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Perceived environmental correlates and physical activity: what neighbourhood aspects really matter for mothers and fathers of young children?

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Abstract

Limited research has been conducted with at-risk populations in examining perceived environmental correlates of physical activity (PA); thus, we examined this relationship among parents with young children, a group at risk for physical inactivity. Parents (252 mothers, 206 fathers) completed a questionnaire assessing measures of perceived neighbourhood environment and a 1-week follow-up of PA behaviour. Mothers were more likely than fathers to perceive their neighbourhood as unsafe to go for walks at night and less likely to perceive transit stops within 10-15 minutes walking distance, sidewalks on most streets, and facilities to bicycle. Adjusting for demographics, shops within easy walking distance, sidewalks on most streets, and having no more than one motor vehicle were associated with being active for both sexes. Access to transit stops and free/low cost recreational facilities were also associated with mothers' PA. These findings suggest that environmental factors may support parents being active at recommended levels.

Keywords: parenthood, mothers, fathers, physical activity, perceived neighbourhood environments

Introduction

Participation in regular health enhancing physical activity (HEPA), which is often interpreted as 150 minutes/week of at least moderate-intensity PA (Haskell et al., 2007; United States Department of Health and Human Services, 2008), is a key component to a healthy lifestyle (United States Department of Health and Human Services, 1996; Warburton, Nicol, & Bredin, 2006). However, lack of physical activity (PA) at recommended levels to gain health benefits is a major concern both nationally (Australian Bureau of Statistics, 2006) and internationally (World Health Organization, 2003). Of greater concern is that specific groups within broader populations are more at risk for inactivity, including parents with young children (Bellow-Riecken & Rhodes, 2008). Although there is a growing body of research surrounding parental PA, specifically examinations of intrapersonal (e.g., attitudes, self-efficacy) and interpersonal (e.g., social support, social norms) variables on parents' regular PA (Brown, Brown, Miller, & Hansen, 2001; Hamilton & White, in press; McIntyre & Rhodes, 2009), little is known about the influence of external variables, such as perceived neighbourhood environmental factors, on parents' PA behaviour.

While the examination of intrapersonal and interpersonal influences have been well established factors in explaining people's PA behaviour in general, research has highlighted also the importance of physical environmental influences on an individual's PA participation (Sallis et al., 2009; Sallis & Owen, 2002), including mothers' PA (Cleland, Timperio, & Crawford, 2008). Early research examining PA determinates indicated that certain aspects of the environment correlated significantly with PA, including access to facilities and seasonal variation (Dannenberg, Keller, Wilson, & Castelli, 1989; Dishman, Sallis, & Orenstein, 1985). Since these early findings, researchers have continued to propose a wide range of environmental influences on PA levels with emerging empirical support (Bamana, Tessier, & Vuillemin, 2008; Bauman, Sallis, Dzewaltowski, & Owen, 2002; Humpel, Qwen, & Leslie,

2002; Owen, Humpel, Leslie, Bauman, & Sallis, 2004; Sallis et al., 2009; Sallis, King, Sirard, & Albright, 2007; Trost, Owen, Bauman, Sallis, & Brown, 2002).

Environmental influences at both the individual and community level have been found to correlate with PA performance. At the individual level, opportunities for activity (e.g., exercise equipment at home, awareness of facilities, satisfaction with recreation facilities) and accessibility of facilities (e.g., access to parks, presence of facilities, facilities on frequently travelled route, cycle path, urban location) are found to positively influence PA levels (Bamana et al., 2008; Humpel et al., 2002; Owen et al., 2004; Trost et al., 2002). At the community level, safety (e.g., unattended dogs, safe footpaths, crime rates), aesthetics (e.g., hilly terrain, enjoyable scenery, friendly neighbourhood), and modelling (e.g., frequent observation of others being active) have been identified as correlates of PA (Humpel et al., 2002; Owen et al., 2004; Trost et al., 2002). Other environmental influences, such as weather (e.g., wind and rain) and season (e.g., winter), are also found to influence people's PA performance (Bauman et al., 2002; Tucker & Gilliland, 2007). However, the association between environmental variables and PA is only weak or, at best, modest.

