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The Validity and Reliability of a School-Based Physical Activity Opportunities Survey

Validité et fiabilité d'un sondage sur les occasions de pratique d'activité physique en milieu scolaire

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This article outlines the development of a physical activity opportunities survey intended to assess perceptions of school staff and parents relative to factors associated with school-based physical activity opportunities. A secondary aim was to construct a valid and reliable tool that would be relevant across Canadian school contexts. Survey validity was determined through completion of the online survey by parents, teachers, and administrators from elementary, middle, and secondary schools. Several participants agreed to take the survey a second time for reliability purposes. Results indicated the best-fit model to be 19 items constrained by three factors: school policies and practices, school artifacts, and parent involvement in physical activity promotion. Test-retest analysis revealed strong reliability (intraclass correlation coefficient = .783, $p < .05$). Therefore, the survey is a viable aid towards identifying factors in school environments that contribute to or impede the offering of school-based physical activity opportunities.

Cet article décrit l'élaboration d'un sondage sur les facteurs associés aux occasions de pratique d'activité physique en milieu scolaire, à partir de la perception du personnel et des parents. Un objectif secondaire consistait à produire un outil valide et fiable qui pourrait servir à toutes les écoles canadiennes. Pour établir la validité du sondage, des enseignants, des administrateurs scolaires et des parents d'écoles élémentaires, intermédiaires et secondaires ont rempli un sondage en ligne. Plusieurs ont accepté de participer une deuxième fois au sondage pour vérifier la fiabilité. Les résultats révèlent que le modèle de sondage le plus pertinent comporte 19 éléments constitutifs de trois facteurs : les politiques et pratiques de l'école, les artefacts de l'école et la participation des parents à la promotion de l'activité physique.

L'analyse du sondage et du sondage secondaire indique que le degré de fiabilité est élevé (coefficient de corrélation interclasses = ,783, $p < ,05$). Le sondage constitue un outil viable pour cerner les facteurs qui contribuent positivement ou négativement à la création d'occasions de pratique d'activité physique dans un contexte scolaire.

Introduction

Enhancing the proportion of physically active school-aged children and youth continues to be a public health priority in Canada. Recent evidence indicates that Canadian youth are accumulating at least six hours of screen time daily (Active Healthy Kids Canada, 2010) and less than one-third are using active transportation to and from school (Cragg, Cameron, & Craig, 2006). These factors, among others, have contributed to 88% of Canadian children and youth failing to meet the recommended 90 minutes of daily physical activity.

In keeping with insufficient physical activity levels and the influence of place on behaviour (Dooris, Poland, & Kolbe, 2007), a key strategy to improve daily physical activity levels of children and youth has been to focus on the school environment. Schools are where children and adolescents spend the majority of their time during the school year (Fox, Cooper, & McKenna, 2004) and most children and youth, including high risk groups (Dobbins, DeCorby, Robeson, Husson, & Tirillis, 2009) are present in this setting. Many schools across Canada have policies to improve student physical activity levels but insufficient support (i.e. resources), and actual evidence of effective implementation is vague (Rhodes, Naylor, & McKay, 2009; Spitters, Schwartz, & Veugelers, 2009).

School-based physical activity has traditionally been promoted at the individual level (i.e. student or teacher) (Giles-Corti & Donovan, 2002; Gorely, 2005; Loucaides, Jago, & Charalambous, 2009; Sallis, Bauman, & Pratt, 1998). According to Cale (2000), the responsibility of promoting school-based physical activity should be reinforced within the whole school culture, particularly through its curricular and organizational practices. Evidence has shown that when schools incorporate physical activity into daily routines (Fairclough, Butcher, & Stratton, 2008; Fein, Plotnikoff, Wild, & Spence, 2004) and promote physical activity during leisure times (Loucaides et al., 2009; Verstraete, Cardon, De Clercq, & DeBourdeaudhuij, 2006) and in the classroom (Mahar et al., 2006; Scruggs, Beveridge, & Watson, 2003), student physical activity levels are positively influenced. Student benefits associated with regular physical activity include improved physical health (Holmes, Eisenmann, Ekkekakis, & Gentile, 2008; Nabkasorn et al., 2006), enhanced mental health (Barr-Anderson et al., 2007; Zoeller, 2007), and academic success (Ahamed et al., 2006; Stevens, To, Stevenson, & Lochbaum, 2008).

