

Use of local area facilities for involvement in physical activity in Canada: insights for developing environmental and policy interventions

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SUMMARY

Despite growing literature showing associations of availability and accessibility of facilities to greater levels of physical activity, considerably less is known about the actual extent of use of these facilities. The purpose of this study was to examine the individual (sex, age, education and extent of involvement in vigorous physical activity) and local area characteristics (socioeconomic status, locations and number of physical activity organizations per 1000 residents) associated with the use of local facilities for involvement in physical activity. A telephone survey was conducted with 3191 randomly selected adults in 22 non-contiguous areas across Canada. Use of local facilities for involvement in physical activity was examined among a subset of 1006 physically active adults. Data were analyzed using multilevel modeling. Findings

revealed significant variation across areas in likelihood of use of local facilities among women but not men. Women in the 25–34 and 45–55 age categories were significantly more likely to use local facilities than women of 35–44 years of age. Women reporting greater levels of involvement in vigorous physical activity were more likely to use local area facilities. Higher area affluence and living in areas located in small urban towns were associated with greater use of local facilities among women only. None of the individual and local area characteristics was associated with the outcome among men. Understanding the processes associated with differential use of local area facilities for physical activity is essential for the implementation of effective environmental and policy interventions to increase physical activity in the population.

Key words: use of physical activity facilities; multilevel analyses; small area analysis

INTRODUCTION

The role of environmental and policy interventions to promote physical activity is emerging as a critical component of an overall strategy to increase physical activity levels in the population (Task Force on Community Preventive Services, 2002; Brownson *et al.*, 2006; Sallis *et al.*, 2006). Several studies demonstrate that greater availability and accessibility to exercise facilities and to environments conducive to

physical activity are associated with more frequent and lengthier involvement in physical activity (Brownson *et al.*, 2001; Giles-Corti and Donovan, 2002a,b; Huston *et al.*, 2003; Fisher *et al.*, 2004; Wendel-Vos *et al.*, 2004; Li *et al.*, 2005; van Lenthe *et al.*, 2005). Greater availability to parks and to open green spaces have been associated with greater levels of walking (Giles-Corti and Donovan, 2002a; Fisher *et al.*, 2004; Li *et al.*, 2005), cycling (Wendel-Vos *et al.*, 2004) and overall physical activity (Giles-Corti

and Donovan, 2002b; Huston *et al.*, 2003). One study reported the association of proximity to sport and recreational facilities to sport participation but not to walking or cycling (van Lenthe *et al.*, 2005). These studies draw attention towards accessibility to facilities and to environmental activity-friendliness as viable targets for population-based interventions promoting regular involvement in physical activity (Sallis *et al.*, 1998). In this regard, results of a systematic review of physical activity interventions shows that people are more likely to become physically active if exposed to improved access to places to engage in physical activity (Task Force on Community Preventive Services, 2002), thus suggesting that environmental and policy interventions represent a viable means of promoting increased levels of physical activity.

However, the presence and availability of facilities for physical activity does not necessarily entail that facilities will be used. Despite the growing literature showing associations between availability and accessibility of facilities and greater levels of physical activity, considerably less is known about the actual extent of use of these facilities. One group of researchers examined the use of local area resources for recreational physical activity among Australian adults (Giles-Corti and Donovan, 2002a,b). Results indicated that among those reporting exercising vigorously, 100% reported using at least one location or facility near their home; this proportion was only 40.6% among light to moderate exercisers. Furthermore, the likelihood of using local area resources for recreational physical activity was substantially lower for respondents living in areas characterized by populations with low socioeconomic status (SES). Obtaining information on the use of physical activity facilities and proximity of use to the home is critical since public policies and environmental interventions to increase physical activity are often place-based entities and likely to be more far-reaching if implemented in the locales wherein people are most likely to use them.

Towards this end, the purpose of this study was to examine the individual and local area characteristics associated with the use of local facilities for engaging in physical activity among a sample of physically active adults. Facilities were defined as locations where physical activity programs and services are offered such as gyms,

pools and fitness classes. Facilities for physical activity differ from environments that are conducive to activity. Facilities for physical activity are organizational structures with a method of operation that allows for delivering physical activity programs and services. In contrast environments that are conducive to physical activity refer to locations such as streets and parks where people may engage in leisure physical activity as well as alternative forms of physical activity including travel and occupational activities. These locales are typically devoid of an organizational structure for dispensing programs and services.

