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Original quantitative research

School- and intervention-related factors associated with institutionalization of health promotion interventions in elementary schools

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Abstract

Introduction: Long-term availability of health-promoting interventions (HPIs) in school settings can translate into health benefits for children. However, little is known about factors associated with HPI institutionalization in schools. In this study, we identified correlates of the institutionalization of HPIs offered in elementary schools in Quebec, Canada.

Methods: In two-part, structured telephone interviews over three academic years (2016–2019), elementary school principals (or their designees) throughout Quebec identified an index HPI offered at least once in their school during the previous three years, and were asked whether it was institutionalized (i.e. explicitly written in the school's educational project, e.g. in the form of educational objectives and means of achieving them). We examined associations between institutionalization and 10 school-related and 16 HPI-related characteristics in univariable and multivariable logistic regression analyses.

Results: School key informants (n = 163) reported on 147 different HPIs that had been available in their schools in the past three years, 56% of which were institutionalized. Three aspects of school culture—parent/community engagement with the school, school/teacher commitment to student health and school physical environment—were positively associated with HPI institutionalization. HPI-related characteristics positively associated with HPI institutionalization included number of competencies addressed by the HPI, number of teaching strategies employed, modifications made to the HPI prior to or during implementation and perceived success of the HPI. Inviting families or community groups to participate in the HPI was inversely associated with institutionalization.

Conclusion: Better understanding of factors associated with HPI institutionalization may inform the development of school-based HPIs that have the potential for sustainability.

Highlights

- Parent/community engagement with the school, school/teacher commitment to student health and school physical environment were positively related to health-promoting intervention (HPI) institutionalization.
- HPIs that included more competencies, that employed more teaching strategies, that were modified prior to or during implementation and that were seen as more successful were more likely to be institutionalized.
- Perceived success was unrelated to formal evaluation of HPIs.
- Understanding school- and HPI-related factors associated with HPI institutionalization may help optimize sustainability.
- We suggest incentivizing evaluation of HPI effectiveness to guard against ending effective or sustaining ineffective interventions.

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Introduction

Health-promoting interventions (HPIs) targeting children and youth support the development of a wide range of positive health behaviours. Schools are ideal settings for both long-term and continuous HPI delivery because all youth attend school early in life when health-related attitudes and behaviours are shaped.[1,2] Indeed, in order to accrue long-term benefits, a core feature of HPIs that requires consideration, in addition to their effectiveness, is their sustainability (i.e. continuation and durability).[3]

Little is known about how to sustain HPIs, although accumulating evidence suggests that sustainability is challenging, especially in complex settings such as schools. Follow-up of two highly resourced school-based programs (i.e. the Child and Adolescent Trial for Cardiovascular Health [CATCH] program in the US[4] and the KidsMatter mental health promotion program in Australia[5]) indicates that most schools did not continue to deliver the program in full or at the same intensity after the first year of implementation.[4,6] In alignment with these findings, a recent systematic review on school-based HPI sustainability in high-income countries indicated that none of the 18 programs studied were sustained in their entirety after funding had ended, when evaluation of sustainability occurred one to five years after the intervention.[7]

A key indicator of HPI sustainability is institutionalization, which refers to the formal integration of health promotion activities into the established structures and operations of a school.[8] Specifically, policies, programs and systems are created or adapted within schools to support and sustain the HPI over the long term. Institutionalization not only optimizes HPI implementation over time but also fosters a school culture that is supportive of health and well-being.[9] Institutionalization may be a critical component in achieving long-term HPI success and should be prioritized in future research and practice.

Despite the importance of institutionalization for long-term success, the evidence on factors associated with institutionalization of school-based HPIs is nascent. Indeed, a systematic review of 24 studies on sustainability of HPIs found that most focussed solely on early implementation,

with only two specifically examining institutionalization.[7] The few existing qualitative studies identify barriers to institutionalization, including lack of resources, lack of teacher and parent "buy in" and involvement, changes in school leadership, staffing, culture and student needs, lack of staff training, incompatibility of the HPI with the school environment, goals, mandates and, finally, inadequate "know-how" to implement and evaluate the HPI.[6,8,10]

In the current study, we defined HPIs as activities complementary to the educational curriculum that are offered to all students during class time at no cost, and for which student attendance is expected. We operationalized institutionalization as written incorporation of the HPI into the school's educational project (*projet éducatif*), which details the school's values, policy orientations and educational objectives, along with tangible actions, indicators and evaluation measures to ensure that the educational project is achieved.[11]

Periodically (typically, every five years), the Quebec Ministry of Education updates its strategic educational plan, which "defines … the main orientations to be adopted by the education system and specifies the expected results."[11, p.6] School boards and the schools they oversee then design their educational projects in alignment with the Ministry's strategic plan, and schools report progress on the educational project to their respective school boards and the public annually.