To date, surveys and questionnaires used to examine aspects of the school environment relative to physical activity opportunities have largely focused on the superficial level of a school's cultural system (Allison & Adlaf, 2000; Barnett et al., 2009; Durant et al., 2009). For example, school artifacts (i.e. tangible elements on school grounds) such as the size and design of school buildings (Cohen, Scott, Zhen Wang, McKenzie, & Porter, 2008; Haug, Torsheim, & Samdal, 2008), and specific school contexts (i.e. elementary, middle, and secondary schools) (Bauer, Yang, & Austin, 2004; Sallis et al., 2003; Wong,

Leatherdale, & Manske, 2006) are environmental factors that have been investigated for associations with school-based physical activity opportunities. However, identifying factors that influence physical activity opportunities across school contexts can be problematic.

Recently, Bradley (2008) developed and validated the ActivePASS (physically active school settings) survey to assess facilitators and barriers to physical activity opportunities in Australian school environments (Wong et al., 2006). To our knowledge, it is the first survey to examine physical and cultural factors associated with school-based physical activity opportunities. Specifically, ActivePASS examines factors outside the curriculum that have shown to influence school-based physical activity opportunities (Bauman, Bellew, Vita, Brown, & Owen, 2002; Bradley, 2008; Gorely, 2005; Sallis et al., 1998; Sallis et al., 2001). Moreover, it accesses school member assumptions that may highlight intangible factors such as teacher beliefs within a school's cultural system that influence opportunities for physical activity.

Therefore, the aims of this study are to modify the ActivePASS survey to assess school-based physical activity opportunities across Canadian elementary, middle, and secondary schools and, to evaluate its validity and reliability.

Method

Instrument development

The modified ActivePASS survey (MAPS) was developed in several stages. Initially, several ActivePASS items were deleted because of content duplication, improper language, or lack of relevance to Canadian school contexts. For example, one item, "The school employs a specialist physical education teacher," was eliminated because physical education specialists are no longer present in many Canadian elementary and middle schools. These initial modifications reduced the 58-item ActivePASS survey to 40 items but maintained the original five sub-scales: (i) the school's natural and built environments, (ii) parent and community involvement in the school-based physical activity, (iii) active transportation policies, (iv) other school policies and informal practices linked to physical activity, and (v) extension ideas including opportunities for students with physical or cognitive disabilities. An additional modification was the adjustment of the response scale to ensure consistency across survey items: strongly disagree = 1, disagree = 2, undecided = 3, agree = 4, strongly agree = 5. According to DeVellis (1991), Likert scaling with five response options is preferred when measuring perceptions, beliefs, and attitudes as it allows participants to answer on a continuum from strong disagreement, a neutral midpoint, to strong agreement. Furthermore, items were worded in a strong and descriptive manner to minimize excessive agreement in response choices (DeVellis, 1991). For example, item six originally read, "Are your school grounds well-maintained?" Potentially being unaware of the meaning of "well-maintained" and reading the item as presented, participants may reflexively agree with little thought given beyond the statement. Altering the item to read, "School grounds are well-maintained" and including specific examples related to school maintenance (i.e. free from graffiti, litter, rundown spaces), provokes an educated and thoughtful response. Lastly, a "don't know" response option was inserted to reduce the number of forced false perceptions and provide participants new to a

school or those unaware of a situation presented in an item a more relevant choice.

Content validity

The purpose of establishing content validity was to ensure MAPS' items were relevant to Canadian school contexts and for participant clarity (i.e. school staff and parents). To accomplish this, a delphi group including physical education pedagogy academics (n = 5) and elementary parents, teachers, and administrators (n = 7) rated the relevance of each item to Canadian school contexts on a scale: not relevant = 1 to very relevant = 7, and item clarity on a scale: unclear = 1 to very clear = 7. As a whole, feedback was directed at providing more examples for participants to draw upon; reducing total items to minimize required time for completion; and additional questions were suggested based on their personal experiences in schools. Consequently, MAPS was modified to contain 30 items (Table 1).

