded in implementation science are still rare, especially in socially vulnerable areas. Considering the co-creation process of the implementation foundations (i.e., logic model, LM) of new interventions is relevant to enhancing acceptability and sustainability in different contexts and resource conditions. We aimed to describe the co-create process of the LM of a school health-promoting program among public schools from socially vulnerable areas in a large municipality in Brazil.

Methods This study followed the co-creation process of the program's LM considering three main stages: planning, conducting and evaluating, and final validation. The Program's LM was structured based on the *Implementation Research LM* (determinants, implementation strategies, mechanisms, and outcomes). The planning stage considered five strategies, using theoretical, evidence, and practice-based information. Stakeholders were invited by personal contacts, including researchers, teachers, managers, health professionals, undergraduate students, and recent school graduates. After the thematic analysis and consensus for the first version of the situational analysis and LM's elements, a second workshop was conducted. The final version of the Program's LM was validated by stakeholders who participated in the workshops and approved the version through consensus and scoring.

Results Four HPS-WHO documents, ten systematic reviews on the implementation of HPS-WHO programs, a survey with 121 stakeholders, eight meetings with school managers, and a 2-h workshop with 17 stakeholders supported the development of the first version of the situational analysis with 35 themes and the Program's LM. The final version of the Program's LM and elements were approved by 13 stakeholders, with scores of 4.7 points or higher. The final LM included 15 determinants, four core strategies, three mechanisms, and three outcome domains.

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Conclusions After an interactive, multi-strategic, and multi-stakeholder process to co-create the LM, it may be used to guide the implementation and evaluation process of a public health program in all full-time public schools in the fifth most populous municipality in Brazil, in areas with very low Human Development Indexes. This highlights the essential role of cross-sectoral collaboration in strengthening primary health care through school-based strategies.

Keywords School health services, Health promotion, Resource-limited settings, Regional health planning, Implementation science, Stakeholder participation, Methodological studies

Background

Health promotion in school settings has been widely recognized as a fundamental strategy for improving the well-being and holistic development of children and adolescents, as a key component of both education and primary health care systems [1]. In establishing the Health-Promoting School (HPS) framework, the World Health Organization (WHO) emphasizes the need to integrate health into the daily school routine by strengthening policies, practices, and partnerships that foster healthier and more equitable educational environments [2, 3]. Although several school-based intervention studies have been conducted [4, 5], evidence on how these interventions work on a large scale (i.e., as sustained programs across school systems) remains unclear. One reason is the lack of study designs grounded in implementation science that adopts a system-based approach and considers local specificities and long-term sustainability [6, 7]. This constitutes one of the major gaps in school health promotion research and practice [8, 9].

To ensure consistent implementation and sustainability of programs, well-designed, robust plans and tools should be structured. One essential component for successful implementation is the logic model (LM). LM is a visual and systematic representation of how an intervention is intended to operate, including inputs, mechanisms, outputs, and outcomes, as well as the factors influencing its success [10, 11]. Smith et al. [10] suggest that an LM is necessary for the effective planning, implementation, and evaluation of interventions because it provides a solid foundation in the implementation process and ensures both rigor and reproducibility. The LM for Implementation Research, proposed by the authors, was created to increase transparency in describing the complex processes of improving the adoption of evidence-based interventions in health service delivery systems and health policy. For instance, the HPS-WHO's implementation guide emphasizes that LM is one of the key initial steps in developing HPS initiatives and a collaborative tool for aligning priorities, goals, and strategies with the school community [3].

Evidence shows that the absence of a well-structured program (including the LM approach) can result in major implementation failures and insufficient outcome measurements, especially in complex interventions in the real-world setting [10–12]. Therefore, developing LM for

new interventions is critical and should be performed considering strategies that address evidence and practical information, including situational analysis (e.g., SWOT matrix), evidence mapping, and participatory workshops with stakeholders [3, 10, 11].

One of the most promising approaches for participatory model development is co-creation—a strategy for designing public health solutions aligned with the needs and priorities of their intended users [13, 14]. Messiha et al. [15] defined co-creation as a comprehensive principle involving collaborative and innovative problem-solving among diverse stakeholders across the phases of an initiative—from problem identification to evaluation. By engaging diverse stakeholders and contexts, co-creation fosters the development of feasible and acceptable strategies applicable across diverse settings [16]. The collaborative development with stakeholders and users—including teachers, students, managers, health professionals, and school community members—is essential for creating more acceptable, successful, and sustainable intervention programs [13, 16, 17].

While co-design studies have been conducted [17], few studies reported in detail on the co-creation of LMs in school settings. For instance, Longworth et al. [18] identified 54 intervention studies using co-creation to plan or evaluate public health programs—however, only six were school-based interventions. Moreover, children and adolescents from low- and middle-income countries (LMIC) and vulnerable areas face significant health challenges, such as school and community violence, food insecurity, and lack of safe spaces for physical activity [19, 20]. However, evidence from public health interventions in LMICs is still scarce [21]. De Boer et al. [22] reviewed co-creation processes in school-based public health interventions and found only ten studies addressing this topic—just two were conducted in LMIC. Similarly, Tinner et al. [23] conducted a realist review of 22 community mobilization intervention studies addressing adolescent risk behaviors, but only two took place in LMICs (Mexico and Chile). Filling these research and practice gaps is crucial for the global health agenda, because it may help to guide school-based interventions that aim for large-scale implementation and effectiveness, particularly in contexts marked by health inequities [19]. In such settings, participatory approaches are particularly important because they enhance contextual relevance, foster

community ownership, and increase the likelihood of sustainable health improvements.

This study aims to describe the co-create process of the LM for an intervention program designed to strengthen school health promotion in full-time public schools from socially vulnerable areas in the capital of a Brazilian state.

Methods

Context and theoretical foundation of the program

The program will be implemented in Fortaleza, the capital of the state of Ceará, located in Northeastern Brazil. The city has a population of approximately 2.43 million (the fifth most populous municipality in Brazil) and an area of 312 square kilometers. Fortaleza had a Human Development Index (HDI) of 0.754, ranking 19th among the 27 Brazilian capitals [24]. In 2025, 33 Full Time Municipal Schools were operating across six administrative areas from the municipality, enrolling approximately 11,000 students from 6 to 9th grades (elementary education). Notably, these schools are in neighborhoods with HDIs ranging from 0.135 to 0.491, classified as very low HDI [24]. The program will be implemented in this school network as a collaborative initiative between the Municipal Department of Education, the Municipal Department of Health of Fortaleza, Ceará State University, and other academic and funding institutions. All information and program materials are accessible via the official website: <https://promove-escolas-saudaveis.com.br>.

The initiative is part of a hybrid effectiveness-implementation study, aiming to strengthen policies, programs, and actions for school health promotion. This research design was selected for two main reasons. First, although multicomponent school programs in Brazil have shown promise in improving lifestyle indicators, several implementation challenges persist, including low acceptability, fidelity issues, and inconsistencies across schools and stakeholders [25–27]. Therefore, designing an implementation science-driven program is a pressing need for large-scale strategies. Second, a hybrid effectiveness-implementation design allows greater flexibility in how, where, and by whom the intervention is implemented and received, thus maximizing its public health impact [28, 29].

