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Abstract: *Several correlates of Indigenous youth participation in sport and/or physical activities (S/PA) have been recognized; however, there is a paucity of research on the relative importance of these predictors, especially those related to the context in which the youth's physical activities take place. The purpose of this cross-sectional study is to explore the correlates of participation in S/PA among off-reserve Indigenous youth. Using data from the 2012 Aboriginal Peoples Survey (APS), our analysis was limited to those between the ages of 12 and 17 who were attending elementary or high school and were identified as having a single Indigenous identity (First Nations, Métis, or Inuit [N=4,790]). Using logistic regression, we first assessed unadjusted the effects of each of the correlates on participation in S/PA. We then examined the magnitude of the independent effects of these correlates, controlling for the effects of others. Sampling weights and bootstrap weights were used to account for the multi-stage sampling design employed in the 2012 APS. The results of the multivariate analysis suggest that, controlling for other correlates, youth's sex, age, health status, drinking behaviour, participation in Indigenous cultural activities and volunteering in community, as well as parental involvement in school activities, strength of family ties, and living in a lone-parent family had statistically significant effects on participation in S/PA. Further research should explore the relationships between these correlates using mediational models to better understand the nature of their effects on participation in S/PA at this age.*

Introduction

Being physically active is an integral part of health and wellness. Habitual physical activity is associated with numerous health benefits, yet approximately 80% of adolescents worldwide are insufficiently active (World Health Organization 2016). Physical activity and participation in sports contribute to the physical, emotional, intellectual, and social dimen-

sions of health and well-being (Cargo, Peterson, Lévesque, and Macaulay 2007; McHugh 2011; McHugh, Coppola, and Sinclair 2013). For school-aged children and youth, physical activity has been found to benefit musculoskeletal health and fitness, cardiovascular health, adiposity levels among those who are overweight (Janssen and LeBlanc 2010; Strong et al. 2005), self-concept, anxiety, and depression symptoms, and academic performance (Strong et al., 2005). Moreover, participating in sport may promote a sense of achievement and enable children and youth to build necessary skills, including teamwork, leadership, problem-solving, decision-making, and communication (Clark, 2008). Despite these benefits, many Canadian school-aged children are not meeting the Canadian physical activity guidelines of 60 minutes per day of moderate-to-vigorous physical activity (MVPA) for at least six days a week (Tremblay et al. 2011). Results from the 2007–09 Canadian Health Measures Survey show that only 9% of boys and 4% of girls accumulate the recommended amount of MVPA in an average week (Colley et al. 2011).

Although the research on physical activity among Indigenous youth is limited, the prevalence of physical inactivity is apparent (Foulds, Warburton, and Bredin 2013). In a systematic review of physical activity levels among Indigenous populations in Canada and the United States, Foulds et al. (2013) found that 26.5% (self-reported) to 45.7% (pedometry/accelerometry) of children and youth (>18 years old) accumulated 60 minutes per day of physical activity. Results from the 2005 Canadian Community Health Survey indicated that First Nations and Métis people living off reserve (>12 years old) were significantly more likely than were their non-Indigenous peers (37% and 39% versus 30%, respectively) to have an active lifestyle (Findlay, 2011). Also, Smith, Findlay, and Crompton (2010) found that a high percentage (69%) of off-reserve First Nations, Métis, and Inuit children (ages 6 to 14) participated in sports at least once a week.

Similar to the non-Indigenous population, Indigenous people's participation in sport and/or physical activities (S/PA) tends to decrease with age, with youth spending less time being active than children (Colley et al. 2011; Findlay and Kohen 2007). Moreover, S/PA participation is often lower among adolescent females than among males (Lavallée, Thorne, Day, Thorne, and Matchiwita 2010; Smith et al. 2010). In a comprehensive international review of physical activity correlates among children (ages 5–13) and youth (ages 12–18), Bauman et al. (2012) identified male sex/gender, self-efficacy, previous physical activity, and family support as factors that were consistently associated with physical activity. The factors related to participation in sports and cultural activities were explored in a study among First Nations, Inuit, and Métis children and youth (6–14 years of age) living off-reserve. The results indicated that parental education, weekly contact with Elders, involvement in extracurricular activities, having very good to excellent health, higher income, and spending less than four hours per day watching TV or playing computer and videos games were associated with participation in sports (Smith et al. 2010).