METHODS

Design

Data reported in this study are part of a larger project designed to study public health infrastructures, policies and practices for the promotion of physical activity in Canada (Gauvin *et al.*, 2001). Telephone interviews were conducted in the fall of 2000 with 3191 adults living in 22 local areas in three Canadian provinces (Alberta, Ontario and Quebec). Interviewers were trained by members of the research team to appropriately address questions to respondents. Respondents were asked to report on their involvement in physical activity (frequency and duration) and their use of facilities in their local area to engage in physical activity. Participants also provided socio-demographic information. To insure quality control, members of the research team monitored about 25% of interviews. Response rates for the overall sample were about 75% (based on acceptance rates of persons answering the phone) but were lower (61%) when including total number of telephone calls dialed (including calls with completed interviews, refusals, no answers, absent upon follow-up call).

Sample

Sampling of local areas

To obtain a broad representation of Canadian residential local areas, 22 areas located in large urban, small urban, suburban and rural centers, were sampled. Local areas in large urban residential areas were selected in cities with a population of more than 500 000 inhabitants;

local areas were delimited by municipality-identified boroughs. Local areas were selected in suburban cities that were located on the periphery of the large urban areas, and in small urban cities with populations <100 000 inhabitants located more than 100 km from the large urban center. The suburban and small urban local areas were delimited by city limits. Finally, rural local areas were selected in cities with a population <10 000 inhabitants located in agricultural areas and were delimited by the contours of the city and township. Overall, 13 local areas were sampled in large urban centers, and a further three local areas were sampled in each of the suburban, small urban and rural environments. Population size of the local areas ranged between 1 604 in one rural local area to 93 442 in one small urban local area, for an average population of 25 588. Data on the socio-economic profile of the local areas were obtained from the 1996 Canadian census.

Sampling of persons within local areas

In order to insure accurate representation of persons, within each of the 22 local areas, participants were randomly sampled across high, average and low affluence census-defined areas (census tracts), through the application of specialized computer software, which allows linking telephone numbers to census-defined areas. Criteria for inclusion in the sample was age (between 25 and 55 years old), having lived at their current address for at least 12 months and being able to respond to a series of questions in either French or English.

Study population

For the purpose of this study, use of local facilities for involvement in physical activity was examined among a subsample of active adults because physically inactive persons evidently do not use any facilities for involvement in physical activity. Our interest was in identifying differential patterns of local facility use among persons who would necessarily use at least one facility to be physically active. Active individuals were defined as those meeting minimum requirement for involvement in vigorous physical activity and thus those persons who would require access to some type of physical activity facility. Extent of involvement in vigorous physical activity was measured by the question: 'Over the past three months, have you been involved

in one or many of the following activities: cycling, swimming, jogging/running, cross-country skiing, tennis, ice hockey, fitness classes, racquetball, squash?' Response options were 'yes' and 'no'. Individuals who responded 'yes' were asked questions about the duration and the frequency of involvement in these activities. Those reporting involvement in vigorous physical activity between 15 and 30 min three times or more per week and those reporting 30–60 min or over an hour of activity two times or more per week were selected for this study. This measure was adapted from the Canadian Community Health Survey in which questions on participation, duration, and frequency of involvement were asked for each enumerated activity.

Overall, 31.6% of the sampled individuals were considered physically active. Among Canadians aged between 20 and 64 years old, 41% of women and 42% of men were considered physically active in their leisure time (Statistics Canada, 2002; www.statcan.ca). Discrepancies between our sample and the Canadian population may be explained by different thresholds for levels of involvement in physical activity.

Measures

Dependent variable

Use of local area facilities for involvement in physical activity was assessed by asking respondents whether or not they used programs, services or facilities located in their local area to participate in vigorous physical activities (i.e. cycling, swimming, jogging/running, cross-country skiing, tennis, ice hockey, fitness classes, racquetball, squash).

