Factors influencing the adoption of a Health Promoting School approach in the province of Quebec, Canada

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Received on April 23, 2009; accepted on September 18, 2009

Abstract

This study examined a prediction model that integrated three categories of predictors likely to influence adoption of the Quebec Healthy Schools (HS) approach, i.e. attributes of the approach, individual and contextual characteristics. HS receptivity was considered as a potential mediator. For this study, 141 respondents representing 96 schools participated in a postal survey. We used bivariate logistic regression to assess factors associated with HS adoption and Baron and Kenny’s method to test the mediation effect of HS receptivity. Four predictors related to school organizational characteristics had more weight in influencing the adoption of HS: the ‘presence of leaders within schools’, ‘perceived school contextual barriers’, ‘school investment in healthy lifestyles’ and ‘beliefs in collective efficacy’. The influence of the latter two predictors was not direct but mediated by HS receptivity. Our findings showed that standard attributes generally considered as predictors of the adoption of an innovation are not the strongest determinants to explain HS adoption in the present context. The results shed light on the crucial role of organizational context in the adoption of this type of approach.

Introduction

Promotion of healthy lifestyles among youths is a developing issue in public health and a growing priority for the federal and provincial governments in Canada. The emerging epidemic of overweight and obesity among youths in the last few decades[1, 2] and its consequences in terms of chronic diseases [3–8] explain this concern. Recent studies on interventions designed to promote healthy lifestyles among school-aged children support global school-based approaches as privileged interventions to improve healthy lifestyles and prevent chronic diseases [9–14].

The ‘Health Promoting School’ (HPS) and the ‘Coordinated School Health Program’, respectively, from the World Health Organization and the US Centers for Disease Control and Prevention, have been advocated as effective approaches to promote health-related behaviours and well-being among school communities [4, 15–17]. These approaches require a substantial change in the way schools and their staff practice school health. They involve moving from practices that rely mainly on classroom-based health education models to a more comprehensive integrated construct of health promotion that focuses on both children’s attitudes and behaviours and their environment. In the province of Quebec, Canada, Healthy Schools (HS), a whole-school approach equivalent to the HPS model, was launched in 2004 (more information on HS in Quebec can be found online at: http://www.mels.gouv.qc.ca/DGFJ/csc/promotion/pdf/19
The concept of HS has been adopted by schools on a voluntary basis. As of March 2007, 17% of Quebec schools had adopted it [18].

Few studies have evaluated their optimal implementation from a practical point of view as well as the schools’ capacity to operationalize them [12,19]. More research on their adoption and implementation is necessary to better assess their feasibility and efficiency in different contexts [20–22]. The present paper serves these purposes and identifies the factors most likely to predict the adoption of HS by schools in Quebec. Our results may prove valuable to support strategic changes aimed at disseminating such approaches on a broader scale.

Diffusion of the HS approach in Quebec

The HS approach suggests combining education and health concerns by making the promotion of educational success, health and well-being and the prevention of social and health problems central to the schools’ educational project and success plan [23]. HS represents an integrative framework fostering complementary and effective health promotion interventions. Alongside HS, support measures have been offered by both the Ministries of Health and Education to all Quebec regions to facilitate the dissemination of HS. Thus, regional and local agents have been appointed and trained to support the dissemination of HS at their level—to accompany schools willing to adopt the approach. A variety of tools have also been developed, such as a Guide to HS principles [23] and a School Self-Assessment Index [24].

Conceptual framework

Diffusion studies have brought to light a complex array of factors likely to affect the adoption of an innovation, including: (i) the characteristics of potential users [25–29], (ii) attributes of the innovation [25,26,29–31] and (iii) characteristics of the setting [30–34]. Most investigations have focused on the characteristics of potential adopters and perceived attributes of the innovation. However, as mentioned by Greenhalgh et al. [31], some studies do not support a sole influence of innovation attributes in specific contexts. Therefore, contextual factors pertaining to HS adoption, such as the school environment, should be taken into consideration.

