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PHYSICAL ACTIVITY V. PHYSICAL EDUCATION

The Relationship Between Secondary School Physical Education and Postsecondary Physical Activity

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Abstract

Background: *Throughout secondary school in Ontario, PE is offered with the goal of students developing "the skills and knowledge they require to participate in physical activities throughout their lives" (Ontario Ministry of Education 1999a, p. 2). Despite the curricular goals of PE, little research has been conducted on the effects of PE on PA after secondary school completion.* ***Purpose:*** *The purpose of this study was to examine the relationship between previous secondary school PE and current PA of postsecondary students.* ***Method:*** *A convenience sample of 112 participants was recruited to complete an online survey about current PA behaviors and past enrollment in secondary PE (amount and type). A subsample of participants agreed to wear a pedometer to monitor their PA behavior objectively. We used t tests to analyze the relationship between current PA and previous enrollment in secondary PE in volume and in regard to specific course enrollment.* ***Results:*** *We found no significant relationship between total number of PE classes taken during secondary school and PA participation as an emerging adult. We found some significant differences in PA participation between those who took specific types of PE courses compared to those who took a single mandatory course.* ***Conclusion:*** *The results suggest that content as opposed to volume of PE courses is related to increased PA after secondary school completion. Future studies should seek to examine the content of specific PE courses and the effect of course content related to transition stages such as emerging adulthood.*

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Only a small percentage of Canadian adults attain the physical activity (PA) recommendations of 150 min/week of moderate to vigorous activity (Colley et al., 2011a). Activity levels are equally poor for Canadian youth (Colley et al., 2011b) and youth in other countries (e.g., Hallal et al., 2012). Physical education (PE) is one way in which PA may be enhanced for youth (e.g., Sallis & McKenzie, 1991; Sallis et al., 2012). Discussions pertaining to the effects of PE have extended from the immediate benefit for students to the longer term adult implications, specifically the notion of "lifelong activity participation" (e.g., Kirk, 2005; Penney & Jess, 2004; Sallis & McKenzie, 1991; Sallis et al., 2012). In considering the goal of ". . . a lifetime of physical activity," Sallis et al. (2012) suggested that "this goal . . . is difficult to evaluate and has limited evidence to support its validity (Trudeau, Laurencelle, Tremblay, Rajic, & Shephard, 1999)" (p. 126).

The "limited evidence" used by Sallis et al. (2012) is the well-known Trois-Rivières study, which showed that only women who had PE for 5 hr/week during elementary school were more physically active as adults versus a control group (Trudeau, Laurencelle, Tremblay, Rajic, & Shephard, 1999). Additional evidence linking PE specifically to adult PA can be garnered from research with emerging adults. Arnett (2000, 2005, 2006, 2007) proposed the term *emerging adulthood* to describe the period of life that postsecondary students in developed countries experience. This life stage falls between adolescence and adulthood and ends when individuals begin to take on adult roles such as marriage, parenthood, or a stable career (Arnett, 2000). For PA levels across the life span, Telama's (2009) review offers evidence for PA tracking.

During transition times, such as entry into postsecondary education, PA levels are affected (Allender, Hutchinson, & Foster, 2008; Kimball, Jenkins, & Wallhead, 2009). In a sample of first year university students, Bray and Born (2004) assessed the level of vigorous PA from the end of high school compared to the beginning of university. They found that students could be classified as "continuously active" from high school to university (33.1%), "continuously insufficiently active" (22.8%) during this time, with the remaining either increasing or decreasing activity from the end of high school to the start of university (p. 184). Butler, Black, Blue, and Gretebeck (2004) followed a group of freshman female students from their entry into

college until 5 months later and found that total PA, work activities, and sport activities decreased.