We do not consider institutionalization equivalent to sustainability of the HPI, which is a broader construct. We identified correlates of HPI institutionalization from an array of school- and HPI-related characteristics. In addition, we studied a wide range of different types of HPIs addressing a multitude of health issues in a large sample of elementary schools. To select potential correlates, we drew on diffusion theory,[12] which describes four phases of HPI delivery, including planning, implementation, sustainability and scale-up. Importantly, our adapted conceptual model[13] also draws on socioecological theory[14] to situate HPI delivery within both the school context and the broader contexts of the community and the educational and political systems. Finally, we focussed on elementary schools because their context, resources and student needs differ markedly from high schools.

Methods

Project Prome*SS*[15] is designed to investigate social inequalities in HPI availability in elementary and high schools across Quebec, Canada, using cross-sectional surveys. In the years 2016 through 2019, data were collected from school principals, vice-principals or teachers in a convenience sample of 171 public primary schools in the province. The details have been described elsewhere.[13]

Ethics approval

Prome*SS* was approved by the Centre hospitalier de l'Université de Montréal (CHUM) Ethics Review Board. The CHUM certificate of ethics approval (2013-4130, CE 12.307) was submitted to all eligible school boards and principals upon request. School boards provided consent to approach the schools within their jurisdiction, and each school principal provided their consent to participate.

Procedures

Data collection procedures are detailed elsewhere.[13,16] Briefly, data were collected in a two-part, structured telephone interview (median length = 52 min) administered by trained interviewers in French or English. School principals were solicited; if they had not worked in their current school at least six months or were unavailable, they were asked to nominate another key informant (i.e. a vice-principal or other staff member). In the first part of the interview, school key informants provided information on characteristics of the school, school key informant (i.e. position, years working in the school) and availability of HPIs.

In the second part of the interview, participants responded to the following instruction: "The following questions pertain to ONE specific health-promoting intervention that is currently being offered in your school or that was offered within the last three years. If your school is currently offering a tobacco control intervention or has offered one in the last three years, please answer the following questions with reference to this tobacco control intervention. If your school does not currently offer a tobacco control intervention or has not offered one in the last three years, then think of any health-promoting intervention that is current or that was offered in the last three years. Please

answer the following questions with that one intervention in mind. Note that the response choices are in the past tense although we understand that the intervention may be ongoing." The Prome*SS* I 2017-2019 elementary school questionnaires (Adoption of HPIs [part 1] and Implementation of HPIs [part 2]) are available here: https://www.celphie.ca/promess -questionnaires.

If no HPIs were offered in the school within the preceding three years, the questions about an index HPI were skipped. After an index HPI was selected, participants responded to in-depth questions on the health issue addressed and the selection, planning, implementation and institutionalization of the index HPI. Prome*SS* questionnaire items were developed de novo or drawn or adapted from previous studies.[17]

Study variables

Institutionalization of the index HPI was measured by asking: "Is the intervention explicitly written in your school's orientation plan (e.g. the educational project, the success plan or others)?" Response options were "no" or "yes."

We assessed 10 school-related characteristics. Six referred to school structure or student demographic characteristics: (1) school deprivation level; (2) size of population centre served by the school; (3) language of instruction (French or English, determined by the school board); (4) number of students in school; (5) teacher turnover; and (6) principal turnover. Four referred to health-promoting school culture: (7) parent/community engagement in school; (8) school/teacher commitment to student health; (9) school physical environment; and (10) ease of principal leadership (i.e. how easy or difficult it is for the principal to accomplish seven tasks; Table 1).

"Health-promoting school culture" encompasses the school contextual elements (e.g. values, expectations, resources) that influence HPI implementation.[18] It is drawn from the World Health Organization's Health Promoting Schools framework, which focusses on (1) incorporating HPIs into the school's formal curriculum; (2) promoting student health and well-being by promoting certain values and attitudes

and providing a favourable physical environment; and (3) engaging with students' families and communities.[18]

The scales measuring parent/community engagement, school/teacher commitment and physical environment were developed through exploratory factor analysis. The scale measuring ease of principal leadership was developed de novo.[18] Table 1 presents the derivation, wording and coding of school-related characteristics.

Sixteen characteristics of the index HPI potentially related to institutionalization included: (1) number of years HPI offered in school; (2) whole school approach to HPI (i.e. all grades received HPI); (3) HPI designer; (4) number of core competencies addressed by the HPI[22]; (5) number of teaching strategies employed; (6) program champion present; (7) nature of HPI animators (i.e. the individuals who deliver the HPI; see list of examples in Table 2); (8) families invited to participate in HPI; (9) community groups invited to participate in HPI; (10) who was responsible for implementing HPI?; (11) school board involved in HPI implementation; (12) number of complementary initiatives in school during HPI implementation; (13) modifications made to HPI; (14) perceived success of HPI; (15) HPI produced changes; and (16) evaluation effort. Table 2 details questionnaire items, response options and coding for analyses of the HPI-related characteristics.