In the present paper, we tested a prediction model that considered the three arrays of factors mentioned above (Fig. 1). The first array was conceptually based on the Social Cognitive Theory [35], whereas the two others were, respectively, based on Rogers’ Diffusion of Innovation model [29] and Greenhalgh’s review on the diffusion of innovations in organizations [31]. Adoption is a process that usually involves prerequisite stages before deciding to formally adopt an innovation [29,36,37]. In Rogers’ theory, the first stage corresponds to awareness and basic knowledge of the innovation while the next stage refers to the process of forming an attitude, receptive or not, towards the innovation, which implies that people assess its value and appropriateness. In the present study, we wanted to explore factors that could affect the adoption of HS in Quebec schools. Our specific objectives were to (i) establish the best predictors of schools’ likelihood of adopting HS and (ii) determine if participants’ receptivity towards HS acts as a mediator in the relationship between predictors and adoption status.

Materials and methods

Participants and procedure

The data reported in this paper are part of a larger investigation that examined factors helping or hampering the dissemination and adoption of HS in Quebec. They were gathered from a 2007 cross-sectional postal survey. The 250 selected elementary and high schools originated from school boards that previously provided them with information on the HS approach, which amounted to half of all school boards in Quebec. In each school targeted, the school principal and the health promotion delegate were key players invited to participate in the survey. These individuals are the schools’ actors most likely to influence the introduction of such a health promotion innovation. The questionnaire was pretested with eight participants representing the two key players. Minor adjustments were made after the pretest, such as rewording and
formatting. Monetary incentives, pre-notification, reminder letters and a second copy of the questionnaire sent at follow-up were included to increase response rates [38]. Participants returned their anonymous questionnaire in a pre-addressed envelope. Their participation was voluntary. Approval from the Ethics Committee of the University of Quebec in Outaouais was obtained before conducting the survey. Among the 250 schools targeted, 190 (76%) returned at least one questionnaire. A response rate of 58%, i.e. 291 of 500, was obtained for individual respondents.

The questionnaire used was self-administered and consisted of two parts. The first part included questions on personal and school characteristics as well as awareness and knowledge of the HS approach. The second part was related to HS characteristics and adoption in the schools. Only participants who were aware of HS and who had basic knowledge of it were invited to answer the second part (compare Fig. 2). A total of 156 school participants (95 principals and 61 health promotion delegates) from 117 schools were eligible at this point. Moreover, for a school to be included in the predictive study, the declared adoption status of HS had to be based on a clear decision to commit or not to HS within the school. Those who were in the process of making the decision were excluded. On this basis, a total of 96 schools and 141 respondents (86 principals and 55 health promotion delegates) were retained.

**Measures**

All measures were adapted or developed specifically to suit the HS approach. Table I provides measurement information on the following variables included in the prediction model.

**Potential predictors**

**Adopter characteristics.** Adopter characteristics included participants’ years of experience in a school setting and two psychosocial variables.

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**Fig. 1.** Prediction model of schools’ likelihood to adopt the HS approach. Potential control variables were: school level, school location, school size and HS knowledge level.
based on Bandura’s Social Cognitive Theory [35]: (i) personal standards towards health-related behaviours and (ii) the participant’s belief about his/her ability to accomplish tasks related to the innovation, i.e. self-efficacy. ‘Personal standards towards healthy behaviours’ were assessed by two subscales: (i) attitudes towards healthy living (healthy eating and physical activity) and (ii) attitudes towards substance consumption (tobacco and alcohol). ‘Participant self-efficacy’ was measured by a scale of his/her perceived ability to collaborate with other partners to effectively implement HS.

‘Knowledge of HS’ was established by asking participants who had heard about HS to indicate the statement which best described their degree of familiarity with HS. For the purpose of this study, participants who knew very little about HS were excluded. Three levels of knowledge were then established based on the literature [29, 39]: (i) Basic—participants knew the general principles and characteristics of HS; (ii) Good—participants knew the specific components and global strategy recommended to implement it and (iii) Very good—participants had a good idea how to put HS into practice. The last two categories were merged. Knowledge of HS served as a control variable in the analysis.

