

# Local school policies increase physical activity in Norwegian secondary schools

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## SUMMARY

*The implementation of school policies to support the adoption of physical activity is one of the main strategies recommended to increase physical activity levels among this age group. However, documentation of the effect of such policies is so far limited. The purpose of this study was to explore policy-related practices to support physical activity in Norwegian secondary schools and their association with recess physical activity. Emphasis was given to examine the association between policies and physical activity, over and beyond, individual level interests and environmental factors and to examine cross-level interaction effects. This cross-sectional study was based on a nationally representative sample of Norwegian secondary schools and grade 8 students who participated in the Health Behaviour in School-aged Children (HBSC) 2005/06 study. The final sample comprised 68 schools and 1347*

*students. Data were collected through questionnaires. The results showed that schools with a written policy for physical activity and schools offering organized non-curricular physical activity several times a week had a higher proportion of students reporting daily participation in recess physical activity. Multilevel logistic regression analysis demonstrated a cross-level main effect of the policy index after controlling for sex, socio-economic status, individual-level interests and the physical environment. A significant contribution of adding the policy index to the prediction of recess physical activity above that provided by the individual-level interests and the physical environment was demonstrated. The results are encouraging and give scientific support to policy documents recommending the implementation of school policies to increase physical activity.*

*Key words:* physical activity; school; adolescents; policies

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## INTRODUCTION

The Global Strategy on Diet, Physical Activity and Health has identified physical inactivity together with poor nutrition as major risk factors for some of the leading causes of mortality (World Health Organization, 2004). Recent studies show that a large number of adolescents spend numerous hours in sedentary screen-based activities after school (Currie *et al.*, 2008a), and a substantial proportion of youth are physically active less than the 60 min daily (Riddoch *et al.*, 2004; Booth *et al.*, 2006; Currie *et al.*, 2008a), recommended to gain positive health effects (Strong *et al.*, 2005). Physical

activity, sedentary behaviours and body weight status are likely to persist from youth into adulthood (Hallal *et al.*, 2006), and young people have therefore been identified as an important target group for physical activity promotion (World Health Organization, 2004). In the past decades, numerous interventions have aimed at increasing physical activity among adolescents. However, the most recent reviews conclude that programmes have had mostly minor or short-term effects (Timperio *et al.*, 2004; Salmon *et al.*, 2007; van Sluijs *et al.*, 2007).

A vast majority of the interventions have focused on targeting students directly and have used education as the only intervention

component (van Sluijs *et al.*, 2007). Although many of the main determinants of health can be viewed as individual behaviours and lifestyles, there is an increasing awareness within the public health field that contextual and structural factors can also be important determinants of health (Sallis and Owen, 2001). A broader ecological approach to health promotion is now widely accepted as a promising theoretical framework for better understanding factors influencing the complex behaviour associated with physical activity (Ball *et al.*, 2006). Such an approach is also the essential structure in the health promoting schools (HPS) initiative (Stewart-Brown, 2006). In Europe, HPS now exist in more than 40 countries. A key objective is the development of school health policies, and physical activity has become one of the health promoting initiatives within these schools (Samdal, 2008).

Little is known about the influences of the environment and especially policies on physical activity (Sallis *et al.*, 2000; Ferreira *et al.*, 2007). Within the context of physical activity, policies have been defined as 'legislative, regulatory, or policy-making actions that have the potential to affect physical activity' (Sallis *et al.*, 1998). Policy development and implementation are dynamic processes that involve different phases and tend to have effects in the long run (Stahl *et al.*, 2002). They are likely to start as informal, general agreements about the importance of making changes and to progress to written commitments and declarations.

Because virtually all young people attend school and spend a large part of the day there, the school setting has been identified by many national and cross-national policy documents as a key arena in which to promote physical activity. The implementation of school policies to support the adoption of physical activity is one of the main strategies recommended (U.S. Department of Health and Human Services, 1997, 2001; World Health Organization, 2004; Norwegian Directorate for Health and Social Affairs, 2005).