More recent studies have begun to explore the relationships with the physical environment and PA in different activity domains, population groups, and combinations of environmental characteristics. In particular, it has been found that individuals more often achieve national PA recommendations when they perceive their neighbourhood environment to be aesthetically pleasant in combination with being satisfied with the facilities in the community (King et al., 2006). Furthermore, unattended dogs and seeing others while walking is associated with activity levels across multiple PA domains (i.e., minutes in moderate-to-vigorous PA, hours walking for errands, and hours walking for leisure), but distance to local stores is associated with walking for leisure and errands only (King et al., 2006). Longitudinal research has also shown that environmental influences affect older adults

more than younger adults, and females were more affected by safety issues and males more by modelling behaviour and opportunities to be active (Sallis et al., 2007). Thus, it has been suggested that relationships between the physical environment and PA may differ depending on the population group and PA behaviour being targeted. Accordingly, further investigation within defined population groups, in particular at-risk groups, and specified PA behaviours are warranted (King et al., 2006).

It should be noted that not all the evidence supports a relationship between physical environments and PA. Sallis, Johnson, Calfas, Caparosa, and Nichols (1997) used 43 self-report items to assess environmental variables in two behaviour settings: at homes and in neighbourhoods or frequently travelled routes. After adjusting for socio-economic status, home equipment was the only environmental factor associated with PA, specifically strength exercise. None of the variables explained any variance in walking and none of the environmental variables explained large amounts of variance in PA (Sallis et al., 1997). Among other explanations, the use of a self-report measure was given as a potential reason as to why a more striking effect was not observed and the authors called for further research using both perceived and objective environmental measures.

In examining perceived versus actual environmental measures on PA, Kirkland et al. (2003) found only small-to-moderate agreement between the perceptions of neighbourhood and community variables via self-reported methods and the objectively measured variables. Ball et al. (2008) found a similar mismatch between perceived and objective measures of access to PA facilities within one's local environment. However, perceived measures of the physical environment may be as important as the real environment in predicting PA where neighbourhood aesthetics, accessibility of facilities, and opportunities for activity are shown to be associated with PA levels in both perceived and objective measures (Hoehner et al., 2005; Humpel et al., 2002). Furthermore, perceptions of the environment may influence an

individual's behaviour more than the actual environment itself (see Stokols, 1992; Wachs, 1999).

In relation to parental PA, recent longitudinal research examining perceived environmental barriers to the activity levels of mothers, in particular, has shown that access to public transport, satisfaction with local facilities, and trusting local people are associated with greater increases in leisure walking over time (Cleland et al., 2008). It is important to understand the influence of perceived physical environments on parental PA as neighbourhood characteristics, such as safety, access, and opportunities, may be particularly influential when one has children. Given the protective nature of parents toward their children, the need to have safe neighbourhoods to walk in may be a strong influence, as may the need to have access to close facilities due to the time constraints often encountered with having children and sidewalks for pram use. Currently, there is a lack of investigation of environmental influences on parental PA and, in the literature that has investigated this aspect of research, there has tended to be a focus on mothers' PA (Cleland et al., 2008). Given that relationships between the physical environment and PA may differ depending on the population group and PA behaviour being targeted, this study aimed to examine the perceived neighbourhood environmental correlates of HEPA among mothers and fathers of young children, a group not well researched but at risk for inactivity.

Method

Participants and Procedure

Prior to conducting the research, ethical clearance by the University Human Research Ethics Committee was granted. Parents were recruited via various family and parenting networks including mothers' and fathers' groups, baby/toddler swim schools, and child play centres as well as through the local Playgroup Association, prominent day care associations, online parenting forums in Australia, and the University Alumni association. Participants

were one parent from each of 458 families ($n = 252$ mothers, $n = 206$ fathers) and included in the study if they were aged 18 years and over and the parent of at least one child younger than 5 years of age. Individuals who were pregnant and/or had a medical condition that prevents performing PA at recommended levels (see Australian Government Department of Health and Ageing, 2005; Haskell et al., 2007) were excluded from participation. The majority (96%) of the parents were in a partnered relationship (see Table 1 for the demographic characteristics of the sample and the descriptive profile of parents' PA behaviour).

