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Age and retirement status differences in associations between the built environment and active travel behaviour

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ABSTRACT

Background: Transport walking and transit use provide opportunities to achieve health-enhancing activity levels within daily routines. Transit access and neighbourhood walkability may influence how readily adults engage in active travel and, ultimately, whether they will. Thus, we aimed to examine associations between Walk Score® and Transit Score® and transit use and transport walking, and to determine whether associations differed across age groups and retirement status.

Methods: We linked data for Canadian Community Health Survey Healthy Aging Cycle (2008/2009) respondents (aged ≥45 years) from British Columbia ($N=3860$) to objectively-measured walkability and transit access. We used logistic regression to examine associations between built environment measures and transport walking and using transit in the past month. We tested whether age group and retirement status were significant moderators of the relation between the built environment and active travel.

Results: A 10-point higher Walk Score was associated with 34% higher odds of walking for transport (OR=1.34; 95%CI: 1.23,1.47) and 28% higher odds of using transit (OR=1.28; 95%CI: 1.17,1.40). A 10-point higher Transit Score was associated with 37% higher odds of walking for transport (OR=1.37; 95%CI: 1.18,1.60) and 40% higher odds of transit use (OR=1.40; 95%CI: 1.22,1.59). Furthermore, those in neighbourhoods with *Excellent Transit/Rider's Paradise* had over three-and-a-half times higher odds of walking for transport and three times higher odds of using transit than those in neighbourhoods with *Minimal Transit/Some Transit* ($p<0.005$). Stronger associations were observed between Transit Score and active transport among older age groups and between Walk Score and transport walking among those not retired.

Conclusions: Transit accessibility and walkability can support active travel behaviour in middle-aged and older adults. Transit access may be especially important in older age groups and walkability may be especially important for middle-aged and older adults who are still working.

1. Introduction

Physical inactivity was recently cited as 'the biggest public health problem of the 21st century' (Blair, 2009). Lack of adequate physical activity increases the risk of a host of major chronic diseases in both the developed and developing world (Lee et al., 2012). Current Canadian guidelines recommend 150 min of moderate- to vigorous-intensity physical activity per week in bouts of 10 min or more [estimated to be equivalent to 7000–10,000 steps per day (Tudor-Locke and Bassett, 2004;Canadian Society for Exercise Science, 2011a; Canadian Society for Exercise Science, 2011b)]. Walking is a moderate intensity activity accessible for people of all socioeconomic means. Thus, it may be one solution to address low levels of physical activity amongst middle-aged and older Canadians, where 47.5% report being sufficiently active and when measured by accelerometry only 15% are sufficiently active (Colley et al., 2011; Statistics Canada, 2012).

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Thus we require novel solutions that incorporate walking into daily routines. Active transport may present one opportunity, as adults who walk for transport and use public transit are more likely to meet recommended guidelines for physical activity than those who do not (Besser and Dannenberg, 2005; Davis et al., 2011; Duncan et al., 2013; Rissel et al., 2012; Saelens et al., 2014; Winters et al., 2014). Despite this, 74% of Canadians rely on car travel as their main form of transportation (Farber and Paez, 2011) and there is thus a loss of potential opportunities for utilitarian physical activity.

Further, there are links between active transport and features of the built environment, including density, land use mix and street connectivity, and with composite indices of walkability and access to transit (Badland and Schofield, 2005; Handy, 2005; King et al., 2011; McCormack and Shiell, 2011; Rissel et al., 2012; Saelens and Handy, 2008; Van Holle et al., 2014; Vojnovic, 2006). However, researcher-derived walkability indices are typically normalised specific to the study area and specific components have been varying (Barnes et al., 2013; Frank et al., 2010b; Leslie et al., 2007). This creates a challenge when comparing outcomes across studies and settings. In addition, transit access metrics also vary markedly across studies. Transit metrics include distance to the nearest transit stop, density of transit stops, miles of bus routes, ability to access activity centres using only walking and transit, and perceptions of 'ease of access' (Rissel et al., 2012). Standard measures are critical if researchers are to compare results across studies (Brownson et al., 2009).

