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Specialist or Nonspecialist Physical Education Teachers in Ontario Elementary Schools: Examining Differences in Opportunities for Physical Activity

Research supports the position that specialists are the preferred providers of physical education in elementary (primary) school settings. We examined whether specialists delivered more physical education lessons and provided greater opportunities for moderate and vigorous physical activity and whether barriers to curricular and extracurricular physical activity opportunities in Ontario elementary schools differed for specialist and nonspecialist teachers. Using a cross-sectional design, a questionnaire was mailed to key informants in 599 randomly selected elementary schools in Ontario, yielding an 85% response rate. Most physical education in Ontario elementary schools is delivered by nonspecialists (63%). No self-reported differences were found between specialists and generalist teachers in the number of physical education lessons delivered per week, the

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minutes per physical education class, or in the amount of reported moderate or vigorous physical activity in lessons. Compared with specialists, respondents in schools in which generalist teachers taught PE perceived lack of training as a greater barrier to delivering physical education. Given the importance of subject knowledge in teaching effectively, there is still need to advocate for specialist physical education teaching in elementary schools. However, concerns about teaching specialism may be secondary to broader and more complex factors surrounding the delivery of physical education in elementary schools.

La recherche appuie le point de vue selon lequel les spécialistes sont les mieux placés pour enseigner l'éducation physique au primaire. Nous nous sommes penchés sur deux questions: (a) les spécialistes offrent-ils plus de cours d'éducation physique et d'occasions de pratiquer des activités physiques modérées ou vigoureuses ?, et (b) les obstacles à la participation aux activités physiques scolaires et extra-scolaires dans les écoles primaires de l'Ontario sont-ils les mêmes pour les enseignants spécialistes et les enseignants non-spécialistes ? Dans le contexte d'un modèle croisé, nous avons envoyé un questionnaire à des répondants clés dans 599 écoles primaires sélectionnées au hasard en Ontario. Notre taux de réponse a été de 85%. La majorité (63%) des cours d'éducation physique en Ontario sont offerts par des non spécialistes. Les résultats n'indiquent aucune différence entre les enseignants spécialistes et les enseignants non-spécialistes quant aux critères suivants: le nombre de cours d'éducation physique offerts par semaine, la durée des cours d'éducation physique et la mesure dans laquelle les cours impliquent de l'activité physique modérée ou vigoureuse. Par rapport aux répondants des écoles où les cours d'éducation physique se donnaient par des spécialistes, ceux des écoles où ces cours se donnaient par des généralistes ont indiqué que le manque de formation constituait un obstacle plus important à l'enseignement de l'éducation physique. Compte tenu du rôle important de la connaissance de la matière dans l'enseignement efficace, il faudrait continuer à promouvoir l'enseignement de l'éducation physique par des spécialistes dans les écoles primaires. Toutefois, les préoccupations portant sur l'enseignement par des spécialistes semblent secondaires face aux facteurs plus généraux et complexes en matière d'enseignement de l'éducation physique dans les écoles primaires.

The school setting is recognized as a central environment that can provide opportunities for health-enhancing physical activity for all children regardless of factors such as socioeconomic status and family influences. Although not without convincing evidential support, a critical assumption is that in the school setting, students may learn the attitudes, skills, and knowledge required to develop a lifelong habit of physical activity (Fox & Harris, 2003). At the least, school-based programs, including physical education, can allow regular and structured opportunities for students to spend time in moderate and/or vigorous physical activity that contributes to levels commensurate with public health recommendations for children and adolescents. However, concerns about the quality of physical education both now and in the future are readily apparent (Hardman & Marshall, 2000).