Parents completed a questionnaire, either on-line or paper-based, assessing measures of perceived neighbourhood environment and then 1 week later, via telephone follow-up, self-reported their PA behaviour in the previous week. A prize draw of a chance to win one of five AUD\$150 sporting store gift vouchers was offered as an incentive for participation.

Measures

Perceived environment. The first 11 questions from the International Physical Activity Questionnaire-Environmental Module (IPAQ-E) were used to measure the perceived neighborhood characteristics associated with PA (International Physical Activity Prevalence Study, 2002). The IPAQ-E consists of 17 items (the first 11 of which are considered core and recommended items with the remaining 6 questions considered as optional items for use) reflecting current thinking in environmental attributes that affect PA behaviour. The measure has shown good reliability (Sallis et al., 2009). Specifically, parents were asked to think about the different facilities in and around their neighbourhood that they could walk to in 10-15 minutes (see Table 2). Responses were scored on a 4-point Likert scale (*strongly agree* [4], *somewhat agree* [3], *somewhat disagree* [2], *strongly disagree* [1]), with the exception of the questions measuring the main type of housing in the neighbourhood and number of motor vehicles in working order at the household. For main types of housing, five options were

given (*detached single-family housing* [1], *townhouses, row houses, apartments, or condos of 2-3 stories* [2]; *mix of single-family residences and townhouses, row houses, apartments or condos* [3]; *apartments or condos 4-12 stories* [4]; *apartments or condos of more than 12 stories* [5]). For number of motor vehicles, participants were asked the open-ended question: *How many motor vehicles in working order (e.g., cars, trucks, motorcycles) are there at your household?* For the analyses, and similar to other studies in this area (García Bengoechea, Spence, & McGannon, 2005; Sallis et al., 2009), the environmental variables were collapsed into binary items. Residential density was divided into ‘*detached*’ (score of 1) and ‘*other*’ (scores of 2-5) and number of motor vehicles was classified into ‘*1*’ and ‘*>1*’. The remaining environmental items were categorised as ‘*disagree*’ (scores of 1 or 2) or ‘*agree*’ (scores of 3 or 4).

Physical activity. A 7-day PA recall instrument measured parents’ moderate and vigorous PA behaviour. Given changes in people’s PA as a consequence of parenthood (see Hamilton & White, 2010), the 7-day PA recall in this study incorporated aspects from the International Physical Activity Questionnaire (IPAQ, Craig et al., 2003) and the Australian Women’s Activity Survey (AWAS; Fjeldsoe, Marshall, & Miller, 2009). Both the IPAQ and AWAS have acceptable measurement properties comparable to that of other established PA self-reports (see Craig et al., 2003; Fjeldsoe et al., 2009). The measure assessed minutes spent in moderate and vigorous PA relating to the domains of employment, childcare, household, transport, and planned activities over the previous week (e.g., “Over the past week, did you do any employment related activities of vigorous effort”, “During the last 7 days, on how many days did you do vigorous physical activities as part of your employment work”, “How much time did you usually spend on one of those days doing vigorous physical activities as part of your employment work”). Only values of 10 or more minutes of activity were included in the calculation of scores. It is suggested that more comprehensive measurements

of PA often result in the majority of populations meeting the recommendations and, therefore, are not necessarily health enhancing (Craig et al., 2003). Thus, in this study we were interested in those activities that are considered health enhancing. Parents' total weekly HEPA was calculated by summing data in the domains of transport and planned activities, activity domains that are widely accepted as sufficient to confer health benefits (Haskell et al., 2007) and consistent with recommendations for treating data collected using the IPAQ and AWAS. The total HEPA score was dichotomised into parents being active (cuff off at 150 minutes or more per week according to current PA recommendations; Haskell et al., 2007) and inactive (cut off at below 150 minutes).