In addition to the aforementioned factors, participation in S/PA among Indigenous peoples may be affected by a number of additional factors unique to this population. Declining or lack of participation in S/PA can be attributed to structural, institutional, interpersonal, and cultural barriers (Mason and Koehli 2012). Historical factors such as colonization by

Europeans, dispossession of traditional lands, and assimilative policies (such as the residential school system) have profoundly impacted the traditional activities and culture of Indigenous peoples (Forsyth 2007; Lavallée and Lévesque 2013; Willows, Hanley, and Delormier 2012). Many of the barriers related to access to and participation in sport are rooted in historical and contemporary colonial practices (Lavallée and Lévesque 2013).

Issues such as poverty, racism, and gender discrimination, along with other forms of marginalization serve to limit opportunities for dedicated involvement among Indigenous youth (Forsyth and Heine 2008; Paraschak 2013). Many of these issues are documented in national reports, declarations, and policies, such as *Sport Canada's Policy on Aboriginal Peoples' Participation in Sport* (Canadian Heritage 2005), the *National Recreation Roundtable on Aboriginal/Indigenous Peoples: Final Report* (Federal-Provincial/Territorial Advisory Committee 2000), and the *National Aboriginal Youth Strategy* (Human Resources Development Canada 1999). These documents are also important because they call attention to compounding problems such as the high costs associated with organized sports and recreation participation and the need for capacity development in vital areas such as coaching and leadership development, issues that are often neglected in academic analysis of Indigenous S/PA development in Canada (Forsyth 2014).

What is more, *Sport Canada's Policy on Aboriginal Peoples' Participation in Sport*, the national policy the federal government used to guide its responsibility for Indigenous S/PA development throughout the country, never had an implementation plan, which would have been used to identify and measure its progress in key areas (Forsyth and Paraschak 2013). The absence of an implementation plan is less worrisome, however, than the fact that the policy itself has been shelved, which means that there is no national framework to guide federal and provincial priorities for Indigenous S/PA initiatives. In light of this policy vacuum, it is reasonable to question the current level of support for Indigenous S/PA development across the country.

Ecological models of health behaviour are useful for exploring the factors influencing health, as they account for multiple levels of influence (Sallis, Owen, and Fisher 2008). This is particularly applicable to Indigenous populations. Loppie Reading and Wien (2009) suggest that "health behaviours must be considered within the socio-political context of Aboriginal peoples' health, lest an individualistic perspective predominate analysis" (7). Moving beyond the proximal determinants of health behaviours to consider broader community, organizational, historic, political, social, and economic factors is necessary for identifying the multiple levels of influence on Indigenous youth's participation in S/PA (Loppie Reading and Wien 2009; Sallis et al. 2008). A more comprehensive understanding of these correlates will clarify how influences on behaviours operate at diverse levels (Sallis et al. 2008), which will in turn better inform policies and interventions for improving the physical activity levels among Indigenous youth in Canada.

While several correlates of Indigenous youth's participation in S/PA have been recognized, there is a paucity of research on the relative importance of these correlates, especially those related to the context in which youth physical activities take place. Thus, the purpose of this study is to assess the independent effects of correlates of participation in S/PA, operating at multiple levels of influence, using a nationally representative sample of off-reserve Indigenous (First Nations, Inuit, and Métis) youth (aged 12 to 17).

For the purposes of this study, S/PA is defined as participation in sport or physical activity or organized sports (including lessons) at any point in the past year. The correlates included in the study were classified following Willows, Hanley, and Delormier's (2012) ecological model for understanding obesity among Indigenous children.

Methods

Study Design

This study used a cross-sectional design to examine the correlates of participation in S/PA among off-reserve Indigenous youth. Ethical approval for this study was not needed, as the study used anonymous and confidential secondary data from Statistics Canada. Consent from respondents was obtained at the time of data collection.¹

Data Sources

The 2012 Aboriginal Peoples Survey (APS) is a large cross-sectional (N = 28,410), nationally representative survey of Indigenous people living off reserve conducted by Statistics Canada (Statistics Canada 2012). The APS sample was selected from the 2011 National Household Survey (NHS) from among respondents who reported an Aboriginal identity or ancestry (Statistics Canada 2013). The 2012 APS was conducted only in non-reserve communities, although this covers about 75% of the total population who identify as having Indigenous identity or ancestry (Indigenous and Northern Affairs Canada, 2013). Proxy reporting, primarily from parents and caregivers, was used for the majority of children aged 12 to 14 years and almost half of youth aged 15 to 17. Data were directly collected from February 2012 to July 2012 from the survey respondents, and the master dataset also includes responses to the 2011 NHS (Statistics Canada 2012). To remain consistent with a previous study of correlates among First Nations youth living on-reserve (Lévesque, Janssen, and Xu 2015), we limited the analysis to those who were between the age of 12 and 17 at the time of the interview, who attended elementary or high school (grades 7 to 12), and who were identified as having a single Indigenous identity (First Nations, Métis, or Inuit [N = 4,790]).

