2010, Vol. 2, No. 3

PHENex Journal/Revue phénEPS

Developing an Educational Tool to Support Planning and Tracking of Health Promoting Schools

Mise au point d'un outil pédagogique pour la planification et la surveillance des écoles axées sur la promotion de la santé

Jessie-Lee Langille
University of Alberta

Kim Raine
University of Alberta

Sandi Carmichael
Annapolis Valley Health Promoting Schools Program

Caroline Whitby
Annapolis Valley Health Promoting Schools Program

Paul J. Veugelers
University of Alberta

Creating a supportive healthy school environment is a critical part of a Health Promoting Schools (HPS) program; however there is a great deal of variability and uncertainty in the literature to describe exactly how this should be planned, implemented and tracked over time. Despite the existence of some planning and assessment tools, the educational context is not always considered. The purpose of this paper is to describe a case study of a HPS program that tailored an educational tool, using Innovation Configuration (IC) theory, to assist in the planning and tracking of the implementation of HPS. The IC maps included items related to healthy eating and active living that were based on best practices from a local HPS program. Each item had four levels ranging from beginning (4) to ideal (1) level of implementation. IC maps were completed annually at meetings with school staff, support workers, parents, community members, and students. The tool was pilot tested and revised by describing the specific responsibilities of various school-based partners and further descriptions of the variations. Stakeholders commented on the usefulness of the IC map in that it provided a common vocabulary for HPS, clarified roles of stakeholders and set specific expectations for implementation of HPS. The IC map is a useful tool to plan and track implementation of HPS as it provides descriptions for implementing best practice and is integrated into the local educational jurisdiction. Future research

should explore the relevance of this tool in different school environments and the effectiveness of the tool to relate level of implementation to student outcomes.

L'établissement d'un milieu scolaire favorable constitue une composante essentielle de tout programme d'écoles axées sur la promotion de la santé. Cela dit, on note beaucoup de variabilité et d'incertitude dans la documentation au moment d'expliquer comment tout doit être planifié, instauré et vérifié au fil du temps. Malgré tous les outils de planification et d'évaluation qui existent, le contexte éducationnel n'est pas toujours pris en compte. Cet article présente une étude de cas portant sur un programme d'écoles axées sur la promotion de la santé dans le cadre duquel on a mis au point un outil pédagogique sur mesure, partant de la théorie de configuration innovatrice, pour aider à planifier et surveiller la mise en œuvre des programmes d'écoles axées sur la promotion de la santé. Les cartes de configuration comprenaient des volets sur la saine alimentation et sur la vie active inspirés des pratiques exemplaires découlant d'un programme local d'écoles axées sur la promotion de la santé. Chaque volet prévoyait quatre niveaux de mise en œuvre, allant du point de départ (4) à la situation idéale (1). Les cartes de configuration innovatrice étaient remplies chaque année lors de réunions avec le personnel de l'école, les employés de soutien, les parents, les membres de la collectivité et les élèves. L'outil a fait l'objet d'essais pilotes et a été revu à la lumière des descriptions de responsabilités spécifiques des divers partenaires de l'école et en décrivant davantage les variations. Les parties intéressées ont commenté sur l'utilité des cartes de configuration innovatrice en précisant qu'elles créaient un vocabulaire commun pour les écoles axées sur la promotion de la santé, précisaient les rôles des parties intéressées et établissaient des objectifs spécifiques de mise en œuvre. La carte de configuration innovatrice constitue un outil utile pour planifier et surveiller la mise en œuvre des programmes d'écoles axées sur la promotion de la santé, puisqu'elle explique comment instaurer des pratiques exemplaires et s'harmonise avec les compétences éducatives locales. À l'avenir, les recherches devraient explorer la pertinence de cet outil dans divers contextes scolaires et son aptitude à faire des liens entre le niveau de mise en œuvre et les résultats des élèves.

Introduction

The school's primary mandate is to educate, but it also plays an important role for health and wellbeing. Children that are physically active (Chomitz et al., 2009; Etnier et al., 1997; Hillman, Castelli, Castelli, Buck, & Buck, 2005) and well-nourished (Florence, Asbridge, & Veugelers, 2008; Kim et al., 2003; Kleinman et al., 2002; Pollitt & Mathews, 1998; Rampersaud, Pereira, Girard, Adams, & Metzl, 2005; Taras, 2005) have demonstrated improvements in cognition, behaviour and academic performance, thus providing a rationale for the need to support health in schools. A Health Promoting Schools (HPS) approach is being increasingly adapted as a comprehensive strategy to foster both health and learning. There is also a focus on strategies that make changes to the school environment (Stewart-Brown, 2006) to make "the healthier choice the easy choice." Implementation of HPS requires a clear understanding of how the essential elements are coordinated and will be applied. At the same time a certain degree of flexibility is required to allow for adjustments prompted by changes in