One particular concern is the predominant delivery of physical education by generalist teachers in the elementary (primary) school system (Hardman & Marshall, 2000) in contrast to PE specialists who have either majored or minored in PE (often 3-5 years) before completing their Bachelor of Education degree or have received specialized and intense training during preservice education (Spence et al., 2004). For example, in Canada the Active Healthy Kids Canada report card on physical activity for children and youth reports that only 42% of elementary schools have a formal policy in place to hire trained physical educators to deliver physical education (Active Healthy Kids Canada, 2005). Also, a recent report issued by Ontario's Chief Medical Officer of Health

recommended that schools and school boards ensure that physical education is taught by teachers who have physical education training (Ministry of Health and Long-Term Care, 2004). Given the importance of subject knowledge and subject-specific pedagogical knowledge (Schempp, Manross, Dan, & Fincher, 1998; Schulman, 1986), it makes sense that physical education specialists who have received more intensive and subject-specific training than generalist teachers are more likely to teach all areas of a physical education curriculum and deliver physical education confidently and accurately (DeCorby, Halas, Dixon, Wintrup, & Janzen, 2005).

Research consistently supports this conclusion. For example, in a descriptive analysis of nonspecialist elementary physical education [PE] teachers' curricular choices and class organization in Southern California, it was found that children "enjoyed few opportunities to either develop physical skills or improve their fitness levels during class time" (Faucette, McKenzie, & Patterson, 1990, p. 291). Furthermore, teachers frequently permitted children to engage in free play or dropped PE classes from the day's schedule. Compared with generalist teachers, PE specialists have also been found to teach longer lessons, spend more time developing skills, provide more opportunities for moderate and vigorous physical activity, and use state-of-the-art physical education teaching practices (Davis, Burgeson, Brener, McManus, & Wechsler, 2005; McKenzie et al., 1995; McKenzie, Sallis, Kolody, & Faucette, 1997; National Institute of Child Health and Human Development Study of Early Child Care and Youth Development Network, 2003; Sallis et al., 1997). School-based interventions have also demonstrated that specific training can have an effect on the amount of physical activity provided in lessons by both generalists and specialists, but that physical education specialists still provide longer lessons and more physical activity (Kelder et al., 2003; McKenzie et al., 2001).

In the Canadian context, a survey of teachers and principals in Alberta schools found that teachers classified as specialists reported being more confident, felt better trained, enjoyed teaching physical education more, and devoted a larger proportion of the timetable to physical education than in classes taught by non-PE specialists (Spence et al., 2004). DeCorby et al. (2005) drew on ethnographic data to depict vividly the differences in physical education program quality in two Manitoba schools delivered by either a specialist or a generalist teacher. In the school with a specialist teacher, "the gym was where fun happened" (p. 218).

Overall, research substantiates the position that specialists are the preferred providers of physical education, and the Centers for Disease Control and Prevention in the United States recommend policies that ensure that physical education instruction is provided by credentialed PE teachers (Lowry et al., 2005). More research has been recommended in Canadian provinces to examine the effects that physical education specialists have in schools (Spence et al., 2004). In addition to physical education, specialists may have the extra time and energy to develop extracurricular activities (DeCorby et al., 2005) that might provide further opportunities for children to be physically active. As part of a larger study examining structured opportunities for physical activity in Ontario elementary schools (Dwyer et al., 2008), we addressed the following two questions. First, do curricular (physical education) and extracurricular

(intramural and inter-school programs) physical activity opportunities in Ontario elementary schools differ by the type of PE teacher? In particular, do specialists deliver more physical education lessons and provide greater opportunities for moderate and vigorous physical activity? Second, do barriers to curricular and extracurricular physical activity opportunities in Ontario elementary schools differ for specialist and nonspecialist teachers?

Method

Sample

The sampling frame consisted of 3,653 Public and Catholic regular elementary schools listed in the current Ontario Ministry of Education's Directory and Ministry Identification Number (MIDENT) file. A sample of 350 was considered sufficiently large to estimate physical activity opportunities in Ontario elementary schools (5% margin of error). A simple random sample of 599 schools was selected. Of the 599 schools, 512 returned completed questionnaires, yielding a response rate of 85%.

Description of Respondents and Schools

Respondents were people who were knowledgeable about physical activity opportunities in their schools. They included classroom teachers (33.6%), health and physical education specialist teachers (32%), and principals or vice-principals (30.7%). The remaining 3.7% of respondents included other school personnel such as resource teachers. Most respondents (99.8%) worked in co-educational schools, and the median number of years that respondents had worked in their schools was 4.0. The mean number of students enrolled in the schools was 381 ($SD=178$).