Measurement Instruments

Outcome Variable

Participation in sport and/or physical activities

Respondents (or persons most knowledgeable) were asked, "At any time during this school year, did you (or your child) participate in a sport or a physical activity or played organized sports (including taking lessons)." Those who replied positively to this question were classified as those who participated in S/PA.

¹ Data were provided by Statistics Canada through the Research Data Centres program and accessed under the *Statistics Act* of Canada. The analyses and the interpretation are the authors' alone.

Individual Factors

Demographics and Indigenous identity

The youth's sex/gender was measured by a binary variable, and their age was measured in years, from 12 to 17. Respondents were asked if they self-identified with one of three Indigenous identity groups: First Nations (North American Indian), Métis, or Inuk (Inuit). Those who self-identified themselves as First Nations were also asked to indicate whether they were Status Indians, as defined in the *Indian Act*. Based on the responses to these two questions, youth were classified into four groups: First Nations-Status Indian; First Nations-Not Status Indian; Métis; and Inuit. Youth with multiple Indigenous identities were excluded from the analysis.

Health status and health-related behaviours

Respondents were classified into two groups based on how they perceived their own health: healthy (those who indicated that their health was "Excellent" or "Very good") and less healthy (those who answered "Good", "Fair," or "Poor"). Based on responses to questions on their smoking and drinking behaviours, two binary variables were created identifying smokers (daily or occasional smokers) and drinkers (drinking more than once a month).

Knowledge of Aboriginal language

Respondents were asked, "Do you speak an Aboriginal language, even if only a few words?" Those who responded negatively were then asked, "Do you understand an Aboriginal language, even if only few words." Responses to these two questions were captured by a single binary variable, with those who spoke or understood Aboriginal language forming one group and those who did not speak or understand an Aboriginal language forming the other.

Interpersonal Factors

Spending time with Elders

Respondents were asked if, at any time during the current school year, they spent time with Elders. The response to this question was captured in a binary variable indicating participation in this type of activity.

Parental school involvement

Respondents were asked to indicate whether their parents or caregivers attended one of the following school activities: "Speak to, correspond or visit respondent's teacher"; "Attend school event in which respondent participated"; and "Participate in other school activities." Based

on the responses to these questions, a scale measuring parental involvement was developed, ranging from 0 (“No involvement”) to 3 (“Involved in three activities”).

Family ties

Respondents were asked to indicate how strong the ties among members of their family were within the same community but in another household. The response to this question was captured on a scale from 0 (“Very weak”) to 4 (“Very strong”).

Community, Home, and Sociocultural Environments

Participation in extracurricular activities and working during school year

Respondents were asked whether, at any time during the school year, they had participated in art, drama, or music groups (including taking lessons); participated in school clubs (such as student council, yearbook, or science clubs) or clubs outside of school; and whether they had volunteered or helped without pay in the community. Based on the responses to these questions, three binary variables were created measuring participation in each of these three activities. Respondents were also asked whether or not they worked for pay during the school year. Responses to this question were captured in a separate binary variable.

Indigenous cultural activities

The youth were also asked whether they had participated in Indigenous cultural activities outside of school hours. Responses to this question were captured in a binary variable indicating participation in this type of activity. The types of cultural activities youth participated in were not addressed in the APS.

Family structure

Based on the responses to a number of questions on their living arrangements, the youth were allocated into one of three family types: couple living with a child/children; lone parent with a child/children; and other family types. We also created a binary variable indicating if the respondents had any siblings under the age of 18 residing in the same household.

Parental educational attainment and household income

We developed two binary variables indicating whether the mother and father had obtained at least some post-secondary education. Information on household income—the sum of the total incomes of all members of that household, adjusted by the number of individuals in the household—was obtained from the 2011 NHS and recoded into deciles to account for extreme values.

School environment

Positive school environment was assessed with the following four questions: “Overall respondent feels safe at school”; “Overall respondent is happy at school”; “Most children enjoy being at school”; and “The school provides many opportunities to be involved in school activities.” Negative school environment was assessed with the following questions: “Racism is a problem at school”; “Bullying is a problem at school”; “The presence of alcohol is a problem at school”; “The presence of drugs is a problem at school”; and “Violence is a problem at school”. Supported by the results from the exploratory factor analysis, two scales ranging from 0 to 3 were computed to indicate separately the level of school’s positive and negative environments.

Community type

Respondents were assigned to one of two community types: rural (Rural area or small population centre; $\leq 29,999$) and urban (Medium and large population centre; 30,000–99,999 or more).