It has been noted that the cross-national difference in school systems, infrastructure, environment and social norms most likely exist (van Sluijs *et al.*, 2007). In the Norwegian school system, students on average are provided with recess periods for 1 h daily throughout secondary school (age 13–16 years) (Haug *et al.*, 2008a, b). Recess can be defined as 'regularly scheduled time for unstructured activity and

play' (Wechsler *et al.*, 2000, p. 123). Recess time, including lunch breaks, has been found to contribute considerably to daily levels of moderate to vigorous physical activity in primary school students (Ridgers *et al.*, 2006; Verstraete *et al.*, 2006) and is a potential arena for physical activity uptake among secondary school students. The limited research that exists on school environmental influences of physical activity mostly concerns the physical environment (Davison and Lawson, 2006; Ferreira *et al.*, 2007); however, it is relevant to assume that organization-related policy actions might also influence physical activity behaviour.

So far, different environmental effects have been reported mainly in relation to demographic characteristics, although it has been hypothesized that psychological and behavioural factors also may moderate the environment–behaviour relationship (Brug *et al.*, 2006; Kremers *et al.*, 2007). Interests have been found to be an important factor that drives children to adopt certain behaviours as a response to influences in the immediate environment (Chen and Zhu, 2005). Studies testing the mechanisms underlying the interactions between specific environmental influences and individual-level factors and their influences on physical activity behaviour are needed to produce more effective interventions (Ball *et al.*, 2006). The purpose of this study was to (i) explore policy-related organizational practices to support physical activity in Norwegian secondary schools and their association with students' participation in recess physical activity, (ii) to examine the association between policies and physical activity during recess, taking into account the simultaneous influence of students' interests in physical activity and physical environmental factors and (iii) to examine the cross-level interaction effect between interests and organizational practices on physical activity.

## METHODS

### Study sample and participants

The study was based on a nationally representative sample of Norwegian grade 8 students (age 13 years) participating in the Health Behaviour in School-Aged Children (HBSC) 2005/06 study. The HBSC study is a World Health Organization Cross-National Survey of 11, 13 and 15 year olds conducted every fourth year and is currently

carried out in 41 countries (Roberts *et al.*, 2007). The original nationally representative sample involving grade 8 students comprised 115 schools and 2 754 students. Seventy-nine schools (69%) chose to take part in the study with 1954 students enrolled in the sampled grade 8 classes. Eighty-two percent (1595) of the sample students participated, and absence on the day that the survey was conducted was the most frequent cause of non-response. In addition to the student survey, a school-level survey was conducted. Of the 79 participating schools, 11 did not return the school-level questionnaire. Students in these schools were therefore excluded from the analysis reported here, and the final sample for this study was 68 schools and 1347 students. Of these, 52.3% were boys and 47.7% were girls. The mean number of students enrolled in the sample schools was 301 (SD = 148; range, 9–712); 43.3% of the students came from urban and 56.7% from rural school areas. The mean number of grade 8 students participating in the sampled classes was 19.8 (SD = 6.8; range, 1–30). Most of the students (70.3%) were in the high socio-economic status (SES) group, 26.7% in the medium SES group and 3% in the low SES group.

## Procedures

The data were collected in November–December 2005 in accordance with a standardized protocol (Roberts *et al.*, 2007). A cluster sampling procedure was followed using the school class as the sampling unit and with one participating class from each of the sampled schools. The school principal was instructed to complete the school-level questionnaire, and teachers received instructions on how to administer the student survey. Passive consent was received from parents and guardians. The student survey was carried out as a student self-completion in-school questionnaire during an ordinary class hour (45 min). Students were informed that their participation was voluntary and that responses would be treated anonymously. National ethical approval was obtained from the Regional Committee for Medical Research Ethics.

## Measurements

### *Recess physical activity*

Physical activity during recess was measured with the item: ‘During recess, how OFTEN are

you physically active in a way that makes you out of breath and/or makes you sweat?’ The answer categories were; ‘every recess’, ‘not every recess but every day’, ‘not every day but every week’, ‘not every week’ and ‘never’. The variable was dichotomized with the first two response categories defined as ‘Daily physically active during recess’. The wording of the item refers to vigorous physical activity (Biddle *et al.*, 1998; Welk *et al.*, 2000). However, the type of activity quantified by this item should not be interpreted only as vigorous physical activity because spontaneous behaviour by children and youths in non-organized physical activities characteristically involves alternating moderate to vigorous physical activity with short rest periods (Welk *et al.*, 2000). A separate test–retest study of students age 13 and 15 years indicated moderate stability (intraclass coefficient = 0.68) for the item (Torsheim *et al.*, 1995).