Procedure

The study was approved by the university ethics committee at the first two authors' affiliations. Dillman's (2000) tailored design method, which entailed five personalized mailings over an eight-week period during the winter of 2004, was used to conduct the mail survey. Respondents provided informed consent by returning completed questionnaires.

Questionnaire

As in other research (Allison & Adlaf, 2000; Barnett, O'Loughlin, Gauvin, Paradis, & Hanley, 2006; O'Hara Tompkins, Zizzi, Zedosky, Wright & Vitullo, 2004), the current study used a self-report survey approach. The eight-page questionnaire consisted of 23 questions, including items from an earlier survey of physical activity opportunities in Ontario elementary schools (Allison & Adlaf) and adapted items from the school health index for elementary schools (US Department of Health and Human Services, 2005). These questions related to opportunities and participation in PE, intramural programs, and inter-school sports programs. Other questions about the provincial PE curriculum and barriers to physical activity programs were included in the questionnaire. The original survey (Allison & Adlaf) was developed in consultation with an advisory committee, Ontario Physical and Health Education Association (OPHEA), Canadian Association for Health, Physical Education, Recreation and Dance (CAPHERD), and the Ontario Ministry of Health. OPHEA and

several teachers and principals reviewed the questionnaire and commented on its clarity.

Measures

Curricular and Extracurricular Physical Activity Opportunities

Curricular physical activity opportunities were assessed in terms of five outcomes: (a) frequency of physical education class, (b) duration of physical education class, (c) duration of moderate physical activity in physical education class, (d) duration of vigorous physical activity in physical education class, and (e) frequency of implementing vigorous physical activity guidelines. Frequency of physical education class is the average number of days per week that students have physical education class in grades 1, 3, 6, and 8. Duration of physical education class is the number of minutes in the typical physical education class in grades 1, 3, 6, and 8. Duration of moderate physical activity in physical education class is the number of minutes of moderate physical activity (e.g., brisk walking) that the student receives in grades 1, 3, 6, and 8. Duration of vigorous physical activity in physical education class is the number of minutes of vigorous physical activity that the student receives in grades 1, 3, 6, and 8. Vigorous physical activity causes sweating and heavy breathing (e.g., running). Frequency of implementing vigorous physical activity guidelines is measured in terms of whether the Ontario Ministry of Education health and physical education (HPE) curriculum's expectation for the number of continuous minutes of vigorous physical activity in grade 1 (5 to 10 minutes), grade 3 (8 to 10 minutes), grade 6 (10 to 15 minutes), and grade 8 classes (a minimum of 15 minutes) was met in no classes (1), some (2), most (3), or all classes (4) in each grade.

Extracurricular physical activity opportunities were estimated in terms of two outcomes. Participation rate in intramural sports is the percentage of students participating in an intramural program of organized activity between January and June 2004. An intramural program was defined as a program in which students participated and/or competed with other students in school. Participation rate in inter-school sports is the percentage of students participating in an inter-school sports program between January and June 2004. An inter-school sports program was defined as a program in which students competed with students from other schools.

Perceived Barriers to Curricular and Extracurricular Physical Activity Opportunities

We examined eight perceived barriers to curricular (implementation of Ontario Ministry of Education HPE curriculum's expectation for the number of continuous minutes of vigorous physical activity in grades 1, 3, 6, and 8) and extracurricular (intramural and inter-school sports) physical activity opportunities. The eight perceived barriers included: (a) staff morale, (b) funding, (c) facilities, (d) supervision issues, (e) timetable, (f) resources, (g) safety issues, and (h) teacher training. These questions were developed based on input about relevant barriers from OPHEA and were also chosen to examine some similar issues covered in the school health index for elementary schools (US Department of Health and Human Services, 2004). All items were scored using a four-point scale (1 = *not at all difficult* to 4 = *very difficult*).

Type of teacher delivering physical education

The person responsible for teaching physical education in the school was our independent measure. Respondents were asked to indicate who taught most of the physical education classes in the school. Response categories included: (a) classroom teacher, (b) physical education specialist, (c) combination of classroom teacher and physical education specialist, (d) parent or volunteer, and (e) other. Because the latter two categories of PE teachers were small ($n=2$), they were excluded from our analyses. Classroom teachers who taught PE were classified as nonspecialist PE teachers, whereas physical education specialists who taught PE were classified as specialist PE teachers.