Historical Factors

Residential school attendance

Respondents were asked whether their mother, father, or one of the grandparents had attended residential school. Based on the responses to these questions, we created three binary variables indicating whether the youth’s mother, father, or one of the grandparents had attended residential school.

Statistical Analysis

Using logistic regression, we first assessed the unadjusted effects of each of the correlates on a binary variable measuring participation in S/PA (unadjusted estimates). We then assessed the individual effects of these correlates while controlling for the effects of others (adjusted estimates). The statistical significance of all estimates was assessed at the $p = 0.05$ level. Sampling weights and bootstrap weights were used to account for the multi-stage sampling design employed in the 2012 APS. We used SAS 9.4 for all analyses (SAS Institute Inc 2015).

The child’s age, parental school involvement, family ties, household income, and positive and negative school environments were represented in the statistical models as a continuous variable, while all other correlates were entered as categorical variables. For the continuous variables, we tested for both linear and quadratic effects; however, none of the quadratic effects was found to be statistically significant.

The outcome variable and some of the correlates had a substantial percentage of missing values (see Table 1), while the variables for age, sex, Indigenous identity, and household income did not have any missing values. To address this problem explicitly, we assumed

that the missing data pattern for variables related to residential school attendance and parental educational attainment was non-ignorable. We thus created separate categories for respondents with missing values. For all other variables, we conducted 50 imputations of missing values using SAS's *proc mi/mianalyze* procedures, specifying the *fcs discrim* option for categorical variables and the *regpmm* option for continuous variables. We reported and interpreted only the estimates computed from the analysis of imputed data. However, the pattern and statistical significance of these results are very similar to those obtained from the analysis of the data from which all the individuals with missing values were deleted.

Results

Frequency distributions and descriptive statistics were computed for all variables used in this study (see Table 1). A total of 4,790 individuals who participated in the 2012 APS were between the ages of 12 and 17 and attended elementary or high school at the time of the survey. As many as 63.2% youth participated in S/PA.

TABLE 1. Description of youth respondents (ages 12–17) of the 2012 Aboriginal Peoples Survey

Variable	N	%
Participation in Sport and Physical Activities		
No	1740.0	36.9
Yes	2980.0	63.2
Missing Data	80.0	16.6
Sex		
Female	2460.0	51.3
Male	2340.0	48.7
Indigenous Identity		
First Nations-Not Status	1450.0	30.2
First Nations-Status	1030.0	21.5
Métis	2040.0	42.5
Inuit	280.0	5.7
Residential School Attendance - Grandparents		
Did not attend	2410.0	50.2
Attended	1590.0	33.2
Missing Data	800.0	16.6
Residential School Attendance - Mother		
Did not attend	4250.0	88.6
Attended	250.0	5.3
Missing Data	290.0	6.1
Residential School Attendance - Father		
Did not attend	4120.0	86.0
Attended	270.0	5.7
Missing Data	400.0	8.4

Knowledge of Aboriginal language		
Does not Speak or Understand	2720.0	58.0
Speaks or Understands	1970.0	42.0
Missing Data	100.0	
Spending Time with Elders		
No	2610.0	55.5
Yes	2100.0	44.5
Missing Data	80.0	
Participated in Indigenous Cultural Activities		
No	3370.0	74.4
Yes	11600.0	25.6
Missing Data	260.0	
Participation in Art, Drama and Music Groups		
No	2780.0	59.3
Yes	1900.0	40.7
Missing Data	110.0	
Participation in Clubs		
No	3340.0	71.6
Yes	1330.0	28.4
Missing Data	120.0	
Volunteering in Community		
No	2280.0	48.4
Yes	2430.0	51.6
Missing Data	90.0	
Worked during School Year		
No	2440.0	51.4
Yes	2310.0	48.6
Missing Data	50.0	
Health Status		
Less Healthy	1250.0	26.5
Healthy	3450.0	73.5
Missing Data	110.0	
Smoking Behaviour		
Non-smoker	3990.0	85.7
Smoker	670.0	14.3
Missing Data	140.0	
Drinking Behaviour		
Non-drinker	3100.0	67.9
Drinker	1470.0	32.1
Missing Data	220.0	

Family Type		
Couple with children	2170.0	47.4
Lone parent	1880.0	41.0
Other types	530.0	11.7
Missing Data	210.0	
Siblings under 18		
No	1430.0	31.2
Yes	3150.0	68.8
Missing Data	210.0	
Educational Attainment - Mother		
Less than post-secondary	1690.0	35.2
Post-secondary	2880.0	60.1
Missing Data	220.0	4.7
Educational Attainment - Father		
Less than post-secondary	2280.0	47.7
Post-secondary	1990.0	41.5
Missing Data	520.0	10.8
Community Type		
Rural	2360.0	49.2
Urban	2440.0	50.8
	M	SD
Age	15.2	1.6
Parental Involvement in School Activities	1.8	1.0
Family Ties	3.8	1.5
Household Income	4.1	2.9
Positive School Environment	2.0	0.5
Negative School Environment	1.2	0.6