In addition to observing reductions in certain types of PA from the mid-teens until the late 20s, Zick, Smith, Brown, Fan, and Kowaleski-Jones (2007) identified being "in school" as a factor affecting activity levels (differently) for males and females, although the interaction with age was not reported (thus not indicating if school meant secondary school or postsecondary schooling). More recently, Kwan, Cairney, Faulkner, and Pullenayegum (2012) followed a nationally representative sample of Canadian adolescents for 12 years (starting from ages 12 to 15) and observed a decline in PA during that period. Distinguishing the sample by gender and whether participants had undertaken postsecondary education, they found that the decrease in PA was most noticeable for men entering postsecondary education (Kwan et al., 2012).

Sallis and McKenzie cited evidence from the mid-1980s and identified declines in activity as an issue in 1991, following with a suggestion that "high school and college physical educators may have the best opportunity to prepare students to maintain patterns of regular physical activity" (p. 134). In addition, researchers have examined the link between secondary school PE and PA levels among postsecondary students. When Texas college students were surveyed, those who had not taken PE in high school (compared to those who did) were more active as college students (Everhart et al., 2005). Using the Lifelong Physical Activity framework, Kimball et al. (2009) investigated "university students' perceptions of the influence of high school PE programs on their current level and modality of PA" (p. 252). The participants were taking an activity course at university. The only link between total PA at the time of the study and past experience in PE was for females, whereby ". . . respondents suggested that their current level of PA was influenced by how little they learned during the high school PE experience and the lack of comfort they perceived in performing PA . . ." (p. 263). In another study with university students taking an elective PA course, researchers found that many participants reported past PE success and a positive experience in PE (Hildebrand & Johnson, 2001).

In Ontario, secondary school students are required to complete 1 PE credit to receive an Ontario Secondary School Diploma

(Ontario Ministry of Education, 1999a, 2015). It is clear from previous research that in Ontario as grade levels increase, student enrollment in PE decreases (Allison & Adlaf, 2000; Dwyer et al., 2006; Hobin, Leatherdale, Manske, Burkhalter, & Woodruff, 2010). Specifically, Hobin et al. (2010) found that enrollment in PE dropped from 73.4% in Grade 9 to 51.3% in Grade 12 in a large study of Ontario secondary schools.

At the time of this study, the secondary curriculum in Ontario also espoused the concept of lifelong participation according to the Ontario Ministry of Education (1999a), which designed

> the health and physical education curriculum . . . to provide learning experiences that will help students realize their potential in life. Students will develop . . . the skills and knowledge they require to participate in physical activities throughout their lives. (p. 2)

A new curriculum was introduced in 2015 in Ontario, which includes similar goals; two of the four expectations include that "students will develop . . . the skills and knowledge that will enable them to enjoy being active and healthy throughout their lives . . . [and] a sense of personal responsibility for lifelong health . . ." (Ontario Ministry of Education, 2015, p. 6). Given the opportunity for learning the skills for lifelong PA through such courses, students may be missing the opportunity (if not enrolled) to gain valuable skills to allow them to overcome the decrease in PA associated with the transition from secondary school to university.

In keeping with Sallis et al. (2012), Trudeau and Shephard (2005) suggested that more research is needed to determine if and to what extent PE influences PA over the life span. Although there has been research on PA declines in the postsecondary years (e.g., Kwan et al., 2012) and a link between current PA and perceived PE experiences (e.g., Kimball et al., 2009), currently there is a lack of research examining the relationship between amount or type of PE taken in secondary school and postgraduate levels of PA. As such, the purpose of this study was to determine if a relationship exists between

the amount and type of PE taken during secondary school and the PA level of emerging adults who pursue postsecondary education in Ontario.

Method

Recruitment

After receiving research ethics board approval from two Ontario postsecondary institutions (one college and one university), we recruited participants through the postsecondary institution in which they were enrolled using a variety of tools including attending lectures (28 in-class announcements on the college campus and 54 on the university campus to explain the study and leave a card with a website link to the study and with contact information for the primary researcher) with prospective participants in attendance and posting posters and leaving information cards on the university campus. We directed interested participants to an online questionnaire. Participants provided informed consent prior to completing the survey.