Data analysis

After computing descriptive statistics, we estimated associations for each potential correlate in two logistic regression models—an unadjusted model and a model adjusted for school deprivation level, population centre size, language of instruction and number of students. We did not estimate a model containing all potential correlates, as such models may include variables on the causal pathway for the correlate of interest,[23] which can result in attenuated estimates.[24] In addition, because the two models estimated for each correlate test only a single hypothesis, we did not adjust for multiple comparisons.[25]

Variables with missing values included institutionalization (n = 5, 3%); number of students (n = 1, 0.6%); teacher turnover (n = 2, 1.2%); principal turnover (n = 2, 1.2%); principal leadership (n = 17,

10.4%); years HPI in school (n = 10, 6.1%); families invited to participate (n = 19, 11.7%); community groups invited to participate (n = 20, 12.3%); school board involved (n = 17, 10.4%); program champion present (n = 2, 1.2%); and modifications made to HPI (n = 19, 11.7%). Missing values in institutionalization and potential correlates were accounted for using multiple imputation. Per von Hippel's 2-step calculation to determine the number of imputation sets needed to produce replicable estimates of standard errors,[26] we created 20 imputed datasets using predictive mean matching with 10 nearest neighbour comparators for continuous and ordinal variables,[27] logistic regression for binary variables and negative binomial regression for number of students, which was overdispersed.[28]

Results

School key informants and school characteristics

Of 171 elementary schools participating in Prome*SS*, 163 (95%) provided data on the index HPI and were retained for analysis. School key informants were principals (93%), vice-principals (4%) or teachers (3%) and had spent on average 3.4 years working in their school (SD = 2.6, range = 1–10). Characteristics of participating elementary schools were similar to those of all eligible elementary schools in Quebec regarding school deprivation level (35% of participating vs. 38% of eligible schools served disadvantaged students),[19] language of instruction (primarily French, 83%) and number of students.[13] Fifty-six percent of participating schools were located in rural or small population centres (population ≤ 29 999). Finally, 42% and 22% of school key informants reported "some/a lot" of teacher and principal turnover in the past three years, respectively.

Description of index HPIs

Across the 163 participating schools, a total of 147 unique HPIs were selected by participants in the second part of the interview, some of which are described in previous work.[13] These index HPIs addressed one or multiple health-related topics (e.g. physical activity and healthy eating,* personal safety and injury prevention, bullying,* aggressive behaviour, mental health, personal hygiene, puberty, addiction prevention, oral health* and tobacco prevention

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* Mandated by the Quebec government for elementary schools.

Characteristic	Questionnaire item	Response options	Recoding for analysis
School deprivation indicator[19]	Each school was assigned a decile rank according to the 2016/17 school deprivation indicator (i.e. the *Indice de milieu socioéconomique* [IMSE]) available from the Ministère de l'Éducation du Gouvernement du Québec. The IMSE is a composite score based on data for each student within the school reflecting whether the mother had completed high school and whether both parents were employed full-time.	1 (lowest deprivation) to 10 (highest deprivation)	Advantaged (1–3) Moderately advantaged (4–7) Disadvantaged (8–10)
Size of population centre[20]	Population centres (PCs) are groupings of geographical units classified into four groups: rural area; small PC (population 1000–29 999); medium PC (population 30 000–99 999); and large urban PC (population ≥ 100 000).	Small, medium, large	Rural/small Medium/large
Teacher turnover	"Indicate your level of agreement. In the past 3 years your school experienced … teacher turnover."	No turnover in > 3 years; no turnover in the past 3 years; few staff; some staff; several staff	None/few Some/several
Principal turnover	"Indicate your level of agreement. In the past 3 years your school experienced … principal turnover."	0 in > 3 years; 0 in 3 years; 1 in 3 years; 2 in 3 years; ≥ 3 in 3 years	None/few (< 2) Some/a lot (≥ 2)
Parent/community engagement in school[21]	"Indicate your level of agreement. In your school … (1) meetings with teachers are well attended by parents, (2) parents attend school-sponsored events, (3) PPO (Parent Participation Organization) or Home & School meetings are well attended by parents, (4) parent volunteers are easy to recruit, (5) community partners (e.g. community organizations) are involved in the planning and implementation of joint activities or interventions."	Strongly disagree; disagree; neither agree nor disagree; agree; strongly agree	Responses were summed and divided by the number of items responded to, to create a score (range: 1.75–5.00; α = 0.7)
Teacher commitment to student health[21]	"Indicate your level of agreement. In your school … (1) the amount of emphasis on health promotion in your school's educational project is sufficient; (2) teachers in your school are innovative, always seeking out new ways to facilitate students' progress; (3) teachers in your school have a real interest in the health of the students; (4) teachers in your school are committed to promoting healthy behaviours in their students."	Strongly disagree; disagree; neither agree nor disagree; agree; strongly agree	Responses were summed and divided by the number of items responded to, to create a score (range: 2.0–5.0; α = 0.7)
School physical environment[21]	"Indicate your level of agreement. In your school … (1) area provided for eating meals is pleasant and inviting; (2) food distribution (including cafeteria, daycare, outside food suppliers, nutritional support programs) prioritizes foods of good nutritional value; (3) measures are in place to foster active transportation (e.g. crossing guards, secure bike racks, etc.); (4) physical activity is provided on all days when there is no physical education class to all students (not including activities during lunch, recess or before/after school); (5) indoor facilities for physical education, extracurricular and other physical activities meet the needs of all students; (6) outdoor facilities for physical education, extracurricular and other physical activities meet the needs of all students; (7) indoor school physical activity facilities are available to all students outside the class timetable; (8) outdoor school physical activity facilities are available to all students outside the class timetable; (9) access to indoor and outdoor facilities for physical education, extracurricular and other physical activities belonging to other schools or community/private organizations is available to all students (does not include municipal parks)."	Strongly disagree; disagree; neither agree nor disagree; agree; strongly agree	Responses were summed and divided by the number of items responded to, to create a score (range: 1.17–5.00; α = 0.6)
Ease of principal leadership[21]	"Indicate the level of difficulty. In this school, how difficult is it for the principal to … (1) demonstrate leadership for change, (2) establish a climate of openness to innovation, (3) ensure that instructional goals are clearly communicated to everyone, (4) secure resources for health-promoting interventions, (5) foster respect, (6) establish a safe and orderly school environment, (7) guide the staff in the process of solving problems."	Strongly disagree; disagree; neither agree nor disagree; agree; strongly agree	Responses were summed and divided by the number of items responded to, to create a score (range: 2.57–5.00; α = 0.8)