Socio-demographic variables. Socio-demographic variables included age and number of children (coded as a continuous variables), education (coded as no university or university), ethnic background (codes as not Australian or Australian), and work status (coded as not full time or full time).

Statistical Analyses

Data analyses were conducted with the statistical Package for the Social Sciences (SPSS), version 17.0 and the level of significance was set at $p < 0.05$. Descriptive statistics were calculated for HEPA and socio-demographic variables, and differences between mothers and fathers were tested with chi-square analysis for categorical variables and t tests for continuous variables. Differences in responses on the environmental characteristics between the sexes were tested with chi-square analysis. Logistic regression analyses, with HEPA as the dependent variable, were used to calculate unadjusted and adjusted (HEPA regressed on the socio-demographic variables) odd ratios (OR) and the 95% confidence intervals (CI) for each environmental variable. Conducting separate analyses for mothers and fathers allowed for the examination of unique patterns of associations between the perceived neighbourhood environmental variables and HEPA.

Results

Based on the cut-off value at 150 minutes or more per week, 39.4% of mothers and 29.1% of fathers were considered physically active (i.e., meeting current PA recommendations; Haskell, 2007). As shown in Table 1, fathers were slightly older ($t = -6.17$, $p < 0.001$) and engaged in significantly more full-time employment ($\chi^2 = 67.46$, $p < 0.001$) than mothers. As seen in Table 2, mothers were more likely than fathers to perceive their neighbourhood as unsafe to go for walks at night ($\chi^2 = 19.15$, $p < 0.001$) and less likely to perceive transit stops within 10-15 minutes walking distance ($\chi^2 = 7.31$, $p < 0.01$), sidewalks on most streets ($\chi^2 = 16.12$, $p < 0.001$), and facilities to bicycle ($\chi^2 = 4.47$, $p < 0.05$).

In examining the perceived environmental correlates of mothers' and fathers' HEPA, the results revealed some similarities and differences between the sexes for the perceived neighbourhood characteristics. As shown in Table 3, both mothers and fathers who perceived many shops within easy walking distance (OR = 2.49, OR = 1.87, respectively) and sidewalks on most streets in their neighbourhood (OR = 2.30, OR = 3.01, respectively), were more likely to be physically active than those who did not, and these associations remained significant even after adjusting for the socio-demographic variables. In addition, those mothers and fathers that had no more than one motor vehicle in working order at their household were also more likely to be active (OR = 2.64, OR = 2.68, respectively). Among mothers, perceptions of transit stops within 10-15 minutes walking distance (OR = 2.02) and availability of free/low cost recreational facilities (OR = 2.05) were also linked with being physically active, and these associations remained significant after adjusting for the socio-demographic variables. Residential density, facilities to bicycle, crime safety at night, traffic safety, seeing people being active, and aesthetics were not significantly associated with either mothers' or fathers' HEPA.

Discussion

The purpose of this study was to examine perceptions of the physical environment and environmental correlates with HEPA in mothers and fathers of young children, a group at risk of physical inactivity. Our findings add to the growing body of literature that suggests an important link between the physical environment and people's behaviour and that the role of gender in examining the environment-behaviour relationship should be considered. In particular, we found that a significant number of mothers (60.6%) and fathers (70.9%) are not engaging in sufficient HEPA and that specific neighbourhood characteristics may help to support parents being active at recommended levels. In addition, we found that the association between PA and environmental variables are similar yet slightly different between mothers and fathers.