Participants

To be included in the study, individuals had to have attended an Ontario high school and be between the ages of 18 and 25. Given this age range and the time of the study, all participants would have been exposed to the 1999 version of the Ontario Health and Physical Education curriculum during secondary school. A convenience sample of 112 eligible participants who completed a questionnaire was obtained, of which 94 were enrolled at a university and 17 were enrolled at a college and one participant had missing data on this variable. This participant was kept in the Total Sample for all variables except Current Postsecondary Program (see tables below) but not in the split of university or college students. The average age of the sample was 20.22 years (SD = 1.78) with 78 being female and 34 being male. For further demographic information, see Table 1.

Table 1
Participant Descriptives

Demographic information	Total sample *n* (%)	University students *n* (%)	College students *n* (%)
Sample	112 (100)	94 (83.93)	17 (15.18)
Gender			
Male	34 (30.36)	27 (28.72)	7 (41.18)
Female	78 (69.64)	67 (71.28)	10 (58.82)
Age			
18	19 (16.96)	15 (15.96)	4 (23.53)
19	28 (25.00)	26 (27.66)	2 (11.76)
20	20 (17.86)	16 (17.02)	4 (23.53)
21	20 (17.86)	19 (20.21)	1 (5.88)
22	11 (9.82)	7 (7.46)	4 (23.53)
23	8 (7.14)	6 (6.38)	2 (11.76)
24	4 (3.57)	3 (3.19)	0
25	2 (1.78)	2 (2.13)	0
BMI			
Underweight	5 (4.46)	4 (4.25)	1 (5.88)
Normal weight	80 (71.43)	68 (72.34)	11 (64.71)
Overweight	24 (21.43)	20 (21.28)	4 (23.53)
Obese	3 (2.68)	2 (2.13)	1 (5.88)
Current Postsecondary Program			
Health-related	37 (33.04)	26 (27.7)	11 (64.71)
Non-health-related	74 (66.07)	68 (72.3)	6 (35.29)

Data Collection

The online questionnaire included six sections. The section containing demographic and schooling PE background questions such as gender, age, height, weight, current postsecondary context (e.g., current type of residence, program of study), and secondary school information (e.g., location, the PE courses taken during high school [from a provided list], sport team participation) was relevant to this research.

The second section included the short form of the International Physical Activity Questionnaire (IPAQ; Craig et al., 2003). The short form IPAQ is a seven-question, self-report instrument of current PA level (*International Physical Activity Questionnaire,* 2002). In this section, the IPAQ poses questions about the participants' past 7 days and allows participants to provide information about their current PA at moderate and vigorous levels and their walking behavior, allowing for a weekly MET-minute score. We made two modifications to the questionnaire. For questions asking the number of hours and minutes per day, we added a sample answer of 1 hr (under hours per day) and 30 min (under minutes per day) to avoid confusion. Also, to minimize errors in responses, we replaced standard blank lines for responses in a scroll down menu to avoid responses of greater than 59 min or greater than 18 hr. Eight versions of the IPAQ have been tested for concurrent and criterion validity, using accelerometers, and test–retest reliability over 7 days in several international settings, including Canada (Craig et al., 2003). The short form has also been evaluated for intraclass correlation, receiving a "substantial" correlation (r = 0.68; Brown, Trost, Bauman, Mummery, & Owen, 2004, p. 210).

We also asked participants if they were willing to wear a pedometer for 3 days. Tudor-Locke et al. (2005) found that pedometer recordings of 3 consecutive days demonstrated the same average step count as recordings of a 7-day period, and pedometers have also been found to be a feasible way to measure PA objectively (Tudor-Locke, Lind, Reis, Ainsworth, & Macera, 2004). Because the IPAQ asks about a 7-day period, collecting 3 days of pedometer data allowed for the pedometer data to be comparable to the IPAQ scores.