Data Analysis

All statistical analyses were completed using SPSS for Windows, version 13.0 (SPSS Inc., Chicago, IL). We used one-way analysis of variance (ANOVA) to assess differences in our outcome measures by type of PE teacher. The type of PE teacher included three categories: (a) nonspecialist PE teachers ($N=322$), (b) specialist PE teachers ($N=73$), and (c) a combination of specialist/nonspecialist PE teachers ($N=113$). Results of evaluation of assumptions of normality and homogeneity were satisfactory. Significant ANOVAs (F -tests, $p<.05$) were examined further using Scheffé's post hoc multiple comparisons significance test to establish differences between specific pairs of PE teacher type. For the extracurricular physical activity variables ($n=2$), $p<0.05$ was required to declare statistical significance. Because of the large number of curricular ($n=20$) and barriers to physical activity opportunity ($n=24$) variables analyzed, we used a Bonferonni correction for multiple comparisons to reduce type 1 error. For the curricular physical activity variables $p<0.003$ ($0.05/20$) was required to achieve statistical significance, and $p<0.002$ ($0.05/24$) was also employed for the barriers to physical activity opportunity variables. Although this correction is conservative, we considered it appropriate given the exploratory nature of our study.

Results

Table 1 shows the means and standard deviations for curricular and extracurricular physical activity opportunities by type of PE educator. Significant post hoc results using Scheffé multiple comparisons significance test are also presented. In terms of curricular physical activity opportunities, no significant differences between type of PE teacher were found. In addition, we found no significant differences between PE teacher type for the implementation of recommended physical education practices. These results were mirrored across all four grade levels examined.

Regarding extracurricular physical activity opportunities, results in Table 1 show a significant difference in participation in intramural sports on the basis of PE teacher type [$F(2, 403)=3.39$, $p<.05$]. Specifically, schools in which PE specialists were responsible for teaching PE had a significantly greater percentage of students involved in intramural sports (mean=55.91%) compared with those in which nonspecialist PE teachers taught PE (mean=46.91%). When enrollment in inter-school sports was considered, no significant differences between PE teacher type were found for student participation rates.

Table 1
Means and Standard Deviations for Curricular and Extracurricular Physical Activity Opportunities for Grades 1, 3, 6, and 8, ANOVA and Scheffé Results for the Significant Differences by Type of PE Teacher

Physical activity opportunities	Nonspecialist PE teacher (NST; n=322)		Specialist PE teacher (ST; n=73)		Combination of specialist/nonspecialist PE teachers (ST/NST; n=113)		ANOVA p(F)	Significant Scheffé contrasts
	Mean	(SD)	Mean	(SD)	Mean	(SD)		
Grade 1								
Number of days of PE classes per week	2.57	(0.92)	2.42	(0.80)	2.68	(0.95)	0.233	
Minutes per PE class	39.70	(12.08)	41.09	(12.91)	40.37	(12.43)	0.703	
Minutes of moderate PA per PE class	18.88	(9.61)	15.69	(7.86)	18.66	(7.51)	0.062	
Minutes of vigorous PA per PE class	14.96	(7.57)	14.21	(8.20)	14.92	(10.38)	0.834	
Recommended minutes of vigorous PA is met	3.11	(0.81)	3.39	(0.83)	3.20	(0.81)	0.056	
Grade 3								
Number of days of PE classes per week	2.55	(0.87)	2.42	(0.80)	2.66	(0.95)	0.278	
Minutes per PE class	40.09	(11.94)	40.70	(13.30)	40.93	(12.39)	0.816	
Minutes of moderate PA per PE class	18.32	(9.39)	15.92	(7.44)	18.13	(7.84)	0.192	
Minutes of vigorous PA per PE class	16.16	(7.78)	14.78	(7.64)	16.35	(10.23)	0.503	
Recommended minutes of vigorous PA is met	3.13	(0.81)	3.35	(0.83)	3.23	(0.79)	0.129	
Grade 6								
Number of days of PE classes per week	2.54	(0.88)	2.63	(0.84)	2.70	(0.77)	0.285	
Minutes per PE class	42.49	(12.57)	43.85	(12.66)	42.85	(12.44)	0.757	
Minutes of moderate PA per PE class	18.50	(10.31)	17.75	(8.06)	17.53	(8.36)	0.656	
Minutes of vigorous PA per PE class	18.57	(8.63)	16.45	(8.13)	18.47	(10.21)	0.266	
Recommended minutes of vigorous PA is met	3.07	(0.83)	3.31	(0.89)	3.18	(0.80)	0.121	