**Perceived attributes of HS.** Studies on the perceived attributes of innovation [30, 31] have been widely influenced by Rogers’ Diffusion of Innovation model [40], which suggested five standard attributes, four of which seemed more relevant with
Table I. Descriptive statistics and Cronbach’s alpha of continuous variables included in the prediction model of schools’ likelihood to adopt HS

<table>
<thead>
<tr>
<th>Variables</th>
<th>No. of items</th>
<th>Sample item</th>
<th>Scale range$^a$</th>
<th>Mean (SD)</th>
<th>$\alpha$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adopter characteristics</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Years of experience in a school setting</td>
<td>—</td>
<td>How many years of experience do you have in a school setting?</td>
<td>—</td>
<td>19.7 (9.1)</td>
<td>—</td>
</tr>
<tr>
<td>Personal standards towards healthy behaviours</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Attitudes towards healthy living</td>
<td>3</td>
<td>In your everyday life, how important are physical activities for improving or maintaining your health?</td>
<td>3–15</td>
<td>12.9 (1.9)</td>
<td>0.74</td>
</tr>
<tr>
<td>Attitudes towards substance consumption (tobacco, alcohol)</td>
<td>2</td>
<td>In your everyday life, how important is moderate alcohol consumption for improving or maintaining your health?</td>
<td>2–10</td>
<td>8.5 (1.8)</td>
<td>0.62</td>
</tr>
<tr>
<td>Self-efficacy</td>
<td>3</td>
<td>I believe I am able to collaborate with school personnel to implement HS</td>
<td>3–15</td>
<td>13.3 (1.7)</td>
<td>0.79</td>
</tr>
<tr>
<td>Perceived attributes of HS</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Anticipated benefits/observability</td>
<td>5</td>
<td>I believe HS will have a positive impact on the adoption of health-promoting behaviours among students</td>
<td>5–25</td>
<td>21.0 (2.5)</td>
<td>0.74</td>
</tr>
<tr>
<td>Relative advantages</td>
<td>2</td>
<td>I believe HS represents the best model to integrate multiple health promotion interventions for youth</td>
<td>2–10</td>
<td>7.3 (1.7)</td>
<td>0.61</td>
</tr>
<tr>
<td>Organizational context</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Perceived school innovativeness</td>
<td>5</td>
<td>Members of our school team are open to trying new pedagogical approaches</td>
<td>5–25</td>
<td>19.5 (2.6)</td>
<td>0.70</td>
</tr>
<tr>
<td>Relative priority of prevention and health promotion within school</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Investment in healthy lifestyles</td>
<td>2</td>
<td>In the last 2 years, has your school invested in interventions related to regular practice of physical activities?</td>
<td>2–8</td>
<td>6.7 (1.1)</td>
<td>0.66</td>
</tr>
<tr>
<td>Investment in prevention of substance abuse</td>
<td>2</td>
<td>In the last 2 years, has your school invested in interventions related to responsible behaviours with regard to alcohol and other drugs?</td>
<td>2–8</td>
<td>5.1 (1.6)</td>
<td>0.75</td>
</tr>
<tr>
<td>Investment in violence prevention</td>
<td>3</td>
<td>In the last 2 years, has your school invested in interventions related to social competencies/pacific behaviours?</td>
<td>2–8</td>
<td>6.8 (1.2)</td>
<td>0.65</td>
</tr>
<tr>
<td>Perceived feasibility of HS</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Beliefs in collective efficacy</td>
<td>3</td>
<td>I believe that the members of our school team have the necessary competencies to implement an approach such as HS</td>
<td>3–15</td>
<td>11.4 (2.0)</td>
<td>0.72</td>
</tr>
<tr>
<td>Perceived school contextual barriers</td>
<td>3</td>
<td>I believe my school has other priorities which interfere with the implementation of HS</td>
<td>3–15</td>
<td>9.4 (3.5)</td>
<td>0.82</td>
</tr>
<tr>
<td>Presence of leaders within school</td>
<td>5</td>
<td>What level of influence do you think you can have on the opinion of your colleagues about HS?</td>
<td>5–25</td>
<td>14.3 (4.1)</td>
<td>0.85</td>
</tr>
<tr>
<td>Perceived popularity of HS among school community members</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Participant receptivity towards HS</td>
<td>1</td>
<td>How receptive are you towards HS?</td>
<td>1–5</td>
<td>4.4 (0.7)</td>
<td>—</td>
</tr>
</tbody>
</table>