The program is also grounded in the HPS-WHO framework [2, 3]. This model outlines political and organizational actions to enable schools to fulfill their potential in improving the health of children, adolescents, staff, families, and the surrounding community. Schools joining the program are expected to adopt the HPS framework through the integration of key standards, engaging various stakeholders and strategies during the health promotion initiative.

Study design, phases, and ethical aspects

The activities described in this study were conducted between December 2023 and January 2025. The implementation phase of the program within the school system is scheduled for 2025–2027, as mentioned in the research protocol (Brazilian Clinical Trials Registry, identifier: RBR-9dbk25m Registration date: April 3, 2025).

This study was approved by the Research Ethics Committee of Ceará State University (Approval Number: 6.844.517; CAAE: 77,285,324.8.0000.5534) in accordance with the Declaration of Helsinki. All participants aged 18 years or older signed an informed consent form. Audio recordings and written notes were authorized by participants, and all analyses were conducted ensuring the confidentiality of personal data.

This report follows the *Guidance for Reporting Intervention Development Studies in Health Research* (GUIDED, see Supplementary Material 1) [30]. The participatory research approach was framed according to the PRODUCES model (Problem, Objective, Design, end-users, Co-creators, Evaluation, and Scalability. See Supplementary Material 2). The co-creation process was guided by interactive procedures structured in three main phases: planning, implementation and evaluation, and final validation of the program's LM. These steps align with recommendations by Leask et al. [16] for co-creating public health interventions through theoretical (HPS-WHO model), scientific evidence (systematic reviews), and participatory practice (stakeholder engagement) grounding, as detailed in Fig. 1.

Phase 1 – Planning the program's LM

The planning phase for the co-creation of the program's LM integrated five key strategies. This phase occurred over the years 2023 and 2024.

The first strategy consisted of a theoretical analysis of institutional documents addressing the HPS-WHO framework documents on the implementation guidance [3], indicators [2], success country cases [31], and specific approaches (e.g., experts' perception of the implementation process) [1, 32]. These documents were analyzed carefully to extract information on strategies needed to guide policy, governance, school health services, and school routine practices—along with the contextual determinants that shape implementation at both school and system levels.

The second strategy focused on evidence synthesis. Systematic and scoping reviews on school-based interventions based on the HPS-WHO framework were consulted and analyzed [4, 33–37]. Key strategies and findings were searched to identify evidence of both intervention effectiveness and implementation challenges, such as acceptability, feasibility, and stakeholder engagement.

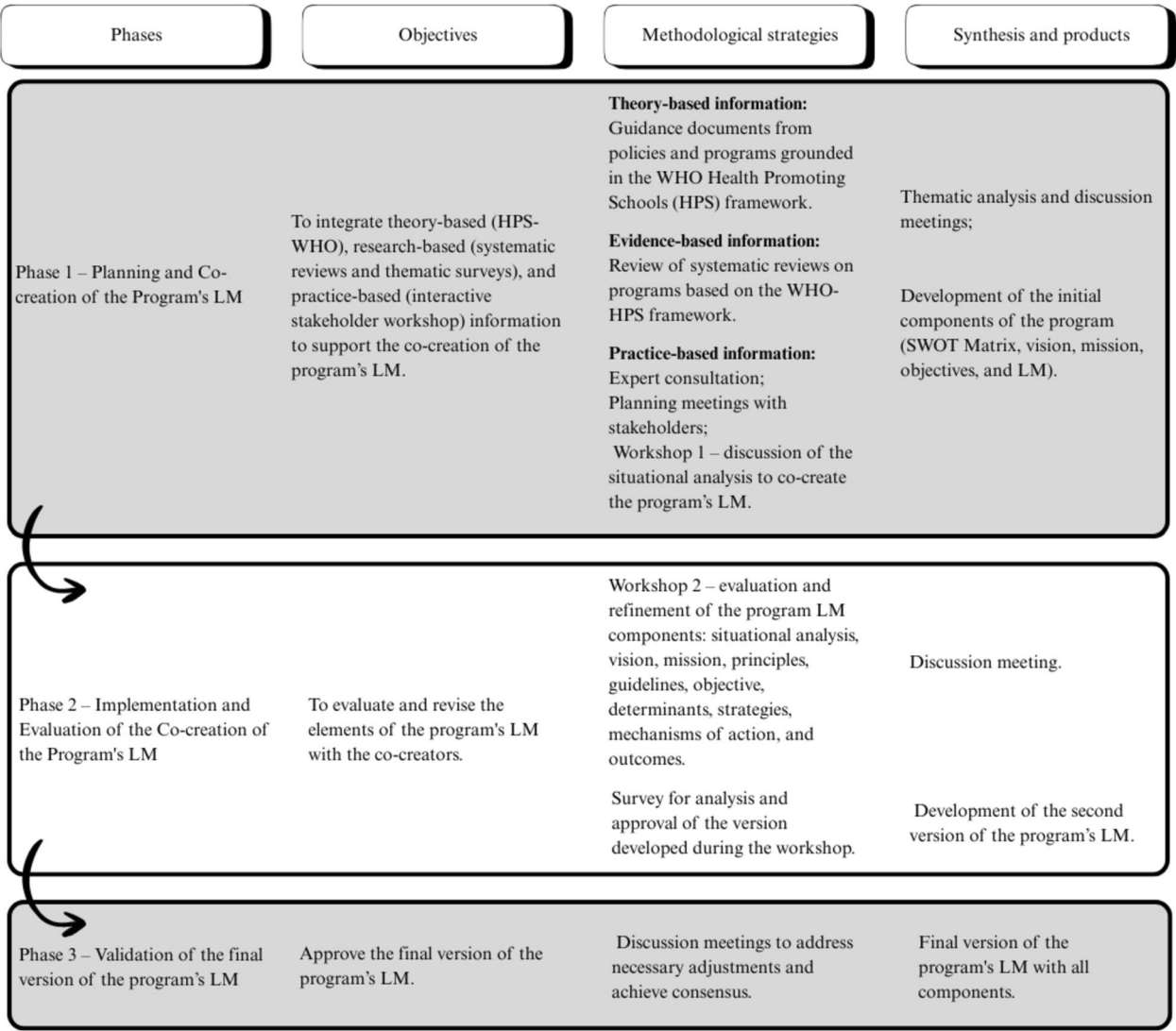


Fig. 1 Co-creation phases of the program's logic model (LM), including objectives, methodological strategies, and outputs for each phase. Note: LM = logic model; HPS-WHO = Health-Promoting School—World Health Organization; SWOT = Analyze of strengths, weaknesses, opportunities, and threats

The third strategy was a survey with Brazilian stakeholders, who evaluated the acceptability and feasibility of various school health promotion actions—the results of the survey were published elsewhere [38]. A total of 121 participants (15 education and health managers, 23 researchers, 37 schoolteachers, and 46 health professionals) assessed 36 proposed actions aligned with the HPS-WHO framework and identified key barriers and facilitators for their large-scale implementation.

The fourth strategy involved eight in-person planning meetings (from November 2023 to January 2024) with education managers and technical teams from the municipal school network. Each meeting lasted approximately two hours and followed a guided script to explore stakeholder knowledge, needs, challenges, and implementation possibilities for a school health promotion

program. Field notes were taken by the lead researcher and subsequently reviewed with stakeholders.