We contacted those who were willing to wear a pedometer to confirm their willingness to wear the pedometer for 3 consecutive days. Of these participants, 28 met with the primary investigator. During this meeting, we provided the participant with another information letter and all participants signed the informed consent for this portion of the study. The participant's height and weight were then measured and the height measure was used to program the stride length into the New Lifestyles NL-1000 pedometer. We then showed the participant how to wear the New Lifestyles NL-1000 pedometer and described when to wear the pedometer. Next, we set

up a follow-up meeting for the participant to return the pedometer. We also explained to the participant that the pedometer would be sealed for the time it was worn. This was following the suggestion by Tudor-Locke that allowing participants to see or record their daily step counts may result in the participants attempting to increase their step count in the following days (Tudor-Locke, Bassett, Shipe, & McClain, 2011). Participants wore the pedometer during their waking hours. They also kept a log of when the pedometer was attached and when it was removed. Participants could add notes to the log such as illness, reasons for not wearing the pedometer (e.g, forgot), or activities that may not have been recorded by the pedometer (e.g, swimming, upper body exercise). Participants did not wear the pedometers when sleeping, swimming, or bathing. The other sections of the online survey asked about other health behaviors and life changes and are not reported here. We collected data between the Fall 2011 and Winter 2012 terms.

Data Analysis

We performed data analysis using SPSS (version 19). We performed correlational analyses to address the relationship between current PA and total and total types of PE classes. The MET-minutes per week and the sitting minutes per weekday scores from the IPAQ and the average daily step count from the pedometer data represented current PA. We also compared the objective and subjective measures of PA using correlational analysis to determine if they were related.

We then performed *t* tests to compare the current PA level of those who elected to enroll in each type of PE course to those who only enrolled in the required Grade 9 or 10 course. A different type of PE was considered a course with a different course code with the exception of the year indicator. Types included Healthy Active Living Education, Personal and Fitness Activities, Large Group Activities, Individual and Small Group Activities, Aquatics, Rhythm and Movement, Outdoor Activities, Health for Life, Exercise Science, and Recreation and Fitness Leadership.

Results

Participants took an average of 3.5 secondary PE courses (see Table 2). Participants who reported taking more than 10 PE classes

were removed from the data set ($n = 9$) because curricular restraints would have made this unrealistic. Table 2 shows descriptive data for total types of PE classes taken. We examined the current PA of participants using sitting time, PA level from the IPAQ, and step counts for those who participated in the pedometer portion of the study (see Table 3).

Table 2
Means and Standard Deviations for Physical Education

Descriptive data	Total sample $n = 112$	University students $n = 94$	College students $n = 17$
Total Physical Education Classes			
n	103	87	15
M	3.50	3.47	3.53
SD	2.41	2.50	1.88
Total Types of Physical Education Classes			
n	103	87	15
M	2.11	2.15	1.87
SD	1.44	1.54	0.74

Table 3
Means and Standard Deviations for Physical Activity

Descriptive data	Total sample $n = 112$	University students $n = 94$	College students $n = 17$
MET-minutes per week			
n	109	93	15
M	3709.93	3428.01	5545.20
SD	3158.57	2504.81	5610.07
Sitting minutes per weekday			
n	112	94	17
M	515.14	543.57	363.53
SD	239.66	242.39	164.96
Average steps per day (Pedometer)			
n	28	26	2
M	9210.46	9282.08	8292.50
SD	3206.65	3295.54	2073.94

We compared the total number of classes to the current PA level from the IPAQ (n = 97) and pedometer data (n = 28) and found no correlation between the variables (see Table 3). We found a significant weak negative correlation (r = -0.228, p < .05) between sitting time as reported in the IPAQ and total number of reported PE classes taken during secondary school. Therefore, those who reported taking more PE courses during secondary school reported sitting significantly less on weekdays as an emerging adult.

Courses with a different course code, with the exception of grade level, were considered a different type of course because the curricular foci are different for courses with different course codes. We compared the total number of types of classes to the current PA level from the IPAQ (n = 97) and pedometer data (n = 28) and found no significant correlation. We did not find a significant correlation between sitting time as reported in the IPAQ and the total types of PE (see Table 4).

