

A Cross-Sectional Examination of the Association Between Co-ed and Gender-Specific School Intramural Programs and Intramural Participation Among a Sample of Canadian Secondary School Students

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Abstract

Background

Intramurals are an important part of the physical activity offerings in secondary schools; however, it is not well understood how co-ed and gender-specific intramural programs impact intramural participation among male and female students. Therefore, the objective of this research was to examine if the number of co-ed, male-only, and female-only intramurals offered at a school was associated with student participation in intramurals.

Methods

A large sample of Canadian secondary school students (N=60,635) completed the COMPASS survey in 2017-2018. School staff reported the number of co-ed, male-only, and female-only intramurals offered at each school. Students reported whether they participated in school intramurals. Hierarchical models were used to assess associations.

Results

Intramural participation was marginally higher among male students (36%) than female students (32%; $p < .0001$). Female students attending schools that offered female-only intramurals were 17% (OR 1.17 [95% CI: 1.05-1.30]) more likely to participate. The number of co-ed and male-only intramurals offered were not significantly associated with student participation.

Conclusions

We found a positive association between offering female-only intramurals and female intramural participation, highlighting the importance of these programs for female students. Offering female-only intramurals may be a way for schools to improve participation and physical activity levels of female students. More research is needed on the impact of specific sports or activities on male and female student participation.

Background

Physical activity has many important physiological and psychological health benefits for youth. Physical activity promotes healthy muscle and cardiovascular development (1,2), and reduces the risk of heart disease, cancer, type 2 diabetes, hypertension, osteoporosis and obesity (2,3). Psychologically, physical activity is associated with improved academic performance (4,5), reduced symptoms of anxiety and depression (2,3) and aids in social development (1). Despite this multitude of health benefits, only about 35% of Canadian youth meet the physical activity guidelines set out in the Canadian 24-Hour Movement Guidelines, and more male than female youth meet these guidelines (6–8). Strategies to increase physical activity among Canadian youth are warranted, especially among females.

Schools are an important setting for physical activity promotion, as most Canadian youth spend a large proportion of their lives there (9–11). School-based physical activity programs are examples of strategies to increase physical activity among youth, and they have the potential to reach a large student population regardless of socioeconomic status and athletic ability (12). Intramurals are a less competitive and inclusive opportunity for youth to be physically active within their schools. These programs are played/participated in by

students in the same school and may provide students with a wide variety of activities (13,14). Participation in intramurals is positively associated with physical activity (13,15,16), as well as lower screen time (17). Sport participation in youth (such as participation in intramurals), is also associated with physical activity later in life (18–23). Males are more likely than females to participate in intramural sports (15,24), meaning that females may be missing out on opportunities that can increase their physical activity levels (15).

Evidence suggests that students attending schools with large numbers of intramurals tend to have higher levels of physical activity (13,25,26), however it is unclear if the number of intramural programs offered is associated with youth participation in these programs. Additionally, research suggests that there are gender differences in types of activities youth participate in, as females are more likely to participate in individual sports, while males are more likely to participate in team sports (27). However, it is not well understood how co-ed and gender-specific intramural programs impact intramural participation among Canadian male and female students. Therefore, the purpose of this research was twofold and aimed to examine (1) if the number of intramurals offered at a school was associated with student participation in intramurals and (2) if offering gender specific intramurals was associated with participation for females and males respectively.

Methods

Procedure

The COMPASS study is a prospective cohort study that collects data from a convenience sample of students in grades 9 to 12 in British Columbia, Alberta, Ontario, and Quebec, Canada (28). Schools are recruited based on their use of an active information passive-consent protocol which is essential in self-report research to produce more robust results that limit self-selection and response bias, particularly for measures of substance use behaviours (28–30). The student-level data collected are self-reported via a questionnaire administered to students during class time. The COMPASS study also collects school-level information on policies, programs, and the built environment. The hierarchical nature of the data can allow for more robust statistical analyses and evaluations of programs over time. A full description of the COMPASS study methods can be found in print (28) or online (www.compass.uwaterloo.ca). All procedures were approved by the University of Waterloo Office of Research Ethics (reference number 30118) and appropriate school board committees.