Independent individual characteristics

Given the dearth in knowledge on individual correlates associated with the use of facilities for engaging in physical activity, selected individual variables were measured based on their known association with involvement in physical activity (Sallis and Owen, 1999). Age was recoded in three categories: 25–34, 35–44 and 45–55 years, from which dummy variables were created. Individuals' SES was measured by educational attainment as individual income contained a large proportion of missing data (25.5%). Educational attainment was recorded

into four categories, from which dummy variables were created: those who did not complete high school, those who completed high school and had a few years of college; those who completed college and had a few years of university; and those who held a university degree. Finally, dummy variables were created to distinguish between lower (70–90 min per week), average (135–180 min per week) and higher volume vigorous exercisers (270–360 min per week).

Forty-nine percent of the sample were women (average age = 38.4 years), and 51% were men (average age = 37.6 years). More than 40% held a university degree. Overall, 53.8% of the respondents reported using local facilities for engaging in physical activity.

Independent local area characteristics

Three characteristics of residential environments were measured: SES, location and number of physical activity facilities per 1000 inhabitants. Local area SES was measured by the average household income. Local areas were categorized into three groups: those having an average household income below \$40 000; those between \$40 000 and \$60 000; and those having an average household income above \$60 000. Local areas were situated in four types of communities: in large urban centers, or in either small urban, suburban and rural cities, from which dummy variables were created. As part of the larger research project (Gauvin *et al.*, 2000), a list of organizations offering physical activity programs and services to the adult population in each of the 22 local areas was compiled by searching the phone book and the internet, by word of mouth and by conducting walking-tours of each area. A ratio of number of facilities per 1000 inhabitants was computed and modeled as a continuous variable.

Average household income in the residential areas varied between \$25 241 and \$98 940 (Canadian dollars), with an average of \$52 919. On average, there was one physical activity facility per 1000 residents; however, a majority of local areas ($n = 16$) had less than one physical activity facility per 1000 residents.

Statistical analyses

Given the hierarchical structure of the dataset, i.e. individuals nested within local areas, multi-level analyses were conducted using HLM software (Raudenbush *et al.*, 2001). The model

building followed a step-up approach as suggested by Raudenbush and Bryk (2002). The first model, in which no predictor variables was specified, allowed to explore whether or not there were variations between local areas in likelihood of local facility use (model 1). In the second model, individual correlates were examined. In the third model, the association of local area characteristics on the likelihood of use of local facilities was examined without adjusting for individual-level correlates. Finally, the fourth model adjusted for both individual and local area characteristics. Non-linear Bernoulli analyses for a dichotomous outcome variable were used.

As previous results indicate that individual correlates of physical activity differ across women and men (Bauman *et al.*, 2002; Humpel *et al.*, 2004a,b; Suminski *et al.*, 2005), models without intercepts were specified to allow for the simultaneous estimation of separate equations for women and men (Barnett *et al.*, 1995; Raudenbush and Bryk, 2002). Results are reported in Table 1 for women and in Table 2 for men.

Data are reported for a sample of 1006 active adults nested within 22 local areas. Within area samples varied between 20 respondents in one rural local areas to 74 respondents in one sub-urban area. Average within area sample comprised 46 individuals.

RESULTS

Local area variation in the likelihood of use of local facilities for involvement in physical activity

Results for local area variation are reported in Figure 1 and in model 1 (Tables 1 and 2). Findings showed significant between-area variation in the likelihood of use of local facilities among women [$\chi^2(21) = 47.3$; $P < 0.001$] but not among men [$\chi^2(21) = 26.7$; $P = 0.18$]. Among women the average probability of using local facilities for physical activity was 55.8%. Computation of the 95% plausible value range (Raudenbush and Bryk, 2002) indicated that this probability varied between 32.5 and 76.9% across areas. Among men, the average probability of using local facilities was 51.1%; this probability did not differ significantly across areas. For this reason, the random effect of men was set as fixed (i.e. zero) across residential areas.