Characteristic	Questionnaire item	Coding	Recoding for analyses
HPI designer was …	"Who originally designed (*name of intervention*)?"	School principal; vice-principal; homeroom teacher(s); other teacher(s); professional staff member(s) in your school; internal group; school board (educational services, student services); university-based research team; provincial ministry; CISSS/CIUSSS; community organization; not-for-profit organization; for-profit organization; other	External to school Internal to school Both internal and external
Number of core competencies addressed by intervention[22]	"Were any of the following core competencies incorporated into (*name of intervention*)? Check all that apply. (1) Self-esteem; (2) managing emotions and stress; (3) positive interactions with others; (4) self-awareness; (5) learning to say "no"; (6) asking for help; (7) informed lifestyle choices; (8) adoption of prosocial choices; (9) management of prosocial choices; (10) social engagement; (11) other (specify)."	No, yes (for each)	Yes responses were summed to create a total score (range: 1–11)
Number of teaching strategies employed	"What type of teaching strategy was used for (*name of intervention*)? Check all that apply. (1) Lecture strategies: presentations, demonstrations; (2) individual work: independent practice; (3) interactive teaching strategies: group discussion, role-play, modelling; (4) social constructivist teaching strategies: peer education, tutoring, collaborative and cooperative learning; (5) other (specify)."	No, yes (for each)	Yes responses were summed to create a total score (range: 1–4)
Whole school approach	"Which grade(s) received (*name of intervention*)? Check all that apply … Kindergarten; Grade 1; Grade 2; Grade 3; Grade 4; Grade 5; Grade 6; all grades (adjusted for age-appropriate content); other (specify)."	No, yes (for each)	No, yes (if all grades received intervention)
Program champion present	"Was there someone who advocated strongly for the intervention and supported its adoption despite barriers?"	No, yes (for each)	None During adoption During implementation During both adoption and implementation
HPI animators[a] were …	"(*Name of intervention*) animators were (check all that apply) … (1) homeroom teachers; (2) other teachers; (3) student-peers; (4) school health professionals (e.g. nurse, dental hygienist, etc.); (5) other; (6) external health professionals (e.g. physician); (7) members of a community organization; (8) CEGEP[b] or university students; (9) other."	No, yes (for each)	Internal to school (1–5) External to school (6–9)
Families included in HPI	"Were families invited to participate in (*name of intervention*)?"	No, yes	N/A
Community groups included in HPI	"Were community groups invited to participate in (*name of intervention*)?"	No, yes	N/A
School board involved in HPI implementation	"Was the school board involved in the implementation of the intervention?"	No, yes	N/A
Responsible for HPI implementation	"Who was responsible for planning how (*name of intervention*) would be implemented in the first year? (check all that apply) … (1) A team composed of members of the school staff; (2) a team composed of members of the school staff and a partner organization; (3) school principal; (4) vice-principal; (5) homeroom teacher; (6) other teacher; (7) external agency; (8) intervention developers; (9) other."	No, yes (to each)	Internal individual (3–6) Internal team (1) External individual or team (1, 2 and 3–6 not endorsed) Internal/external team (2)

