UNDERSTANDING PHYSICAL ACTIVITY PATTERNS OF RURAL CANADIAN CHILDREN

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ABSTRACT

The purpose of this cross sectional study was to explore the physical activity patterns of a group of rural children living in Saskatchewan, Canada. Of the 103 participants (aged 8-13 years), 53.7% met the national guideline for the amount of physical activity required to achieve optimal health benefits. Children's involvement in out of school organized physical activities, (e.g. baseball, soccer, dance) was associated with whether or not they met the guideline. There was no statistically significant association between the children's physical activity and their participation in physical activities in school, television watching behavior, or their parents' educational levels. Results suggest that many rural children in Saskatchewan are not physically active enough for health benefits and several factors can potentially influence the physical activity of this group of children. Further exploration of such factors may assist families, communities, schools, and health professionals in promoting physical activity in this population.

INTRODUCTION

Physical activity has significant implications for the physical and mental health of children. In Canada, it has been estimated that 49% of children aged 5 – 12 years (53% of boys and 44% of girls) are physically active enough to achieve health benefits (CFLRI, 2000). The low prevalence of physical activity among Canadian children is a concern since physical inactivity in children has a direct influence on obesity (Fu & Hao, 2002; Kelishadi et al. 2003) and other cardiovascular risk factors, such as low high-density lipoprotein cholesterol levels (Eisenmann et al. 2003), high triglyceride levels (Al-Hazzaa, 2002), high low-density lipoprotein cholesterol levels (Vasankari et al. 2000), and high total cholesterol levels (Schmidt, Walkuski & Stensel, 1998). The prevalence of overweight and obesity in the Canadian population has increased remarkably over the last 15 years, with this increase in prevalence being greater in children than in adults (Tremblay, Katzmarzyk, & Willms, 2002). A recent study comparing the estimates of the prevalence of overweight and obesity in school-aged youth ranked Canada as fifth highest out of 34 countries in the world (Janssen et al 2005).

Studies in the United States (Janz, Dawson, & Mahoney, 2000) and Canada (Trudeau, Laurencelle, Tremblay, & Shepard, 1999) suggest that physical activity patterns may track from childhood to adulthood. Hence, physical activity habits formed in childhood may predict physical activity levels later in life and influence an individual's

risk of obesity and other chronic diseases (coronary heart disease, diabetes, peripheral vascular disease) and conditions (hypertension, osteoporosis, back pain, depression, decreased flexibility).

Previous Canadian studies (Pampalon, 1991; CFLRI, 1999), which included both children and adults, suggest that rural residents are not as physically active as their urban counterparts. Recent studies (Statistics Canada, 2002) have identified that geographic variations also exist in the obesity of Canadians, with rural populations aged 20 to 64 years having higher proportions of overweight residents compared to urban populations. Lower physical activity levels among rural children and adults may be a contributing factor in the observed prevalence of obesity in rural areas. As lifelong habits, such as physical activity patterns, originate in childhood, further exploration of the physical activity of rural children may provide valuable information on the present and future health of this population, their risks for future diseases and conditions, and direction for health promotion initiatives. In Canada, there are few data on the physical activity of rural children. The purpose of this study was to explore and describe the physical activity patterns of a group of elementary school children in grades 4 to 6 living in rural Saskatchewan. The research questions that guided the study were:

1. What are the estimated usual physical activity patterns of rural elementary school children in grades four, five, and six living in the study area?
2. How do the estimated physical activity patterns of the study population compare with national guidelines?
3. What factors are associated with the physical activity patterns of the study population?

METHODS

The target school division for the study, which was one of 53 rural school divisions in Saskatchewan, included four public schools (kindergarten to grade 12), each located in a separate town with population sizes ranging from 535 to 1,046 persons (Saskatchewan Health, 2000). Each town was located over 100 kilometers from the nearest major city (population of over 200,000 persons), 35 - 80 kilometers from the next largest city (population of 39,000 persons), and 50 - 160 kilometers from two smaller cities (populations of 5,000 and 6,000 persons). The total enrollment of the target school division in 2001 was 951 students with 218 students in grades 4, 5, and 6 (aged 8 to 13 years). The students in this school division lived in one of the four towns or the surrounding rural areas.

The study was approved by the University of Saskatchewan Advisory Committee on Ethics in Behavioral Science Research. The Director of Education for the target rural school division and the principals of the four schools agreed to support the study. The questionnaires were distributed through the schools by the first author (H.N.B.). The data were collected over a three-week period in the month of June.

