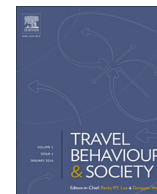




Contents lists available at ScienceDirect

Travel Behaviour and Society

journal homepage: www.elsevier.com/locate/tbs

Children's independent mobility in the City of Toronto, Canada

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ARTICLE INFO

Article history:

Received 6 October 2016

Received in revised form 11 April 2017

Accepted 6 June 2017

Available online xxxxx

Keywords:

School travel

Children's independent mobility

Walking

Built environment

GIS

ABSTRACT

School travel patterns have changed over the past half-century, with more students driven and fewer walking independently. This study examines how individual, household and built environment correlates associate with school travel related children's independent mobility in the City of Toronto, Canada. Parents and children (aged 9–13 years) completed activity-travel surveys and route mapping. Mapped routes were used to measure environmental correlates of independent walking to and from school. Separate to and from school travel models were estimated using binomial logistic regression models. Findings suggest that distance, age, gender, traffic volume and flexible parental work arrangements related to independent mobility. Getting children to walk to and from school may reduce the number of vehicles around the school, reduce safety concerns and possibly increase opportunities for independent mobility in childhood.

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1. Introduction

School transport in much of the urbanized Global North fundamentally transformed during the automobile century from an active to a relatively passive activity increasingly dominated by the use of automotive transport, whether by private vehicle, public transport, or school bus. Decline in the use of active transportation to and from school intensified after World War II. In the U.S., nearly half (49%) of children aged 5 to 14 (Kindergarten to grade 8) actively travelled to school in 1969, by 2009, only 13% engaged in active school travel (AST) (McDonald et al., 2011). In the U.K., 75% of children aged 5 to 10 walked or biked to school in 1975, while only 55% were doing so in 2001 (Pooley et al., 2005). In Toronto, Canada almost 56% of 11 to 13 year olds walked to school in 1986 dropping to 48% by 2006 (Buliung et al., 2009). For automobile travel in Toronto, in 1986 only 14% of 11 to 13 year olds were driven to school compared to 28% by 2006 (Buliung et al., 2009).

The most recent study of school travel in the Greater Toronto and Hamilton Area (GTHA) revealed further decline in AST (Buliung and Colley, 2016). For 11–17 year olds, GTHA auto mode share more than doubled between 1986 and 2011 (Buliung and Colley, 2016). In an earlier paper, Buliung and colleagues suggested

that perhaps the decline in AST might have reached its nadir by 2006 (Buliung et al., 2009). The most recent data indicate that it was too early to tell. Even in the City of Toronto, where walking to school is more common than in other places across the region, walking mode share for 11–13 year olds, taking trips to and from school, declined once again between 2006 and 2011 (to school: 48% to 45%, from school: 55% to 50%). In Toronto, and in other places, more children appear to be driven shorter distances to school, than ever before (Grize et al., 2010; Torres et al., 2010; Mitra et al., 2016).

The case for active transportation in childhood is relatively easy to make. While active travel has declined, the prevalence of childhood obesity and the emergence and earlier onset of various other types of chronic diseases in childhood has risen (Janssen and LeBlanc, 2010; Shields, 2006). Increased sedentary activity has emerged as partial explanation for the upward trend in childhood obesity (Goran, 1997; Rennie et al., 2005; Trost et al., 2001). There are potentially acute and lifelong physical activity benefits related to AST. Research suggests that establishing walking or an active lifestyle in childhood could influence physical activity and transport decisions along the life course (Telama et al., 2005). Data from the Danish project, Mass Experiment 2012 also indicated that the active child has greater ability to concentrate throughout the school day (Vinther, 2012). Creating and enabling opportunities for children to experiment with, and acquire the tacit knowledge produced through the use of active modes, could translate into greater use of active transport in adolescence or as an adult. The

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school trip is an essential and regular context for children and youth to experience and experiment with active transportation.

AST also provides a context for children's independent mobility (CIM) to occur. CIM is typically defined as the freedom to travel around the neighbourhood or city without adult supervision (Hillman et al., 1990; Tranter and Whitelegg, 1994). Some research suggests that the school travel mode decision is a two-stage process that first involves the escort decision (Faulkner et al., 2010). To increase walking for school travel, the social and environmental determinants of CIM should be studied closely. Although there are many potential short and long-term AST benefits, parents may not be immediately prepared to, or be able (e.g., due to other responsibilities or the presence of dis/ability) to participate in walking to/from school with their child. Some parents are likely to legitimately struggle with the decision to allow this walking to occur independent from adult supervision. Parents might also suffer stress and anxiety related to a child's desire to express his/her independence through mobility during school travel.

CIM is also gendered, more "boys" engage in independent travel than "girls". Within households with male-female partners (the children's travel literature and transport research in general is notoriously heteronormative), women are more likely to conduct unpaid labour including managing and undertaking most child transport and communication decisions and activities (Lindsay, 2008; Statistics Canada, 2005). CIM is also produced through historically and personally situated gendered experiences with risk and mobility. In addition, there are the hard to measure socially constructed and media produced and reinforced ideas about the good parent or good mother, as a person whose role it is to protect children from perceived and objective social and environmental safety risks at all costs (Lindsay, 2008; Murray, 2009).