Characteristic	Questionnaire item	Coding	Recoding for analyses
Number of complementary initiatives in the school during HPI implementation	"Were there any other initiatives occurring in your school before or around the same time as (*name of intervention*) that addressed the same health and well-being issue as (*name of intervention*)? Check all that apply. … (1) Media campaign (e.g. posters, distribution of leaflets, social media, etc.); (2) assemblies; (3) extra-curricular activities; (4) linking to services offered by external organization; (5) infrastructure (e.g. installation of bike racks); (6) social environment (e.g. increased surveillance, support to students, etc.); (7) school policy (e.g. nutrition, physical activity, bullying, etc.); (8) school daycare service activities; (9) special events; (10) other."	No, yes (to each)	Yes responses were summed to create a total score (range: 0–7)
Modifications to HPI	"Prior to implementation, did your school make any modifications to (*name of intervention*)? (1) No modifications were made (it could be used as is); (2) no modifications were made (it was already tailored to our school); (3) no modifications were made (other reason); (4) yes (minor modifications); (5) yes (major modifications); (6) yes, but don't know if they were major or minor modifications; (7) don't know (an external agency implemented the intervention in our school). Did (*name of intervention*) change during its implementation? (8) Did not change at all; (9) underwent minor modifications; (10) underwent major modifications; (11) changed completely; (12) don't know (an external agency implemented the intervention)."	N/A	No modifications (1, 2, 3, 7, 8) Modifications prior to implementation (4, 5, 6) Modifications during implementation (9, 10, 11) Modifications prior to and during implementation (any combination of yes responses in both categories)
Perceived success of HPI	"Indicate your level of agreement. In this school … (1) (*name of intervention*) met all objectives; (2) abandoning (*name of intervention*) had/would have a negative effect on the students; (3) (*name of intervention*) had a positive impact on students; and (4) animators enjoyed working on (*name of intervention*)."	Strongly disagree; disagree; neither agree nor disagree; agree; strongly agree	Responses were summed and divided by the number of items responded to, to create a score (range: 2.25–5.00); $\alpha = 0.7$
HPI impact on …	"Did any of the following changes occur in your school as a result of implementing (*name of intervention*)? (1) Changes to the social environment (e.g. increased supervision, emotional support for the students, development of relaxation areas, etc.), update of teachers' roles and responsibilities, revision of school policy or addition of new school policy; (2) changes to school infrastructure (e.g. bicycle racks); addition of equipment; (3) addition of health-promoting interventions, addition of extra-curricular activities, modification/termination of other health-promoting interventions."	No, yes (to each)	No impact (no response endorsed) Social environment (1 endorsed) Physical environment (2 endorsed) Activities/interventions (3 endorsed) Social and physical environments (1 and 2 endorsed) Social environment & activities/interventions (1 and 3 endorsed) Physical environment and activities/ interventions (2 and 3 endorsed) All (1, 2, and 3 endorsed)

Characteristic	Questionnaire item	Coding	Recoding for analyses
Evaluation effort	"Did your school do any of the following to evaluate (*name of intervention*)? (1) Hold regular meetings; (2) obtain feedback from the (*name of intervention*) animators; (3) document the extent to which implementation was carried out in accordance with the plan; (4) document the number of students participating in the (*name of intervention*); (5) document the barriers and facilitators to implementation; (6) formally evaluate the outcomes of the (*name of intervention*)."	No, yes (to each)	The highest level endorsed was recorded: No evaluation (no response endorsed) Informal evaluation (1 or 2 endorsed) Administrative documentation (3, 4 or 5 endorsed) Formal evaluation (6 endorsed)

Abbreviations: CEGEP, Collège d'enseignement général et professionnel; CISSS/CIUSSS: Centre intégré de santé et de services sociaux/centre intégré universitaire de santé et de services sociaux; HPI, health-promoting intervention; N/A, not applicable.

a Animators were defined as the individuals tasked with delivering the HPI.

b A CEGEP is a public school providing the first level of postsecondary education, similar to a junior or community college elsewhere in Canada or in the US.

and education).[29-32] Fifty-six percent of index HPIs (n = 88) were institutionalized, and half had been in schools at least three years (interquartile range = 2–6, range = 1–43). Among index HPIs related to mandated topics, all three that addressed oral health were institutionalized, as were 84% (36/43) addressing bullying, 45% (42/93) related to physical activity and 46% (32/70) related to healthy eating.

School-related correlates of institutionalization

Three aspects of health-promoting school culture (i.e. parent/community engagement in the school, school/teacher commitment to student health and the school's physical environment) were positively associated with HPI institutionalization. None of the characteristics describing school structure or student demographics were associated with institutionalization (Table 3).

HPI-related correlates of institutionalization

Four HPI-related characteristics were positively associated with institutionalization of the index HPI (Table 4). HPIs that incorporated a greater number of core competencies or a larger number of teaching strategies, or both, were more likely to be institutionalized, as were HPIs that were modified during implementation or both prior to and during implementation. Additionally, the greater the perception that the HPI was successful, the higher the odds of institutionalization. Finally, HPIs in which families were invited to participate were less likely to be institutionalized

than those that did not invite families. Adjusted odds ratios for variables with imputed values were within 0.09 of those obtained in sensitivity analyses with complete cases.

The effectiveness of an HPI can be determined only by formal evaluation of the extent to which the intervention met measurable benchmarks.[33] In this study, institutionalization was unrelated to evaluation effort, yet, in an earlier study, the index HPIs were seen as highly successful.[16] Perceived success was equivalent for HPIs evaluated informally (M [SD] = 4.38 [0.58]), via documentation (4.19 [0.52]) or via formal assessment (4.31 [0.49]; $F(2/160)$ = 1.46, p = 0.23).