For both mothers and fathers, perceiving many shops within easy walking distance from their home and having no more than one motor vehicle in working order at their household was positively associated with being active (i.e., meeting current PA recommendations of at least 150 minutes/week of at least moderate-intensity PA; Haskell, 2007). In addition, although mothers, compared to fathers, had lower perceptions of sidewalks on most streets in their neighbourhood, for both parents, perceiving that there were sidewalks on most streets was also positively associated with being active. Although these findings are consistent with some literature in general adult populations (Sallis et al., 2009), these findings are somewhat inconsistent with other research which has found the environmental characteristic of shops within easy walking distance to be associated with males' and not females' increased PA participation and the neighbourhood aspect of sidewalks on most streets to be associated with neither of the sexes PA (García Bengoechea et al., 2005; Liao et al., 2011). Given the many pressures of parenthood and that time constraints are identified as an inhibitor to parents' PA (Hamilton & White 2011), having easy access within walking distance to places where parents can buy things seems reasonable

in supporting parents' HEPA behaviour, as does having access to sidewalks where parents can push a pram. To increase parents' PA, if appropriate, intervention programs should target improving an awareness of shops that are within easy walking distance and highlight those parts of the local environment that have walking paths. In addition, it may be beneficial for urban developers and government policy makers to consider these aspects when designing neighbourhoods targeting young families.

Some interesting differences between the sexes in relation to environmental characteristics and PA behaviour also emerged. Somewhat consistent with previous research examining gender differences in environmental correlates of PA (García Bengoechea, et al., 2005), mothers were more concerned than fathers about the safety of walking at night and had lower perceptions of facilities to bicycle in or near their neighbourhood. Perceptions of crime safety at night and access to facilities to bicycle, however, were not significantly associated with levels of HEPA, findings which concur somewhat with previous cross international research (Sallis et al., 2009) and research examining the correlates of men's and women's PA in particular (García Bengoechea et al., 2005). In addition, mothers had lower perceptions than fathers about access to a transit stop within 10-15 minutes walking distance from their home. However, and consistent with previous research examining mothers' PA and perceptions of the environment (Cleland et al., 2008), access to public transport within walking distance was associated with mothers' HEPA. Conversely, access to public transport within walking distance was not associated with fathers' HEPA. This finding is inconsistent with previous research within general adult populations (Sallis et al., 2009) but consistent with research which examined, specifically, environmental correlates of PA for men (García Bengoechea et al., 2005). It may be that, mothers, although not as aware as fathers of access to transit stops which can be reached by physically active means, seek out those more practical features of the environment to help get them and their child to places of interest.

Similarly, perceiving that one's neighbourhood has several free and low cost recreational facilities was associated with mothers', but not fathers', HEPA. This finding is consistent with previous research where access to recreational facilities was associated with higher levels of PA in women but not men (García Bengoechea et al., 2005). García Bengoechea et al.'s explanation for this finding was that women, who generally have an average annual income lower than men, may perceive access to places where they may engage in PA at a low or free cost as an incentive to renew or initiate PA endeavours. It may also be that mothers, who are generally the primary caregiver of the child, may seek out recreational places such as parks where they can enjoy being active with their child. To promote mothers' PA, intervention programs should be designed not only to increase awareness of neighbourhood public transport stops that are within walking distance but to also raise recognition of recreational facilities within the local environment that support low or no cost PA, such as parks with exercise equipment.

Of further interest was that residential density, facilities to bicycle, crime safety at night, traffic safety, seeing people being active, and aesthetics were not significantly associated with either mothers' or fathers' HEPA. These findings are somewhat consistent with previous research where residential density and crime safety have not been found to be associated with people's PA (García Bengoechea et al., 2005; Liao et al., 2011; Sallis et al., 2009). However, traffic safety, seeing people being active, and aesthetics have been shown to be associated with PA (King et al., 2006; Owen et al., 2004), although the findings in the literature about these environmental aspects on people's PA are equivocal. The inconsistency in findings may be explained via the suggestion that relationships between the physical environment and PA may differ depending on the population group and PA behaviour being targeted. For example, García Bengoechea et al. (2005) found that aesthetics was important for males' PA whereas seeing people being active was important for females' PA, and

Cleland et al (2008) found that traffic speed was predictive of mothers' walking for transport behaviour rather than their walking for leisure behaviour. In this study we combined transport and planned activities to represent parents' HEPA. This amalgamation of domains of PA behaviour (i.e., planned and transport) to represent a specific facet of PA-related behaviour (i.e., HEPA) may explain why some of the environmental variables were not found to be associated with parents' PA. Alternatively, our findings may support the suggestion that perceived environments do indeed have a differential effect on behaviour according to the population being targeted. Overall, the environment-PA behaviour relationship is complex requiring continued investigations.