The fifth strategy was a four-hour workshop that was conducted in October 2024. This session aimed to gather diverse stakeholders (see participants in Supplementary Material 3) to discuss challenges and opportunities for adequate implementation through situational analysis, as a necessary step in developing the program's LM [3]. Members of the research team and other school stakeholders were invited via telephone contact, including researchers specializing in school health and intervention programs, teachers, school administrators, health professionals, and undergraduate students involved in school-based health actions. Participants were selected by convenience sampling due to their experience with school health programs from various perspectives, their availability to attend the workshop, and they engage in

different sectors alignment with HPS-WHO guidelines [2, 3].

The workshop was facilitated by the lead researcher of this study, who served as the discussion moderator and initiated the guiding questions. All participants were informed of their equal status within the group and their responsibility to contribute ideas. The entire session was recorded with participant consent for later transcription and analysis (see Supplementary Material 5).

The workshop was structured in three segments. The first stage consisted of a presentation on the eight dimensions of the HPS-WHO framework and the roles of various school stakeholders. In the second stage, participants were presented with a preliminary list of 17 principles and guidelines for school health promotion, based on the WHO framework [2, 3] and Brazilian government documents [39–42] (see Supplementary Material 4). Using the prompt question “Which principles should be prioritized to guide school health promotion in our context?”, participants selected the most relevant principles either from the provided list or from their own perspectives. Using a digital word cloud tool (<https://www.mentimeter.com>), the most frequently chosen principles were subsequently discussed in terms of their importance and implementation challenges in school health promotion. In the third stage, participants reviewed and discussed the elements of the situational analysis (vision, mission, principles, guidelines, objectives, and the SWOT matrix) [3, 43] and the preliminary LM, including determinants, intervention strategies, mechanisms of action, and outcomes [10]. Four discussion groups were formed, each with participants from different school backgrounds and one member from the research team. The central guiding question was presented: “Is it possible to implement a program focused on strengthening school health promotion actions, based on HPS-WHO principles, at scale and with effectiveness?” Each group created a mind map (using poster boards and markers) outlining the SWOT Matrix that informed their responses and were to be considered in constructing the LM [10, 43]. The workshop concluded with each group presenting the main elements discussed in response to the guiding question, as illustrated by their mind maps.

Thematic synthesis of the initial version of the program's LM

The content extracted from these five strategies was summarized through a process of convergence in a thematic analysis [44]. The themes were triangulated in discussions and meetings with members of this research (the lead researcher and four PhD-level professionals with experience in school health research and practice) until discursive recurrence was reached, which allowed for the drafting of the first version of the Program's LM.

Therefore, this phase was concluded with the first version of the elements: the program's situational analysis (SWOT matrix, mission, vision, principles, guidelines, and objective) [10, 43] and LM. For the latter, the structure and content of the program's LM followed the model proposed by the *Implementation Research LM* [10]: implementation determinants, implementation strategies, mechanisms of action, and outcomes. This approach may guide the design, implementation, and evaluation of the program, which is a valuable tool of the HPS-WHO initiative [5], enabling comparability across countries and strengthening the evidence base for policy and practice.

Phase 2 – Conducting and evaluating of the program's LM

The first version of the Program's situational analysis and LM were evaluated and discussed in a second workshop, performed in November 2024 with a duration of four hours. The same participants from the first workshop were invited to this session, which was also conducted by the same researcher, who mediated the discussions through initial questioning and facilitation (see participants in Supplementary Material 3).

The workshop was structured into four stages. The first stage consisted of analysis and discussion of the content of the first version of the SWOT matrix, which was organized using a digital tool (<https://www.canva.com/>) and accessed on computers during the workshop. Participants were asked whether the SWOT matrix adequately represented the values necessary for school health promotion programs and whether it was suitable for comprehension by other school stakeholders. In the second stage, the principles and guidelines discussed in the first workshop were reviewed and discussed by participants, who provided suggestions to improve the clarity and precision of these elements. In the third stage, participants also discussed and improved the initial version of the program's vision, mission, principles, guidelines, and objective. Participants were then encouraged to offer suggestions and reflections based on this content and to consider how it would influence the operation of a school health promotion program in the given context. Finally, the fourth stage involved the analysis of the first version of the LM. Four groups were organized, corresponding to each element of the LM. Each group discussed and contributed suggestions to improve the written content of the LM elements, which were then presented on a panel and discussed with the other participants. The workshop concluded with presentations by each of the four groups on their respective elements.

The content of the suggestions and discussions (see thematic analyses of the second workshop in Supplementary Material 6) was addressed in a consensus meeting among the research team, to align the modifications in the revised writing of the SWOT matrix and LM

elements. Subsequently, an online survey was sent to the stakeholders to collect their feedback and suggestions for the final version of these elements. For each component, participants answered a closed question (e.g., “Does the mission clearly and objectively reflect the central purpose of the program?”) using a Likert scale from 1 (strongly disagree) to 5 (strongly agree). Additionally, open-ended questions were included to gather qualitative suggestions for improving the final version of each element.

Phase 3 – Validation of the final version of the program’s LM

After the second workshop and stakeholder evaluation, the overall assessment of the elements comprising the program’s LM was considered valid when consensus was reached (100% of stakeholders responded ‘agree’ or ‘strongly agree’). Final suggestions were discussed in meetings held by members of this research (the lead researcher, a PhD-level professional, and master’s Student with experience in school health research and practice) to analyze the relevance of adjustments when necessary.

In the final version, the elements were presented in an illustrative format, following the structured models based on theoretical frameworks [10, 43], and will be made available on the program’s main platforms (website and social media) when appropriate. This phase was concluded in March 2025.

Results

Phase 1 – Planning the program’s LM

The integrative and dynamic process of analyzing, categorizing, and summarizing information based on theory (institutional documents from the HPS-WHO), research (systematic reviews and literature mapping), and practice (interactive workshop with stakeholders) resulted in 35 core themes (numbered according to the sequence in Table 1), which were organized using the SWOT Matrix: nine strengths, ten weaknesses, six opportunities, and ten threats. These themes were derived from the following strategies:

Analysis of HPS-WHO documents (theory-based information)

In total, four institutional documents on the implementation of HPS-WHO were analyzed [2, 3, 31, 32]. From the document that details the indicators and standards of HPS-WHO [2], twenty-one themes were initially extracted. Of these, nine were categorized as potential internal strengths of a program: (1) *the importance of technologies and resources (guides, manuals, practical tools) based on scientific and practical evidence*; (2) *valuing local experiences and practices*; (3) *respect the school-specific differences*; (4) *the need for multidisciplinary teams and interinstitutional partnerships*; (5) *integration*

between schools and universities (teaching and research); (6) *promotion of continuing education*; (7) *the existence of similar programs based on the HPS-WHO framework*; (8) *the pursuit of training to ensure sustainability*; and (9) *the support and interest of local managers*.

Four internal weaknesses were also identified: (11) *limited training and specific technologies for school health*; (13) *insufficient human resources and lack of time for multiple activities*; (16) *limited financial, material, and infrastructure resources*; and (19) *a low number of school health leaders and advocates*.