The data were collected using a self-report questionnaire, which the student and a parent (or guardian) completed together at home. The questionnaire was divided into sections. The first section asked for demographic data about the student (age, grade, gender, and whether the child lived on a farm or in town for more than 6 months of the

previous year) and parents (education), and information on whether the student had any health-related problems that interfered with physical activity. Section two collected information on all of the student's physical activities (i.e., type, duration, intensity, and frequency) during the previous seven days, using a standardized physical activity recall history (Paffenbarger, Wing, & Hyde, 1978; Sallis et al. 1985). Children's physical activity was categorized into light, moderate, or vigorous levels and the total duration was averaged for the week reported. This section also included a question on the daily number of hours the children spent watching television or playing computer or video games before or after school. Section three asked about the student's involvement in organized physical activities at school and outside of school, the average distance traveled to activities outside of school, and the activities the student would like to participate in closer to home.

The data from the questionnaires were coded, entered into a data file using the Statistical Package for Social Sciences (SPSS) Data Entry Program for IBM PC microcomputers, and verified using double entry. The data were cleaned and analyzed using SPSS Base 10. Categorical variables were analyzed using descriptive statistics. Chi square tests (i.e., with continuity correction, test for overall trend, or Fisher's exact test) were used to make comparisons (across schools and grades, between boys and girls, and between town and farm residents) and to assess relationships between each categorical variable and physical activity levels. Analysis of variance (ANOVA) was used to compare the mean distance students traveled (one way) to activities for school and town/ farm residence. Responses to the qualitative questions were analyzed using content analysis to identify the physical activities children participated in school and outside of school, and activities the children would like to see offered closer to home. For all statistical tests, significance was indicated by an alpha level of less than .05.

RESULTS

Of the 218 eligible students, 103 (60 girls, 42 boys, gender not reported for 1 student) returned the completed questionnaire, for an overall response rate of 47.2%. The majority of students (88.2%) were between 10 and 12 years of age, while 8.8% were between 8 and 9 years of age, and 2.9% were 13 years of age. The respondents were in grade 4 (28.4%), grade 5 (32.4%), and grade 6 (39.2%). The distribution of boys and girls did not differ significantly by grade [χ^2 (2, N = 102) = 2.1, p =.343]. A significantly larger proportion of the respondents reported living on a farm (61.4%) for most of the year [Single proportion binomial Z test, z = 2.19, p = .029 (Fleiss, 1981, p.13)]. The proportions of farm and town residents did not differ significantly between boys and girls [χ^2_c (1, N = 101) , p = .487]. The majority of respondents (90.0%) reported having no health problems that interfered with their ability to be physically active. Similar proportions of boys (10.0%) and girls (10.2%) reported health problems; these students reported participating in physical activities throughout the target week and were included in the analysis.

The majority of the respondents reported participating in light (94.0%), moderate (93.8%), and vigorous (82.6%) physical activity during the previous 7 days. Seventy six percent of the respondents (78.6% of the boys and 74.1% of the girls) reported participating in organized physical activities at school during the target week. Seventy

one percent of the respondents, with significantly more boys (83.3%) than girls (62.1%), reported participating in organized physical activities outside of school [χ^2_c (1, N = 100) = 4.4, p = .037]. The proportion of respondents who reported participating in organized physical activities outside of school (71.0%) did not differ significantly between town (35.7%) and farm (64.3%) residents [χ^2_c (1, N = 99) = 0.39, p = .534]. Farm and town residents reported participating in similar types of physical activities. The most frequently reported out-of-school activities were baseball and swimming. Hockey, soccer, and dancing were reported less frequently. Seventy of the 99 respondents (31 boys and 39 girls) reported that they would participate in more organized physical activities if the activities were offered closer to home. The types of activities that students said they would like to have in close proximity to their homes were soccer, baseball, swimming, karate, dance, and football.

At the time of the study, the Canadian Fitness and Lifestyle Research Institute (CFLRI) adopted the guideline for physical activity suggested by Corbin, Pangrazi, and Welk (1994) which recommended that children participate in daily physical activity at a moderate to vigorous intensity level with a duration of activity necessary to expend at least 6 to 8 kcal/kg/day, which is equivalent to 60 minutes of moderate to vigorous physical activity that may be distributed in three or more activity sessions each day. The CFLRI, (1999) suggested that this guideline may also be achieved with 30 minutes of moderate to vigorous physical activity (such as martial arts) plus 60 minutes of lighter physical activity (such as walking) each day. Using these guidelines in the present study, 53.7% of the respondents met the guideline for physical activity. A significantly larger proportion [χ^2_c (1, N = 94) = 4.0, p = .045] of students who reported participating in physical activities outside of school (60.3%) during the target week met the guideline for physical activity compared to only 34.6% of students who did not participate in physical activity outside of school. As Table 1 shows, the proportions of respondents who met and who did not meet the CFLRI guideline for physical activity did not differ significantly by gender, residence, grade, involvement in physical activities in school, hours of television watching, school (data not shown), mother's education level, or father's education level.