Participants

In Year 6 (September 2017-June 2018 school year), 65,892 students participated in the COMPASS study. Student response rate was 81.8% and the primary reason for non-response being absenteeism at the time of data collection. Students with missing values ($n = 5,257$; 8%) were excluded from this study. The Supplemental File includes information on missing data (Table 1) for each variable and a flow diagram (Fig. 1). The Supplemental File Table 2 presents a chi-square comparison of students missing intramural participation data (i.e., outcome of interest) by demographic characteristics. We found significant differences between students with complete versus missing data for measures of gender, grade, and ethnicity. The current analyses used complete data from 60,635 students from 121 schools in Alberta ($n = 8$), British Columbia ($n = 16$), Ontario ($n = 60$), and Quebec ($n = 37$).

Instrumentation

School-level data (SPP Questionnaire and Statistics Canada Data). School-level data were collected using the Schools Policies and Programs (SPP) questionnaire, which is completed annually by a school contact. Additional socioeconomic data was collected from the 2016 census.

At the school level, a contact at each school (typically a principal, guidance counsellor, or gym teacher) completed the SPP questionnaire. To assess the number of intramurals offered at each school, school contacts were asked to “Please select the intramural programs/club activities involving physical activity that were offered to students at your school during the past 12 months.” Program selection included traditional competitive sports such as soccer and badminton as well non-competitive activities such as yoga or fitness class. School contacts were additionally asked to indicate whether the offerings were for males/females only or co-ed. There was also space to indicate other activities not listed. The number of co-ed intramurals offered were categorized based on four quartiles: Q1 (0–4 intramurals), Q2 (5–7 intramurals), Q3 (8–10 intramurals) and Q4 (11–17 intramurals). School contacts also provided school enrollment numbers to determine school size.

Data on schools’ urbanicity was determined by using Geosearch lookup on city name based on 2016 census data (31). Urban/rural classifications were as follows: large urban (populations from 100,000 and greater and a population density of at least 400 per square kilometre), medium urban (populations between 30,000 to 99,999 and a population density of at least 400 per square kilometre), small urban (populations between 1,000 to 29,000 and a population density of at least 400 per square kilometre), and rural (population less than 1,000 or population density less than 400 per square kilometre). School neighbourhood median family income was determined using school postal code to identify household median income in this area, data from the 2016 census (32). School neighbourhood median family income was categorized into 4 groups: less than \$50,000, \$50,001-\$75,000, \$75,001-\$100,000, and greater than \$100,000.

Student level data (Student Questionnaire). To determine student participation in intramurals students were asked “Do you participate in before-school, noon hour, or after-school physical activities organized by your school? (e.g., intramurals, non-competitive clubs)” with response options “Yes, No, or None offered at my school” Students who indicate that none were offered will be grouped with students who responded “No.”

Consistent with other youth health research (33), the following covariates (with their response values in brackets) were included in the analyses: grade, (9,10,11,12), gender (female, male), ethnicity (white, other) weekly spending money (Zero, \$1 to \$20, \$21 to \$100, More than \$100, Don’t know).

Data Analysis

Descriptive characteristics at the school ($n = 121$) and student ($n = 60,635$) levels were examined by gender. An empty Generalized Linear Mixed Model (GLMM) was used to calculate the Intraclass Correlation (ICC) to determine the variability of student intramural participation between schools. Due to the hierarchical nature of these data (students nested within schools), three hierarchical Generalized Estimating Equation (GEE) models via PROC GENMOD were used to create three models. First, examining the association between co-ed intramural quartiles and total student intramural participation. The second model examined if offering female-only intramural programs was associated with intramural participation among females. Finally, the third model studied the relationship between offering male-only intramurals and participation among males. All models controlled for the covariates listed in the above section.