Five opportunities (external factors) were also extracted: (20) *evidence that HPS-WHO-based interventions show promising results in student health indicators*; (21) *integral education and self-care are core principles of Basic Education*; (22) *partnerships with universities and other institutions frequently occur*; (23) *existing policies encourage continuing education*; and (25) *school health policies and programs are already being implemented*.

Finally, three threats were identified: (26) *the complexity of organizing the school environment to support health care*; (34) *lack of time for multiple governance-related tasks*; and (35) *low perceived competence for governance*.

From the document that outlines the implementation steps of the HPS-WHO [3], 18 themes related to program implementation were extracted, categorized as: seven strengths (1, 4, 5, 6, 7, 8, and 9), four weaknesses (11, 13, 16, and 19), four opportunities (21, 22, 23, and 25), and three threats (26, 34, and 35), which were also addressed in the HPS-WHO indicators document [2].

In the document presenting country case studies of successful HPS-WHO programs [31], 16 themes were initially extracted. Among these, four weaknesses (11, 13, 16, and 19), two opportunities (21 and 23), and one threat (34) were previously mentioned. However, other themes concerning program implementation were found and categorized as additional weaknesses: (10) *lack of large-scale evidence-based school health interventions*; (12) *limited communication and integration between school actors and programs*; (14) *few formal commitments established regarding school health within the school network*; (15) *resistance to new actions from school actors*; (17) *health is rarely considered in school management and planning*; and (18) *lack of systematization of school health actions already carried out*. In addition, four threats were also highlighted: (28) *shortage of government funding allocated to school health*; (32) *prioritization of grades and specific academic subjects*; and (33) *fragile employment ties in schools*.

The WHO document on HPS in Latin American and Caribbean countries [32] yielded 17 themes, including five strengths (1, 2, 3, 4, and 5), six weaknesses (13, 14, 15, 17, 18, and 19), one opportunity (23), and one threat (28) that were previously mentioned. However, this document

Table 1 Summary themes from the situational analysis (strengths, weaknesses, opportunities, and threats) identified across the different strategies used in the first phase of planning and co-creation

Section from the SWOT Matrix	Themes	Phase 1 – Planning and Co-creation of the Program's LM				
		Theory-based information	Evidence-based information	Practice-based information		
	<i>"Is it possible to implement a program at scale and still achieve effectiveness when it is focused on strengthening health promotion actions based on the principles of the WHO Health-Promoting Schools (HPS) framework?"</i>	<i>Institutional documents</i>	<i>Scientific evidence</i>	<i>Stakeholder survey</i>	<i>Meetings with school managers</i>	<i>Workshop 1 with stakeholders</i>
Strengths	1. Development of technologies and resources grounded in scientific evidence and practical experience (HPS-WHO)	4,5,32	11,34,36,37,47		✓	✓
	2. Appreciation of context-specific experiences and practices	4,32	6,36		✓	✓
	3. Respect for contextual differences	4,32	6,36,47		✓	✓
	4. Policies promoting ongoing professional development across sectors	4,5,32	6,11,36,46	✓	✓	✓
	5. Emphasis on training and program sustainability	4,5,32	11,36,37,47	✓	✓	✓
	6. Initial support and interest from the school network and local leadership	4,5	34,36,37	✓	✓	✓
	7. Previous experience with similar programs	4,5		✓	✓	
	8. Multidisciplinary teams and interinstitutional partnerships	4,5	34–37	✓	✓	✓
	9. Stimulation through other university-led initiatives (teaching, outreach, and research)	4,5		✓	✓	✓
Weaknesses	10. Limited evidence of large-scale school health interventions	31	36,46			
	11. Limited training opportunities and specific technologies focused on school health	4,5,31	33,34,46,47	✓		
	12. Restricted communication and integration among school actors and the program	31	6,11,33,34,37	✓		✓
	13. Shortage of human resources and insufficient time for new actions due to the high workload in schools	4,5,31,32	6,11,33,34,36	✓	✓	✓
	14. Few formal commitments established with the school network	31,32	11,46		✓	
	15. Resistance to new actions from school stakeholders	31	11,36,37	✓	✓	✓
	16. Limitations in financial, material, and infrastructure resources	4,5,31,32	6,11,34,47	✓		✓
	17. Health is minimally considered in school management and planning	31,32	11,36	✓		✓
	18. Lack of systematization of existing school health initiatives	31,32	37		✓	
Opportunities	19. Low number of leaders and limited protagonism in school health promotion	4,5,31,32	33,36			✓
	20. Previous interventions have shown promising results in student health	4	6,7,34–37			
	21. Comprehensive education and self-care are recognized principles in Basic Education	4,5,31	6,35–37		✓	✓
	22. Partnerships with universities, institutions, NGOs, etc	4,5	34	✓	✓	✓
	23. Policies that promote continued professional development across sectors	4,5,32	6,11,35–37,47	✓	✓	✓
	24. Investment in and expansion of full-time schools				✓	✓
	25. Ongoing policies and programs focused on school health	4,5,31	36		✓	✓

Table 1 (continued)

Section from the SWOT Matrix	Themes	Phase 1 – Planning and Co-creation of the Program's LM				
		Theory-based information	Evidence-based information	Practice-based information		
Threats	26. School environment does not support health care	4,5	6,11			✓
	27. Lack of coordination between different sectors (Health and Education)	32	37,46	✓	✓	✓
	28. Scarcity of allocated governmental financial resources	31,32	6,11,47	✓		✓
	29. Discontinuity and limited implementation of existing programs	32	34,36		✓	✓
	30. School and social insecurity (violence)	32				✓
	31. Low integration of health topics in school and pedagogical planning		6,11	✓		✓
	32. Prioritization of grades and specific academic subjects	31	6,47	✓		✓
	33. Fragile employment ties within schools	31	6	✓		✓
	34. Lack of time to manage multiple tasks	4,5,31	6,11,33,34,36,47	✓	✓	✓
	35. Limited training and low perceived competence	4,5	6,36,37,49	✓		✓

emphasized three additional threats to program implementation in the region that were not addressed in other documents: (27) lack of coordination between sectors such as Health and Education; (29) discontinuity and limited implementation of existing programs; and (30) school and social insecurity (violence).

Analysis of scientific evidence (evidence-based information)

In total, information from ten evidence syntheses was extracted and analyzed [4, 5, 9, 33–37, 45, 46]. From these studies, 31 out of the 35 previously identified themes were extracted: seven strengths (1, 2, 3, 4, 5, 6, and 8), all ten weaknesses (10, 11, 12, 13, 14, 15, 16, 17, 18, and 19), five opportunities (20, 21, 22, 23, and 25), and nine threats (26, 27, 28, 29, 31, 32, 33, 34, and 35).

Among the strengths, reviews reported that it is noteworthy that intervention programs are based on scientific evidence and practical foundations [9, 34, 36, 37, 46], and there is a recognized need for policies that promote continuing professional training [4, 9, 36, 45] and program sustainability [9, 36, 37, 46]. The weaknesses in the implementation process include limited communication and integration between school stakeholders and the program team [4, 9, 33, 34, 37], and limitations in human resources and lack of time for new actions and the demands of school work [4, 9, 33, 34, 36].