$^a$Except for perceived school contextual barriers, the highest score corresponds to a more positive perception.
regard to HS: ‘relative advantages’, ‘compatibility’, ‘complexity’ and ‘observability of benefits’. Since HS is a recently introduced approach and most of its expected benefits are not immediate, they would be more anticipated than readily observable. Recent studies have also highlighted the potential contribution of another attribute, ‘adaptability’ of the innovation [26, 29, 31, 41, 42].

To measure the above five HS attributes, we developed a scale that included items related to them plus a few items linked to the organizational context. Some items were adapted from scales used in similar contexts [27, 43, 44] while others were developed from constructs drawn from the literature on innovation diffusion. Psychometric properties of the scale-assessing HS attributes and its perceived feasibility have been published elsewhere [45]. Our factor analyses revealed two HS attributes congruent with the distinct constructs retained to measure innovation attributes: ‘anticipated benefits/observability’ and relative advantages. The compatibility and adaptability attributes did not stand out from factor analyses, and the complexity items were merged with those related to ‘perceived school contextual barriers’, which is a component of the perceived feasibility of HS, as described in the next section.

**Organizational context.** In terms of organizational context, three demographic variables were retained: ‘school level’, ‘school location’ and ‘school size’. School level included two categories: (i) elementary and (ii) high schools. School location corresponded to three categories: (i) metropolitan region; (ii) large and medium urban regions and (iii) peripheral regions. Response categories were dichotomized to urban versus peripheral regions. School size was measured by the number of students enrolled in the school. School level and school location were considered as control variables (Fig. 1).

Previous studies have found that an organizational climate conducive to experimentation and supportive in providing resources can play a crucial role in the diffusion context [31, 46–50]. A composite measure was constructed to assess ‘perceived school innovativeness’, using five survey questions.

The perception that students’ problems are a priority may also foster innovation receptivity and adoption of HS if it is believed to act on these problems [39]. The relative priority given to different health promotion domains within school, in terms of allocated financial and human resources, was assessed through ‘school investment’. Three subscales were obtained with regard to school investment in the domains of: (i) promotion of physical activity and healthy eating, (ii) alcohol or other drug abuse prevention and (iii) violence prevention.

The perceived feasibility of HS is related to school members’ perception of contextual constraints and beliefs in their capacity, as a whole, to combine their resources, knowledge and skills to put the innovation into practice, i.e. collective efficacy [51]. Perceived feasibility of HS was measured by two components derived from our factor analyses: perceived school contextual barriers [45] and ‘beliefs in collective efficacy’ to implement HS.

The presence of leaders may also have an influence on their colleagues’ opinion and actions at different stages of the innovation process [31, 32, 48, 49, 52–54]. The presence of leaders within school’ with regard to HS was measured by five questions adapted from the ‘Leadership scale’ designed by Ben Miled and Le Louarn [55].

Finally, the decision to adopt an innovation may also be influenced by its perceived popularity in the immediate surroundings of the participant or reference group [25, 56]. To measure the ‘perceived popularity of HS among school community members’, participants were asked to assess the receptivity of school members towards HS.

**Mediator variable**

Participants’ own ‘receptivity towards HS’ was measured the same way as for the perceived popularity of HS among school community members. The receptivity of participants towards HS could potentially modulate other predictors [29].