Table 1: Individual and local area characteristics associated with the likelihood of use of local facilities for physical activity among women

	Model 1		Model 2		Model 3		Model 4	
	OR	95% CI	OR	95% CI	OR	95% CI	OR	95% CI
Individual characteristics								
Intercept	1.26	0.94–1.68	0.64	0.37–1.11	1.03	0.62–1.71	0.48	0.24–0.93*
Age								
25–34			1.58	1.01–2.47*			1.67	1.06–2.64*
35–45			1.00				1.00	
45–55			1.69	1.05–2.78*			1.78	1.10–2.87*
Educational attainment								
University completed			1.00				1.00	
College completed some university			0.97	0.62–1.54			0.99	0.62–1.58
High school completed, some college			0.77	0.47–1.27			0.78	0.47–1.30
Less than high school			0.33	0.08–1.38			0.41	0.10–1.73
Level of involvement in vigorous physical activity								
Light			1.00				1.00	
Moderate			1.97	1.28–3.04**			1.96	1.26–3.04**
High			1.87	1.13–3.08*			1.95	1.18–3.24**
Local area characteristics								
Location of area								
Urban					1.00		1.00	
Small					2.62	1.12–6.16*	2.68	1.15–6.23*
Suburban					0.90	0.45–1.80	0.92	0.46–1.81
Rural					0.86	0.30–2.48	0.95	0.32–2.80
Average household income								
Less than \$40 000					0.82	0.35–1.97	0.81	0.35–1.91
Between \$40 000 and \$60 000					1.00		1.00	
Above \$60 000					1.93	1.01–3.66*	2.05	1.10–3.83*
Facilities per 1000 residents					0.88	0.73–1.08	0.88	0.73–1.07
Variance component								
Variance	0.22		0.23		0.09		0.06	
P-value	0.001		0.002		0.087		0.145	

* $p < 0.05$.** $p < 0.01$.

Individual characteristics associated with the likelihood of use of local facilities for physical activity

Among men, none of the selected individual characteristics was significantly associated with the likelihood of using local facilities for physical activity.

Compared with middle aged women, younger (25–34 years) and older women (45–55 years) were more likely to use local facilities for physical activity (younger women: OR = 1.58; 95% CI: 1.01, 2.47; older women: OR = 1.69; 95% CI: 1.05, 2.78) (Model 2, Table 1). Yet, the difference in facility use between younger and older women was not statistically significant [$\chi^2(1) = 0.06$; $P > 0.50$; results not shown]. Women reporting average and higher involvement in vigorous physical activity were more likely to use facilities to engage in physical

activity than lower exercisers [the difference in facility use between average and high exercisers was not statistically significant; $\chi^2(1) = 0.05$; $P > 0.50$; results not shown]. Educational attainment was not significantly associated with likelihood of facility use; nonetheless it was kept in the final model for control purposes. After introducing individual characteristics, there remained significant random between-areas variation in women's likelihood of use of local facilities for physical activity.

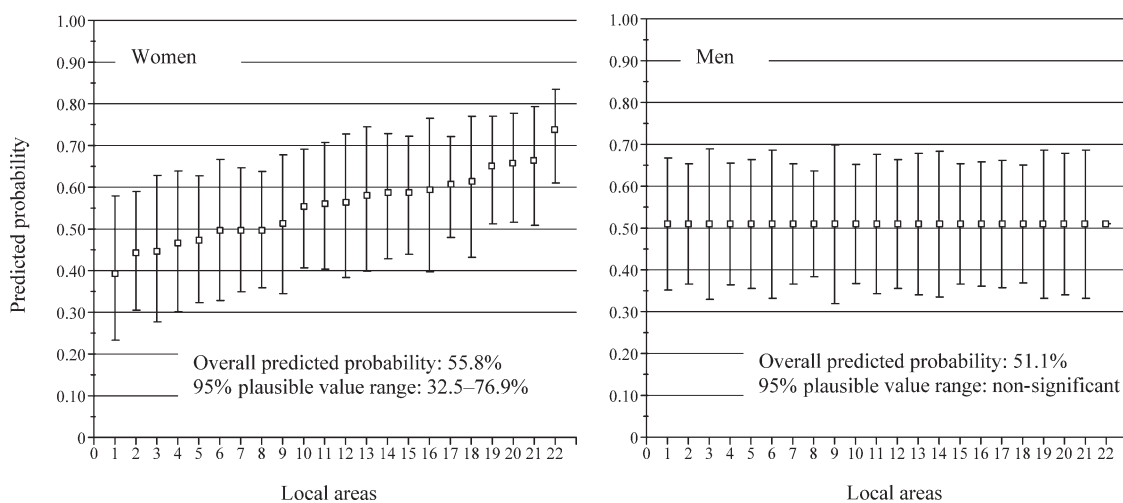
Local area characteristics associated with the likelihood of use of local facilities for involvement in physical activity