As for external factors, opportunities include that previous programs have shown promising results in student's health [4, 5, 34–37] and existing policies that support continuing professional training across sectors [4, 9, 35–37, 46], thereby increasing the potential for program implementation and effectiveness. The main threats highlighted in the reviews include lack of time to perform multiple tasks in governance and manage services [4, 9, 33, 34, 46], shortage of government financial resources [4,

9, 46], limitations in professional training, and low perceived competence for health actions in schools [4, 36, 37].

Stakeholders' survey, meeting, and workshop (practice-based Information)

The surveys conducted with Brazilian stakeholders highlighted 21 of the 35 themes from the situational analysis (Table 1) [38]: six strengths (4, 5, 6, 7, 8, and 9), six weaknesses (11, 12, 13, 15, 16, and 17), two opportunities (22 and 23), and seven threats (27, 28, 31, 32, 33, 34, and 35). Two main categories were identified for program implementation: (1) *political and governance decisions*; and (2) *the schoolwork process*.

In the first category, the main barriers converged to themes of the lack of material and financial resources in schools (13, 16, and 28), and the lack of motivation, planning, and communication among stakeholders (12, 15, 17, 19, 27, 31, 32, and 35). As possible solutions to improve implementation, stakeholders highlighted the allocation of material and financial resources for health care (23 and 24), strengthening of partnerships and public policies (6, 8, 9, 22, and 23), and improvement in communication, motivation, and stakeholders' knowledge about health (4, 5, 6, and 22). Regarding the work process, the main implementation barriers mentioned were lack of time (31, 32, and 34) and insufficient professional training (11 and 35). Potential facilitators identified included hiring and continuing professional training (4, 5, 6, and 23) and the time and personnel in the school routine for health actions (6 and 7).

Twenty-one of the 35 themes also emerged from the records of in-person meetings with public school system management stakeholders (Table 1): nine strengths (1, 2, 3, 4, 5, 6, 7, 8, and 9), four weaknesses (13, 14, 15, and 18), five opportunities (21, 22, 23, 24, and 25), and three

threats (27, 29, and 34). The themes included the need to establish formal agreements between universities and the school network (6, 8, 14, and 22), and coordinate with existing programs at the university (9 and 18) and health/education national and local systems, such as School Health Program [39] (4, 7, 12, 22, 23, and 25). Most of the themes addressed the implementation process with local autonomy and needs, indicating voluntary adhesion and local actions (2, 3, and 5). Accordingly, some mentioned strategies included distance learning courses with flexible structures (1, 2, 11, 13, 15, and 34), particularly in schools with a diversified curriculum (i.e., full-time schools) (21 and 24). Furthermore, the program should invest in actions and resources (e.g., booklets, guides) to improve communication and coordination with school administrators and teachers (27 and 29).

The first co-creation workshop involved 19 stakeholders with diverse educational backgrounds and professional experiences (see participants in Supplementary Material 3). In summary, the discussions informed 29 themes related to the situational analysis (see Table 1): eight strengths (1, 2, 3, 4, 5, 6, 8, and 9), six weaknesses (12, 13, 15, 16, 17, and 19), six opportunities (21, 22, 23, 24, and 25), and ten threats (26, 27, 28, 29, 30, 31, 32, 33, 34, and 35).

After discussing eight dimensions of the HPS-WHO framework, participants analyzed, voted, and discussed the 17 principles and guidelines that were most important based on the local needs and possibilities. The most frequently chosen were *adaptability* ($f=7$), *education and training* ($f=6$), *inclusion* ($f=6$), *articulation and cooperation* ($f=4$), and *equity and social justice* ($f=4$) (see Supplementary Material 5).

Stakeholders mentioned that adaptability was highlighted as an essential condition for effective program implementation due to the territorial and sociocultural diversity of school contexts. Participants emphasized the need to “*adapt actions, thoughts, contexts, and territories*” so that interventions remain connected to everyday realities. Articulation and cooperation among school staff, families, and the community were seen as both strategic and challenging, given the rigidity and bureaucracy of schools and institutions. As one teacher stated, “*If there isn’t articulation among all stakeholders, it simply won’t work.*”

The participation and protagonism of the school community were also emphasized as vital elements of the school health program, as a culture of integration and mutual recognition for health and education goals. The theme of equity emerged through critiques of the traditional curriculum, viewed as limited and restrictive, as reflected in the statement of one participant: “*Education is liberating. It needs to shake things up and go against the system to really work.*”

Additionally, the training of school professionals was considered a foundation for transformation, especially through investments in Full-Time Schools. However, this was also seen as a point of tension — although training opportunities exist, they are not always accessible to all involved and often do not reflect the realities or needs of local territories/contexts. This reflects both structural and subjective barriers that affect schools. One of the possible solutions suggested was enhanced communication and exchange of experiences: “*When my colleagues access successful experiences, it is a good strategy for professional training.*”

In the third stage of the workshop, participants discussed the dimensions of the SWOT Matrix. Comments on strengths emerged during the discussion (see Supplementary Material 5): innovation, training, partnerships, and interdisciplinarity. Among the weaknesses, participants highlighted issues such as shortages in material and human resources, inadequate infrastructure, negative school climate, and antidemocratic school management. Regarding opportunities, participants identified training programs, social projects, health workshops, and strategic partnerships with NGOs, universities, and the existing programs (School Health Program). Finally, the external threats discussed related to structural and systemic factors, such as violence, lack of resources and spaces in schools, precarious employment conditions, underfunding, hierarchical power relations, fragmentation, and lack of intersectoral cooperation.

Thematic summary of the initial version of the program’s LM

In general, 32 out of the 35 themes that emerged for the situational analysis (See Fig. 2) were derived from theory/evidence-based information and practical-based information. Only one weakness (10) and one opportunity (20) were not identified in the strategies involving school administrators, stakeholders, or the workshop. One opportunity (24) was mentioned only during meetings with school managers and in the workshop but was not reflected in the theoretical foundation or evidence synthesis. These 35 themes composed the situational analysis to be discussed in the second workshop.

In the working group meeting held after the first workshop, the summarization of themes that spanned theoretical, scientific, and practical information was organized into principles and guidelines for the program. The program’s principles (its essential pillars) were defined as: contextualization, community protagonism and participation, equity, and social impact. As for the guidelines, the first version included: Adaptability and flexibility; Articulation and cooperation; and Education and training. This led to the structuring of the first version of the