### *Interests in school physical activity*

To assess interests in school physical activity, students were asked to rate on a five-point Likert scale from ‘strongly disagree’ (1) to ‘strongly agree’ (5) how much they concurred with the following statements: ‘I would like various physical activities to be offered during recesses/lunch breaks’, ‘I would like more PE classes at school’, ‘I am not interested in being more physically active during the school day’, ‘I would like various physical activities to be offered after school’ and ‘I want to have more school classes outdoors’. The score for the negatively worded item ‘I am not interested in being more physically active during the school day’ was reversed. Cronbach’s alpha coefficient for internal consistency was 0.77. In the logistic regression model, the scores were standardized, with a score of 0 indicating the minimum and a score of 1 indicating the maximum interests score.

### *Socio-economic status*

Socio-economic status (SES) was assessed using the Family Affluence Scale, which is a composite of four indicators: ‘Does your family have a car or a van?’ [‘No’(0), ‘Yes’ (1), ‘Yes, two or more’ (2)]; ‘Do you have your own bedroom?’ [‘No’(0), ‘Yes’(1)]; and ‘During the past year, how many times did you travel away on holiday (vacation) with your family?’ [‘Not at all’ (0), ‘Once’ (1), ‘Twice’ (2), ‘More than twice’ (3)].

'How many computers does your family own?' ['None' (0), 'One' (1), 'Two' (2), 'More than two' (3)]. The two highest response categories ('2' and '3 or more') of the last two items (holidays and computers) were combined. The scores were added producing a scale that ranged from 0 (least affluent) to 7 (most affluent). An extensive description of the development and use of the scale has been given elsewhere (Currie *et al.*, 2008b). For the descriptive analyses, a three-point ordinal scale was composed, using the following recoding of the scale: 0, 1, 2, or 3=1 (low); 4 or 5=2 (medium); and 6 or 7=3 (high).

### **School environmental factors**

To examine the influence of the school environment on students' physical activity during recess, the school-level questionnaire that had been developed in a cross-national collaboration for the international HBSC 2005/06 survey (Samdal *et al.*, 2005) was applied. Below the employed indicators from this questionnaire are presented.

### **Physical environmental characteristics**

Physical environmental characteristics were assessed with a single item: 'Which facilities for physical activity exist in the indoor school area, the school yard (within 200 m), or in the school neighbourhood (200 m to 2000 m)?' This item included a list of 16 natural or built characteristics. Availability (yes = 1 and no = 0) of each characteristic was assessed to generate a continuous variable labelled 'environment index'.

### **Involved in a physical activity project**

Involvement in a physical activity project was assessed based on the response to the following question: 'If the school has been or is participating in a project to increase the physical activity level of the students, to what degree have the following groups been involved?' The answering categories were: (1) 'The school does not participate in such a project'; (2) 'The principal/school leader'; (3) 'The teachers, the physical education teacher'; (4) 'Students'; (5) 'Parents/guardians'. Schools that marked category 1, were categorized as not being involved in a physical activity project.

### **Physical activity policy**

To assess whether a school had a *physical activity policy*, the following question was asked: 'Has your school adopted a policy to increase physical activity during the school day?' The answer categories were: (1) 'Yes, there is a written policy (e.g., in the school regulations)'; (2) 'Yes, an informal policy exists (e.g., verbal agreements)'; and (3) 'No, we do not have a specific policy'. In the analyses, only the answer about a written policy was included because the content of and the obligations in an informal policy may differ considerably between schools and this may further reflect a less well-defined approach.

### **Physical education classes five times a week**

The provision of physical education five times a week was assessed by summarizing the responses for grade 8 on the two items: (1) 'Please indicate the number of compulsory physical education classes that your school offers per week for each of the following grades' and (2) 'Please indicate the number of extracurricular physical education classes (including sport/outdoor recreational classes and similar subjects) that your school offers per week for each of the following grades'. The scale ranged from 0 to 5 classes on the first item and from 0 to 3 classes on the second item.

### **Organized physical activity in non-curricular school time**

Organized physical activity in non-curricular school time was assessed with the following question: 'Does the school organize physical activity during the school day outside the obligatory or extracurricular physical education classes?' The item included four settings: (1) 'Before school starts'; (2) 'In the lunch break or midday hour'; (3) 'During recess time'; and (4) 'After school'. For each setting, the answer categories were: (1) 'No'; (2) 'Yes, 2–3 times per month'; (3) 'Yes, 1–2 times per week'; and (4) 'Yes, 3–5 times per week'. Schools reporting any '3–5 days a week' non-curricular instance of physical activity were coded 1, the others were coded 0.