Table 4
Bivariate Correlations

PA measurement	1	2	3	4	5
1. Total MET-minutes per week	1				
2. Sitting minutes	-.183	1			
3. Average steps per day	.136	.135	1		
4. Total PE Classes	.076	-.228*	-.070	1	
5. Total Types of PE Classes	.012	-.191	-.142	.785**	1

Note. PA = physical activity; PE = physical education.
*p < 0.05. **p < 0.01.

To further explore the relationship between types of PE taken during secondary school and current PA, we compared individuals who only took one (mandatory for the secondary graduate requirement) course to those who took the mandatory course as well as at least one course in the specific type being analyzed. To complete this, we used t tests with the MET-minute score as the dependent variable. We compared PA level for each type of PE class independently to only taking the mandatory class (M = 2539.55, SD = 1484.69), and those who had taken a Personal and Fitness Activities (M = 3878.47, SD = 3222.29; t = 2.02, df = 46.82, p < .05), Exercise Science (M = 3990.71, SD = 2901.34; t = 2.01, df = 47, p < .05), or Recreation

and Fitness Leadership (M = 5069.06, SD = 3132.92; t = 2.41, df = 11.17, $p < .05$) course reported being significantly more active than those who only took the mandatory course. Due to a significant Levene's test, we did not assume equal variances. We did not find a significant difference in reported activity level for taking any of the other types of PE courses compared to only taking the mandatory course.

Discussion

In this study, we sought to examine the relationship between PA levels of postsecondary students and their past total amount of PE and type of PE taken during secondary school in a Canadian context. We did not find support for a link between current PA and total amount of secondary school PE. We did not find a relationship between total number of different types of PE taken and current PA.

One factor to consider is the self-selection hypothesis, which "posits that those who have a hereditary disposition to fitness and motor performance participate more often in physical activity both at a young age and in adulthood than those who do not have the same disposition" (Telama, 2009, p. 193). Because we did not control for this type of trait, it is possible that the disposition for PA may override any effect that PE may have on an individual. It is possible that a hereditary factor may be strong enough that it may explain the lack of link between overall participation in PE and current PA as an emerging adult.

However, in this study when we compared enrollment in individual types of PE to completing only the single mandatory course, enrollment in any of the three types of courses was related to a report of more activity as an emerging adult. This follows Sallis and McKenzie's (1991) observation that a

> sports-oriented physical education program may not influence adult activity levels, yet a health-oriented physical education program that teaches carryover activities would be more effective in preparing children for a lifetime of physical activity. (p. 131)

The first of the three types of PE courses in which participants showed a significantly higher PA level as an emerging adult was the

Personal and Fitness Activities course. This course could be offered from Grades 9 to 12 with a focus on individual fitness activities such as weight lifting (Ontario Ministry of Education, 1999a, 1999b). It is possible that skills gained in this type of course are applicable to the postsecondary students, resulting in increased PA. Many postsecondary institutions provide weight training and fitness equipment for students to use. The students who took the Personal and Fitness Activities course may already be more comfortable with using this type of equipment, allowing them to be more active. It would be interesting to determine if this relationship remains for postsecondary students who are not provided with these facilities.

The second course type in which participants had higher levels of PA as an emerging adult was Exercise Science. This course was only offered at the Grade 12 level and "focuses on the study of human movement and of systems, factors, and principles involved in human development" (Ontario Ministry of Education, 1999b, p. 24). This course did not involve an activity component; however, it allowed students to gain the knowledge of how the upcoming life change may influence PA and the values of remaining active over the life span. This knowledge may increase the individual's value for PA when they enter postsecondary education and increase their ability to remain active as an emerging adult.

The final course in which participants indicated a significantly higher PA level as an emerging adult was Recreation and Fitness Leadership. Again, this course was offered only at the Grade 12 level (Ontario Ministry of Education, 1999b). The course "focuses on the development of leadership and coordination skills related to recreational activities" (Ontario Ministry of Education, 1999b, p. 29).

This course, similar to the Exercise Science course, did not involve an activity component. It may also have given knowledge to students that they can apply after completing the course such as the skills to coordinate recreational activities not only for others but also for themselves. They also may gain knowledge of the value of PA that may translate into a greater value for remaining personally active through the life span.