school context (Deschesnes, Martin, & Hill, 2003). This complexity and variability across HPS implementation make it difficult to evaluate HPS for program effectiveness (Kalafat, Illback, & Sanders, 2007). Mukoma and Flisher reviewed nine different evaluations of HPS programs and found that most did not allow a confident direct attribution of the observed outcomes to the interventions. The review also identified that there was a gap in the schools' understanding of the core characteristics of HPS and the development of evaluation methods. Specifically, the review identified a need to develop more clearly defined, valid, feasible and suitable indicators to evaluate process, output and outcomes in HPS (Mukoma & Flisher, 2004). Considering the variability across HPS programs and uncertainties on how HPS should be implemented and evaluated (Deschesnes et al., 2003), the purpose of this paper is to describe a case study of a HPS program that tailored an educational tool to assist in the planning and tracking of the implementation of HPS in schools in the Annapolis Valley Health Promoting Schools Program.

Literature Review

Over the past 10 years, there is emerging evidence that the focus of school interventions should go beyond changing individual behaviours to establishing a health enhancing school environment (Wechsler, Devereaux, Davis, & Collins, 2000). A recent statement from international experts explained that effective practice has included approaches that combine traditional health education with more comprehensive, whole-school approaches leading to the development of a supportive physical, social and learning environment and bringing together resources of parents, local communities and organizations (Tang et al., 2009). A HPS approach is being increasingly adopted as a comprehensive strategy to support health in schools (also known as Comprehensive School Health or Coordinated School Health). The model of HPS is adapted from recommendations by the World Health Organization (WHO); specifically there is a focus on fostering health and learning, engaging all school partners (i.e., staff, students, parents and community), providing a healthy environment that supports health and implementing healthy policies and practices (International Union for Health Promotion and Education, 2008; World Health Organization, 2006). Historically, health education in schools has been addressed in the classroom using a topic approach (i.e. physical activity, healthy eating and mental health); HPS offers a more holistic approach that can complement classroom curriculum. As such, HPS requires a new way of thinking about health and the role of the school (World Health Organization, 2006). For example, classroom lessons on healthy eating can be supported and reinforced by a school breakfast program and having only healthy foods available for purchase and at school functions (St Leger, Young, Blanchard, & Perry, 2008).

Measuring a Health Promoting Schools Program

School climate is described as the enduring quality of a school environment that is experienced by participants, affects their behaviour and is based on the shared perceptions of behaviour (Hoy, Tarter, & Kottcamp, 1991). Characteristics of school climate include staff morale, leadership, administrative support, financial and human resources and have a significant impact on the capacity of a school to implement an initiative like HPS (Durlak & DuPre, 2008). Various

measures have been used to study school climate, however, these have not been extensively described for their relevance to the implementation of health promotion programs. The Child and Adolescent Trial for Cardiovascular Health (CATCH) used both the Organizational Climate Description Questionnaire for Elementary Schools and Organizational Health Inventory for Elementary Schools (Hoy et al., 1991) to determine the effect of school climate on the institutionalization of the CATCH program. The authors reported that aspects of school climate were associated with continued implementation of the CATCH classroom component but not foodservice or physical education (Parcel et al., 2003). The authors also suggested that this instrument was helpful to evaluate the readiness of the school to implement and sustain an innovative program. Comparatively, Gittelsohnl et al. used a qualitative assessment (in-depth interviews) to appraise the school climate of schools related to the implementation of a comprehensive school health intervention rather than using previously developed measures for school climate. The results of this research suggested that support from teachers was an indicator of positive school climate and that positive school climate showed a significant impact on implementation of the curriculum and on student exposure in general (Gittelsohn et al., 2003). The authors commented on the limitations of their qualitative assessment as it focused specifically on the influence of school climate on the specific program, rather than the entire school environment (Gittelsohn et al., 2003). Although these studies offer important considerations for previously developed questionnaires to measure school climate, their application requires extensive support and may not be practical for naturally occurring health promotion programs. Related to HPS, these tools do not offer an explicit mechanism to support school planning nor has research explored their relevance to a comprehensive school health approach.

