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What predicts children's active transport and independent mobility in disadvantaged neighborhoods?

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ABSTRACT

This study examined two year changes in children's active transport and independent mobility and prospective associations between individual, social and physical environmental predictors of interest and these behaviors two years later. Overall, 43.5% of children (12.0 ± 2.1 years) used active transport on the school journey at T1 and at T2 (p=0.77), and 35.3% engaged in independent mobility on the school journey at T1 and 29.6% at T2 (p=0.07). Enjoyment, parental safety concerns, and proximity to walking tracks were associated with independent mobility on the school journey. Road safety and social norms were associated with active transport and independent mobility to local destinations. These factors provide potential targets for interventions.

1. Introduction

The importance of regular physical activity for promoting both physical and mental health in childhood and adolescence is well-established (Janssen and Leblanc, 2010). Active transport, which involves walking or cycling to places such as school or local destinations, can make an important contribution to overall physical activity (Roth et al., 2012; van Sluijs et al., 2009). Active transport is an informal, low cost source of physical activity (Humbert et al., 2006) that also offers opportunities for independent mobility if children have the freedom to walk or cycle around their neighborhoods without adult accompaniment (Hillman et al., 1990). Independent mobility confers additional benefits to children by promoting their social, cognitive and emotional development (Kytta, 2004).

Despite these benefits, studies from various developed countries have shown rapid declines in the prevalence of active commuting and independent mobility (Fyhri et al., 2011; McDonald, 2007; Schoeppe et al., 2013). Since 2002 only about 40% of UK children 7–13 years have been allowed to commute to school unaccompanied (Mackett, 2013) and a recent study in Australia showed less than 46% of children walk or cycle to school, and less than 38% are independently mobile (Carver et al., 2012). Emerging evidence suggests that active transport to/from school increases with age during childhood, particularly from childhood to adolescence (Costa et al., 2012; Hume et al., 2009; Pabayo et al., 2011), though some studies have shown that active transport declines with age (Trang et al., 2012).

Individual, social and physical environmental level factors influence physical activity behavior (Sallis and Owen, 1997). Although mainly based on cross-sectional studies, evidence in relation to influences on active transport and independent mobility among children suggests that each of these levels of influence are important. A review study showed shorter distances to school, mixed land use, access to parks and other sport/recreation destinations, urban residence, population/residential density and ethnicity (non-white) are positively associated, while car ownership, family income, parental education, and concern about child and traffic safety are negatively associated with active travel to school (Pont et al., 2009). Longitudinal studies of active transport show that knowing many people in the neighborhood and satisfaction with the number of pedestrian crossings are associated with higher odds of active transport to school, and that insufficient traffic lights and crossings is associated with lower odds of active transport to school among children and adolescents (Hume et al., 2009).

Among 10 year-olds in the UK, Panter et al. (2010) found shorter distance to school, urban residence, lower socioeconomic status, parental perceptions of higher route safety and inconvenience of travelling to school by car were associated with higher odds of taking up active commuting to school and maintaining it after one year. Having direct routes to school was associated with lower odds of taking up active transport (Panter et al., 2010). Recent studies have found

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well-connected streets and cycling lanes to be positively associated with active travel among children (Helbich et al., 2016; Oliver et al., 2015).

Some studies have examined possible influences on children's independent mobility (Carver et al., 2012; Christian et al., 2015; Santos et al., 2013; Villanueva et al., 2013). These cross-sectional studies found positive associations with independent mobility and access to parks and outdoor play spaces, neighborhood walkability and safety, parental confidence that their child could travel independently and negative associations with social norms towards independent mobility. In one of the only studies to have examined longitudinal determinants of independent mobility, Carver et al. (2014) reported that among English children (aged 9–10 years at baseline) those whose parents allowed them to play outside anywhere in the neighborhood (boys) and whose neighborhoods had high land use mix (girls) were more likely to engage in active travel to school independently one year later. Those with car access (boys), parental encouragement for walking/cycling to school, and a high proportion of the route being a main road (girls) had lower odds of being independently mobile on the school journey.

Overall, longitudinal studies examining patterns and predictors of active transport and independent mobility to school and other local destinations are rare, especially among school- aged children residing in socioeconomically disadvantaged areas. These children tend to be less physically active than those who reside in more advantaged areas and this may be detrimental to their future health (Humbert et al., 2006). This study aimed (1) to describe changes in levels of participation in active transport and independent mobility among children residing in low socioeconomic areas at two seasonally-matched time-points, two years apart; and (2) to examine prospective associations between individual, social and physical environmental predictors of interest and active transport and independent mobility two years later.