### **Data analysis**

SPSS for Windows v. 15.0 was used for descriptive analyses. A chi-square test with Yates'

correction for continuity was applied to examine sex differences in physical activity participation. Preliminary inspection of the school level data revealed that several of the variables had a considerable number of missing data. Since the multilevel analysis combines data from a school-level survey and a student-level survey, missing on one independent school level variable, would result in that all cases within that school would be excluded from the analysis. In cases where the school-level model only includes a few independent variables, this problem can be avoided with the multiple imputation (MI) procedure. Multiple imputations employ missing data that are imputed based on information external to the model, thus the missing data are imputed based on a richer set of information. The multiple imputations estimation requires the generation of multiple data sets, and performs data analysis on each of these data sets. Using the software SOLAS 3.2, five data sets were imputed based on available school level information. These five data sets were merged with the individual student-survey, and prepared for analysis in Mplus. Two-level logistic regression was performed using the 'TWOLEVEL' command in Mplus. Adaptive quadrature with 15 quadrature points was used in the estimation.

A necessary requirement in multilevel modelling is that the dependent variable has variation at multiple levels. The intraclass correlation was computed using the formula for multilevel logistic models presented in Snijders and Boskers (Snijders and Boskers, 1999, p. 224). If the intraclass correlation was sufficiently high, two sets of further analysis were planned. First, a multilevel logistic regression was performed for each of the policy factors at study. The objective of this analysis was to assess the relative strength of association with physical activity, adjusting for individual differences in interests. In a second, more targeted set of analysis, hierarchical blockwise models of cross level main effects and cross-level interaction effects of policy were undertaken. The first model was labelled an 'Individual model'. In the second block, the environment index was added, to model cross-level main effects of environment on physical activity. In the last block, cross-level main effects of policy index were added, to isolate the unique association between policy and activity, over and beyond, individual and environmental factors.

## RESULTS

The proportion of schools that had put in place policies to support physical activity is shown in Table 1. The provision of physical education classes five times a week and being involved in a physical activity project were cited most frequently.

Overall, 41.5% of boys and 32.6% of girls reported daily participation in physical activity during recess periods and school breaks. The cross-level relationship between organizational policy changes and participation in recess physical activity is displayed in Table 2. Schools with a written policy for physical activity and schools offering organized physical activity in non-curricular school time three times or more a week had a higher proportion of students reporting daily participation in recess physical activity. Physical activity was most frequently organized in the lunch break/mid-hour or in

**Table 1:** The prevalence (%) of having a written physical activity policy and policy-related changes across schools

Variables	%
Written policy for promoting physical activity	25.4
Organized physical activity in non-curricular school time $\geq 3$ a week	29.4
Being involved in a physical activity promoting project	50.7
Provision of PE classes five times a week	66.1

**Table 2:** Percentage of students being active during recess as a function of policies and practices for physical activity

Policy factors	% active during recess	Wald test	
Written policy for promoting physical activity			
Yes	49	14.33	$p < 0.01$
No	34		
Organized physical activity in non-curricular school time $\geq 3$ times a week			
Yes	43	4.60	$p < 0.05$
No	34		
Involvement in a physical activity-promoting project			
Yes	41	3.06	ns <sup>a</sup>
No	34		
Provision of PE five times a week			
Yes	39	2.27	ns <sup>a</sup>
No	33		

<sup>a</sup>Not significant.



recess periods (results not shown). Although not significant, also being involved in a physical activity-promoting project and the provision of physical education classes five times a week were associated with a higher proportion of students being active during recess.

Ecological analysis of bivariate correlations between school-level variables is presented in Table 3. School-level factors showed moderate to strong intercorrelations. For example, having a written physical activity policy was strongly correlated with involvement in a physical activity-promoting project and organized non-curricular physical activity, and moderately related to the physical environment index.

Table 4 shows the results of multilevel logistic regression models using hierarchical blockwise modelling. Block 1 showed that students' interests in school physical activity was a significant

predictor of recess physical activity, after controlling for sex and SES. Adding the environment index to the model (block 2) revealed that the physical environment was significantly associated with physical activity after adjusting for individual factors. Block 3 showed a cross-level main effect of the policy index, with a change in daily recess physical activity of 0.63 logits from few to many policy-related organizational changes, demonstrating a significant contribution of adding the policy index to the prediction of recess physical activity above that provided by the individual-level interests and the physical environment (deviance 1525.03–1517.12 = 7.91,  $df = 1$ ,  $p < 0.01$ , two-tailed test). Two-way interactions between policies and student interests and between policies and the environment index did not achieve significance ( $df = 2$ ).