Walk Score® is an increasingly common metric used in walkability research. Walk Score is calculated from the distance to a range of amenities (including schools, grocery stores and parks) (Walk Score®, 2015a) and has been validated against traditional walkability metrics (Carr et al., 2010, 2011; Duncan et al., 2011, 2013; Manaugh and El-Geneidy, 2011) and perceived measures (Carr et al., 2010). It is currently available across US, Canada, Australia and New Zealand, and therefore can be used comparably in built environment studies across countries. A Transit Score®, a measure of how well an area is serviced by public transit, was also developed and validated against Geographic Information Systems (GIS)-derived transit availability measures (Duncan et al., 2013). To our knowledge only one study examined the association between Transit Score and walking (Hirsch et al., 2013), and no study examined associations between Transit Score and transit use. Use of these standardised measures can overcome comparability issues in the evidence to date.

Here, we employed Walk Score and Transit Score to understand how travel behaviour changes over the adult life course. It is likely that the built environment may have differential impacts as one ages. For example, press-competence models suggest that the environment becomes a stronger predictor of behaviour later in life because there is a higher importance for supportive environments. These models are based on the fact that as one ages they move towards reduced levels of individual competence (Satariano, 2006), and that the demands (or press) of the environment therefore also changes during the aging process. When there is a better person-environment fit, there is potential for more active travel in older adults (Webber et al., 2010). Life stages changes are also accompanied by changes in travel behaviour. For example, as the adults move towards retirement and living arrangements often change due to factors such as children leaving thei home, there are often substantial changes to the nature of their transportation (Chad et al., 2005; Shigematsu et al., 2009). Arguably, travel behaviour in older adults may be more flexible with fewer responsibilities around transporting children and rigid work schedules (Kaczynski et al., 2009; Shigematsu et al., 2009). If this is the case, the local built environment may thus have greater influence on whether or not older adults *choose* to walk or take transit as compared to middle-aged adults as their decisions are not driven by other factors.

Given these gaps, we examined the association between Transit Score and Walk Score and transport walking and transit use in middle-aged and older adults who live across British Columbia, Canada and if this differs across life stages. Although age and retirement status are correlated, we examined both for interactions with the environment with the aim of identifying whether it is at retirement specifically when the role of the environment for active travel may be different and whether there are differences in associations between specific age groups. Our hypotheses were: (1) that each score (Walk Score and Transit Score) would be positively associated with transport walking and using transit; and (2) that these associations would be stronger among older age groups (versus younger) and those retired (versus working), given that during these life stages individuals may have fewer responsibilities and constraints on time use.

2. Methods

2.1. Survey data

We used the population-based Canadian Community Health Survey-Healthy Aging survey (CCHS-HA) to examine travel behaviour. The CCHS-HA is a cross-sectional survey of $n=30{,}865$ adults aged 45 years and older who reside in private dwellings (i.e., not institutions) in the 10 provinces across Canada (Canadian territories were excluded) (Statistics Canada, 2010). Statistics Canada collected data using computer assisted personal interviewing (CAPI) from December 2008 to November 2009, achieving an overall response rate of 74% (Statistics Canada, 2010). We included respondents living in Census Metropolitan Areas (CMAs) in British Columbia (BC) (Vancouver, Abbotsford-Mission, Kelowna, and Victoria) to deliberately limit our sample to those living near large urban centres, as built environment correlates of walking may differ in more rural settings (Saelens et al., 2003). This study did not require review by an institutional review board as it was deemed exempt under the *Tri-Council Policy Statement: Ethical Conduct for Research Involving Humans (TCPS 2)*, Article 2.4, by Simon Fraser University's Office of Research Ethics.

2.2. Sample characteristics

Demographic variables collected included sex (men or women), age group (45–54, 55–64, 65–74, and 75+years), highest level of education (less than secondary, secondary/some post-secondary or post-secondary), household income (less than $30,000, $30,000–59,999, $60,000–89,999, $90,000 or more and 'not stated'), country of birth (Canada or other), marital status (married/common law or single/widowed/divorced/separated), retirement status (retired or not), living alone (yes or no), valid driver's license (yes or no) and a derived variable for body mass index (underweight, normal, overweight, obese or 'at least one question not answered').

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