The two latter courses also have another benefit in relation to individuals remaining active as emerging adults. Both courses are designated at the Grade 12 level. It may be that skills gained in the

mandatory course may be lost because many students take this course early in their secondary school career. Individuals may be more aware of the transitions related to emerging adulthood when they are enrolled in a course in Grade 12 than when they are enrolled in a course in Grade 9.

In 2002, Corbin suggested that other skills besides typical motor skills should be emphasized in the PE classroom. He specifically noted that "self-management skills" (p. 136) need to be taught for students to gain the knowledge in the classroom to become active adults. The latter two courses seem to include an emphasis on these types of skills. It is possible that the reason for the lack of relationship between total PE classes and PA in emerging adults might have been due to the lack of focus on these organizational skills during some secondary school PE classes.

As mentioned, the Ontario Ministry of Education introduced a new curriculum for implementation during the 2015–2016 school year. The curriculum has similar goals; however, course content has changed slightly. Several of the significant changes have been in the Healthy Living portion of the curriculum, which has little focus on PA. As the new curriculum is implemented, future research should examine whether the change in content is more successful in helping students postgraduation in their PA participation.

This study offers support for the assertion that course content matters when exploring a relationship between PE and PA. Although the curriculum stipulates that a main goal is lifelong activity for the student, this may not be a main focus in many PE classes, something that others (e.g., Kirk, 2005; Penney & Jess, 2004) have suggested is problematic if the goal is a lifelong PA participant. In Ontario's recent secondary curriculum, changes have been made to the Living Skills strand of the curriculum, which now focuses on "personal skills," "interpersonal skills," and "critical and creative thinking" (Ontario Ministry of Education, 2015, pp. 26–29). Consideration of the idea to emphasize life skill development may be particularly salient here.

Limitations and Future Directions

This study has several limitations. First, a small number of college student participants in the sample precluded between-group analysis with university-enrolled students. We also collected data during the Fall 2011 and Winter 2012 term for students, and as such,

reported current PA may have been lower than if data were collected during spring and summer months (e.g., Tucker & Gilliland, 2007). Next, student enrollment in PE in Ontario is related to gender, BMI, smoking status, and other personal characteristics as well as school-level characteristics (Hobin et al., 2010). These differences between those who choose to enroll in multiple classes and those who choose to enroll only in the required course make it difficult to control for personal factors that may influence PE enrollment and lifelong PA. Other PE curriculums in Canada (and potentially internationally), such as the Manitoba curriculum (Manitoba Education n.d.), require students to complete more than one course to complete secondary schooling. Researchers should examine differences between individuals who are required to take more than a single PE course during secondary school and those who are required to take only one PE course, to avoid the limitation of having a population who elect to take multiple PE classes and to better control for personality differences.

Another limitation for this study was that we did not ask participants which courses their secondary school offered. It may be that some individuals took a smaller number of elective courses or did not take different types of courses because of the course offering available at their institution. Researchers should examine the relationship between PE and PA after high school graduation with course offering in mind. International comparisons in curricular content are also of interest here. Further, we did not ask participants about the types of PA in which they currently engage as emerging adults, to connect this back to the type of PE courses taken. We also did not have information on the specific content (types of activities) for each course as experienced by participants. Researchers could explore the relationship between activities experienced in PE and types of PA engaged in during adulthood. PA was also assessed via self-report for the entire sample, which is not as strong a measure compared to if pedometers had been available for the entire sample. It is also possible that the past week of PA was not a typical week for participants. Participants were asked to wear pedometers for 3 days of "normal day-to-day activity."

Conclusion

This study was a starting point for examining the complex relationship between secondary school PE and PA over the life span, and it yielded mixed results. Longitudinal research is needed to track activity patterns and PE enrollment and course offerings across time, in particular in light of the new secondary school health and PE curriculum in Ontario. At the same time, researchers need to explore the skills being taught in the PE classroom and pay special attention to class type to determine if PA over the life span is different dependent on skills taught in different courses.

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