Various tools have been developed to help schools plan and monitor HPS, however, the long-term feasibility and practicality in schools has not yet been well explored. Many of these tools use an audit or survey style format and have been developed from a health promotion or public health lens. For example, the School Health Index (SHI), from the Centers for Disease Control (Centers for Disease Control and Prevention, 2008) is commonly used to support research activities in the United States (Brener et al., 2006). A study by Staten et al. reported that at least one immediate change was made in each school that participated in the School Health Index project, however, staff turnover, lack of time, and limited resources resulted in few schools achieving longer-term policy changes (Staten et al., 2005). In Canada, a survey format is used to generate health profiles of schools with the School Health Action, Planning, and Evaluation System (SHAPES) (Cameron et al., 2007; Leatherdale, Manske, Wong, & Cameron, 2009). Based on initial success, additional modules have been developed and have also informed the development of a national tool endorsed by the Joint Consortium for School Health (Centre for Behavioural Research and Program Evaluation, 2009). Despite the promise of this tool there is little information about its long-term utility to support HPS planning. Finally, a different approach was used in developing the School Health Portfolio System (also in the United States), which provides a tool for schools in the form of a notebook that leads the school through seven separate tasks to assess, plan and monitor progress in school health (Weiler & Pigg, 2004). This tool was evaluated

for its feasibility and found to be helpful for a small sample of schools but barriers, such as lack of time, money and human resources, persisted in these cases (Barnes, Torrens, George, & Brown, 2007).

Despite the existence of some supportive tools to guide HPS planning, schools need to have the capacity to interpret and use resources that support their specific school context. Furthermore, resources developed from a health perspective do not always fit with typical educational priorities. Thus, the local educational contexts, and educationally developed tools, are important to consider in the development of a planning and assessment tool for school health.

Educational Assessment Tools

Innovation Configuration (IC) is an established and well-researched theory developed by experts in a national research center (University of Texas Research and Development Center in Austin) studying educational change (Hall & Hord, 1987). IC theory offers a diagnostic tool for change facilitators who want to monitor innovations and is specifically used to: describe a new initiative to stakeholders, set goals, establish realistic expectations and a timeline for implementation, monitor and gauge implementation in a self-assessment and gather data to diagnose emerging needs (Champion, 2003). IC maps are assessments that provide specificity on how standards should look in practice and direction for those involved in the implementation of an innovation (Roy & Hord, 2004). In order to fully implement the standards of an innovation, such as HPS, various individuals within a school system must work together to develop policies and create a system that supports the knowledge and skills of those involved. IC theory assumes that the "users" (i.e., school staff, students, parents and community) need to have a clear understanding of the innovation to be able to consistently implement. IC maps identify the major components of an innovation and describe a continuum of use, or variations, that range from "ideal implementation" to "non-use." This range allows for measurement of true program fidelity by identifying how current actions compare to the ideal level of implementation (Roy & Hord, 2004). To our knowledge there is no research relating to IC maps to support HPS planning. Rather, the majority of literature on IC maps has focused on traditional education programs; specifically, this theory has been used with family support, literacy and extended services in schools (Craig & Kacer, 2000; Kalafat et al., 2007; Meehan, Walsh, Swisher, Spring, & Lewis, 1999).

Case Study: Annapolis Valley Health Promoting Schools Program

Although Canada does not have national legislation on HPS, many provinces and school boards have created policies or procedures to guide the implementation of HPS within their jurisdictions. In Nova Scotia, the provincial government has a program that supports HPS but each regional school board must create a separate approach to determine how the program will be implemented within their region. The Annapolis Valley Health Promoting Schools Program (AVHPSP) emerged as a grassroots initiative, prior to the existence of the Provincial program, by parents and school staff who had become increasingly concerned about the poor eating habits, physical inactivity and consequent health of their children. Using an ecological approach to change the school environment, the program focused on "making the healthy choice the easy

choice" for students. Environmental changes were made through the development of healthy school policies and practices and by enabling strong community leadership and partnerships with health, recreation, and food industry sectors. The program also ensured that students had the opportunity to gain personal skills through the health and physical education curriculum (Annapolis Valley Health Promoting Schools, n.d.). In 2003, a provincial survey of children's body weights and healthy living behaviours identified children attending these schools had healthier diets, were more active, 59% less likely to be overweight and 72% less likely to be obese (Veugelers & Fitzgerald, 2005). As a result of the initial success of AVHPSP additional funding allowed the program to be expanded from its initial 8 schools to additional schools in the school board. Research is currently being conducted in a three-year study to investigate the impact of program expansion.

Along with the growth of the AVHPSP, program champions identified that there was a need to help "new" schools understand how to implement the best practices used by the original AVHPSP schools. The AVHPSP Project Implementation Team judged IC theory to be appropriate to support HPS planning and tracking because it was familiar and of interest to educators in the region. For example, staff in this school board also had experience by using IC theory as teaching tools with literacy, race relations, cross-cultural understanding and human rights initiatives. Two individuals of the Team (program manager and educational consultant/former principal) led the development of the IC map.