The escorted and/or chauffeured child of today might not become the active traveller of tomorrow (Roberts, 1996). Moreover, a driven child's environmental acuity and familiarity with their local neighbourhood may be limited by the enclosed space and travel speed of the automobile (Fusco et al., 2012; Mitchell et al., 2007). Other research indicates, however, that the driven child is likely more aware of, and interested in learning about, her/his travel environment than expected (Fusco et al., 2013). Aligning adult mobility decisions with a child's interest in "neighbourhood" may present an opportunity to encourage greater uptake of AST.

Consistently escorting children to and from school may also limit opportunities for independent problem solving of a social, spatial or environmental nature, and reduces opportunity for the independent play, neighbourhood exploration, and socializing that can take place during a walked school trip (Fusco et al., 2012, 2013). Potential CIM benefits extend beyond physical activity (Schoeppe et al., 2013). Encouraging independent school travel may also produce independent mobility to other destinations while increasing participation in unsupervised outdoor play and physical activity (Mitra et al., 2014; Page et al., 2010). CIM also relates to cognitive development, knowledge acquisition, and sense of community for children (Brown et al., 2008; Prezza and Pacilli, 2007). School travel provides an opportunity for independent mobility to happen.

Despite its many possible benefits, CIM, along with AST, has also declined during the automobile century (Fyhri et al., 2011; Gaster, 1991; Hillman et al., 1990; O'Brien et al., 2000). To increase walking for school travel (and the physical activity benefits associated with it), we must thoughtfully consider the barriers to increasing opportunities for CIM within cities and urbanized regions. Previous work in Toronto has highlighted how the environment may relate to walking for children (Larsen et al., 2013; Mitra et al., 2010), in this study we turn to an ecological analysis of the social and environmental correlates of school based CIM in the City of Toronto, Canada, the nation's largest city.

2. Background

This study adopts a social-ecological framework (Bronfenbrenner, 1989; Sallis et al., 2008). Conceptually, an ecological framework relates health outcomes to the nesting of multiple levels of influences, from the individual to broader policy and neighbourhood features (van Loon and Frank, 2011). Under this framework and in this context it is assumed that travel behaviour, human health and the environment are related. The purpose of this paper is to examine how individual, social and environmental factors relate to CIM. The application of the social-ecological framework is useful for identifying these nested and related features. The application of the social-ecological framework along with our review of the literature helped guide model specification.

2.1. Individual and household characteristics

Studies commonly report a connection between a child's gender and CIM. Without much acknowledgment of diversity with regard to gender, and the problematic aspects of essentializing such a complex socio-cultural, political and economic construct, most studies tell a story of "boys" having greater independence and active travel than "girls" (Fyhri and Hjorthol, 2009; Murray, 2009; Villanueva et al., 2014; Yarlagadda and Srinivasan, 2008). In other words, and via the application of a reductionist gender binary, we observe a gender gap in school travel in childhood in most of the research conducted in the Global North. Murray (2009) offered a refreshing and more critical appraisal of gendered travel in childhood pointing to the contribution of gendered generational experiences with mobility and risk and the potential effect of such things on the socio-cultural construction of contemporary parenting. Childhood age has also emerged as a common research theme, with, unsurprisingly, older children more likely to travel independently (Alparone and Pacilli, 2012; Björklid and Gunnemsson, 2013; Mammen et al., 2012; Mitra et al., 2014; Prezza et al., 2001). While age is likely an important factor in relation to CIM, it is necessary to also consider the range of ages examined. Age may be more important when comparing 6 year olds to 14 year olds, but less so when only looking at 10–12 year olds. Research suggests that independent travel is more common once a child reaches the age of 13 or 14 (Larsen et al., 2015a).

Household resources such as income and vehicle ownership may also connect with school travel. A few studies have reported a statistically significant relationship between household automobile ownership and rates of children walking to school, while others have found no such connection (Schlossberg et al., 2006; Vovsha and Petersen, 2005). While automobile ownership may relate to mode choice, no statistically meaningful relationship has been reported between household automobile ownership and CIM (Tranter and Whitelegg, 1994). Of course, income and auto-ownership do relate to the work travel of adults and so by casting school travel within the older trip-based transport research paradigm, some of the school travel research is likely missing the indirect impact of other adult activities on school travel mode choice (McDonald, 2008). Similarly, income is commonly examined in the school mode choice literature, with a higher household income related to a lower rate of AST (Larsen et al., 2012; Vovsha and Petersen, 2005), but income may not relate to independent travel patterns (Mammen et al., 2012).

2.2. Objective environment

Three methods are often used in the literature to objectively measure the potential environmental correlates of school travel: neighbourhood buffers, shortest path routes or reported mapped

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