Discussion

In this study, we identified correlates of HPI institutionalization from among a comprehensive range of school- and HPI-related characteristics in elementary schools in Quebec, Canada. Benefits of school-based HPI institutionalization include HPI sustainability, consistency over time, accountability and scalability.[8,34,35] Institutionalization is generally viewed as a positive step toward ensuring that HPIs can continue to benefit students after the initial implementation phase.[8] In the current study, over half of the HPIs were institutionalized. The correlates of institutionalization identified herein are discussed below.

School-related correlates of institutionalization

School culture indicators associated with HPI institutionalization included more

active involvement of parents and the community in the school, strong commitment to student health among school staff and a physical environment favourable to student health. Beliefs and norms shared within the school (i.e. school culture) are known to be driving forces of the operational processes and motivations that guide HPI implementation.[8] Availability of health-promoting equipment and space could increase the likelihood of school staff choosing an HPI that aligns with the school context. Strong commitment to student health promotion among the school staff can positively influence perceptions of HPIs within the school community, especially in schools where staff believe in the relevance and importance of such interventions. Finally, our results support existing evidence that the role of school principals in guiding staff towards objectives, obtaining resources, distributing responsibilities and resolving conflicts is critical, with multiple studies highlighting the need for strong leadership to facilitate HPI implementation.[36]

Two systematic reviews recently investigated barriers and facilitators to sustainability of school-based HPIs targeting a variety of health themes.[7,34] Although most interventions in these reviews were not completely sustained, Herlitz et al. identified four categories of factors associated with sustainment: school capacity to sustain HPIs, staff motivation and commitment to sustain HPIs, HPI adaptability and integration, and the wider policy context. Factors consistently related to HPI sustainability included leadership by school principals and administration, and

TABLE 3
Unadjusted and adjusted ORs and 95% CIs from logistic regression models for the association between school characteristics and institutionalization of school-based health-promoting interventions

	N[a]	Proportion of institutionalized HPIs, %	OR (95% CI)	aOR[b] (95% CI)
School deprivation				
Advantaged	34	56.3	Ref	Ref
Moderately advantaged	71	58.0	1.12 (0.48–2.60)	1.08 (0.45–2.57)
Disadvantaged	58	52.6	0.90 (0.38–2.14)	0.81 (0.31–2.14)
Size of population centre				
Rural/small	91	55.7	Ref	Ref
Medium/large	72	55.7	1.03 (0.55–1.93)	0.94 (0.43–2.07)
Language of instruction				
French	136	53.4	Ref	Ref
English	27	66.7	1.72 (0.72–4.12)	1.77 (0.72–4.34)
Number of students[c]			0.99[d] (0.91–1.08)	0.99[d] (0.89–1.10)
< 149	40	60.0		
149–265	41	70.3		
266–425	40	35.9		
≥ 426	41	58.5		
Teacher turnover				
None/few	92	58.9	Ref	Ref
Some/a lot	69	50.0	0.71 (0.38–1.34)	0.71 (0.37–1.35)
Principal turnover				
None/few	125	56.8	Ref	Ref
Some/a lot	36	48.4	0.77 (0.35–1.68)	0.79 (0.36–1.75)
Parent/community engagement in school[c]			**2.07 (1.22–3.49)**	**2.32 (1.31–4.08)**
1st quartile	35	28.6		
2nd quartile	35	65.7		
3rd quartile	48	65.1		
4th quartile	45	60.0		
School/teacher commitment to student health[c]			**2.18 (1.18–4.03)**	**2.33 (1.22–4.44)**
1st quartile	46	40.9		
2nd quartile	39	58.3		
3rd quartile	26	50.0		
4th quartile	59	69.2		
School physical environment[c]			**1.80 (1.07–3.02)**	**1.74 (1.02–2.97)**
1st quartile	41	46.2		
2nd quartile	38	44.4		
3rd quartile	48	57.5		
4th quartile	36	75.0		
Ease of principal leadership[c]			1.88 (0.93–3.81)	1.96 (0.96–4.03)
1st quartile	36	55.9		
2nd quartile	35	43.8		
3rd quartile	40	65.0		
4th quartile	35	62.9		

Abbreviations: aOR, adjusted odds ratio; CI, confidence interval; HPI, health-promoting intervention; OR, odds ratio; Ref, reference group.

Note: Models were run using imputed data. Bold font indicates confidence intervals that do not contain the null (1.00).

[a] *n*s do not always sum to 163 because of missing data.
[b] Adjusted for school deprivation, size of population centre, language of instruction and number of students.
[c] Continuous potential correlates are presented categorically for descriptive purposes but were retained as continuous in analytic models.
[d] OR represents the change in odds per 50 students.