Table 1
Modified ActivePASS Survey (MAPS)

Physical Environment

1. The school grounds provide enough space for large groups of students (20+) to be physically active in all types of weather (i.e. PE classes, intramurals, recess and lunch periods).
2. The school has many visible cues on school grounds that prompt physical activity (i.e. targets, nets, playground markings for games/activities).
3. School facilities are available for use before and after school hours (e.g. running/walking tracks, nature pathways, bike riding and skateboard areas, playgrounds, sport courts and fields, and school gymnasiums).
4. School equipment used for physical activities (i.e. balls, skipping ropes etc.) is available to students during recess and lunch periods.
5. The school's playgrounds and physical activity facilities are of good quality (i.e. safe, maintained, painted).
6. School grounds are well maintained (i.e. free from graffiti, litter, rundown spaces).
7. Physical activity areas such as playgrounds, fitness/weight rooms, and gymnasiums are accessible to students with mobility difficulties (i.e. using wheelchairs or walkers).

Parent and Community Interaction

8. Parents are well informed about school programs and initiatives in PE, sport, and other opportunities for physical activity (i.e. through school newsletters, parent council meetings, online media).
 9. Parents are given opportunities to be involved in their child's physical activity programs (i.e. extracurricular sport and leisure clubs, teams, lunch and recess activities).
 10. The school usually informs parents about opportunities for physical activity outside of school (i.e. through school newsletters, class bulletins, school webpage).
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11. The school shares its rationale for PE, sport, and physical activity with community recreational groups.
 12. The school shares its equipment and facilities used for physical activity with community recreational groups.
 13. The school has established partnerships with community parks and recreation departments (i.e. use of community sport fields, trails, or facilities).
 14. The school integrates commercial and non-profit recreation providers (i.e. dance studios, karate clubs, fitness clubs, YMCA/YWCA) into physical activity programs.

Active Transportation

15. The school has secure and sheltered storage for bicycles and other modes of active transportation (i.e. rollerblades, scooters, skateboards).
16. School staff and students are encouraged to use active transportation to and from school.
17. On local field trips, students and staff walk where possible.
18. The school has assessed and publicized safe routes for active transportation to school.
19. Parents are usually involved in school decisions around active transportation initiatives (i.e. walk/bike to school week).

School Policies and Practices

20. The school's values concerning physical activity are explicit (i.e. policy documents, assembly announcements, school newsletters).
21. Students have opportunities to learn how to organize games, sports, and other physical activity programs at school.
22. School staff are encouraged to be physically active role models (i.e. walk/run with students during Terry Fox walks/runs).
23. The school provides opportunities for staff and students to be physically active together (i.e. intramurals, Terry Fox walks/runs, class activities).
24. The school provides organized physical activity opportunities for students before and after school hours (i.e. running clubs, swim teams, gardening clubs).
25. School staff promote and facilitate student participation in physical activities during recess and lunch periods (i.e. organize intramural activity programs, supervise open gym sessions, etc.).

Extension Ideas

26. The school recognizes students through celebrations, certificates, and/or rewards for physical activity participation.
 27. The school discourages the removal of time dedicated to PE or recess and lunch periods as punishment.
 28. The school provides physical activity opportunities beyond PE classes for students with disabilities.
 29. Students with disabilities are included in regular PE classes.
 30. School staff are encouraged to share their personal physical activity interests with students (i.e. running a marathon, yoga instructor).
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Construct validity and reliability

To determine construct validity and reliability, parents, teachers, and administrators were purposively sampled from ten elementary schools (kindergarten – grade 5), three middle schools (grades 6-8), and four secondary schools (grades 9-12) from one public school district in Western Canada. An array of learning environments existed across participating schools; ten schools offered conventional curricular programs, five schools were French-immersion, and two schools were considered by the school district as alternative learning environments. These schools were chosen because of their geographical proximity to one another, and their equal access and opportunity for use of local community physical activity resources (i.e. sport facilities, local sports' clubs and teams). Additionally, school staff and parents were of interest because of their potential influence on school physical activity policies and practices; their beliefs often provide the framework for school values, member behaviour, and how the school environment is perceived (Schein, 1999). In particular, teachers are usually long-standing school members and have established beliefs and assumptions surrounding access to, and opportunities for physical activity in their school.