Results

Descriptive Statistics

School-Level. The characteristics of the school-level sample are presented in Table 1. The mean student enrollment for the schools was 702 students (± 372). In the 2017–2018, school year 31% of schools offered 0–4 intramural programs, 21% of schools offered 5–7 intramural programs, 23% of schools offered 8–10 intramural programs and 25% of schools offered 11–17 intramurals programs. Of the 121 schools, 42% ($n = 51$) offered female-only intramurals while 35% ($n = 29$) offered male-only intramurals.

Table 1
Descriptive Statistics for School-level Characteristics (N = 121)

Variable		Freq/ mean	%/SD
Income group (\$)	25001–50000	14	11.6
	50001–75000	71	58.7
	75000–100000	30	24.8
	> 100000	6	5.0
Province	Alberta	8	6.6
	BC	16	13.2
	Ontario	60	49.6
	Quebec	37	30.6
Urbanicity	Large Urban	54	44.6
	Medium Urban	15	12.4
	Small Urban	49	40.5
	Rural	3	2.5
Co-ed intramural quartiles	1 (0–4 intramurals)	38	31.4
	2 (5–7 intramurals)	25	20.7
	3 (8–10 intramurals)	28	23.1
	4 (11–17 intramurals)	30	24.8
Female only intramurals	No	70	57.9
	Yes	51	42.2
Male only intramurals	No	86	71.1
	Yes	35	28.9
Enrolment (number of students)		701.7	372.2

Student-Level. The characteristics of the student-level sample by gender are presented in Table 2. As shown, 50.5% of the sample was female (n = 30,762) and 69.3% were White (n = 42,228). A large majority of students (95%) in the “other” grade category consists of students in secondary 1 and 2 in Quebec which is equivalent to grade 7 and 8. The other 5% could be in 5th year or ESL/FSL classes with no assigned “grade”. Of the total sample, 34% reported participating in intramurals, with more male students (36%) reporting participation in intramurals compared to female students (32%; $p < 0.0001$).

Table 2
Descriptive statistics for student level characteristics by gender (N = 60,635)

Variable		Total (n = 60,635)		Female (n = 30,637)		Male (n = 29,998)		DF	Chi- square Value	P- value
		Freq	%	Freq	%	Freq	%			
Grade	9	14541	24.0	7400	24.2	7141	23.8	4	5.7466	0.2189
	10	14778	24.4	7505	24.5	7273	24.2			
	11	14092	23.2	7149	23.3	6943	23.1			
	12	9189	15.2	4546	14.8	4643	15.5			
	Other	8035	13.3	4037	13.2	3998	13.3			
Ethnicity	White	42043	69.3	21367	69.7	20676	68.9	1	4.7689	0.0290
	Other	18592	30.7	9270	30.3	9322	31.1			
Weekly Spending Money	Zero	9767	16.1	4369	14.3	5398	18.0	4	387.2587	< .0001
	\$1-\$20	15370	25.4	7926	25.9	7444	24.8			
	\$21-\$100	14448	23.8	7827	25.6	6621	22.1			
	\$100+	11349	18.7	5198	17.0	6151	20.5			
	Don't Know	9701	16.0	5317	17.4	4384	14.6			
Intramural participation	No	39809	65.7	20701	67.6	19108	63.7	1	100.7237	< .0001
	Yes	20826	34.3	9936	32.4	10890	36.3			

Regression Models

School-level differences accounted for less than 1% of the student-level variability in intramural participation. Regression results can be found in Table 3. Males (OR = 1.21 [95% CI = 1.15–1.27]) were more likely than females to participate in intramurals. Students in grade 11 (0.83 [0.77–0.88]) and grade 12 (0.74 [0.68–0.80]) were less likely to participate in intramurals, while students in the “other” grade (primarily [95%] students in secondary 1 and 2 in Quebec which is equivalent to grade 7 and 8) were more likely to participate in intramurals (1.15 [1.01–1.32]), all compared to grade 9 students. These associations were consistent when stratified by gender, as male (0.88 [0.80–0.96]) and female (0.78 [0.72–0.84]) grade 11 and male (0.83 [0.74–0.92]) and

female (0.65 [0.59–0.72]) grade 12 students were less likely to participate in intramurals compared to grade 9 students. When stratified by gender, only females in the “other” grade (1.23 [1.05–1.44]) were more likely to participate in intramurals, as this association was non-significant among males.