**Table 3:** School-level correlation between policy elements, physical environmental factors and daily recess activity (Robust weighted least-square estimation)

	1	2	3	4	5	6
1. Physical activity during recess						
2. Organized physical activity in non-curricular school time $\geq 3$ a week	0.35					
3. Written policy for promoting physical activity	0.57	0.42				
4. Provision of PE five times a week	0.25	-0.03 ns	0.15			
5. Involvement in a physical activity-promoting project	0.31	0.32	0.46	0.11		
6. Policy index	0.56	0.66	0.76	0.48	0.73	
7. Environmental index	0.54	0.20	0.29	0.02	0.17	0.26

**Table 4:** Blockwise multilevel logistic regression analysis with physical activity as a function of individual factors and school level environmental facilities and policy elements, and between policy elements, physical environmental factors and daily recess activity<sup>a</sup>

	B <sup>b</sup>	<i>t</i>	<i>p</i>	-2loglikelihood (SD) <sup>c</sup>
Block 1: Individual factors				1532.80
Intercept	-0.54	-8.01	<0.001	-
SES	-0.39	-0.92	0.36	-
Sex	-0.11	-0.79	0.43	-
Interest index (0 to 1)	2.29	7.09	<0.001	-
Block 2: Environment				1525.03 (0.37)
Environment index (0 to 1)	1.24	3.43	<0.001	-
Block 3: Policies				1517.12 (1.12)
Policy index (0 to 1)	0.62	3.46	<0.001	-
Block 4: Policy interaction				1515.78 (1.66)
Interests by policy index	1.09	1.24	0.22	-
Policy by environment	-0.67	-0.81	0.42	-
Random effect	0.05	0.68	0.50	-

<sup>a</sup>All variables are centred at the grand mean.

<sup>b</sup>B-estimates are those obtained for the full model.

<sup>c</sup>SD from the results from the multiple data sets.

## DISCUSSION

Our data from a national sample of Norwegian secondary schools revealed that 42% of boys and 33% of girls reported performing daily physical activity during recess periods, which confirmed that the recess setting is a potential arena for physical activity uptake among secondary school students. The policy-related organizational actions were implemented partly. Schools with a written policy for physical activity and schools that frequently organize physical activity during non-curricular school time had a higher proportion of students reporting recess physical activity. Our study extends previous research by demonstrating that policies and policy-related changes can add explanatory value to the variance in physical activity above that provided by physical environmental and individual-level factors. The findings support the multilevel approach when exploring correlates for adolescent physical activity and confirm that both individual and more distal conceptual or environmental factors can impact significantly on physical activity behaviour, as proposed in the ecological theory (Sallis and Owen, 2001; King *et al.*, 2002).

An important finding was that having a written policy for physical activity had a positive effect on participation in recess physical activity. Having a formal commitment to prioritize physical activity in the school organization may function as a catalyst for stronger involvement and increased attention to and status for school physical activity. In addition, such a commitment would likely be followed by defined goals and specific plans for increasing physical activity performed by students. Our findings support these hypotheses. Having a written policy correlated with involvement in a physical activity-promoting project, and with organized physical activity in non-curricular school time, and with the physical environment index. Although it was not possible to assess the directions of these associations, one may assume that a large number of facilities for physical activity would result from a written school policy developed to promote physical activity.

Organized physical activity in non-curricular school time three times or more a week was also associated with higher participation rates in recess physical activity. In Norway, this reflects intramural recreational activities and sports involving students within one school. The

results demonstrated that the schools commonly used the lunch break/mid-hour or recess periods to organize for physical activity. The structure and the content of these organized activities may have varied greatly between schools. However, the national policy documents and programmes (Norwegian Ministry of Education, 2003; The Norwegian Ministries, 2005) emphasize specifically that schools should ensure that physical activity programmes are suitable for all school children and are matched to their various skills and abilities. This may have influenced the content of the organized non-curricular physical activity programmes. Few studies have addressed the effects of distal-level policies, such as national governmental initiatives. However, a comparison study of the national physical activity policy orientation in Finland and eastern and western Germany showed that a strong policy orientation with a focus on the entire population, as in Finland, was associated with better opportunities and infrastructure for physical activity (Stahl *et al.*, 2002). Organized facilitation of physical activity also likely includes involvement of adult staff. Teenage students emphasize the importance of having an enthusiastic adult present to supervise and facilitate physical activities in various settings (Humbert *et al.*, 2008). In a recent study of 9- and 15-year-old Norwegian school children, physical activity specific teacher support was a significant predictor of physical activity during non-curricular school time, before entering the strong effect of age to the model (Ommundsen *et al.*, 2006).