Development of the IC Map

Based on best practices found in the AVHPSP original eight schools, a list of core components of an HPS approach was developed. Three main categories were identified: 1) the school; 2) the food available; and 3) opportunities for physical activity. Subcategories were listed within these. Table 1 provides a list of categories and subcategories in the revised IC map.

Table 1
List of categories and subcategories in the revised IC map.

The Health Promoting School Leader
Creates a Health Promoting School team
The Health Promoting School Team
Develop a Health Promoting School culture
Promote an inclusive Health Promoting School culture
Establish Partnerships
The people (person) responsible for providing snacks and meals in the school
Work(s) with the HPS team
Support(s) the intent of the Provincal Nutrition Policy (*Food and Nutrition Policy for Nova Scotia Public Schools)*
Promote(s) fruit and vegetable consumption
Emphasize(s) whole grains
Actively support a Health Promoting School culture
The people (person) responsible for providing breakfast
Work(s) with the HPS team
Work(s) through Breakfast for Learning "Keys to Success"
Ensure(s) food is available when students arrive at school
Ensure(s) the food available meets nutrition guidelines
Ensure(s) universal accessibility
Encourage(s) community involvement
Actively support a Health Promoting School culture
The people (person) involved in coordinating physical activity in the school
Work(s) with the HPS team
Provide(s) a range of opportunities so all students can participate in daily physical activity during the school day
Provide(s) opportunities for students to be physically active outside the school day
Actively support a Health Promoting School culture
The physical education teacher(s)
Work(s) with the HPS team
Provide(s) school wide leadership for daily physical activity with support from the administration
Actively support a Health Promoting School culture
All teachers
Actively support a Health Promoting School culture
All support staff
Actively support a Health Promoting School culture

Components of these categories were transformed into action words by stating them in behaviours or actions that described what the "school" was doing. Variations were described to clarify how the intervention would look at different stages that moved from the beginning to the ideal level of implementation. The intention was to encourage schools to move from the right (level 4 or 3, beginning stage) to the left (level 1, ideal stage). Elementary, middle and high

school maps were developed to describe the different best practices expected at each school level.

The Team felt that the first draft of the IC map was appropriate and manageable for the schools. However, upon pilot testing inconsistencies were identified. With support from a public health researcher, an opportunity for funding, guidance from an expert of the original research group who developed IC maps (Hord, Rutherford, Huling-Austin, & Hall, 1987) and support from other expertise in the region, the tool was adjusted in three ways. Firstly, in order to increase the knowledge and understanding of the scope of a HPS culture, school teams were introduced to the "Protocols and Guidelines for Health Promoting Schools," International Union of Health Promotion and Education (International Union for Health Promotion and Education, 2006). Local examples were included to help teams relate each guideline to the region. Secondly, IC maps were made more comprehensive by describing the specific responsibilities of various school-based personnel, each on separate pages (i.e., the HPS Leader, the HPS Team, those responsible for providing snacks and meals in the school, those responsible for providing breakfast, those involved in coordinating physical activity in the school, the physical education teacher(s), all teachers, all support staff). This replaced the three major categories previously described.

Finally, there was more detail on the variations in implementation. This helped to clarify both the level at which the schools were currently operating, as well as to provide detail on what they needed to do to move forward to the next level. See Table 2 for an example of the revised variations in behaviours for the "People Responsible for Coordinating Physical Activity" section.

A document review of best practices from the original HPS schools was completed to ensure reliability in the components used in the IC maps. Focus groups were also conducted with the principals, teachers and parents from the original schools and public health staff were consulted to further ensure validity of the tool. In some cases, the IC map described best practices that were beyond the actions of the original schools to ensure the components of the IC map represented an ideal HPS framework for schools.

Although the IC map was not originally designed as an evaluation tool, the level of implementation corresponds to a numeric value (ranging from 1 to 4). These numbers provide indication of school progression with respect to implementation. For example, the average score in all schools in 2006 was 2.19, in 2007 was 1.78 and in 2008 was 1.67. These figures demonstrate a trend of improved implementation of HPS in the AVHPSP (decrease in score) during the three years of tracking. This use of the IC maps supports program-level tracking of HPS implementation for the AVHPSP and enables further analysis to determine the impact of school-level implementation on student outcomes.

Table 2
Example of variations of behaviors (1 being ideal and 4 being "beginning stage") for the "People Responsible for Coordinating Physical Activity" section.