While the research has a number of strengths including the examination of environmental correlates in an at-risk group for physical inactivity and having a sample that was representative of both sexes, the current study also has a number of limitations. First, although we used a prospective design in that PA behaviour was measured at a 1 week follow-up, the study was correlational in nature and, therefore, causal inferences cannot be made. Second, we used self-report measures of both PA and perceptions of the physical environment which might facilitate socially desirable responses. However, self-reports of PA have been shown to be a valid and reliable way of measuring people's PA behaviour (Sallis & Saelens, 2000) and perceptions of the environment may influence an individual's behaviour more than the actual environment itself (see Stokols, 1992; Wachs, 1999). Third, the sample was predominately in coupled relationships; thus, the findings may not generalise to other family groups, such as single parent households. It is important that future research continue to examine environmental correlations across different family structures, especially given that the environment-behaviour relationship may differ depending on the population group being targeted (King et al., 2006). Finally, this study provides the basis for environmental factors to be directed at in resultant intervention work and future research

should test the efficacy of interventions targeting these identified neighbourhood characteristics in improving people's PA over time, especially during life changing transitions such as parenthood which may contribute to a lack of PA behaviour.

Conclusion

There is an emerging body of evidence that supports environments as playing an important role in influencing people's PA behaviour. To date, however, few studies have explored environmental factors that influence at risk groups, in particular, parents with young children who are suggested to be one of those groups at risk for low levels of PA (Bellows-Riecken & Rhodes, 2008). Perceptions of the local physical environment were demonstrated to have associations with parents' prospective HEPA, with observed sex differences also emerging from the data. Specifically, perceiving many shops within easy walking distance from their home, perceiving sidewalks on most streets, and having no more than one motor vehicle at the household was positively associated with parents' HEPA. In addition, for mothers but not fathers, perceiving access to a transit stop within 10-15 minutes walking distance and access to several free and low cost recreational facilities was positively associated with HEPA. The findings from this study add to the body of evidence suggesting that environmental factors may support parents being active at recommended levels. Further, the findings add to the literature suggesting that relationships between the physical environment and PA may differ depending on the population group and PA behaviour being targeted. Overall, the environment-behaviour relationship should continue to be examined as understanding those aspects of the neighbourhood which are important to people's behaviour can ultimately guide future interventions and urban developments that aim for promoting physically active lifestyles among all groups of people.

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Table 1

Demographic Characteristics and Descriptive Profile of Parents' Physical Activity-related Behaviours

	Mothers (<i>n</i> = 252)	Fathers (<i>n</i> = 206)	<i>z</i>
PA-related behaviour			
7-day PA recall measure (mins/wk)			
Health enhancing physical activity ^a			-0.27
Median	115	90	
% active	39.4%	29.1%	
Demographic characteristics			<i>t</i> or χ^2
Age			-6.17***
Mean	34.20	37.22	
SD	5.11	5.31	
Children			-1.19
Mean	2.06	2.17	
SD	0.92	0.97	
Education , (% in each category)			0.10
No university degree	46.0	47.3	
University degree	54.0	52.7	
Ethnic background , (% in each category)			2.03
Not Australian	21.9	27.7	
Australian	78.1	72.3	
Work , (% in each category)			312.00***
Not full-time	93.2	10.7	
Full-time	6.8	89.3	

Note. ^aTotal time in minutes across the transport and planned activity domains self-reported on the 7-day recall measure.