From the sampling population, 246 participants (parents; elementary (n = 125), middle school (n = 8), secondary (n = 26); teachers: elementary (n = 45), middle school (n = 7), secondary (n = 20); and administrators: elementary (n = 12), middle school (n = 1), secondary (n = 2) agreed to complete an online version of MAPS for validity purposes. Participants were asked to provide informed consent and complete the survey at a time and in a location convenient to them. Moreover, the test-retest reliability analysis used data from a convenience sample of 46 participants (teachers (n = 9), parents (n = 35), and administrators (n = 2)) who took the survey a second time, one week later. Prior to recruitment, the University, necessary administrators, and the school district ethics review boards granted approval of these procedures.

Results

Construct validity

To ascertain construct validity of MAPS, a scree plot and exploratory factor analysis using varimax rotation was performed using SPSS (version 18). Exploratory factor analysis has shown to be an effective method for improving model solutions (Green, Thompson, & Poirier, 1999). Additionally, principal components extraction estimated the number of factors, presence of outliers, and correlation between survey items. Items with eigenvalues below .30 (Stevens, 2001) and/or cross-loaded on multiple factors were removed. Furthermore, descriptive statistics (means, standard deviations) helped evaluate the multicollinearity and homogeneity of the data.

Based on the feedback from the delphi group, it was hypothesized the best solution would be a five-factor model that included items pertaining to a school's physical environment (seven items), parent and community involvement in school-based physical activities (seven items), active transportation policies (five items), school policies and practices (six items), and other school practices (five items) associated with physical activity opportunities. However, the rotated principal factor extraction revealed two items with eigenvalues below .30, seven

cross-loaded items, and only 46% of cumulative variance was accounted for. Therefore, a more parsimonious solution was sought.

After multiple iterations and analysis of the scree plot, a healthy three factor, 19-item solution evolved as the best-fit model. All items showed normal distribution patterns and possessed eigenvalues above 1.0 which is deemed an acceptable criterion (Stevens, 2001). Overall, the final survey included twelve items related to factor one, "School policies and practices related to physical activity opportunities;" four items focused on factor two, "School artifacts" and three items concerning, "Parent involvement in school-based physical activity opportunities" (Table 2).

Reliability

Using the final model, the test-retest reliability analysis of MAPS included an examination of descriptive statistics (means and standard deviations (SD)) and intraclass correlation coefficients (ICC). Intraclass correlation is considered an appropriate statistical technique for measuring test score consistency when the same test is given twice (Thomas & Nelson, 2001).

Descriptive statistics associated with all MAPS items ($n = 19$) confirmed significant reliability over time ($ICC = .783, p < .05$; time one mean = 51.96, $SD = 13.87$; time two mean = 59.35, $SD = 22.73$). In terms of individual factor reliability, items connected to school policies and practices ($n = 12$) showed significant test-retest reliability ($ICC = .734, p < .05$; time one: mean = 30.28, $SD = 11.82$; time two: mean = 32.15, $SD = 20.45$). Additionally, items related to parent involvement in physical activity opportunities ($n = 3$) demonstrated resilient reliability ($ICC = .862, p < .05$; time one: mean = 10.77, $SD = 2.82$; time two: mean = 10.49, $SD = 3.24$). However, items associated with school artifacts ($n = 4$) showed weak reliability ($ICC = .379, p < .05$; time one: mean = 14.81, $SD = 2.68$; time two: mean = 16.68, $SD = 2.26$). Reliability may be lower within this particular factor because of perceptual variations rather than any noticeable change in school artifacts within one week of re-test. A potential carry-over effect was not controlled for and as a result, it is a limitation in this statistical review.