Desired Outcome	**LEVEL 1**	**LEVEL 2**	**LEVEL 3**	**LEVEL 4**
Provide(s) opportunities for students to be physically active outside the school day (before and after school)	Coordinate opportunities for an after-school program 5 days a week Emphasize sportsmanship Encourage all students to participate Identify barriers to student participation to the principal and/or school based HPS Team Provide more time for a variety of non-traditional and recreational activities which emphasize different aspects of fitness Identify and promote opportunities for students during weekends & holidays Build links with local community (e.g. high school students)	Coordinate opportunities for an after-school program 4 days a week Emphasize sportsmanship Encourage all students to participate Identify barriers to student participation to the principal and/or school based HPS Team Provide more time for a variety of non- traditional and recreational activities which emphasize different aspects of fitness Identify and promote opportunities for students during weekends & holidays	Coordinate opportunities for an after-school program 3 days a week Emphasize sportsmanship Encourage all students to participate Identify barriers to student participation to the principal and/or school based HPS Team Provide more time for a variety of non-traditional and recreational activities which emphasize different aspects of fitness	Coordinate opportunities for an after-school program 1 or 2 days a week Emphasize sportsmanship Encourage all students to participate Identify barriers to student participation to the principal and/or school based HPS Team

Discussion

The IC maps are now typically used at a yearly school meeting that is dedicated to HPS planning. The teams attending the meetings vary in size and range but are generally comprised of a mix of school administration, teachers, support workers, parents, community members and students. The purpose of these meetings is to discuss HPS activities and reach a consensus on each component of the IC map with respect to the current level of their school. Afterward, schools identify their HPS goals for the next school year and discuss actions that are needed to achieve these goals. Substitute/supply teacher coverage, enables staff to attend meetings during school time, and facilitation support is provided through funding available from the AVHPSP. The length of team meetings varies depending on the availability and commitment by the school; generally, during a three hour meeting, the IC map component would take approximately one hour. The team process, including the self-assessment and planning used by the AVHPSP is well supported as being essential to establish and maintain HPS (International Union for Health Promotion and Education, 2008). Furthermore, the integration and coordination of the IC map into the process of HPS at the school and program level is a critical part of why this tool works for the AVHPSP.

The IC map provides a unique and practical tool for schools in the AVHPSP. The focus on the educational environment is important and different from other tools that have been developed from a "health" or "research" lens. A focus on the educational environment was facilitated in various ways. First, the emphasis on a comprehensive HPS approach offers an advantage as it emphasizes a link between health and education (World Health Organization, 2006). Moreover, as development of the tool was led by educational stakeholders, developed from an educational based theory and familiar to the local education sector, it may have been perceived as more feasible for schools when it was introduced. Also, the IC maps allow for emphasis on process rather than outcomes. The descriptions of how to achieve best practice used in the IC map help to teach schools how to implement a HPS approach. Furthermore, there is a persistent consideration given to both academic school requirements and priorities. Program champions understand and endeavour to connect the IC map and HPS planning process to school requirements, such as school accreditation; this integration will help to maintain "buy in" from schools. The integration of the IC map process into the work of schools through the AVHPSP is also a key feature of this success. In order to receive funding for HPS programming, schools need to hold a HPS team meeting, which includes the completion or review of their IC map. Finally, the IC map has enabled feelings of ownership among school level stakeholders in the AVHPSP as they participate in discussions about how their school has been implementing the HPS framework and, based on their resources, on how they want to move forward.

Comparatively, many tools developed from a "health" or "research" lens are led by health stakeholders, focus on health outcomes and are not well integrated into the processes or priorities of schools. For example, the SHI was developed by the Centers for Disease Control (Centers for Disease Control and Prevention, 2008), which is part of the United States Department of Health and Human Services, not the Department of Education. SHAPES was developed by researchers (Cameron et al., 2007; Leatherdale et al., 2009) and although the

newly developed Healthy Planner is now endorsed by the Joint Consortium for School Health (Centre for Behavioural Research and Program Evaluation, 2009), the tool is not integrated into the education system. Similarly although research interventions, such as CATCH and Pathways have used tools to measure school climate these have not been well integrated into the process of a school. Positively, use of SHI, SHAPES and the Healthy School Planner suggest a similar process that links self-assessment and planning. However, both of these tools assess how well best practices are in place in a school (Cameron et al., 2007; Centers for Disease Control and Prevention, 2008; Leatherdale et al., 2009), rather than describing how a school might move forward with further implementing particular components. Furthermore, these tools do not seem to consider education requirements and priorities and are not well integrated into educational jurisdictions.