**Dependent variable**

The adoption status of HS ‘by schools’, the dependent variable, was established by two response
categories: (i) adoption of HS: ‘our school has agreed, in writing or verbally, to adopt HS’ and (ii) non-adoption of HS: ‘our school is not interested in adopting HS for the time being’. Among the 96 schools who were eligible in regards to their adoption status, 54 (56%) had adopted HS. In these schools, the school principal was always involved in the decision-making process. Teachers and school professionals were involved in 90% of the schools while Health and Social services centers’ representatives and parents took part in the decision in 60% and 30% of the schools, respectively.

Data analysis
Analyses were performed with SPSS 15.0. Prior to the main analyses, principal component analysis was undertaken to test the scale dimensionality of all constructs. Scale and subscale consistency was assessed by Cronbach’s alpha (Table I). The dependent variable being school based and not individual based, we created a school score for each predictor based on the average scores obtained by the two key actors. When only one of them participated, the school’s position was established based on the answer of the respondent who returned his/her questionnaire.

Bivariate analysis was performed with simple logistic regression to identify, among potential predictors, mediator and control variables, those significantly associated with HS adoption. The data are presented as means or percentages, odds ratios and associated 95% confidence intervals (95% CIs) for each level of factors relative to baseline. Furthermore, multivariate analysis with a mediation method served to identify the best predictors of HS adoption and determine whether the influence of the predictors was direct or mediated by HS receptivity. A mediating effect was observed when a variable reduced the influence of predictors on the dependent variable while conserving its influence on it [57]. In accordance with Baron and Kenny’s method [57], the mediating effects of receptivity were assessed following four paths linked to conditions required to observe the effect: (i) the predictor must significantly influence the dependent variable (Path 1); (ii) the predictor must be significantly associated with the mediator (Path 2); (iii) the mediator must significantly influence the dependent variable when associated with the predictor in the same regression equation (Path 3) and (iv) the influence of the predictor on the dependent variable must be reduced when associated with the mediator in the same regression equation (Path 4). The influence of each predictor was assessed by logistic regression for Paths 1, 3 and 4 and linear regression for Path 2. In each equation, coefficients were adjusted for control variables. Coefficients were standardized to make them comparable across equations [58]. To compensate for some limitations of Baron and Kenny’s method (e.g. low statistical power) [59–61], bootstrapping, appropriate for small samples, was performed with Mplus 5.2 to determine the statistical significance of the mediating effect [62].

Results

Sample characteristics
Mean (SD) age of the participants was 46 (8.7) years, and the majority (62%) was women. Over half had a degree in education (55%) with 19 (10.1) years of experience in a school environment. No statistical differences were found for these demographic variables between participants from schools who had adopted HS and those who had not.

Results of bivariate analyses
Firstly, we tested the influence of potential control variables, i.e. school location, school level, school size and ‘HS knowledge level’, on adoption. The results showed that the likelihood of adopting HS was influenced by school location and HS knowledge level but not by school level and school size. Schools in urban areas had a lower prevalence of adoption than those in peripheral areas (47.1 versus 81.5%). Analyses also disclosed that schools with participants having a good or very good knowledge of HS were more likely to adopt HS than those with a superficial knowledge (79.3 versus 21.1%). Secondly, we identified predictors significantly associated with adoption in bivariate analyses
Factors influencing the adoption of an HPS approach

(Table II). Self-efficacy (13.7 versus 12.6), anticipated benefits/observability (21.7 versus 20.1) and perceived popularity of HS in the school community (12.2 versus 10) were higher for participants in schools that adopted HS than for those from other schools. Investments in healthy lifestyles by schools that adopted HS were also higher (7 versus 6.3). Moreover, their participants showed more leadership (16.4 versus 11.3), believed more in the collective efficacy of their school to implement HS (12 versus 10.6) and perceived fewer school contextual barriers (7.6 versus 11.9). In regard to the mediator, the likelihood of adopting HS was higher among schools with participants more receptive to the approach, although receptivity was high in both groups (4.6 versus 4.1).