Table 2

MAPS' Items and Associated Factor Loadings

| Item | Factor 1: School policies and practices | Factor 2: School artifacts | Factor 3: Parent involvement |
|---|---|----------------------------------|------------------------------------|
| 4. School equipment used for physical activities (i.e. balls, skipping ropes etc.) is available to students during recess and lunch periods. | .526 | | |
| 7. Physical activity areas such as playgrounds, fitness/weight rooms, and gymnasiums are accessible to students with mobility difficulties (i.e. using wheelchairs or walkers). | .463 | | |
| 12. The school shares its equipment and facilities used for physical activity with community recreational groups. | .611 | | |
| 13. The school has established partnerships with community parks and recreation departments (i.e. use of community sport fields, trails, or facilities). | .562 | | |
| 21. Students have opportunities to learn how to organize games, sports, and other physical activity programs at school. | .552 | | |
| 22. School staff are encouraged to be physically active role models (i.e. walk/run with students during Terry Fox walks/runs). | .614 | | |
| 23. The school provides opportunities for staff and students to be physically active together (i.e. intramurals, Terry Fox walks/runs, class activities). | .488 | | |
| 25. School staff promote and facilitate student participation in physical activities during recess and lunch periods (i.e. organize intramural activity programs, supervise open gym sessions, etc.). | .526 | | |

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| 26. The school recognizes students through celebrations, certificates, and/or rewards for physical activity participation. | .518 | |
| 27. The school discourages the removal of time dedicated to PE or recess and lunch periods as punishment. | .698 | |
| 28. The school provides physical activity opportunities beyond PE classes for students with disabilities. | .688 | |
| 29. Students with disabilities are included in regular PE classes. | .619 | |
| 1. The school grounds provide enough space for large groups of students (20+) to be physically active in all types of weather (i.e. PE classes, intramurals, recess and lunch periods). | | .880 |
| 2. The school has many visible cues on school grounds that prompt physical activity (i.e. targets, nets, playground markings for games/activities). | | .746 |
| 5. The school's playgrounds and physical activity facilities are of good quality (i.e. safe, maintained, painted). | | .628 |
| 6. School grounds are well maintained (i.e. free from graffiti, litter, rundown spaces). | | .879 |
| 8. Parents are well informed about school programs and initiatives in PE, sport, and other opportunities for physical activity (i.e. through school newsletters, parent council meetings, online media). | | .685 |
| 9. Parents are given opportunities to be involved in their child's physical activity programs (i.e. extracurricular sport and leisure clubs, teams, lunch and recess activities). | | .751 |

19. Parents are usually involved in school decisions around active transportation initiatives (i.e. walk/bike to school week).

.622

Thus, reliability findings suggest that MAPS has potential for use on larger sample populations of parents, teachers, and administrators within Canadian school contexts.

Discussion

The aims of this research were to modify the ActivePASS survey to assess physical activity opportunities in Canadian elementary, middle, and secondary schools and to evaluate its validity and reliability. Applying methods outlined in the literature (DeVellis, 2003; Sekaran, 2000), MAPS is a valid and reliable survey for determining facilitators and barriers to school-based physical activity opportunities. Prior to MAPS, no surveys have measured physical activity opportunities across the tangible and intangible levels of a school's environment within the framework of Canadian school contexts. However, further testing is required to enhance the robustness of the tool.

Certain limitations restricted participant responses. For example, the presence of major renovations in some schools forced school members into temporary school locations. This made it challenging for participants to respond as they would in their home school setting. In terms of reliability, the elapsed time between survey completion (one week) was a limitation for those participants who agreed to take MAPS a second time. Understanding that schools are dynamic places, participant perceptions could have changed between test-retest because of alterations in the school environment. However, it is not entirely clear why some items scored lower in the retest phase.

In summary, MAPS is a valid and reliable tool that examines school staff and parent perceptions related to physical activity opportunities in Canadian schools. Researchers that use MAPS in future studies may consider modifying items to examine middle and secondary school student perceptions of factors that influence school-based opportunities for physical activity. Studies have shown that when students create and play a role in delivery of physical activity initiatives at school, they feel more connected to their school (Juvonen, 2006; Resnick et al., 1997) which, in turn, is associated with increased engagement with the school environment (Gilman, Meyers, & Perez, 2004). In general, MAPS shows promise for use with large-scale populations and may be efficacious in a needs-based assessment of environmental factors in schools that impact physical activity opportunities.

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