The Program Implementation Team and schools have identified many positive experiences of working with the IC map. At a program level, it provides a mechanism to track implementation of HPS across schools. Each year, schools complete and submit their yearly IC map, develop school goals and request HPS related funding. This tool provides a means of tracking the level of implementation across schools; together with their priority goals for the year, the IC map provides some consideration for distributing HPS related funding. The IC map also provides a common vocabulary for the AVHPSP, clarifies roles of stakeholders and sets specific expectations for implementation of HPS. With descriptions of how to achieve best practice and by indentifying resources and support available through AVHPSP, schools are able to envision how they can achieve change. This is particularly helpful for schools that are at the beginning stage of implementing HPS. Having leadership within a school, often referred to as a "champion", is consistently reported as an enabling factor for coordinating and implementing HPS (International Union for Health Promotion and Education, 2006; Resnicow, Allensworth, & Allensworth, 1996; World Health Organization, 2006). In this case study, stakeholders also reported that having a champion helps to facilitate the use of the IC map. The direct support of a facilitator also ensures that the IC maps are more consistently implemented, thereby increasing the validity and reliability of the IC maps and trustworthiness of the score. The facilitator also encourages participation from all HPS team members and helps to balance disproportionate opinions from individuals on the team. Similarly, an evaluation of the SHI also reported that external facilitators were essential for implementation success (Staten et al., 2005). Best practices from HPS also recommend engaging diverse stakeholders, including principals, teachers, staff, parents, community members and students, in planning, implementation and evaluation (Cameron et al., 2007; Centers for Disease Control and Prevention, 2008; International Union for Health Promotion and Education, 2006; Leatherdale et al., 2009; Queensland Health et al., 2005; Weiler & Pigg, 2004; World Health Organization, 2006). In this case, diversity in the IC map meetings seemed to increase the richness of discussion and also ensured all voices were heard.

Similar to other barriers identified with other tools (Barnes et al., 2007; Staten et al., 2005), an ongoing challenge for the AVHPSP is to ensure the IC map is user-friendly and integrated into the dynamic educational requirements and priorities of schools and is adequately and appropriately resourced. The

AVHPSP team has identified that the IC map needs to be revised as the initiative evolves. Specifically, the team has acknowledged that the IC should include aspects of HPS beyond the topics of healthy eating and physical activity (for example, mental and sexual health). Furthermore, schools have identified that the focus on "individuals" in the revised IC map can create some discomfort among the team. As the IC map evolves in the AVHPSP, it will be important to document changes and impact on school use. Sustained funding for substitute coverage and support from a facilitator through the AVHPSP will also be important as these factors were reported as being critical to the school process. Furthermore, continued integration into the educational priorities of the school board will be an important part of ensuring ongoing use by schools.

This article focuses on the development and use of the IC map for planning and tracking implementation of HPS in the case of the AVHPSP. The case suggests that the critical aspects of a useful tool for HPS practice requires descriptions for implementing best practice at different stages of readiness and integration into the school system. Although this tool was adapted for the context of the AVHPSP, components were based on best practices and could be adapted and applied in other HPS programs. For example, the use of the IC maps with the AVHPSP was recently highlighted as an example of a useful planning tool for comprehensive school health in an article in a supplementary issue of the *Canadian Journal of Public Health* (Veugelers & Schwartz, 2010). Future research could explore the effectiveness of the IC map to monitor changes in school level practices and relate these changes to improvements in students' health behaviours and health status. It will also be important to explore the relevance of this tool in different school environments and the capacity of the tool to reliably evaluate improvements in school level implementation of HPS programs. Future analysis will be conducted to analyze the extent of implementation at different levels as well as relating this to the health behaviours of students.

Acknowledgements

The authors thank all stakeholders involved with the Annapolis Valley Health Promoting School Program, including students, school staff, parents and community members, the Annapolis Valley Regional School Board, the Annapolis Valley Health Authority as well as support from the Nova Scotia Government through the Nova Scotia Health Promoting Schools Program.

This research was funded by the Canadian Population Health Initiative and through a Canada Research Chair in Population Health and Alberta Heritage Foundation for Medical Research Health Scholarship to Dr Paul J. Veugelers. The primary author, Jessie-Lee Langille, would like to acknowledge support from a Vanier Canada Graduate Scholarship from the Canadian Institutes of Health Research. Dr. Kim Raine acknowledges salary support from the Canadian Institutes for Health Research/ Heart and Stroke Foundation of Canada Applied Public Health Chairs Program, and the Alberta Heritage Foundation for Medical Research.