Results of mediation analyses
Three regression equations were included to verify the mediation effect among predictors. Logistic regression results from equation 1 showed that ‘self-efficacy’, anticipated benefits/observability and ‘perceived popularity’ were not significantly associated with adoption after controlling for school location and HS knowledge level. Therefore, the first condition of mediation was only fulfilled by four predictors: ‘school investment in healthy lifestyle’, the presence of leaders within school, beliefs

<table>
<thead>
<tr>
<th>Variables</th>
<th>Adoption</th>
<th>OR (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Yes Mean (SD) or %</td>
<td>No Mean (SD) or %</td>
</tr>
<tr>
<td>Experience in a school setting (years)</td>
<td>19.6 (7.8)</td>
<td>19.9 (10.7)</td>
</tr>
<tr>
<td>Attitudes towards healthy living</td>
<td>12.9 (1.6)</td>
<td>12.8 (2.2)</td>
</tr>
<tr>
<td>Attitudes towards substance consumption</td>
<td>8.6 (1.8)</td>
<td>8.5 (1.8)</td>
</tr>
<tr>
<td>Self-efficacy</td>
<td>13.7 (1.4)</td>
<td>12.6 (2.0)</td>
</tr>
<tr>
<td>HS knowledge level</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Superficial (%)</td>
<td>21.1</td>
<td>78.9</td>
</tr>
<tr>
<td>Good to very good (%)</td>
<td>79.3</td>
<td>20.7</td>
</tr>
<tr>
<td>Anticipated benefits/observability</td>
<td>21.7 (2.4)</td>
<td>20.1 (2.3)</td>
</tr>
<tr>
<td>Relative advantages</td>
<td>7.5 (1.6)</td>
<td>7.0 (1.7)</td>
</tr>
<tr>
<td>School level</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Kindergarten to primary school (%)</td>
<td>50.8</td>
<td>49.2</td>
</tr>
<tr>
<td>High school (%)</td>
<td>65.4</td>
<td>34.6</td>
</tr>
<tr>
<td>School location</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Urban (%)</td>
<td>47.1</td>
<td>52.9</td>
</tr>
<tr>
<td>Peripheral (%)</td>
<td>81.5</td>
<td>18.5</td>
</tr>
<tr>
<td>School size</td>
<td>434.7 (422.2)</td>
<td>361.0 (245.3)</td>
</tr>
<tr>
<td>Perceived school innovativeness</td>
<td>19.7 (2.3)</td>
<td>19.2 (3.0)</td>
</tr>
<tr>
<td>Investment in healthy lifestyles</td>
<td>7.0 (0.9)</td>
<td>6.3 (1.1)</td>
</tr>
<tr>
<td>Investment in prevention of substance abuse</td>
<td>5.2 (1.5)</td>
<td>5.0 (1.6)</td>
</tr>
<tr>
<td>Investment in violence prevention</td>
<td>6.9 (1.0)</td>
<td>6.6 (1.3)</td>
</tr>
<tr>
<td>Beliefs in collective efficacy</td>
<td>12.0 (1.8)</td>
<td>10.6 (2.0)</td>
</tr>
<tr>
<td>Perceived school contextual barriers</td>
<td>7.6 (2.6)</td>
<td>11.9 (3.2)</td>
</tr>
<tr>
<td>Presence of leaders within school</td>
<td>16.4 (3.4)</td>
<td>11.3 (3.2)</td>
</tr>
<tr>
<td>Perceived popularity of HS in the school community</td>
<td>12.2 (1.6)</td>
<td>10.0 (2.2)</td>
</tr>
<tr>
<td>Receptivity towards HS</td>
<td>4.6 (0.5)</td>
<td>4.1 (0.7)</td>
</tr>
</tbody>
</table>

OR = odds ratio.
in collective efficacy and perceived school contextual barriers (Equation 1, Path 1—Table III).

For the second condition, the results of linear regression from equation 2 revealed that these four predictors had a significant influence on HS receptivity, after controlling for HS knowledge level and school location (Equation 2, Path 2—Table III).