Effects of local area SES, location and the number of physical activity organizations per 1000 residents were modeled simultaneously, in

Table 2: Individual and local area characteristics associated with the likelihood of use of local facilities for physical activity among men

	Model 1		Model 2		Model 3		Model 4	
	OR	95% CI	OR	95% CI	OR	95% CI	OR	95% CI
Individual characteristics								
Intercept	1.02	0.83–1.27	0.99	0.57–1.71	0.78	0.53–1.13	0.74	0.39–1.41
Age								
25–34			0.99	0.65–1.51			1.01	0.66–1.55
35–45			1.00				1.00	
45–55			0.74	0.46–1.18			0.75	0.47–1.20
Educational attainment								
University completed			1.00				1.00	
College completed some university			0.95	0.62–1.45			0.93	0.60–1.45
High school completed, some college			0.78	0.50–1.21			0.73	0.47–1.16
Less than high school			0.82	0.33–2.02			0.77	0.31–1.94
Level of involvement in vigorous physical activity								
Light			1.00				1.00	
Moderate			1.22	0.77–1.95			1.19	0.75–1.90
High			1.58	0.95–2.62 [†]			1.56	0.93–2.61 [†]
Local area characteristics								
Location of area								
Urban					1.00		1.00	
Small					1.58	0.89–2.81	1.61	0.89–2.90
Suburban					1.56	0.94–2.60	1.59	0.94–2.69
Rural					1.05	0.48–2.31	1.08	0.49–2.40
Socioeconomic status								
Less than \$40 000					1.39	0.76–2.56	1.35	0.71–2.55
Between \$40 000 and \$60 000					1.00		1.00	
Above \$60 000					1.23	0.76–2.00	1.27	0.79–2.05
Facilities per 1000 residents					1.03	0.88–1.21	1.03	0.87–1.21
Variance component								
Variance		0.06						
P-value		0.181						

[†] $p < 0.10$.

**Fig. 1:** Local area variation in the predicted probability of using local facilities for physical activity among women and men.

models unadjusted (model 3) and adjusted for individuals' variables (model 4).

In unadjusted models, significant associations between local area characteristics and likelihood of using local facilities for physical activity were observed among women only. Women living in local areas located in small urban areas were significantly more likely to use facilities in their local area for involvement in physical activity than women residing elsewhere (OR = 2.62; 95% CI: 1.12, 6.16). In more affluent local areas, women were significantly more likely to use local facilities (OR = 1.93; 95% CI: 1.01, 3.66). The number of physical activity organizations per 1000 residents was not significantly associated with the outcome. These effects remained statistically significant in models adjusting for individuals' characteristics (model 4, Table 1).

After introducing local area characteristics, both in models unadjusted and adjusted for individuals' characteristics, the between area variation in women's likelihood of use of local facilities for physical activity was no longer statistically significant [unadjusted model: $\chi^2(15) = 23.16$; $P = 0.08$; adjusted model: $\chi^2(15) = 20.76$; $P = 0.15$].

DISCUSSION

Although availability of resources for physical activity has been associated with greater levels of physical activity, availability of such resources is not an indicator of their use. For this reason, the aim of this study was to examine the association between individual and area characteristics with the use of local facilities for involvement in physical activity among active adults.

Results showed that although women and men overall appeared to use facilities for physical activity in the same proportion, the predicted probability of using local facilities for physical activity varied significantly across areas, but only among women. These data suggest that the determinants of access to facilities may be different for men and women.

Furthermore, among women, individual-level characteristics did not account for the between-area variation which was explained by selected local area characteristics. Living in more affluent areas and in areas located in small urban centers was associated with a higher

likelihood of using local facility for engaging in physical activity. These associations remained statistically significant after accounting for the effect of individual characteristics.