The mean distance traveled (one way) by respondents to participate in organized physical activities was 42.2 kilometers (SD = 35.3 kilometers). Respondents living in town (mean = 56.4 kilometers, SD = 38.9 kilometers) reported traveling significantly farther to participate in organized physical activities compared to respondents who lived on the farm (mean = 35.7 kilometers, SD = 31.7 kilometers). No statistically significant interactions were found between the distance traveled and the participant's gender, grade, parents' education level, hours of television viewing, or participation in physical activities in or out of school.

DISCUSSION

This exploratory study provided a 'snapshot' of the physical activity patterns of a group of rural elementary school children living in the province of Saskatchewan, Canada. During the target week, only 53.7% of the rural children were physically active enough to meet the recommended guideline for the physical activity. Although direct comparison is difficult due to differences in methodology, national studies (Statistics

Table 1
Distribution of Respondents Whose Physical Activity During the Target Week Met the CFLRI Guideline for Physical Activity: Saskatchewan, Canada, 2001

	Met CFLRI Guideline			
	Yes		No	
Variable	Number	%	Number	%
Gender				
Boys	25	62.5	15	37.5
Girls	25	46.3	29	53.7
Residence				
Town	15	44.1	19	55.9
Farm	34	57.6	25	42.4
Grade				
4	12	50.0	12	50.0
5	19	61.3	12	38.7
6	20	50.0	20	50.0
Involvement in physical activities in school				
Yes	43	58.9	30	41.1
No	7	33.3	14	66.7
Involvement in physical activities outside school				
Yes	41	60.3*	27	39.7
No	9	34.6	17	65.4
Hours of television watching				
< 1 hour/week	20	55.6	16	44.4
2-3 hours/week	24	57.1	18	42.9
> 4 hours/week	7	41.2	10	58.8
Mother's education level				
High school or less	16	43.2	21	56.8
Some post secondary	33	60.0	22	40.0
Father's education level				
High school or less	29	54.7	24	45.3
Some post secondary	19	54.3	16	45.7
All respondents	**51**	**53.7**	**44**	**46.3**

Note. The CFLRI guideline for physical activity: 60 minutes daily x 7 days a week at a moderate to vigorous intensity level.* Met the CFLRI guideline for physical activity, involvement in physical activity outside of school (Yes versus No) [χ^2_c (1, N = 94) = 4.0, $\underline{p}$ = .05).

Canada, 1998, Health Canada, 1999, CFLRI, 1999) of both rural and urban children found similar results and suggest that Canadian children regardless of where they live, are not active enough to obtain optimal health benefits. There are limited Canadian data that focused specifically on the physical activity of rural children.

Outside of Canada there have been other studies of the physical activity of rural children. Studies in the United States (Harrell et al. 1997; Felton et al. 1998) and Ireland

(Kelly et al. 2005) found that rural children were relatively inactive. Conflicting results have been reported in studies that have compared the physical activity patterns of rural and urban children. While Proctor et al. (1996) observed rural children living in West Africa and Ozidirenc et al. (2005) observed rural children living in Turkey were more physically active than urban children, researchers in Sweden (Sunnegardh et al. 1985), Canada (Pampalon, 1991), Belgium (Guillaume et al. 1997), Greece (Manios et al. 1998) and Iceland (Kristjansdottir & Vilhjalmsson, 2001) found that rural children were less physically active than urban children. Other studies in the United States (McMurray et al. 1999) and Canada (Plotnikoff, Bercovitz, & Loucaides, 2004) found no differences in the activity levels of rural and urban children.

While some studies report conflicting results between the physical activity of rural and urban children, much of the literature reports the high prevalence of physical inactivity of children, irrespective of geographical location. Further research, especially in Canada, is needed to examine the differences in the physical activity patterns of rural and urban children. Determining and addressing such differences would assist health professionals in tailoring health promotion efforts that would be most effective in promoting the physical activity of children in their geographic location.