Finally, the results of logistic regression from equation 3 demonstrated that the third and fourth conditions were met for two of the four predictors, i.e., school investment in healthy lifestyles and beliefs in collective efficacy. When associated with either of these two variables in a regression equation, HS receptivity still significantly influenced HS adoption (Equation 3, Path 3—Table III) while the effect of beliefs in collective efficacy on HS adoption was not significant anymore, and the effect of school investment in healthy lifestyles was diminished (Equation 3, Path 4—Table III). Bootstrapping determined that the mediated effect of receptivity was significant for both beliefs in collective efficacy (95% CI = 0.0078, 0.4118) and school investment in healthy lifestyles (95% CI = 0.0056, 0.4652). Mediation was not established for the presence of leaders within school and perceived school contextual barriers (Path 3—Table III), indicating a direct effect of these two predictors on HS adoption.

**Discussion**

The present study suggests that the attributes of HS innovation, such as relative advantages, anticipated benefits and individual characteristics, such as HS knowledge level and self-efficacy, are associated with HS adoption, which is consistent with previous findings [26, 27, 31, 63, 64]. However, multivariate analyses showed that four variables of the proposed prediction model had more weight in influencing adoption of the approach. These predictors were all related to the school organizational context. For two of them, i.e., school investment

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### Table III. Influence of predictors on HS adoption and the mediation effect of HS receptivity on the relationship between predictors and HS adoption

<table>
<thead>
<tr>
<th>Predictors</th>
<th>Equation 1</th>
<th>Equation 2</th>
<th>Equation 3</th>
<th>Equation 4</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Path 1&lt;sup&gt;a&lt;/sup&gt;</td>
<td>Path 2&lt;sup&gt;b&lt;/sup&gt;</td>
<td>Path 3&lt;sup&gt;c&lt;/sup&gt;</td>
<td>Path 4&lt;sup&gt;d&lt;/sup&gt;</td>
</tr>
<tr>
<td>Self-efficacy</td>
<td>0.26</td>
<td>1.33 (0.97, 1.79)</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>Anticipated benefits/observability</td>
<td>0.23</td>
<td>1.19 (0.98, 1.52)</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>Perceived popularity</td>
<td>0.24</td>
<td>1.26 (0.95, 1.52)</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>School investment in healthy lifestyle</td>
<td>0.39&lt;sup&gt;**&lt;/sup&gt;</td>
<td>2.07 (1.16, 3.69)</td>
<td>0.22&lt;sup&gt;*&lt;/sup&gt;</td>
<td>0.32&lt;sup&gt;*&lt;/sup&gt;</td>
</tr>
<tr>
<td>Beliefs in collective efficacy</td>
<td>0.34&lt;sup&gt;**&lt;/sup&gt;</td>
<td>1.39 (1.03, 1.86)</td>
<td>0.42&lt;sup&gt;***&lt;/sup&gt;</td>
<td>0.31&lt;sup&gt;***&lt;/sup&gt;</td>
</tr>
<tr>
<td>Perceived school contextual barriers</td>
<td>−0.74&lt;sup&gt;***&lt;/sup&gt;</td>
<td>0.56 (0.54, 0.80)</td>
<td>−0.50&lt;sup&gt;***&lt;/sup&gt;</td>
<td>−0.05</td>
</tr>
<tr>
<td>Presence of leaders within school</td>
<td>0.67&lt;sup&gt;***&lt;/sup&gt;</td>
<td>1.51 (1.24, 1.83)</td>
<td>0.62&lt;sup&gt;***&lt;/sup&gt;</td>
<td>0.01</td>
</tr>
</tbody>
</table>

OR = odds ratio.

<sup>a</sup>Path 1 = Influence of the predictor on HS adoption (standardized logistic regression coefficient and OR adjusted for knowledge of HS and school location).

<sup>b</sup>Path 2 = Influence of the predictor on HS receptivity (standardized linear regression coefficient adjusted for knowledge of HS and school location).

<sup>c</sup>Path 3 = Influence of HS receptivity on HS adoption (standardized logistic regression coefficient and OR adjusted for predictor, knowledge of HS and school location).