The results of the logistic regression analysis indicate that, when assessed separately, most of the correlates had statistically significant effects on participation in S/PA; the odds ratios associated with these effects and the bootstrap confidence intervals for these odds are reported in Table 2 (unadjusted estimates). These unadjusted results (odds) suggest that youth who identified as Inuit and male were more likely to participate in S/PA; however, participation decreased with age. The findings also suggest that youth who identified their mothers and fathers as residential school attendees, who spent time with Elders, and engaged in Indigenous cultural activities and all types of extracurricular activities (arts, drama and music groups; clubs; and volunteering in the community) were more likely to participate in S/PA. Youth who reported better health were more likely to participate, and those who regularly or occasionally smoked were less likely. Youth who reported higher levels of parental involvement in school activities, youth from dual-parent households, and those with greater ties to other family members in the community were also more likely to

participate in S/PA. Additionally, youth from households with higher income or where the mother and father had obtained post-secondary education were more likely to participate. S/PA was also affected by school climate, with greater levels of participation among youth attending schools with positive environments and lower levels among those who attended schools with negative environments. Finally, living in an urban area decreased the odds of participation.

TABLE 2. Associations between correlates and participation in sport and/or physical activities in youth (ages 12–17) participants in the 2012 Aboriginal Peoples Survey

Variable	Unadjusted Estimates				Adjusted Estimates			
	OR	95% CI		*	aOR	95% CI		*
Sex								
Female	0.00				0.00			
Male	1.12	1.01	1.26	*	1.22	1.08	1.37	*
Age	0.81	0.76	0.87	*	0.86	0.79	0.93	*
Indigenous Identity								
First Nations-Not Status	0.00				0.00			
First Nations-Status	0.87	0.71	1.07		0.94	0.74	1.20	
Métis	0.95	0.80	1.12		0.96	0.79	1.18	
Inuit	1.39	1.08	1.72	*	1.18	0.87	1.60	
Residential School Attendance - Grandparents								
Did not attend	0.00							
Attended	1.02	0.88	1.19		N/A			
Missing Data	0.93	0.78	1.11		N/A			
Residential School Attendance - Mother								
Did not attend	0.00							
Attended	1.48	1.12	1.96	*	1.24	0.84	1.85	
Missing Data	0.71	0.53	0.97	*	0.97	0.55	1.72	
Residential School Attendance - Father								
Did not attend	0.00				0.00			
Attended	1.47	1.04	2.06	*	1.18	0.74	1.89	
Non response	0.71	0.51	1.00		0.85	0.44	1.64	
Knowledge of Aboriginal language								
Does not Speak or Understand	0.00				0.00			
Speaks or Understands	1.08	0.97	1.21		0.98	0.86	1.12	
Spending Time with Elders								
No	0.00				0.00			
Yes	1.27	1.13	1.43	*	1.13	0.99	1.29	
Participated in Indigenous Cultural Activities								
No	0.00				0.00			
Yes	1.31	1.14	1.51	*	1.23	1.05	1.45	*
Participation in Art, Drama and Music Groups								
No	0.00				0.00			
Yes	1.27	1.14	1.43	*	1.06	0.93	1.20	
Participation in Clubs								
No	0.00				0.00			
Yes	1.34	1.17	1.54	*	1.05	0.92	1.21	
Volunteering in Community								
No	0.00				0.00			
Yes	1.38	1.24	1.54	*	1.20	1.06	1.36	*