Table 1 (continued)

Physical activity opportunities	Nonspecialist PE teacher (NST; n=322)		Specialist PE teacher (ST; n=73)		Combination of specialist/nonspecialist PE teachers (ST/NST; n=113)		ANOVA p(F)	Significant Scheffé contrasts
	Mean	(SD)	Mean	(SD)	Mean	(SD)		
Grade 8								
Number of days of PE classes per week	2.50	(0.84)	2.66	(0.87)	2.71	(0.74)	0.114	
Minutes per PE class	45.23	(13.52)	47.75	(13.53)	42.83	(8.53)	0.121	
Minutes of moderate PA per PE class	19.92	(11.27)	19.38	(8.68)	16.85	(7.01)	0.080	
Minutes of vigorous PA per PE class	19.75	(9.02)	17.27	(7.42)	18.75	(8.89)	0.237	
Recommended minutes of vigorous PA is met	3.07	(0.86)	3.21	(0.81)	3.09	(0.90)	0.598	
All Grades (entire school)								
Participation rate in intramural sports (%)	46.91	(24.14)	55.91	(25.90)	47.77	(24.71)	0.035	ST>NST*
Participation rate in inter-school sports (%)	23.08	(16.54)	21.62	(12.00)	21.66	(14.89)	0.652	

*p<.05 using Scheffé post hoc multiple comparisons significance test.

Table 2
Means and Standard Deviations for Perceived Barriers to the Implementation of Curricular and Extracurricular Opportunities, ANOVA and Scheffé Results for the Significant Differences by PE Teacher Type

	<i>Non-specialist PE teacher (NST)</i>		<i>Specialist PE teacher (ST)</i>		<i>Combination of specialist/non-specialist PE teacher</i>		<i>ANOVA p(F)</i>	<i>Significant Scheffé contrasts</i>
	<i>Mean</i>	<i>(SD)</i>	<i>Mean</i>	<i>(SD)</i>	<i>Mean</i>	<i>(SD)</i>		
<i>Barriers to the Implementation of HPE curriculum</i>								
Staff morale	1.40	(0.65)	1.39	(0.80)	1.49	(0.78)	0.482	
Funding	1.71	(0.83)	1.68	(1.19)	1.79	(0.91)	0.649	
Facilities	1.96	(0.01)	1.82	(0.92)	1.92	(1.01)	0.582	
Supervision issues	1.61	(0.83)	1.56	(0.86)	1.52	(0.74)	0.599	
Timetable	2.25	(1.05)	2.45	(1.08)	2.43	(1.08)	0.148	
Resources	1.89	(0.85)	1.70	(0.85)	1.84	(0.85)	0.251	
Safety issues	1.61	(0.71)	1.49	(0.70)	1.68	(0.77)	0.215	
Teacher training	2.03	(0.86)	1.53	(0.77)	1.99	(0.92)	0.000	NST>ST*
<i>Barriers to intramural sports</i>								
Staff morale	1.71	(0.84)	1.88	(0.90)	1.86	(0.91)	0.139	
Funding	1.70	(0.83)	1.51	(0.73)	1.75	(0.99)	0.150	
Facilities	1.96	(1.01)	2.14	(1.02)	1.95	(1.02)	0.359	
Supervision issues	2.50	(1.00)	2.44	(1.04)	2.54	(1.04)	0.812	
Timetable	2.21	(1.01)	2.24	(1.09)	2.18	(0.92)	0.939	
Resources	1.74	(0.84)	1.40	(0.64)	1.66	(0.85)	0.008	
Safety issues	1.53	(0.71)	1.49	(0.71)	1.52	(0.69)	0.876	
Teacher training	1.78	(0.74)	1.44	(0.63)	1.69	(0.72)	0.002	NST>ST*
<i>Barriers to inter-school sports</i>								
Staff morale	1.73	(0.88)	1.94	(0.94)	1.96	(0.95)	0.031	
Funding	1.94	(0.98)	1.87	(0.75)	2.10	(0.99)	0.235	
Facilities	1.91	(1.01)	1.99	(0.93)	2.01	(1.02)	0.644	
Supervision issues	2.22	(1.00)	2.33	(1.16)	2.38	(1.03)	0.349	
Timetable	2.01	(0.94)	2.04	(1.04)	2.05	(0.95)	0.923	
Resources	1.72	(0.81)	1.59	(0.65)	1.74	(0.91)	0.439	
Safety issues	1.54	(0.75)	1.59	(0.77)	1.69	(0.90)	0.244	
Teacher training	1.87	(0.83)	1.71	(0.81)	1.93	(0.90)	0.218	