2. Methods

Individual, social and physical environmental predictors of interest were collected at T1 from a self-report survey completed by mothers and objective measures of the physical environment using GIS. Children's active travel and independent mobility were self-reported by children at T1 and T2.

2.1. Sample

Children were recruited through their mothers' participation in a longitudinal cohort study, 'Resilience for Eating and Activity Despite Inequality (READI)', for which baseline recruitment methods have been published previously (Ball et al., 2013; Cleland et al., 2010). Briefly, 18–46 year old women residing in 40 urban and 40 rural socioeconomically disadvantaged areas were invited to participate in a postal survey about diet and physical activity.

Of the 11,940 women randomly sampled from the electoral roll and sent a survey to complete, 861 surveys (7.2%) were returned as undeliverable. A total of 4938 surveys (45% response rate of those delivered) were completed between August 2007 and July 2008. Women who had moved house from the sampled neighborhood before completing the survey (n=571), completed the survey but were not an intended participant (n=3), withdrew their data after completing the survey (n=2), or were aged <18 or >46 years (n=13) were excluded, leaving 4349 (39% of those delivered a survey) eligible women with survey data at baseline. Those who were mothers of a child aged 5–12 years (n=1,457) were also invited to complete survey items on their child's diet and physical activity and 771 (53%) consented. Of these, 613 completed a survey about their child. Of the full cohort, those who consented to further follow-up and remained eligible (n=3019 women and 590 children) were re-contacted to complete a follow-up survey. Two follow-ups during which participating children also completed a guided questionnaire were conducted at three (2010) and five years (2012).

The current study is based on data collected at the two follow-up time-points only (2010 and 2012). Completed surveys were obtained for 311 children (53% response from those completing baseline and consenting to follow-up) in 2010 (T1) and for 207 of these children (67% retention of the T1 sample) in 2012 (T2). Ethical approval was obtained from the Deakin University Human Research Ethics Committee, the Victorian Catholic Education Office and the Department of Education and Training, Victoria.

2.2. Measures

Children completed a questionnaire under guidance by a trained research assistant at school (or at home if more convenient) about their active transport and independent mobility on journeys to/from school and to local destinations. Identical items were included at each time-point. One-week test–retest reliability of key items (described below) was established in a separate sample of 48 children aged 8–9 years in 2010. Mothers also completed a postal survey at T1 (2010).

2.2.1. Child survey

2.2.1.1. Active transport and independent mobility on the school journey. At both time-points, children reported the number of trips they made to and from school in a typical week via six modes of transport. Possible modes of transport in each direction were: (1) walk; (2) ride a bike; (3) skateboard/scooter/rollerblade; (4) public transport/school bus (excluding Walking School Bus); (5) car (child's family only); and (6) car pool (with other families). The habitual travel mode used to travel 1) to school and 2) from school was identified (operationalized as the travel mode used for three or more trips per week). Test-retest reliability of items assessing habitual modes of transport to and from school was high (κ=0.77 and 0.76, respectively). For each time-point, habitual travel modes to/from school were classified as (1) active vs (0) non-active travel. Active travel was defined as usually walking, riding a bike, or skateboard/scooter/rollerblading in at least one direction (test-retest reliability was moderate: κ=0.56).

For the three active modes of travel (walk, ride a bike, skateboard/scooter/rollerblade) children were asked who they usually traveled with on these trips. Response options were: I don't usually [walk] to school; by myself; with parent/other adult; with friends/siblings (no adults). For each time-point, a dichotomous variable was derived to indicate whether the child habitually (i.e. 3+ trips/week) used independent active travel on the school journey (1=yes; 0=no). Independent active travel was defined as habitually walking, riding a bike or skateboard/scooter/rollerblading without adult accompaniment in at least one direction (test-retest reliability was substantial κ=0.86).

2.2.2. Active transport and independent mobility to local destinations

Children were asked which of the following four destination types were located within perceived walking distance of their home: friends' houses; sports or physical activity venues (e.g. walking tracks, tennis courts); parks/playgrounds; and shops. The total number of 'walkable' destination types was computed (possible range 0–4).

For each destination type, children who reported residing within walking distance were asked how often they usually walked to this venue: (a) alone; (b) with a parent/other adult (could include other children); and (c) with friends/siblings (no adults). Response options were: 'never'; 'rarely'; 'sometimes', 'often', and 'very often'. One point was scored for each destination type to which the child walked 'often' or 'very often', regardless of accompaniment. Scores for each destination type were summed to give a score for walking to local destinations. As the number of walkable destinations in each neighborhood varied, this score was weighted by dividing by the number of walkable destination