Worked during School Year							
No	0.00				0.00		
Yes	1.08	0.96	1.21		1.12	0.98	1.27
Health Status							
Less Healthy	0.00				0.00		
Healthy	1.61	1.42	1.83	*	1.43	1.25	1.64 *
Smoking Behaviour							
Non-smoker	0.00				0.00		
Smoker	0.72	0.61	0.84	*	0.88	0.74	1.06
Drinking Behaviour							
Non-drinker	0.00				0.00		
Drinker	0.92	0.82	1.03		1.17	1.00	1.36 *
Parental Involvement in School Activities							
	1.85	1.67	2.06	*	1.52	1.35	1.71 *
Family Type							
Couple with children	0.00				0.00		
Lone parent	0.75	0.63	0.89	*	0.77	0.63	0.95 *
Other types	1.10	0.87	1.39		1.22	0.91	1.64
Siblings under 18							
No	0.00				N/A		
Yes							
Family Ties							
	1.23	1.14	1.32	*	1.16	1.07	1.26 *
Educational Attainment - Mother							
Less than post-secondary	0.00				0.00		
Post-secondary	1.43	1.18	1.74	*	1.21	0.95	1.56
Missing Data	0.71	0.50	1.00		0.87	0.57	1.31
Educational Attainment - Father							
Less than post-secondary	0.00				0.00		
Post-secondary	1.35	1.15	1.58	*	0.98	0.80	1.22
Missing Data	0.72	0.58	0.90	*	1.00	0.72	1.38
Household Income							
	1.07	1.03	1.11	*	1.01	0.96	1.06
Positive School Environment							
	1.36	1.10	1.68	*	0.95	0.74	1.23
Negative School Environment							
	0.82	0.68	0.99	*	0.96	0.78	1.17
Community Type							
Rural	0.00				0.00		
Urban	0.88	0.79	0.98	*	0.96	0.85	1.09

Note: N/A = Not Applicable (variable was not included in final multivariate model); Bold number with * indicates statistically significant odds ratios ($p < 0.05$)

In addition to the statistically significant associations described above, variables measuring knowledge of Aboriginal language, working during the school year, and drinking behaviour were retained for further multivariate analysis, as the level of statistical significance for these variables was between 0.05 and 0.02. However, the two variables that were not statistically significant in the univariate analysis at the cut-off level ($p = 0.2$)—residential school attendance by grandparents and having sibling(s) under the age of 18—were removed. In the multivariate logistic regression analysis, the effects of Indigenous identity; mother and father's residential school attendance; time spent with Elders; participation in art, drama, or music groups; participation in clubs; smoking behaviour; educational attainment for both parents; household income; positive and negative school environments; and community type were attenuated, and the effects of these correlates became statistically non-significant.

In addition, the effects for the two variables that were statistically non-significant ($p > 0.05$) in the univariate analysis but were retained in the multivariate analysis (knowledge of Aboriginal language and working during school year) did not become statistically significant in the multivariate model. However, the effect of drinking behaviour became significant. Thus, the results of the multivariate analysis suggest that, controlling for the effects of other correlates, only the youth's sex (aOR 1.22; 95% CI: 1.08-1.37), age (aOR 0.86; 95% CI: 0.79-0.93), participation in Indigenous cultural activities (aOR 1.23; 95% CI: 1.05-1.45), volunteering in community (aOR 1.20; 95% CI: 1.06-1.36), health status (aOR 1.43; 95% CI: 1.25-1.64), and drinking behaviour (aOR 1.17; 95% CI: 1.00-1.36) as well as parental involvement in school activities (aOR 1.52; 95% CI: 1.35-1.71), family type (aOR 0.77; 95% CI: 0.63-0.95), and strength of family ties (aOR 1.16; 95% CI: 1.07-1.26) had statistically significant effects on participation in S/PA. The directions of these effects were the same as those in the univariate analysis, although the strength of some of these effects changed.

Discussion

The purpose of this cross-sectional study was to examine the potential correlates of Indigenous youth's participation in S/PA. The results of the 2012 APS suggest that 63.2% of youth (ages 12–17) participated in S/PA. This proportion is similar to the findings of Findlay and Kohen (2007), who reported that 65% of Indigenous children and youth who responded to the 2006 APS participated in these activities. Using the General Social Surveys (1992–2005), Clark (2008) indicated that approximately 51% of children aged 5 to 14 in the general Canadian population participated in sports during the past year, a slightly lower participation rate compared to that of Indigenous youth.

Unfortunately, for Indigenous and non-Indigenous youth, participation in S/PA declines with age (Findlay and Kohen 2007; Sterdt, Liersch, and Walter 2013). In both the univariate and multivariate analysis, age had a statistically significant negative effect on participation, indicating that, as children age, they participate in less S/PA. Furthermore, it is commonly reported that males are more active than females, which is consistent with the findings of this study (Colley et al. 2011; Lévesque et al. 2015; Smith et al. 2010; Sterdt et al. 2013). Biddle et al. (2011) note that physical activity is typically measured as “total activity,” which provides no detail on the types of active behaviours males and females prefer to participate in. To gain a more in-depth understanding of the variation in S/PA participation among male and female youth, future research should employ measures to investigate activity preferences. Given the multitude of the health benefits of participating in S/PA, it is imperative to promote participation at this age, especially among female youth, who may be less inclined to engage in S/PA. Physical activity behaviours may carry on into adulthood (Malina 2001; Telama et al. 2005); thus, reductions in these activities could have implications for health and wellness later in life (Lavallée and Lévesque 2013).