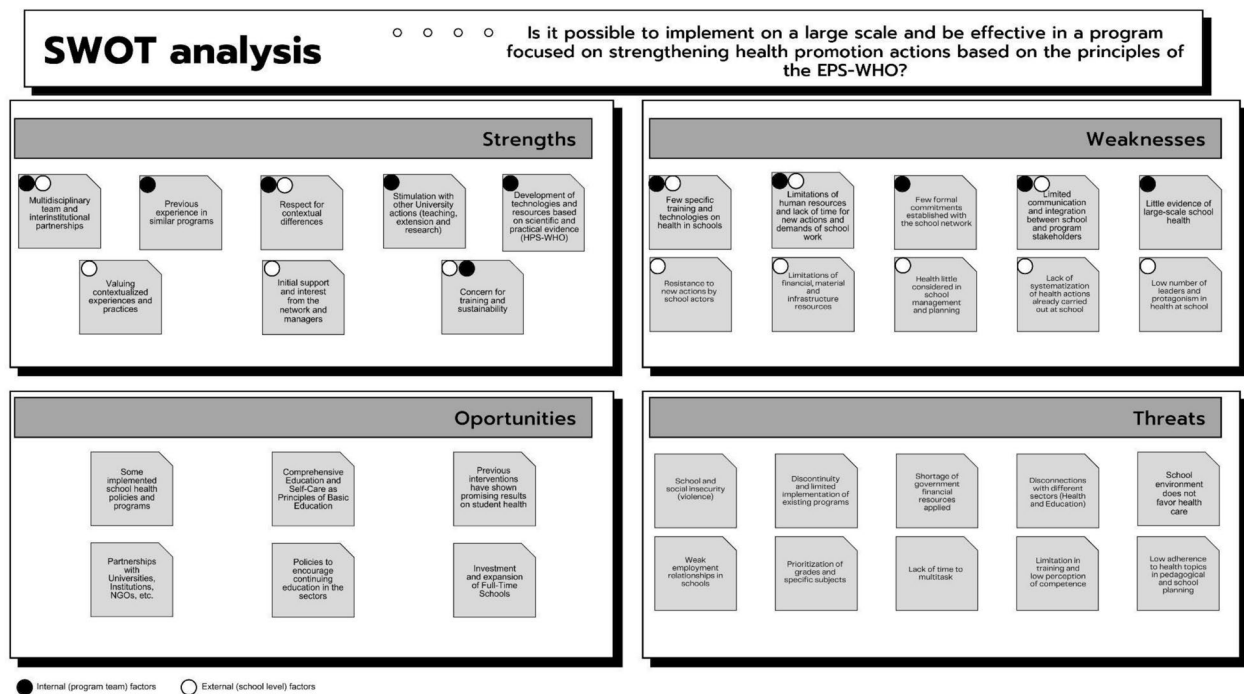


Fig. 2 Final SWOT analysis based on the co-creation process of the *ProMOVE Escolas + Saudáveis* program

program's mission, vision, and objective (see Supplementary Material 7).

The first draft of the mission, vision, and objective were organized for discussion in the second workshop (see Supplementary Material 7). Additionally, the SWOT Matrix themes were mapped to the five levels of implementation determinants outlined in the *Implementation Research LM* [10]: program characteristics, internal factors, external factors, individual characteristics, and processes. They were used in the second workshop. Based on the integration of the principles and guidelines, the program was proposed in four implementation strategies: school health action committees (guided by contextualization and protagonism); teacher and school actor training (guided by the education and training principle); and social and digital technologies (guided by articulation and cooperation, and by equity and social impact). The mechanisms of action and results (implementation process indicators, service indicators, and outcomes in the target population) were not structured in the first version of the PLM, as they were intended to be co-created during the interactions and discussions held in the second workshop.

Phase 2 – Conduction & evaluation of the program's LM

The second co-creation workshop involved 11 stakeholders, all of whom had participated in the first workshop (see participants in Supplementary Material 3). After a welcoming message, the participants were organized into four groups to discuss each element of the SWOT

Matrix. Subsequently, they debated the presented themes and proposed suggestions (modifications, exclusions, or additions).

In general, the content of the SWOT Matrix was extensively discussed during the first workshop. Thus, the changes made to its elements focused on refining the writing (to clarify the themes) and highlighting the relevance and overlap of some topics. For example, certain themes were discussed as influencing both the program's design (strengths) and external factors that affect its potential for large-scale implementation (opportunities). Therefore, these themes were reflected in more than one SWOT dimension in different ways—for example, limitations in resources and the need for training. During the discussions, participants emphasized that these represent both internal and external factors that influence the program's implementation and effectiveness (See Fig. 2).

In addition, adjustments were made to the writing of certain factors to clarify the factor and how it affects the program's implementation—using terms such as “discontinuity,” “few training opportunities,” “lack of,” or “limited.” In the end, the adjustments to the themes in the SWOT Matrix were implemented for presentation in its second version and for the stakeholders' final evaluation.

During the discussion on principles and guidelines, the most relevant and widely discussed terms from the first workshop were presented in a summary (see Supplementary Material 7). The three initial principles and three guidelines were presented based on combinations of terms that emerged as aligned in prior discussions. For

example, “Territorialization and Contextualization” captured both the recognition of community and school territories as powerful assets for health promotion and the importance of respecting specific realities when designing intervention strategies. In the discussion, participants emphasized the value of combining two terms within the description of the principles and values, to reflect their mutual integration—thereby presenting a more robust and comprehensive principle or guideline for an intervention program.

Additionally, participants emphasized the inclusion “Experience Sharing” as one of the relevant principles for the program (see Supplementary Material 7). Furthermore, the importance of “*Innovation and social impact are about how we are going to do things, that is why it is a guideline*.” One participant stated: “*Innovation centered on social impact makes sense as a guideline when it is complemented by the dissemination of experiences*”.

At the end of this stage, participants selected the principles and guidelines to be emphasized (rated with one to three stars) in the program description, based on their relevance to program implementation. As a result, three principles received three stars and stood out: “Adaptability and Flexibility,” “Coordination and Cooperation,” and “Education and Training.” The principle “Experience Sharing” was assigned one star. Two guidelines were identified as primary: “Territory and Contextualization” and “Community Empowerment and Participation,” followed by “Equity and Social Justice” (two stars), and “Innovation and Social Impact” (one star, see Supplementary Material 7).

After that, participants discussed the program’s vision, mission, and objective, modifying the version discussed in the first workshop (see Supplementary Material 7). Overall, the discussions and suggestions emphasized the centrality of school stakeholders in the program. Accordingly, the vision was improved by participants to highlight the role of the school stakeholders: “*environments and school communities that promote healthier lives*.” The mission was also restructured to emphasize the development of competencies within the school community, using action-oriented language. Similarly, this approach was incorporated into the objective, emphasizing both the implementation of actions grounded in the WHO-HPS framework and the achievement of measurable improvements in indicators of a healthy lifestyle. Notably, only in the case of the objective did participants agree to specify the context of the “Full-Time School Network,” as these elements serve as measurable program outcomes (LM).

Lastly, the final part of the second workshop focused on analyzing the initial version of the Program’s LM. Each group added suggestions to the written elements of the LM, followed by discussions with the other workshop

participants. The first groups discussed the determinants (internal and external factors from the SWOT Matrix). They proposed the inclusion of the factors into five categories, based on the LM template [10]: intervention characteristics, internal setting, external setting, individual characteristics, and process-related factors. Of the 35 initially presented, 15 determinants were selected as priorities due to their direct influence on the proposed intervention (see Fig. 3).

The second group presented the program’s four implementation strategies, including suggestions for more detailed descriptions of the technologies and actions for each strategy. Another group presented the expected mechanisms for each implementation strategy, which were discussed and refined by participants for inclusion in the subsequent LM version (see Fig. 3).