TABLE 4
Unadjusted and adjusted ORs and 95% CIs from logistic regression models for the association between intervention-related characteristics and institutionalization of school-based health-promoting interventions

	N[a]	Proportion of institutionalized HPIs, %	OR (95% CI)	aOR[b] (95% CI)
Number of years HPI in school[c]			1.06 (0.98–1.15)	1.06 (0.97–1.16)
< 2 years	33	48.5		
2 years	31	51.6		
3–4 years	34	63.6		
≥ 5 years	55	66.0		
Whole school approach to HPI				
No	56	55.8	Ref	Ref
Yes	107	55.7	0.98 (0.50–1.89)	0.99 (0.50–1.94)
HPI designers were …				
External to school	91	60.0	Ref	Ref
Internal to school	60	50.9	0.72 (0.37–1.41)	0.71 (0.36–1.39)
External and internal	12	45.5	0.53 (0.15–1.87)	0.52 (0.15–1.87)
Number of competencies addressed in HPI[c]			**1.39 (1.19–1.61)**	**1.39 (1.19–1.62)**
< 5	81	38.8		
≥ 5	82	73.1		
Number of teaching strategies used in HPI[c]			**1.77 (1.22–2.58)**	**1.80 (1.22–2.65)**
1	71	44.9		
2	55	55.8		
3–4	37	75.7		
Program champion present				
No	24	59.1	Ref	Ref
Adoption only	14	35.7	0.42 (0.11–1.68)	0.42 (0.10–1.66)
Implementation only	17	47.1	0.64 (0.18–2.27)	0.66 (0.18–2.39)
Adoption and implementation	106	58.3	1.03 (0.41–2.58)	0.97 (0.38–2.49)
HPI animators were …				
Internal to school	117	54.4	Ref	Ref
External to school	17	53.3	0.91 (0.31–2.63)	0.90 (0.31–2.65)
Internal and external	29	62.1	1.35 (0.58–3.11)	1.23 (0.52–2.91)
Families invited to participate in HPI				
No	70	67.7	Ref	Ref
Yes	74	45.8	**0.40 (0.21–0.77)**	**0.42 (0.21–0.82)**
Community groups invited to participate in HPI				
No	124	56.2	Ref	Ref
Yes	19	55.6	1.08 (0.41–2.82)	1.09 (0.41–2.88)
Responsible for HPI implementation				
Individual internal to school	26	46.2	Ref	Ref
Internal team	24	56.5	1.53 (0.49–4.72)	1.55 (0.49–4.92)
External individual or team	47	51.1	1.28 (0.49–3.36)	1.29 (0.49–3.40)
Internal/external team	66	62.5	1.90 (0.75–4.76)	1.93 (0.76–4.88)
School board involved in HPI implementation				
No	116	58.6	Ref	Ref
Yes	30	53.3	0.85 (0.38–1.90)	0.86 (0.38–1.95)

	Nᵃ	Proportion of institutionalized HPIs, %	OR (95% CI)	aORᵇ (95% CI)
Number of complementary initiatives in the school during HPI implementationᶜ			1.08 (0.89–1.30)	1.06 (0.88–1.29)
0	42	53.7		
1	42	42.9		
2	30	75.3		
≥ 3	49	57.8		
Modifications made to HPI				
None	47	40.0	Ref	Ref
Prior to implementation	13	63.6	2.56 (0.65–10.02)	2.67 (0.64–11.20)
During implementation	49	71.4	**3.73 (1.61–8.74)**	**3.96 (1.68–9.33)**
Prior to and during implementation	35	61.8	**2.62 (1.08–6.33)**	**2.62 (1.06–6.45)**
Perceived success of HPIᶜ			**2.67 (1.38–5.14)**	**2.57 (1.33–4.98)**
1st quartile	37	40.5		
2nd quartile	54	50.0		
3rd quartile	29	60.7		
4th quartile	43	72.1		
HPI produced changes in …				
No changes	15	57.1	Ref	Ref
Social environment	18	64.7	1.37 (0.32–5.80)	1.36 (0.31–5.97)
Physical environment	4	25.0	0.25 (0.02–3.06)	0.23 (0.02–2.97)
Interventions offered	18	44.4	0.60 (0.15–2.47)	0.63 (0.15–2.64)
Social and physical env.	12	41.7	0.54 (0.11–2.57)	0.41 (0.08–2.06)
Social env. and interventions	30	60.7	1.23 (0.44–4.48)	1.26 (0.34–4.68)
Physical env. and interventions	12	16.7	**0.15 (0.02–0.96)**	0.16 (0.02–1.01)
Changes in all above	54	67.9	1.55 (0.46–5.20)	1.57 (0.45–5.40)
HPI evaluation effort				
Informalᵈ	13	46.2	Ref	Ref
Administrative documentation	80	42.7	0.91 (0.28–2.96)	0.94 (0.28–3.13)
Formal evaluation	70	71.4	2.92 (0.87–9.76)	3.09 (0.90–10.59)

Abbreviations: aOR, adjusted odds ratio; CI, confidence interval; env., environment; HPI, health-promoting intervention; OR, odds ratio; Ref, reference group.

Notes: Models were run using imputed data. Bold font indicates confidence intervals that do not contain the null (1.00).

ᵃ ns do not always sum to 163 because of missing data.

ᵇ Adjusted for school deprivation, size of population centre, language of instruction and number of students.

ᶜ Continuous potential correlates are presented categorically for descriptive purposes but were retained as continuous in analytic models.

ᵈ All schools reported having conducted at least informal evaluation.

commitment and confidence of school staff to promote health,[7] which aligns with our findings.