<sup>d</sup>Path 4 = Influence of the predictor on HS adoption (standardized logistic regression coefficient and OR adjusted for HS receptivity, knowledge of HS and school location). *P < 0.05; **P < 0.005; ***P < 0.001.
in healthy lifestyles and beliefs in collective efficacy, the influence on HS adoption was not direct but mediated by HS receptivity. Therefore, these two factors are likely to have a significant influence on HS adoption if participants had prior receptivity towards the approach. From these results, it appears that some schools considered HS as an advantageous framework to bring positive changes to youths’ lifestyles.

The influence of the two other predictors, perceived school contextual barriers and the presence of leaders within school, was direct. Thus, if perceived constraints were significant or if schools did not benefit from the presence of leaders with a positive influence, schools were less likely to adopt HS, despite the high level of participants’ receptiveness.

Previous research has often underlined that time and resource constraints are barriers to school member participation in health promotion training or activities linked to the implementation of initiatives such as HS [47, 65–67]. They were also a factor strongly hampering the capacity of schools to adopt the HS approach. This led us to foresee that several schools might wait for more substantial and durable commitments from government authorities before adopting the approach. The fact that prevention and health promotion could be perceived as peripheral to the primary school mission as well as a supplementary burden for teachers [68] could equally impede HS adoption. Our results express tension between HS relevancy in terms of principles (i.e. receptivity to HS) and its feasibility in an environment already under pressure.

Our results shed light on the crucial role of the organizational context as an essential condition for the adoption of this type of approach supporting the Greenhalgh et al. [31] literature review conclusion. Indeed, adjustment between an innovation and its context is a more valid and useful construct than one comprising the innovation’s attributes alone [31].

This study provides insights valuable to guide dissemination efforts for HS and overcome school users’ concerns. If relevant training and opportunities to develop professional skills regarding the principles and components of HS are necessary to support HPS, conditions rendering it possible are even more essential. As suggested by some authors, for this type of approach to be effective and sustainable, the health sector must move closer to the way schools work [69, 70]. The two sectors have to combine their efforts to better explore ways of linking and integrating educational and health priorities in school life, considering the limited time available for various learning areas in the school setting [71, 72]. Stakeholders, responsible for HS dissemination in the health and education government sectors, and HS developers should carefully consider strategies to improve schools’ capacity to implement HS. This actually means that emphasis should be placed not exclusively on strategies aiming to convince schools of the merits of HS but also on strategies that will support the organizational change necessary to incorporate it within schools. Also, our findings on leadership imply that key school actors could exercise their leadership by providing the school community with support and organizational ‘slack’ essential to enable changes of practice.

The main limitations of this study are inherent to cross-sectional investigations. The present work took place in a given period of interaction between participants and HS diffusion, knowing that diffusion of an innovation is a dynamic and evolutive process. Participants’ points of view during the survey reflect their experience at a precise moment of this process. The fact that cross-sectional data are less appropriate for establishing mediation is another limitation. Mediation analysis is more appropriate and is stronger with longitudinal data. However, cross-sectional data are acceptable when temporal precedence is based on theory and prior research, as is the case in this study. Research shows that knowledge and receptivity precede formal decisions regarding the adoption of an innovation [36, 37, 40].

The formal decision to adopt an innovation represents an important stage leading to potential success of implementation of the innovation, even though it is not a guarantee of efficient appropriation and careful utilization [26, 49]. Research on conditions increasing the success potential of implementation and sustainability within schools,
with appropriate adaptation and development, is therefore necessary. Such research could unveil how various actors of the school environment and its immediate community translate the key components of this approach into practice and school life in general. Longitudinal research is then necessary to better understand how to improve the absorptive capacity of schools for new knowledge and practices. Up to now, few studies have investigated organizational change in the context of comprehensive school approaches for health promotion and prevention, though it is acknowledged as an essential condition by different authors [20, 73–75].

Funding

Fonds québécois de la recherche sur la société et la culture in collaboration with the Fonds de la recherche en santé du Québec; Ministry of Health and Social Services of Quebec; Centre de recherche en santé du Québec in collaboration with the culture.

Conflict of interest statement

None declared.

References

Factors influencing the adoption of an HPS approach