Although not significant, being involved in a physical activity-promoting project and providing physical education classes five times a week were both associated with a higher proportion of students being active during recess. The latter finding is important, because of the concern that many physical education classes could negatively affect physical activity during recess, because students may have less energy or feel less need for being physically active during recess.

No interaction effect was observed between the policy index and interest index nor the policy index and the environment index. This suggests that neither students' interests in physical activity in school nor the availability of facilities moderated the effect of policies. A recent study found that students' interests in school physical activity may moderate the effect

of available facilities in school (Haug *et al.*, 2008a). One possible explanation for why student interests did not moderate the effect of policies could be related to a stronger focus on inclusion of all students and more equal opportunities to be physically active in the schools with a strong policy focus, resulting in less need for being highly motivated or interested to take part in physical activity.

### Limitations

A limitation of the study is the use of subjective assessment of physical activity. The sometimes-sporadic nature of physical activity can make it difficult to recall duration, intensity and frequency accurately, and only moderate correlations have been found between self-reports and more objective measurements (Sallis, 1991; Sirard and Pate, 2001). However, in the present study, the recess physical activity item referred to a specific setting and to vigorous intensity, which could have made it easier for the students to recall more precisely. Dichotomizing the item responses may further have increased the correct classification of students. Another limitation is that the self-reported assessment of school-level variables may have been biased with respect to the social desirability of providing opportunities for physical activity in school. However, the policies in question reflect concrete organizational actions that do not allow for a broad interpretation. We do not know whether the school principals, when assessing the physical characteristics in the survey, interpreted each area in the same way and how detailed their knowledge of the school environment was. Objective monitoring of the environment and observation of the policies as implemented could have strengthened the validity of the study. It should also be recognized that the innovation of policy may involve a level selection bias and reflect individual-level factors in principals that predispose them to implement physical activity policies. The cross-sectional design of the study does not allow indication of causal inference, but is a first step in identifying correlates and understanding the mechanisms of behaviour change that can generate hypotheses for further research.

The results from the study are based on data from 13-year old. These students are the youngest attending secondary school and may, from a maturation perspective, have as much in

common with the upper primary grades as their older schoolmates. We do not know if similar associations exist among the older students, therefore we cannot generalize the findings to yield for all secondary school students.

### Conclusions and implications

This study adds to a relatively unexplored field by demonstrating that organizational policies may have explanatory value to the prediction of recess physical activity above that provided by individual-level interests and physical environmental factors. The findings should encourage researchers and practitioners, as well as policy makers both at the local (school) and national level, to include a stronger focus on school policies for physical activity and facilitate opportunities and time for physical activity when developing programmes and strategies. Programmes for several important health-related issues involve the school as the target setting, and the pressure to make more time available for academic subjects is high and increases with grade (Story *et al.*, 2006). However, based on a systematic review, Trudeau and Shephard (Trudeau and Shephard, 2008) concluded that, given competent providers, up to an additional hour per day of curricular time could be allocated to physical activity programmes by taking time from other subjects without impeding students' academic achievement.

Additional studies examining the effect of policy changes on physical activity involvement are strongly warranted. Experimental studies with random allocation of 'policy' and 'no-policy' conditions or natural experiments testing physical activity involvement pre-and post-policy implementation would be stronger research designs to test the effect of policies in the school setting. The latter design could also detect school-level differences at pre-test that may be attributable to factors other than policy implementation. Studies are also recommended to include the effect of distal-level policies and regulations. If documented effective, this may create a stronger acceptance by school leaders and politicians to establish policies and organizational practices aimed at increasing physical activity in school. To help schools prioritize their resources, future research should identify which policies and aspects of the school environment, taking into account individual-



level factors, are most likely to have the greatest impact on students' physical activity behaviour.

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