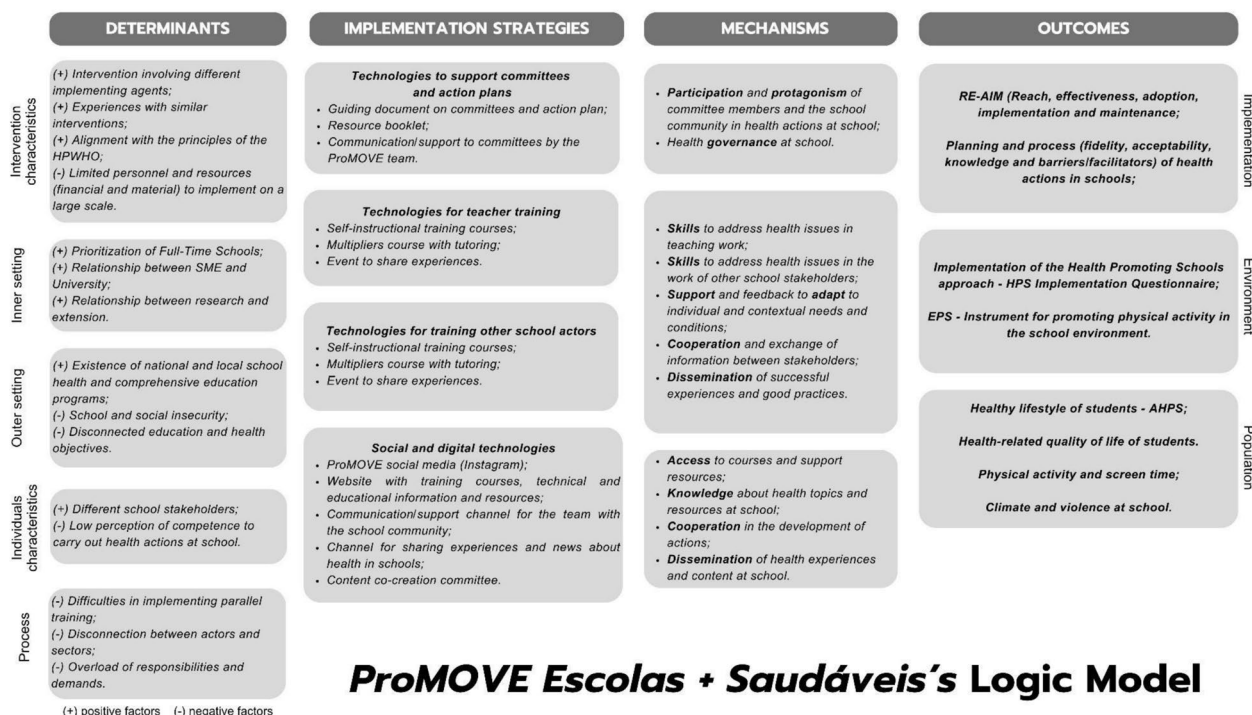
Finally, the last group outlined potential outcomes related to implementation, school environments, and the program’s target population. At this point, participants discussed how indicators based on the RE-AIM framework [47] could be considered to assess public health effectiveness). Additionally, they emphasized the need to evaluate school-level contextual changes using specific tools, such as the WHO-HPS based standards checklists and other instruments aligned with that model. Population-level outcomes may include indicators such as students’ healthy lifestyle behaviors, health-related quality of life, and indicators of school climate and violence (see Fig. 3).

Throughout the second workshop, suggestions and revisions to the SWOT Matrix and LM elements were made concurrently, enabling spontaneous co-creation and advancement toward a final version. Following the workshop, the working group met to refine the wording and formatting of elements for illustrative presentations (visual representations of the final SWOT Matrix and LM) to support the final validation process.

Phase 3 – Validation of the final version of the program’s LM

Thirteen stakeholders participated in the validation survey (Fig. 4). The program’s goals, principles, and LM received 100% agreement among participants, indicating very high validation. Other indicators ranged between “agree” and “strongly agree,” with a final score of 4.6 (SWOT Matrix) or higher (Fig. 4). Only one suggestion was made: change “climate” to environment in one of the threat items in the SWOT matrix (*Previously: School climate does not support health care. Revised: School environment does not support health care*).

The final version of the SWOT Matrix identified eight strengths and ten weaknesses as internal factors of the program. Additionally, six opportunities and ten *threats* were listed as external factors influencing the program



ProMOVE Escolas + Saudáveis's Logic Model

Fig. 3 The final Logic Model (LM) based on the co-creation process of the ProMOVE Escolas + Saudáveis program

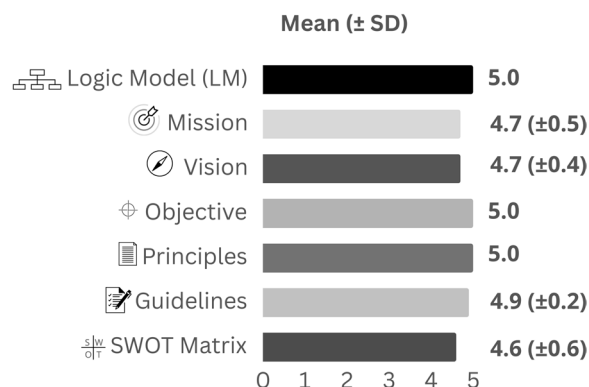


Fig. 4 Indicators of agreement with the final content of the SWOT Matrix and Logic Model (LM). Note: LM=logic model. SWOT=Analyze of strengths, weaknesses, opportunities, and threats

(Fig. 2). The final version of the program's mission, vision, principles, guidelines, and objective were described in Supplementary Material 7).

The final Program's LM included a set of determinants, intervention strategies, mechanisms, and outcomes. The fifteen determinants were grouped into five domains: program characteristics, internal factors, external factors, individual characteristics, and processes. Each item consisted of positive factors, which support the proposal (indicated by a plus sign [+]), and negative factors, which pose barriers to implementation (indicated by a minus sign [-]). In total, eight positive and seven negative determinants were included.

The intervention strategies aligned with the project's core components, as follows: support technologies for committees and action plans; technologies for teacher training; technologies for training other school stakeholders; social and digital technologies. The mechanisms were divided into three sets and aligned with the axes of the intervention. Keywords also present in the situational analysis were highlighted in bold, as follows: participation and empowerment; governance, competencies, support, cooperation, dissemination, access, and knowledge. The outcomes were grouped into three categories: implementation outcomes; environmental outcomes, and population-level outcomes (see Fig. 3).

Discussion

This study detailed an interactive, multi-strategy process involving more than twenty stakeholders (see participants in Supplementary Material 3) of the LM for the ProMOVE Escolas + Saudáveis program. This participatory process enabled the co-creation of a robust and transparent LM outlining the program's implementation determinants, intervention strategies, mechanisms of action, and potential outcomes for promoting health in the school network of the fifth most populous city in Brazil. Furthermore, the participatory development of the situational analysis, principles, guidelines, mission, vision, and objective represent the foundational structure that may support the scaling-up process of the program. Participatory approaches improve the relevance and

adaptability of interventions by involving stakeholders in planning and decision-making. However, these methods can be time- and resource-intensive, require coordination among multiple actors, and may risk unequal participation if some voices dominate [15]. Despite these challenges, their benefits in promoting equity and context-sensitive interventions, particularly in vulnerable settings, outweigh the disadvantages [21].