Three factors that may have the potential to influence the physical activity levels of rural children were identified in the present study. These factors included participation in physical activities at school, participation in physical activities out of school, and parental support. The frequent, regular contact that children have with schools provides a unique opportunity to positively influence the physical activity of children. In this study, similar proportions of boys (78.6%) and girls (74.1%) reported participating in organized physical activities in school. This finding suggests the important role schools have in reducing gender differences in the physical activity levels of school aged children. This role becomes even more important as children become adolescents and gender differences in physical activity (with girls becoming less physically active than boys) become more evident. Interestingly, studies of urban children (Riddoch, Savage, Murphy, Cran, & Boreham, 1991, O'Loughlin, Paradis, Kishchuk, Barnett, & Renaud, 1999) reported a smaller proportion of urban children participating in physical activities in school. Again, while direct comparison is difficult, due to differences in methodology among studies, these findings suggest that there may be differences in the participation rates in school physical activities between rural and urban children. The smaller gender differences in participation rates and the high prevalence of participation in physical activities in school suggest that high proportions of rural children participate in physical activities in school. Schools in rural areas play a unique role in positively influencing the physical activity levels of both girls and boys. This ‘venue’ of physical activity opportunities appears to have addressed the common trend towards lower rates of physical activities among girls and assists in developing lifelong healthy habits among all children

Although physical activity rates seem to be higher in those that participated in programs offered at school, the results indicate that their interest or participation in such activities are not at a level to obtain optimal health benefits as outlined in the national guidelines. One possible explanation for this non-significant finding is the small sample size and low statistical power of the test. Alternatively, the frequency, duration, and intensity of the physical activities in school may have been confounding factors in the

relationship between children's participation in physical activities in school and whether they met the guideline for physical activity. As schools have the potential to positively influence the physical activity patterns of rural school aged children, rural educators and health professionals may develop strategies that improve the children's physical activity to levels that meet the national guidelines.

This study found that children who met the recommended guideline (compared to children who did not) were more likely to be involved in physical activities outside of school. The results further showed that a significantly larger proportion of boys (compared to girls) participated in organized physical activities out of the school environment. These findings suggests that for this sample of Saskatchewan rural children, accessibility to organized physical activities outside of school may be an important determinant of children's physical activity. Factors that may influence accessibility are costs of activities (registration, supplies), required time commitment of parents and children, purpose of activity (competition versus participation for recreational activity), and geographical location. Although the trend of gender differences in the participation in leisure time physical activities has been previously observed, this raises questions about potential differences in the types of physical activities available in rural areas outside the school setting and whether these activities are directed more towards interests of boys than girls. Hence, health promotion efforts need to target not only enhancing accessibility to physical activity opportunities, but include those that meet the needs and interests of both genders outside of the school environment.

The third factor that was explored in the present study was the potential influence that parental support had on the physical activity of rural children. The substantial distances driven by parents every week to enable their children to participate in physical activities observed in the present study provided evidence of the high degree of parental support. Sallis et al. (1992) suggested that parents who provide transportation for their children to participate in physical activities demonstrate strong support and encouragement of physical activity in children. Approximately two-thirds of the respondents in the present study traveled an average of 42.2 kilometers (SD=35.3 kilometers) one way to participate in organized physical activities. Since rural children's participation in physical activities outside of school depends on parental support, community strategies that acknowledge, support, or assist the families in transporting their children to activities are important to positively influence the physical activity of these children.

This exploratory study provided a description of the physical activity patterns of a group of rural children (grade 4 – 6) in Canada and suggests directions for future research. Replication of the study with a larger, representative sample (i.e., a random sample or population based sample that includes children in all age groups) would increase generalizability of this information. In addition, examining seasonal variation in rural children's physical activity, perhaps several times in one year, may provide a more accurate view of the physical activity patterns of children living outside of urban communities. This is particularly relevant given that the types of physical activities available to children vary by season (i.e., baseball in summer and ice hockey in winter) and by the school year (i.e., organized in-school physical activities during the fall and winter and organized out-of-school physical activities during summer holidays).

Approximately 54% of the rural children in the present study were found to be physically active enough for health benefits. As the associations between physical activity and obesity and other cardiovascular risk factors have been well documented, increasing the physical activity of rural children can have a significant impact on the present and future health of this population. Factors such as participation in physical activities in school and out of school, and the influence of parental support appeared to be factors that may influence the physical activity of rural children. Health professionals, families, communities, and schools can all play a role in examining and developing strategies that utilize these factors in assisting rural children to increase their levels of physical activity.

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