In this study, healthier youth were more likely to participate in S/PA than were those who reported poorer health. We are not able to establish a causal relationship between these two variables, however. Smith and colleagues also found that Indigenous children

and youth (6- to 14-year-olds) were more likely to participate if they were in very good or excellent health than if their health was poorer (Smith et al. 2010). As greater participation in S/PA can lend to improved physical, mental, emotional, and spiritual health (Cargo et al. 2007; McHugh 2011), it is necessary to provide more opportunities to be active during early adolescence and encourage a balance among these four areas (Lavallée and Lévesque 2013).

In examining health-related behaviours among youth, an unexpected result was the relationship between drinking and participation in S/PA. Although the effect of drinking was not statistically significant in the unadjusted analysis ($p = 0.145$), this effect became statistically significant in the adjusted analysis ($p = 0.044$), suggesting that those who drink are more likely to participate in S/PA. It is difficult to extrapolate this finding for a specific category of respondents. However, Wharf Higgins, Gaul, Gibbons, and Van Gyn (2003) found comparative results and argued that it may be due to a “subculture” related to athletic and sport celebration. In a recent international review by Lisha and Sussman (2010), the relationships between high school and college sport participation and alcohol, tobacco, and illicit drug use were examined among 13- to 24-year-olds. The results suggest that alcohol use was positively associated with sport participation. The authors speculate that this relationship may be due to 1) the competitive nature of athletes, 2) drinking as a coping mechanism for sport-related stress or anxiety, 3) environmental influences (e.g., perception of social norms), or 4) the culture surrounding sport and drinking behaviour (e.g., advertisements at sporting events). Alcohol consumption may also differ between males and females. Research among high school students in the United States found that increased levels of physical activity were related to alcohol consumption among females but not males (Pate, Heath, Dowda, and Trost 1996). However, sex differences have not been consistently reported in the literature (Lisha and Sussman 2010) and may also be dependent on the type of sport or physical activity (Moore and Werch, 2005).

We also did not find that smoking had a significant effect on participation in S/PA in the multivariate analysis; however, previous research among Indigenous and non-Indigenous populations has suggested that those who participate tend to smoke less (Findlay and Kohen 2007; Lavallée et al. 2010; Lisha and Sussman 2010). Accordingly, further research on drinking and smoking behaviour among Indigenous youth is needed to clarify these findings.

Participation in Indigenous cultural activities was associated with a higher likelihood of participation in S/PA. In addition, youth who volunteered or helped without pay in the community were more likely to participate. These results are consistent with previous findings that children and youth who took part in cultural activities and volunteered were more likely to participate in sport (Smith et al. 2010). As physical activity has been found to increase along with social involvement (Jago et al. 2009; Salvy, Haye, Bowker, and Hermans 2012; Wharf Higgins et al. 2003), it is possible that youth who tend to be more engaged in cultural, extracurricular, or volunteer activities are more likely to participate in S/PA as well. Promoting activities for youth that also provide social opportunities may be an effective way to increase physical activity among this age group (Jago et al. 2009).

Family-related characteristics were significantly related to youth participation in S/PA. Those whose parents were more involved in school activities were more likely to

participate. Parental involvement in this capacity may be related to parental support, which has been positively associated with non-Indigenous youth's activity levels (Sterdt et al. 2013; Yao and Rhodes 2015). In a study done in the United States, Shen and colleagues found that parental social support could enhance children's enjoyment of participation in physical activity during school hours (Shen et al. 2016). Thus, the provision of parental support for and involvement in the development of physical activity programs may foster youth's tendencies to participate in more active behaviours (Kerpan and Humbert 2015; Lavallée and Lévesque 2013). Further research should examine the relationship between interpersonal factors and participation in S/PA among Indigenous youth, specifically those living off-reserve and in urban areas.

The ability to provide support for physical activity might depend on the time availability and resources of the parents. Youth in this study from lone-parent families had lower levels of participation in S/PA. Previous research indicates that Indigenous children and youth who live with both parents may be more active, as the parents are able to provide more facilitation for participation in S/PA due to shared care-giving (Findlay and Kohen 2007). Additionally, stronger family ties were related to increased participation in S/PA. In a study involving youth living on-reserve and in northern First Nations communities, Lévesque et al. (2015) highlight the connection between culture and physical activity and suggest that family support for culture may also be related to family support for physical activity. In fact, they noted that youth who reported feeling spiritually balanced tended to be more likely to participate in S/PA.