*Bonferonni adjusted $p < 0.02$.

Note. All barriers were scored on a 4-point scale. Higher mean scores indicate greater perceived barriers.

Table 2 presents the means and standard deviations for perceived barriers to the curricular and extracurricular opportunities by type of PE teacher. Significant post hoc results using Scheffé multiple comparisons significance test are also presented. Turning first to the results for barriers to curricular physical activity opportunities, we found significant differences between type of PE teacher for only one of the eight barriers to the implementation of the HPE

curriculum. In terms of type of teacher, there was a significant difference for teacher training, [$F(2, 494)=9.93, p<.001$]. Respondents in schools in which nonspecialist PE teachers (mean=2.03) taught PE were more likely to perceive teacher training as a greater barrier to the implementation of the HPE curriculum than did respondents in schools in which specialist PE teachers were responsible for teaching PE (mean=1.53).

For barriers to extracurricular physical activity opportunities, Table 2 shows that only two of the eight barriers to intramural sports produced significant PE teacher type differences. Significant differences according to type of PE teacher were found for perceived barriers to resources [$F(2, 491)=4.90, p<.01$] and teacher training [$F(2, 490)=6.45, p<.01$]. More specifically, respondents in schools in which nonspecialist PE teachers (mean=1.78) taught PE perceived teacher training as a greater barrier to the implementation of intramural sports compared with respondents in schools in which specialist teachers were responsible for teaching PE (mean=1.44). For perceived barriers to resources, however, multiple comparison tests revealed no significant differences between specific pairs of PE teachers (e.g., nonspecialist vs. specialist teachers).

Finally, with respect to barriers to the implementation of inter-school sports, Table 2 indicates that of the eight perceived barriers, only staff morale was significantly related to the type of PE teacher [$F(2, 475)=3.51, p<.05$]. However, multiple comparison tests revealed no significant differences between specific pairs of PE teachers (e.g., nonspecialist vs. specialist teachers).

Discussion

Most physical education in Ontario elementary schools is being delivered by nonspecialists (63%). We found no differences between specialists, generalist teachers, or a combination in the self-reported number of physical education lessons delivered per week, the minutes per physical education class, or in the amount of moderate or vigorous physical activity in lessons. This finding was consistent across all four grades assessed. Overall, we found no difference in the *quantity* of physical education and physical activity provided by specialists or generalists.

However, we did not assess the *quality* of the physical activity experiences provided by these teachers. On the basis of earlier research, it might be assumed, for example, that the lessons taught by specialists were more enjoyable for students (DeCorby et al., 2005) and included more effective instructional behaviors (Davis et al., 2005; McKenzie et al., 1993). These qualities may be more important than quantity in promoting active lifestyles during and after the school years by promoting the generalization of physical activity outside the school setting (Sallis et al., 1997). We are not aware of any research that has systematically (e.g., using objective measures of physical activity such as pedometers or accelerometers, and direct observation measures such as the System for Observing Fitness Instruction Time [SOFIT; McKenzie, Sallis, & Nader, 1991]) assessed both quantity or quality of physical activity opportunities delivered in Canadian schools on the basis of teaching specialism, and this remains a future research priority.