Table 3

Logistic GEE models examining the association between (1) the number of co-ed intramurals and intramural participation among males and females, (2) whether schools offer female only intramurals and intramural participation among females, and (3) whether schools offer male only intramurals and intramural participation among males

Variable		(1) Total (n = 60,635) OR (95% CI)	(2) Female (n = 30,762) OR (95% CI)	(3) Male (n = 30,189) OR (95% CI)
Grade	9	1.00	1.00	1.00
	10	0.97 (0.91–1.03)	0.93 (0.85–1.00)	1.02 (0.94–1.11)
	11	0.83 (0.77–0.88)	0.78 (0.72–0.84)	0.88 (0.80–0.96)
	12	0.74 (0.68–0.80)	0.65 (0.59–0.72)	0.83 (0.74–0.92)
	Other	1.15 (1.01–1.32)	1.23 (1.05–1.44)	1.10 (0.94–1.29)
Ethnicity	White	1.00	1.00	1.00
	Other	0.97 (0.92–1.03)	0.88 (0.82–0.94)	1.06 (0.98–1.15)
Weekly Spending Money	Zero	1.00	1.00	1.00
	\$1-\$20	1.30 (1.23–1.38)	1.29 (1.19–1.41)	1.30 (1.22–1.39)
	\$21-\$100	1.51 (1.41–1.61)	1.45 (1.33–1.58)	1.57 (1.46–1.69)
	\$100+	1.32 (1.22–1.43)	1.25 (1.13–1.40)	1.37 (1.26–1.49)
	Don't Know	1.26 (1.17–1.35)	1.22 (1.11–1.35)	1.27 (1.16–1.40)
School median neighbourhood income	25001–50000			
	50001–75000	0.88 (0.76–1.03)	0.88 (0.74–1.04)	0.87 (0.72–1.05)
	75000–100000	0.89 (0.76–1.03)	0.89 (0.76–1.05)	0.88 (0.72–1.08)
	> 100000	0.77 (0.65–0.93)	0.69 (0.56–0.84)	0.78 (0.63–0.96)
Coed intramural quartiles	Q1	1.00		
Models also controlled for province, urbanicity, and school enrolment. Values significant at p < 0.05 are bolded.				

Variable		(1) Total (n = 60,635) OR (95% CI)	(2) Female (n = 30,762) OR (95% CI)	(3) Male (n = 30,189) OR (95% CI)
	Q2	0.99 (0.87– 1.12)		
	Q3	1.05 (0.92– 1.20)		
	Q4	1.09 (0.96– 1.23)		
Female only intramurals offered	No		1.00	
	Yes		1.17 (1.05–1.30)	
Male only intramurals offered	No			1.00
	Yes			1.05 (0.94–1.18)
Models also controlled for province, urbanicity, and school enrolment. Values significant at p < 0.05 are bolded.				

Compared to students with \$0 of weekly spending money, males (\$1-\$20 OR = 1.30 [1.22–1.39]; \$21-\$100 OR = 1.57 [1.46–1.69]; \$100 + OR = 1.37 [1.26–1.49]) and females (\$1-\$20 OR = 1.29 [1.19–1.41]; \$21-\$100 OR = 1.45 [1.33–1.58]; \$100 + OR = 1.25 [1.13–1.40]) with weekly spending money were more likely to participate in intramurals. Regarding ethnicity, female students identifying as “other” had lower odds (0.88 [0.82–0.94]) of intramural participation compared to females identifying as “white”. No relationship between ethnicity and intramural participation was observed for male students. Additionally, students attending a school with a school median neighbourhood income of >\$100 000 were less likely to participate in intramurals (0.77 [0.65–0.93]) compared to a median neighbourhood income of \$25,001–50,000.