****p* < 0.001.

Table 2

Gender Differences in Perceptions of the Physical Environment

Environmental characteristic	Mothers		Fathers		χ^2	(df, n)
	<i>n</i>	%	<i>n</i>	%		
Residential density					0.46	1,457
detached	206	82.1	174	84.5		
others	45	17.9	32	15.5		
Access to shops					2.41	1,457
disagree	109	43.3	74	36.1		
agree	147	56.7	131	63.9		
Access to transit stops					7.31**	1,457
disagree	52	20.6	23	11.2		
agree	200	79.4	182	88.8		
Presence of sidewalks					16.12***	1,456
disagree	92	36.7	40	19.5		
agree	159	63.6	165	80.5		
Facilities to bicycle					4.47*	1,456
disagree	98	38.9	60	29.4		
agree	154	61.1	144	70.6		
Access to recreational facilities					3.52	1,457
disagree	59	23.4	34	16.6		
agree	193	76.6	171	83.4		
Crime safety at night					19.50***	1,456
disagree	173	68.7	176	86.3		
Agree	79	31.3	28	13.7		
Traffic safety					1.67	1,456
disagree	196	78.1	170	82.9		
agree	55	21.9	35	17.1		
Seeing people being active					1.25	1,456
disagree	56	22.3	55	26.8		
agree	195	77.7	150	73.2		
Aesthetics					1.52	1,455
disagree	86	34.4	82	40.0		
agree	164	65.6	123	60		
Household motor vehicles					1.71	1,448
one	60	23.9	37	18.8		
more than one	191	76.1	160	81.2		

* $p < 0.05$. ** $p = 0.01$. *** $p < 0.001$.

Table 3

Perceived Environmental Correlates of Being Active Versus Inactive

Environmental characteristic	Mothers		Fathers	
	Unadjusted OR (95% CI)	Adjusted ^a OR (95% CI)	Unadjusted OR (95% CI)	Adjusted ^a OR (95% CI)
Residential density				
detached	1.91 (0.99-3.69)	1.72(0.87-3.41)	1.11(0.52-2.37)	0.97(0.44-2.14)
others	1.00	1.00	1.00	1.00
Access to shops				
disagree	1.00	1.00	1.00	1.00
agree	2.49(1.46-4.25)***	2.31(1.33-4.02)**	1.87(1.03-3.40)*	1.95(1.05-3.40)*
Access to transit stops				
disagree	1.00	1.00	1.00	1.00
agree	2.02(1.03-3.97)*	2.06(1.02-4.15)*	1.75(0.69-4.46)	1.81(0.70-4.72)
Presence of sidewalks				
disagree	1.00	1.00	1.00	1.00
agree	2.30(1.32-4.01)**	2.25(1.26-4.01)**	3.01(1.35-6.72)**	2.94(1.30-6.34)**
Facilities to bicycle				
disagree	1.00	1.00	1.00	1.00
agree	1.17(0.70-1.98)	1.67(0.68-1.99)	1.64(0.87-3.08)	1.66(0.87-3.16)
Access to recreational facilities				
disagree	1.00	1.00	1.00	1.00
agree	2.05(1.08-3.89)*	2.01(1.05-3.86)*	1.92(0.86-4.25)	2.09(0.91-4.80)
Crime safety at night				
disagree	0.91(0.53-1.57)	0.97(0.56-1.70)	1.60(0.69-3.73)	1.70(0.70-4.14)
agree	1.00	1.00	1.00	1.00
Traffic safety				
disagree	0.85(0.46-1.57)	0.83(0.45-1.53)	1.27(0.60-2.69)	1.36(0.63-2.93)
agree	1.00	1.00	1.00	1.00
Seeing people being active				
disagree	1.00	1.00	1.00	1.00
agree	1.02(0.55-1.87)	1.12(0.60-2.11)	1.23(0.66-2.33)	1.23(0.64-2.33)
Aesthetics				
disagree	1.00	1.00	1.00	1.00
agree	1.48(0.86-2.55)	1.37(0.79-2.38)	0.99(0.56-1.76)	0.92(0.51-1.67)
Household motor vehicles				
one	2.64(1.45-4.79)***	2.46**(1.32-4.58)	2.68**(1.28-5.61)	2.87**(1.31-6.25)
more than one	1.00	1.00	1.00	1.00

Note. ^a Adjusted by age, number of children, education, ethnic background, and work status

* $p < 0.05$. ** $p < 0.01$. *** $p \leq 0.001$.