References

Annapolis Valley Health Promoting Schools. (n.d.). *Making the healthy choice the easy choice: Guidebook*. Annapolis Valley, Nova Scotia: Annapolis Valley Regional School Board.

Barnes, S. P., Torrens, A., George, V., & Brown, K. M. C. (2007). The use of portfolios in coordinated school health programs: Benefits and challenges to implementation. *Journal of School Health, 77*(4), 171-179.

Brener, N. D., Pejavara, A., Barrios, L. C., Crossett, L., Lee, S. M., McKenna, M., Michael, S., & Wechsler, H. (2006). Applying the school health index to a nationally representative sample of schools. *Journal of School Health, 76*(2), 57-66.

Cameron, R., Manske, S., Brown, K. S., Jolin, M. A., Murnaghan, D., & Lovato, C. (2007). Integrating public health policy, practice, evaluation, surveillance, and research: The school health action planning and evaluation system. *American of Public Health, 97*(4), 648.

Centers for Disease Control and Prevention. (2008). *Welcome to the school health index (SHI).* Retrieved April 8, 2009, from https://apps.nccd.cdc.gov/shi/default.aspx

Centre for Behavioural Research and Program Evaluation. (2009). *Healthy school planner*. Retrieved October 6, 2009, from http://www.shapes.uwaterloo.ca/School%20Environment%20Modules/HSP/

Champion, R. (2003). Taking measure. *Journal of School Development, 24*(2), 69.

Chomitz, V. R., Slining, M. M., Slining, M. M., McGowan, R. J., Mitchell, S. E., Dawson, G. F., Dawson, G. F., & Hacker, K. A. (2009). Is there a relationship between physical fitness and academic achievement? Positive results from public school children in the northeastern United States. *Journal of School Health, 79*(1), 30-37.

Craig, J. R., & Kacer, B. A. (2000). *Using an innovation configuration component map to assess the relationship between student achievement and the degree of implementation of extended school services in a sample of Kentucky middle schools*. Retrieved from http://www.eric.ed.gov/PDFS/ED448168.pdf

Deschesnes, M., Martin, C., & Hill, A. J. (2003). Comprehensive approaches to school health promotion: How to achieve broader implementation*? Health Promotion International, 18*(4), 387-396.

Durlak, J. A., & DuPre, E. P. (2008). Implementation matters: A review of research on the influence of implementation on program outcomes and the factors affecting implementation. *American Journal of Community Psychology, 41*(3-4), 327-350.

Etnier, J. L., Salazar, W., Landers, D. M., Petruzzello, S. J., Han, M., & Nowell, P. (1997). The influence of physical fitness and exercise upon cognitive functioning: A meta-analysis. *Journal of Sport & Exercise Psychology, 19*(3), 249-277.

Florence, M. D., Asbridge, M., & Veugelers, P. J. (2008). Diet quality and academic performance. *The Journal of School Health, 78*(4), 209-15; 239-41.

Gittelsohn, J., Merkle, S., Story, M., Stone, E. J., Steckler, A., Noel, J., Davis, S., Martin, C. J., & Ethelbah, B. (2003). School climate and implementation of the Pathways study. *Preventive Medicine, 37*, S97-S106.

Hall, G. E., & Hord, S. M. (1987). *Change in schools: Facilitating the process*. Albany, New York: State University of New York Press.

Hillman, C. H., Castelli, D. M., Castelli, D. M., Buck, S. M., & Buck, S. M. (2005). Aerobic fitness and neurocognitive function in healthy preadolescent children. *Medicine and Science in Sports and Exercise, 37*(11), 1967-1974.

Hord, S. M., Rutherford, W. L., Huling-Austin, L., & Hall, G. E. (1987). *Taking Charge of Change*. Alexandria, Virginia: Association for Supervision and Curriculum Development.

Hoy, W. K., Tarter, C. J., & Kottcamp, R. B. (1991). *Open Schools/Healthy Schools: Measuring Organizational Climate*. Sage Publications: London.

International Union for Health Promotion and Education. (2006). *Protocols and guidelines for health promoting schools*. Saint-Denis Cedex, France: International Union for Health Promotion and Education.

International Union for Health Promotion and Education. (2008). *Achieving health promoting schools: Guidelines for promoting health in schools.* International Union for Health Promotion and Education: Saint Denis Cedex, France.

Kalafat, J., Illback, R. J., & Sanders, D. (2007). The relationship between implementation fidelity and educational outcomes in a school-based family support program: Development of a model for evaluating multidimensional full-service programs. *Evaluation and Program Planning, 30*(2), 136-148.