The number of co-ed intramural programs offered by a school was not significantly associated with intramural participation among students. However, female students attending schools that offered female-only intramurals were significantly more likely (1.17 [1.05–1.30]) to participate in intramurals compared to females attending schools without such intramurals. Lastly, there was no significant relationship between schools that offered male-only intramurals and male intramural participation.

Discussion

To our knowledge, this is the first study to explore the association between co-ed and gender-specific school-level intramurals and intramural participation. Although the number of intramurals offered was not associated with intramural participation among students overall, an important association was observed between female-only intramurals and female participation. Specifically, females attending schools offering female-only intramurals were significantly more likely to participate in intramurals compared to female students attending schools that did not offer female-only intramurals regardless of the type of intramural. Female youth are an at-risk group because in addition to lower intramural participation (15,24), they have lower physical activity levels(6–8) compared to males. A practical application of this finding could be for secondary schools to

consider allocating resources to offer female-only intramurals, as these programs could improve intramural participation and physical activity levels among females (13,15,16). Although male students participated in more intramural programs compared to females, male-only intramurals were not associated with male intramural participation. This suggests that male students may be less selective in the intramurals they participate in and may be more open to participating in co-ed programming compared to females. Male-only intramural programs provide an important opportunity for males to participate and be physically active, however if a school is dealing with limited resources, offering female-only intramurals may be an effective strategy to promote physical activity among female students as discussed above.

Additionally, being in grade 11 and 12 was negatively associated with intramural participation across both males and females. This is consistent with other research to suggest that age is negatively associated with sport participation (34). The grade “other” was associated with higher odds of participating in intramurals in the total sample and among females only. This may be explained by the fact that the “other” category consists mainly of grades 7–8 students, and younger students are more likely to participate in intramurals and sports programs (34). These results suggest that older youth may be missing out on opportunities to increase their physical activity, which is concerning given that physical activity tends to decrease with age (35,36). Participation in intramurals is positively associated with physical activity (13,15,16) and increased participation in these older youth may positively influence physical activity levels.

We also found that income was significantly and positively associated with intramural participation as students with weekly spending money of \$21-\$100 had the highest odds of intramural participation. Weekly spending money is a proxy measure of socioeconomic status, and previous research has shown socioeconomic status to be positively associated with sport participation (34). A similar result was found after examining school median neighbourhood income, as students attending schools with a neighbourhood median income of >\$100 000 were less likely to participate in intramural sports compared to those of the lowest income. Again, this may be explained by the fact that students in wealthier neighbourhoods may be able to play more expensive community sports(37) and therefore have less time for intramurals.

Future research should examine which specific intramural activities impact intramural participation. For example, it would be valuable to understand which specific activities are associated with intramural participation and physical activity to allocate resources to intramurals more accurately. These analyses could examine specific co-ed, male- and female-only activities as well, to understand how they impact participation and physical activity. While this research suggests that female-only intramurals are important for female intramural participation, there may be specific activities that are more appealing to males and females regardless of gender restrictions (e.g., co-ed, female-only, male-only). For example, individual activities such as swimming and walking tend to be more popular among girls compared to team activities such as baseball and basketball, and this this research does not differentiate whether offering co-ed or female-only individual and team activities encourage female participation equally.(27) Additionally, longitudinal research could examine how intramural programs impact intramural participation and physical activity levels, to make causal inferences.