Although LM is one of the main strategies to guide the implementation of HPS-WHO [3], the development of the program's LM with stakeholders and action agents remains incipient and challenging. De Boer et al. [22] summarized school-based public health interventions employing similar co-creation processes (e.g., interviews, focus groups, co-creation workshops) and highlighted key concerns based on school staff experiences. Firstly, one issue was "competing work roles and responsibilities", which reflected the constant job pressures and lack of time, which limited the staff engagement and motivation in the co-creation processes. However, the experience of "feeling heard" emerged as a vital theme—school staff valued being acknowledged and having their contributions recognized in the co-creation and day-to-day routines [22]. These aspects were also observed in the present study during workshops and stakeholder meetings, where stakeholders reported the multiple responsibilities in the school context and difficulties in articulation and cooperation as key determinants of the program's success. Thus, the benefits of co-creation are optimized when an adaptative, flexible process of program design or implementation is considered. This may help to understand the school-specific challenges and stakeholders' preferences, enhancing the overall effectiveness and cultural sensitivity of the outcomes [17].

The integration of theory, research, practical, and stakeholders' experiences enabled the development of a situational analysis (SWOT matrix) and the identification of key determinants that reflect a broad range of challenges and opportunities for implementation at both the program at the school network and individual level. Notably, stakeholders validated more weaknesses ($n=10$) and threats ($n=10$) than strengths and opportunities, mainly on governance gaps and low cooperation between Education and Health sectors (see Fig. 2). Similarly, Felicio et al. [38] found that school administrators had a lower perception of the acceptability of governance actions (e.g., intersectoral coordination and school health funding). Silva et al. [48] also highlighted intersectionality and intersectionality (among stakeholders in the same school) as key barriers to implementation and sustainability. Given that situational analysis is vital for the strategic planning of programs, the internal and external factors found in the present study may be considered when adapting programs to large, socioeconomically

vulnerable municipalities. The SWOT matrix also served as a communication tool to align understandings among stakeholders from different sectors and contexts (school network managers, individual school leaders, and the school community), thus helping to inform implementation adjustments and improve outcomes [10–12].

To address the identified challenges, strategic actions were proposed involving community empowerment, teacher, and staff training, and intersectoral cooperation (see Fig. 3). Professional training is a well-documented intervention strategy—previous school-based training programs have shown promising impacts on student health outcomes [4, 5, 34–37]. Similarly, the co-creation process of the Creating Active Schools Framework included 50 stakeholders from the UK and emphasized the primary role of training in boosting capacity, motivation, and opportunity to support whole-school physical activity [49]. Furthermore, while the education and health sectors promote continuing education policies for professionals [9, 46], stakeholders still perceive the need for better professional development programs [4, 9, 36, 45], and to improve health promotion competencies to address health topics in the school curriculum [4, 36, 37].

The stakeholders voted for an LM with strategies on school committees and action plans, which allows that voices of the different school stakeholders to be included not only during LM development but also throughout the decision-making process. This is essential for school health promotion programs aiming to reduce health inequities [22], as it helps identify context-specific needs and align actions with local priorities and capacities [3, 19]. This was reinforced by Tinner et al.'s realist review of 22 community mobilization interventions (some involving school-family-community linkages), which highlighted that the interventions for reducing adolescents' multiple-risk behaviors succeed when they are supported by strong, diverse groups of experts and community members [23].

Stakeholders considered relevant to include strategies to support school stakeholders in a collaborative climate in the health promotion process, by including strategies on social and digital technologies. By centering on these strategies and mechanisms of action, the program can generate resources (guides, manuals, practical tools) that foster a culture of integration and mutual recognition among school stakeholders, thus supporting the creation of a positive school climate for health [1, 2]. Consequently, the program's potential to achieve contextual and individual-level outcomes is enhanced, aligning with expected results from hybrid effectiveness-implementation interventions [11, 12].

This study offers important implications for health policies and practice. First, the LM and co-produced elements can serve as implementation tools for the next

phases of the program and local school health services. The core team, municipal managers, and school-level teams may use these products to identify local implementation determinants, tailor strategies to specific realities, and define and assess relevant outcomes. Moreover, similar health promotion programs may consider this LM to guide planning discussions and consensus activities tailored to socially vulnerable contexts. This would foster the regional and local advancement of the HPS-WHO framework by elucidating both commonalities and local variations of the current LM and other programs.

Research implications are also evident. School health-promoting programs increasingly adopt co-creation methodologies [50, 51], but this approach remains rare in low- and middle-income countries [21, 22]. Programs intended for scale in socially vulnerable contexts must adopt similarly participatory and iterative design processes. This is a key contribution—and challenge—for global health including health systems and policy planning, as complex interventions require methodological rigor and transparency to overcome issues of limited reproducibility [11, 12].

One limitation of this study was the absence of direct participation by elementary school students — only younger undergraduate students were included. This gap may weaken future implementation since student engagement is essential to ensure relevance, acceptance, and impact [18]. We hope that student participation in school action committees during the program implementation mitigates this limitation. Also, future research could explore additional co-creation cycles with greater representation of students and families, amplifying the voices of vulnerable groups (e.g., people with disabilities and families with diverse compositions) in school decision-making and action.

Conclusions

The present study conducted an interactive, multi-strategic, and multi-stakeholder process to co-create the LM and core planning elements—including situational analysis, mission, vision, principles, guidelines, and objective—of the ‘ProMOVE Escolas + Saudáveis’ program. This participatory design, grounded in implementation science, stakeholder engagement, and evidence-informed planning, yielded a robust and contextually adapted LM aligned with the HPS-WHO framework to guide the implementation and evaluation process across all public full-time schools in one of Brazil’s most populous cities.

These program elements are particularly valuable in the vulnerable contexts because they consider strategies to be contextually relevant, foster stakeholder engagement, and increase the likelihood of sustainable health improvements. They are not only tools to guide the implementation and evaluation of the ‘ProMOVE Escolas + Saudáveis’

program but also addresses gaps in school health promotion, offering a potential approach for low- and middle-income countries with similar sociocultural aspects, where schools play a critical role in promoting health and equity. Thus, the findings underscore the importance of participatory, context-sensitive methods to enhance the effectiveness and sustainability of public health interventions in vulnerable communities.

Supplementary Information

The online version contains supplementary material available at <https://doi.org/10.1186/s12875-025-03054-y>.

Supplementary Material 1: MS1 - GUIDE Checklist. MS2 – PRODUCES checklist: Co-creation model of the program’s LM. MS3 - Detailed description of the stakeholders involved in the co-creation process. MS4 - Principles and guidelines that were considered in Workshop 1. MS5 - Thematic synthesis and comments from the stakeholders who participated in Workshop 1. MS6 - Thematic synthesis and comments from the stakeholders who participated in Workshop 2. MS7 Mission, Vision and Objectives of the program during the phases of the co-creation process

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Data availability

All data generated or analysed during this study are included in this published article [and its supplementary information files].

Declarations

Ethics approval and consent to participate

This study was approved by the Research Ethics Committee of Ceará State University (Approval Number: 6.844.517; CAAE: 77285324.8.0000.5534) in accordance with the Declaration of Helsinki. All participants aged 18 years or older signed an informed consent form. Audio recordings and written notes were authorized by participants, and all analyses were conducted ensuring the confidentiality of personal data.

Consent for publication

Not applicable.

Competing interests

The authors declare no competing interests.

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