Kim, H. Y., Frongillo, E. A., Han, S. S., Oh, S. Y., Kim, W. K., Jang, Y. A., Won, H. S., Lee, H. S., & Kim, S. H. (2003). Academic performance of Korean children is associated with dietary behaviours and physical status. *Asia Pacific Journal of Clinical Nutrition, 12*(2), 186-192.

Kleinman, R. E., Hall, S., Green, H., Korzec-Ramirez, D., Patton, K., Pagano, M. E., & Murphy, J. M. (2002). Diet, breakfast, and academic performance in children. *Annals of Nutrition & Metabolism, 46 Suppl 1*, 24-30.

Leatherdale, S. T., Manske, S., Wong, S. L., & Cameron, R. (2009). Integrating research, policy, and practice in school-based physical activity prevention programming: The school health action, planning, and evaluation system (SHAPES) physical activity module. *Health Promotion Practice, 10*(2), 254.

Meehan, M. L., Walsh, S., Swisher, A., Spring, J., & Lewis, H. (1999). *Process and outcomes evaluation of an even start program*. Retrieved from http://eric.ed.gov/PDFS/ED436333.pdf

Mukoma, W., & Flisher, A. J. (2004). Evaluations of health promoting schools: A review of nine studies. *Health Promotion International, 19*(3), 357-368.

Parcel, G. S., Perry, C. L., Kelder, S. H., Elder, J. P., Mitchell, P. D., Lytle, L. A., Johnson, C. C., & Stone, E. J. (2003). School climate and the institutionalization of the CATCH program. *Health Education & Behavior, 30*(4), 489-502.

Pollitt, E., & Mathews, R. (1998). Breakfast and cognition: An integrative summary. *The American Journal of Clinical Nutrition, 67*(4), 804S-813S.

Queensland Health with Education Queensland, Brisbane Catholic Education Centre and Association of Independent Schools. (2005). *How to conduct a school health audit*. Retrieved April 29, 2009, from

http://www.health.qld.gov.au/healthyschools/documents/29338.pdf

Rampersaud, G. C., Pereira, M. A., Girard, B. L., Adams, J., & Metzl, J. D. (2005). Breakfast habits, nutritional status, body weight, and academic performance in children and adolescents. *Journal of the American Dietetic Association, 105*(5), 743-60; 761-2.

Resnicow, K., Allensworth, D., & Allensworth, D. (1996). Conducting a comprehensive school health program. *Journal of School Health, 66*(2), 59-63.

Roy, P., & Hord, S. M. (2004). Chart a measured course toward change. *Journal of Staff Development, 25*(2), 54-58.

Staten, L. K., Teufel-Shone, N. I., Steinfelt, V. E., Ortega, N., Halverson, K., Flores, C., & Lebowitz, M. D. (2005). The school health index as an impetus for change. *Preventing Chronic Disease, 2*(1), A19.

St Leger, L., Young, I, Blanchard, C., & Perry, M. (2008). Promoting health in schools: From evidence to action. International Union for Health Promotion and Education: Saint Denis Cedex, France.

Stewart-Brown, S. (2006). *What is the evidence on school health promotion in improving health or preventing disease and, specifically, what is the effectiveness of the health promoting schools approach*? Copenhagen: World Health Organization Regional Office for Europe.

Tang, K. C., Nutbeam, D., Aldinger, C., St. Leger, L., Bundy, D., Hoffmann, A. M., Yankah, E., McCall, D., Buijs, G., & Arnaout, S. (2009). Schools for health, education and development: A call for action. *Health Promotion International, 24*(1), 68-77.

Taras, H. (2005). Nutrition and student performance at school. *The Journal of School Health, 75*(6), 199-213.

Veugelers, P. J., & Schwartz, M. E. (2010). Comprehensive school health in Canada. *Canadian Journal of Public Health, 101*(8), S5-S8.

Veugelers, P. J., & Fitzgerald, A. L. (2005). Effectiveness of school programs in preventing childhood obesity: A multilevel comparison. *American Journal of Public Health, 95*(3), 432-435.

Wechsler, H., Devereaux, R. S., Davis, M., & Collins, J. (2000). Using the school environment to promote physical activity and healthy eating. *Preventive Medicine, 31*(2), S121-S137.

Weiler, R. M., & Pigg, R. M. (2004). The school health portfolio system: A new tool for planning and evaluating coordinated school health programs. *Journal of School Health, 74*(9), 359-364

World Health Organization. (2006). *What is a health promoting school*? Retrieved from http://www.who.int/school_youth_health/gshi/hps/en/print.html