Limitations

This study is not without limitations. First, this study has missing data for 8% of students. Previous work examining these students has found no differences in physical activity among missing and non-missing students (38), however we found differences in reporting intramural participation by gender, grade, and ethnicity. Next, the cross-sectional nature of the data used in this study prevents causal inferences from being made about intramurals and participation. Future work should examine if adding female-only intramurals results in increased student participation. Finally, this study makes use of self-reported data and schools were recruited using purposive sampling, potentially limiting the generalizability of results. However, this study had a large sample size of students from four provinces in Canada and used an active-information, passive-consent protocol which encourages participation and honest self-reporting suggesting these conclusions are still relevant to a large number of Canadian high school students (39).

Conclusions

Only one third of Canadian youth are meeting the physical activity guidelines(6) and numbers are similarly low in the United States(40) and globally.(41) Schools are a key environment to target youth physical activity due to the large amount of time students spend there and represent a key opportunity in helping youth achieve the recommended physical activity targets. Physical activity promotion and funding in schools is largely based around physical education class (PE).(42) This is problematic once students reach high school, as the PE requirements tend to be modest in most Canadian secondary schools(43–46) at the same time when student physical activity levels begin to decrease.(35,36)

Offering intramurals are an important way for schools to encourage student physical activity. In secondary schools, intramurals are unique school-level approach to increase physical activity because students can participate outside of school hours, potentially appealing to students with busy academic schedules that may be unable to enrol in PE courses. Intramurals are also a less competitive and inclusive opportunity for youth to be physically active within their schools compared to varsity sports that may require tryouts and team fees. The current study indicates that offering female-only intramurals may be a way for schools to increase female student participation in these activities. While more research is needed on which types of intramurals have the potential to be the most effective, this research indicates that female-only intramurals could play a part in a comprehensive school physical activity approach that encourages the participation of all students.

Declarations

Ethics approval and consent to participate

All procedures were approved by the University of Waterloo Office of Research Ethics (reference number 30118) and appropriate school board committees.

Consent for publication

Not applicable.

Availability of data and materials

The datasets generated and analyzed during the current study will not currently be shared because this is an ongoing study; however, access to the data supporting the findings of the study can be requested at <https://uwaterloo.ca/compass-system/information-researchers>.

Competing interests

None to declare

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Authors' contributions

GCW and KEB devised the study research questions. GCW performed the statistical analysis, with the guidance of KB. GCW and KEB wrote the manuscript and KB, MdG, YJ, and STL revised the manuscript for important intellectual content. STL conceived of the COMPASS study and wrote the funding proposal, developed the study tools, and is leading the study implementation and coordination. All authors read and approved of the final manuscript.

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Figures

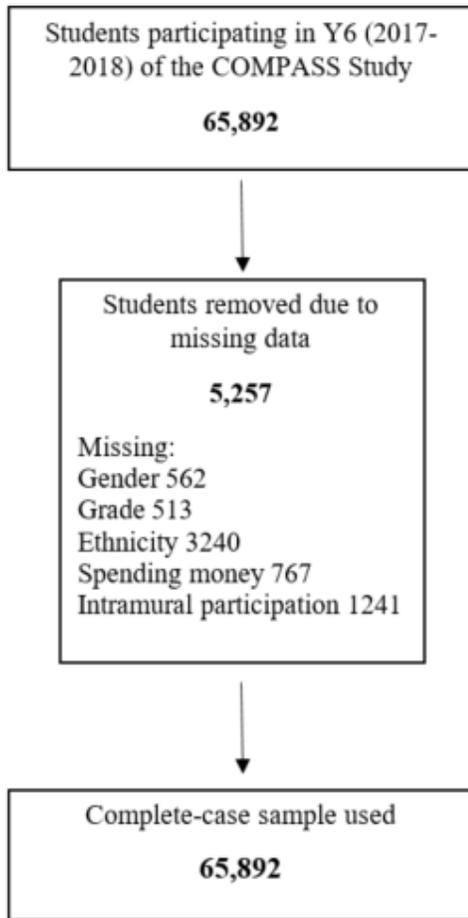


Figure 1

Flow diagram of participant inclusion

Supplementary Files

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