Several results that appeared significant in the unadjusted models became insignificant in the multivariate model. Specifically, Inuit were initially found to be more likely to participate in S/PA; however, this effect disappeared in the adjusted model. Additionally, residential school attendance for mothers and/or fathers was found to be significant and positive but became statistically insignificant in the multivariate model. Parental education and income were not significant in the multivariate model, nor were school environment and community type. Though these factors did not remain significant in the multivariate model, additional work is warranted to clarify their relationship with S/PA.

Building upon the results from this study, further research should explore the relationships between correlates and how they affect youth participation in S/PA using mediational models—particularly to explain the role of drinking behaviour. Additionally, there is a need for improved data on some of the correlates, especially Indigenous determinants of health, as well as longitudinal data that would allow researchers to assess the directions of some of the relationships examined in this study.

Limitations

As with any study, this one is not without limitations. First, the study employs a cross-sectional design and therefore cannot infer any causal relationships. Second, due to the limited number of questions pertaining to S/PA in the APS survey, we were unable to adequately determine the activity levels of the youth who participated. They may also not capture all

the activities that are considered S/PA among Indigenous youth. Additionally, the variables currently available in the APS measurement tools do not allow for a direct measurement of many of the broader contextual factors that affect various health-related behaviours among Indigenous peoples. Finally, the information provided on youth activity levels was self- or proxy-reported, which may lend to reporting bias (due either to social desirability bias or misinterpretation of the level of activity; (LeBlanc and Janssen 2010). Nonetheless, this study provides valuable insight into the factors related to Indigenous youth's participation in S/PA—the key insight being that, in addition to personal-level characteristics, family and cultural factors are influential on participation in S/PA.

Conclusions

Physical activity is an integral part of health and as such should be promoted throughout childhood and adolescence to ensure the longevity of positive health habits. While Indigenous peoples have been found to be more active than the general population, many children and youth are still below national and international recommendations (Foulds et al. 2013), and their self-reported health tends to be poorer (Findlay 2011). High rates of obesity and diabetes within this population suggest that promoting physical activity might be particularly important (Amed et al. 2010; Gionet and Roshanafshar 2013; Katzmarzyk 2008). Further, decreased participation in S/PA is particularly disadvantageous for Indigenous youth, as it has been associated with improved mental health and reduced risk-taking behaviours, such as smoking (Findlay and Kohen 2007; Lavallée et al. 2010) or substance use (Critchley et al. 2006; Lavallée et al. 2010; McHugh 2011).

Given that youth in Canada spend approximately 25 hours per week in school, this setting represents an important context for increasing the levels of S/PA among youth (Godin, Leatherdale, and Elton-Marshall 2015). Moreover, improving the accessibility and frequency of sport activities during school hours (e.g., physical education or recess) may be a viable way to improve the activity levels among youth and promote holistic health and wellbeing (McHugh 2011). Participation in school activities may be particularly important for Indigenous youth, who face a number of barriers related to participation outside of school activities (Halas, McRae, and Carpenter 2013; McHugh 2011). However, little research is available on effective school-based programs focusing on changes concerning obesity, diet, or physical activity for Indigenous youth in Canada—particularly for Métis and Inuit youth, secondary school-aged youth, and those living in urban areas (Godin et al. 2015). More work is also needed to assess the link between school based physical activity practices and cultural identity, to assess how S/PA can assist the process of cultural revitalization in which many Aboriginal people and communities are now purposefully engaged. The physical and organizational aspects of S/PA must be understood alongside the cultural aspects, as this may help to explain why some S/PA programs are more successful than others.

Understanding how particular factors determine physical activity and inactivity among certain populations is necessary to develop and implement appropriate programs that will help minimize the rates of inactivity (Bauman et al. 2012). It is apparent from this study and

others that many factors affect the participation in S/PA among Canadian Indigenous youth. In line with the previous research, factors such as sex, age, and family-level characteristics were found to be consistent correlates of youth participation in physical activity (Biddle et al. 2011; Sallis, Prochaska, and Taylor 2000; Yao and Rhodes 2015). Additional research into the correlates of First Nations, Métis, and Inuit youth participation in S/PA at the local level is necessary to determine the facilitators and barriers that should be addressed in targeted physical activity programs and interventions. In addition to quantitative data, gaining perspectives and feedback from youth is also vital to the development and implementation of relevant S/PA programs and policies. The findings of this study suggest that programs targeting girls may be particularly advantageous, given that girls are less likely to participate in S/PA and that activity levels tend to decline between childhood and adulthood. Furthermore, involving family in the development and implementation of physical activity programs may be particularly important, given that the provision of support helps increase participation among adolescents. However, all of this work must also align with calls for the development of policies to guide the priorities and actions of government and service organizations working in this area. Without such policies, these indicators, while useful and meaningful, will be of limited use for addressing some of the core issues that continue to limit Indigenous participation in S/PA.

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