We found some support to suggest that specialists contribute in other ways. Schools with specialist teachers reported a higher student participation rate in

intramural sports, but not inter-school sports. Specialists may have greater enthusiasm and commitment in developing, promoting, and accessing resources for these types of opportunities for their students. As such, specialists can play a valuable role in encouraging a school climate that is characteristic of an "active school" (Fox & Harris, 2003). This may not translate to inter-school sport, which is probably less controllable for individual teachers who will be dependent on other people and schools in its provision.

In terms of barriers, the only consistent difference was in terms of teacher training. Not surprisingly, respondents in schools in which generalist teachers taught PE perceived teacher training as a greater barrier than respondents in schools in which specialist teachers were responsible for teaching PE. However, the reduced salience of this barrier for specialist teachers did not appear noticeably to convey any advantage in alleviating the other barriers that were assessed. That is, regardless of teacher training, all teachers may be facing more subtle yet pernicious barriers to effective delivery. For example, physical education may still be perceived as a lower priority, particularly in relation to other subjects that have clear performance measures such as reading, writing, and mathematics as assessed by the Education Quality and Accountability Office (Barroso, McCullum-Gomez, Hoelscher, Kelder, & Murray, 2005; Dwyer et al.). In addition, insufficient infrastructure and timetabling challenges amid education budget constraints and labor unrest may continue to challenge even the best-prepared teacher to deliver physical education in the elementary setting (Dwyer et al., 2003). Teacher education needs to move beyond equipping teachers with the knowledge, confidence, and skills to deliver physical activity opportunities to demonstrating how this can be done in the larger context influencing curriculum requirements and implementation in elementary schools (Faulkner, Reeves, & Chedzoy, 2004). School immersion experiences and school integrated teacher education (SITE) courses may be particularly well suited in assisting generalist student teachers prepare for these challenges (Clarke & Hubball, 2001; Hopper, Brown, & Rhodes, 2005). We speculate that such training is just as important for specialist physical education teachers.

A major strength of our study is the high response rate, which suggests that we were successful in ensuring a representative sample of Ontario schools. Nevertheless, caution is clearly required in interpreting these results given the self-reported nature of classifying who taught the most physical education classes in the school. One important limitation is that we cannot surmise the basis on which respondents were classifying teachers as *physical education specialists*. These teachers may be deemed specialists by respondents on the basis of degree, professional development courses, sporting background, or even interest. This limits our ability to make inferences about the type or amount of teacher education *specialists* receive, and indeed what differentiates specialists from nonspecialists. Future surveys of physical activity opportunities in elementary school settings should collect this information. In addition, the extent of underreporting or social desirability in overreporting of our physical activity measures cannot be determined. However, we completed analyses to assess the possibility that the type of respondent (e.g., classroom teachers, HPE teachers, or principals) affected our results. With three exceptions, there were no differences in outcomes based on the type of respondent,

which suggests that type of respondent did not have appreciable effect on our findings.

In summary, our results suggest that increasing the number of physical education specialists in Ontario elementary schools may not be a panacea, particularly in terms of the quantity of physical education delivered to children. They may be part of the solution in ensuring that children receive recommended levels of physical activity. Given the importance of subject knowledge in teaching effectively, we believe that there is still a need to advocate for specialist physical education teaching in elementary schools for other reasons such as ensuring quality physical education and promoting a school climate that values physical activity. Greater numbers of children participating in intramural sporting activities in schools where PE specialists were responsible for teaching PE may reflect this. Rather, our results infer that concerns about teaching specialism may be secondary to broader and more complex factors in the delivery of physical education in elementary schools such as the status ascribed to physical education that affects all teachers. As Ontario schools consider how to integrate the new mandatory guidelines for daily physical activity, a broader effect in terms of physical activity outcomes might be achieved through developing more explicit and collaborative partnerships between students, parents, teacher educators, and *all* teaching staff.

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