Our findings also support previous work underscoring the importance of establishing a supportive environment in schools, either before introducing an HPI or as a target of intervention, as well as considering the school climate or culture for adapting an HPI.[21,37] For long-term success, a comprehensive and collaborative approach is needed to address the complex public health challenges that many HPIs aim to tackle. The feasibility of improving school culture to increase access to and effectiveness of HPIs is demonstrated in Canada by the APPLE Schools initiative: an innovative, evidence-based HPI that fosters a supportive school culture to facilitate behaviour change (healthy eating, physical activity, mental well-being) in students.[38-40]

HPI-related correlates of institutionalization

Several characteristics of HPIs were associated with institutionalization. First, HPIs that integrated more core competencies and/or a wider range of teaching strategies were more likely to be institutionalized. Research suggests that multicomponent school-based HPIs are more likely than single-component interventions to meet benchmarks and be cost-effective and sustainable.[40] Second, if an HPI was modified during or prior to implementation, it was more likely to be institutionalized. A "one size fits all" approach may overlook modifications and adaptations needed to render an HPI a good fit to the school.[41] Each school has a unique environment, with its

own student population, staff and culture, and what works in one school may not work in another. Modifying or adapting an HPI to the school culture and context is essential to increase its relevance, acceptability and effectiveness, integrate local resources and assets and ensure its institutionalization.[41]

Third, HPIs that included families were less likely to be institutionalized compared to those that did not involve families. This finding is intriguing because involving families and other external stakeholders has been recommended as important to HPI success.[42-44] It is possible that there may be concerns around confidentiality and privacy or that excluding parents increases ease and efficiency of HPI implementation. Additional coordination and resources may be needed to ensure parental participation. However, parental involvement can be critical to HPI success, particularly in promoting healthy behaviours beyond the school environment.[42-44] Thus, striking a balance between the advantages of institutionalization and the potential benefits of parental involvement is essential.

Finally, HPIs that were perceived as successful were more likely to be institutionalized. Perceived success can generate support and buy-in from key stakeholders, including school administrators, staff and parents, who may be more willing to allocate resources to the intervention over time.[8]

It is important to note that neither perceived success nor institutionalization of HPIs guarantees that they are (or remain) effective (i.e. meet established benchmarks), which can be assessed only through formal evaluation.[33,37] Many school-based HPIs are not evaluated in practice for reasons related to lack of time and resources, and challenges in measuring health outcomes in the short- and long-term, and many HPIs are sustained despite being ineffective. In a survey of US public health practitioners from state and local health departments and related agencies, 36% to 42% reported that effective programs that should have continued were discontinued, and 25% to 29% reported that ineffective programs that should have been terminated were continued.[45] Perceived success may not align with effectiveness when HPIs are not adequately evaluated. We suggest that the Ministry and school

boards provide incentives to schools to evaluate the effectiveness of available HPIs in achieving measurable benchmarks, and that the evaluations be conducted on a regular basis to guard against decisions that are not evidence-based.

Strengths and limitations

Strengths of this study include the use of a structured interview to collect data, which allowed for expansion and clarification of respondents' comments, and the exploration of aspects of a health-promoting school culture that have not been previously investigated in the context of HPI institutionalization.

Limitations of this analysis include the convenience sample of schools, which could limit generalizability. However, the characteristics of PromeSS schools resembled those of all eligible elementary schools in Quebec. Responses from a single key informant within a school may not provide an accurate portrayal of the organizational perspective. However, data collection from multiple respondents within the same school was not feasible. In addition, the PromeSS questionnaire was sent to informants prior to the interview so that they could consult their staff to prepare. Our measure of institutionalization included a single item, and its validity and reliability are not established. Recall error could have resulted in misclassification bias in the observed associations. Our measures of health-promoting school culture are new and require further validation. Finally, participants might have been motivated to present the most desirable impression of their schools or chosen to discuss an HPI with which they were more familiar and, perhaps, which was more likely to have been institutionalized, which may have introduced bias.

Conclusion

The work presented herein adds to a growing literature on factors associated with HPI institutionalization. These factors include indicators of health-promoting school culture (parent/community engagement with the school, school/teacher commitment to student health, school physical environment) as well as characteristics of the HPI (number of competencies addressed by the HPI, number of teaching strategies employed, modifications made to the HPI prior to or during implementation, perceived success of the

HPI, not inviting families/community groups to participate in the HPI). Our findings therefore suggest that to optimize sustainability, characteristics of both the school context and the intervention itself must be considered in the design and implementation of HPIs.

Conflicts of interest

The authors have no competing interests.

Authors' contributions and statement

RW—supervision, methodology, formal analysis, writing—original draft, writing—review & editing.

EOL—conceptualization, methodology, writing—original draft, writing—review & editing.

KM—supervision, conceptualization, writing—review & editing.

JK—conceptualization, writing—original draft, writing—review & editing.

TR—resources, conceptualization, writing—original draft, writing—review & editing.

JOL—conceptualization, resources, methodology, writing—original draft, writing—review & editing, supervision, project administration, funding acquisition.

All authors approved the final manuscript as submitted and agree to be accountable for all aspects of the work.

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