Results of the study also indicate gender differences in the correlates of use of facilities: among men, none of the individual and local area characteristics were significantly associated with the outcome. Previous research supports the existence of gender differences in the correlates of physical activity (Bauman *et al.*, 2002; Humpel *et al.*, 2004a,b; Suminski *et al.*, 2005). Other studies showed gender and socio-economic differences in the perception of accessibility to places to exercise (Browning *et al.*, 2001; Giles-Corti and Donovan, 2002a). With respect to using local facilities for physical activity, objectively assessing area characteristics and characteristics of facilities for physical activity may contribute to better explaining the observed gender discrepancies.

Individual SES might be an important characteristic associated with facility use since some of them may have a pay-for-use access. Although no associations were observed between the individual measure of SES (educational attainment) and local facility use, there appears to be a gradient in facility use, with those with lower educational attainment being less likely to use local facilities for physical activity than those with higher education. Associations between the likelihood of use of local facilities for physical activity and other measures of individual SES might have yielded different results.

Interestingly, no association was observed between the number of physical activity facilities and the likelihood of use of local facilities for physical activity. Although recent findings support the association between availability and accessibility of resources and involvement in physical activity, these findings are nonetheless inconsistent as associations appear to vary depending on the type of facilities and physical activity levels measured (Wendel-Vos *et al.*, 2004; van Lenthe *et al.*, 2005).

Results support those of Giles-Corti and Donovan (Giles-Corti and Donovan 2002a,b) who observed significant associations between-area SES and using facilities for physical activity. However, whereas these authors observed a lower likelihood of using facilities for physical activity in less-affluent areas, in the current study, the opposite was observed, i.e. a greater use of local facilities was more likely in

more affluent local areas, though only among women.

Limitations

The current findings should be interpreted in light of certain limitations. First, the small number of local areas limits the accuracy of parameter estimates. Since there was random between-area variation in the likelihood of facility use among women, a larger sample of local areas would have yielded more accurate estimates (Raudenbush and Bryk, 2002). In future investigations, the intricacies of clustered designs should be examined more explicitly to determine the optimal number of areas and persons within areas to sample (Raudenbush, 1997).

In this study, we asked respondents whether or not they had used facilities for physical activity located in their neighborhood. As such, we relied on residents' perceptions of their neighborhood boundaries which may or may not correspond to the boundaries of the local areas defined for the purpose of this study. Future studies should strive to define neighborhood boundaries and explore the extent to which different contours do or do not correspond to residents' perceptions (Coulton *et al.*, 2001; Galster, 2001; Gauvin *et al.*, in press). In addition, systematically and objectively assessing local area characteristics and characteristics of the local physical activity delivery system may contribute to better understanding the correlates of greater facility use for physical activity among both women and men.

The cross-sectional nature of the data limits the ability to establish whether or not local area characteristics are the catalyst for greater involvement in physical activity and whether or not persons who are involved in greater amounts of physical activity choose to live in an environment that has more physical activity resources. In other words, little can be said about the directionality of the associations observed. Despite this limitation, the current findings represent a first step in ascertaining the individual and ecological correlates of use of local facilities for physical activity.

Further research is needed to disentangle the correlates of the use of facilities for physical activity among both women and men, among individuals of differential SES and across different residential environments.

CONCLUSION

Findings reported herein are novel in that the design of the study allowed for the joint examination of individual and local area characteristics associated with the likelihood of use of local facilities for physical activity. What seems to emerge from the results is that individual and ecological correlates of local facility use differ across women and men. Furthermore, selected local area characteristics explained the between area variations in outcome which suggests that characteristics of the built and social environment might be crucial in investigating local facility use for physical activity over and above individual characteristics.

Results reported in this paper indicate that both individual and local area characteristics are associated with the likelihood of using local facilities to engage in physical activity, but that the correlates differ across women and men. This suggests that policies and environmental interventions to promote physical activity might be more effective if a gender-specific approach is adopted. Also, using facilities for physical activity appears to be influenced by local area characteristics, independent of the characteristics of local population. This implies that environmental and policy interventions aimed at creating opportunities for engaging in physical activity, in conjunction with individual-oriented interventions, holds promise in increasing activity levels of population.

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