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## Living in school catchment neighborhoods: Perceived built environments and active commuting behaviors of children in China

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### ABSTRACT

The contribution of the current study to the existing literature of school trips is twofold. First, we estimate the proportion of children living in neighborhoods within walking-distance who actively commute to school taking into consideration the educational system policy in China of “attending nearby school”. Secondly, we identify how and to what extent the neighborhood and individual-level built environment characteristics affect the behaviour of active school traveling. We recruited 1090 children from four primary schools in Shenzhen, China. Multilevel models examined the relationship between built environments and school commuting behavior (that is, mode choice, travel time to and from, and route difference to and from school). We found the average distance to school was 575 m [min = 206 m, max = 1303 m]. Three out of four children (N = 805) lived within their school catchment neighborhoods in our study samples, of which 87% were active commuters and 6% arrived in school by their parents’ cars. For children living outside of school catchment areas (N = 285), 22% of them walked or cycled to school and 23% arrived to school by their parents’ cars. Having more gates, measured by density of neighborhood entrances, was positively associated with active mode choice. Route aesthetics greatly impacted the active mode choice. Safety was associated with different route use to and from school. Compared to children who commuted alone, children who traveled with classmates or parents were less likely to use different routes to and from school. This study highlights the importance of considering the local built environment context of school catchment planning in understanding school commuting behaviors in China.

### 1. Introduction

Physical activity has many known health benefits including improvements to cardiovascular health, lung function, bone strength, and mental health, and a decreased risk of diabetes, obesity, cancer, and overall mortality (Bauman et al., 2012; Lee et al., 2012). Studies have shown that levels of physical activity among children are low. Ninety-three percent of Canadian children ages 5–11 do not meet the recommended physical activity guidelines of at least 60 min of daily moderate-to-vigorous-intensity physical activity (Gray et al., 2014). In the UK, the proportion of children aged 5 to 15 years meeting recommendations between 2008 and 2012 declined from 28% to 21% (Panter et al., 2008; Townsend et al., 2015). In the USA, 42% of children ages 6–11 year obtain the recommended 60 min of physical activity, whereas only 8% of adolescents achieve this goal (Troiano et al., 2008). In China, 77% of students in primary and middle schools failed to meet the recommendation in the “2010 National Physical Fitness and Health Surveillance” survey (Zhang et al., 2012). Low levels of physical activity may predispose children to developing childhood obesity, which has become a global epidemic (Boreham and Riddoch, 2001). The

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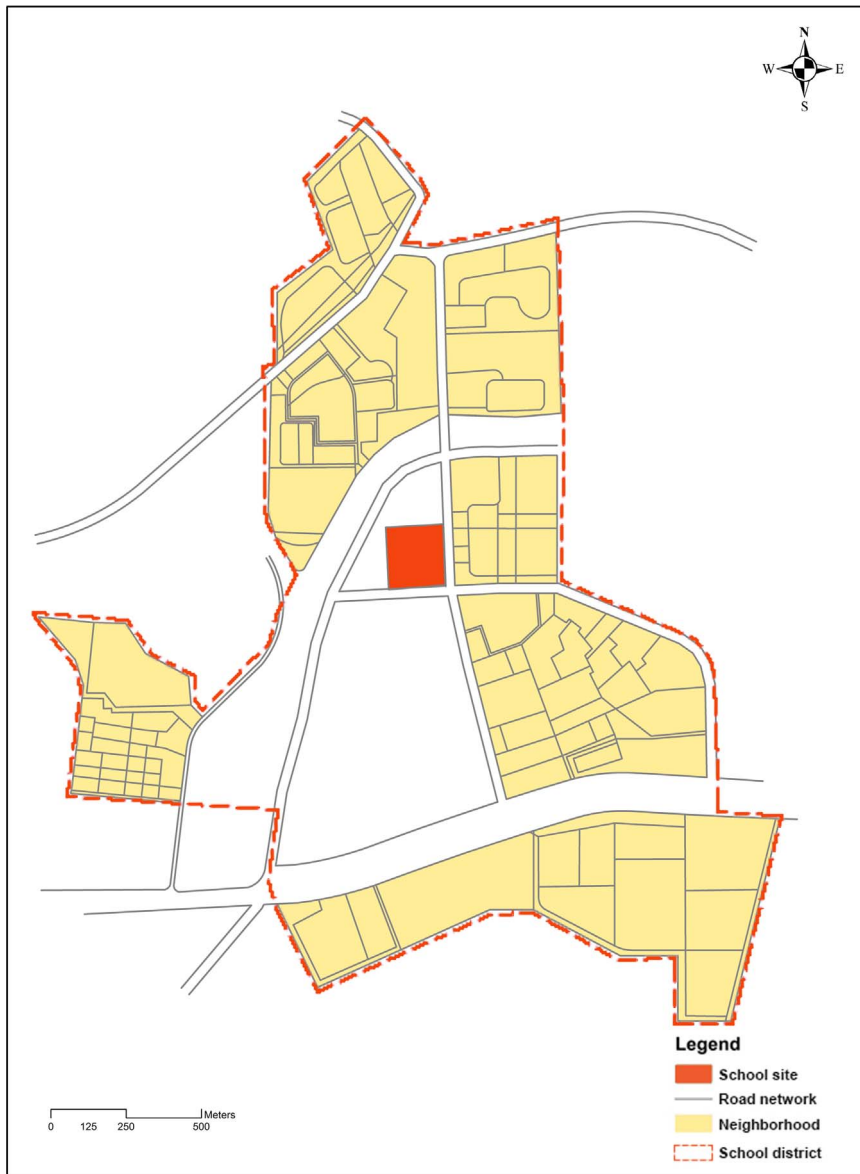


Fig. 1. Catchment neighborhoods of a primary school in China.

journey to school is a potentially important opportunity for increasing children's daily physical activity (Fulton et al., 2005; Rowland et al., 2003). Encouraging active commuting to school (ACS) can further foster healthy active commuting habits during later adolescence and adulthood (Merom et al., 2006; Yang et al., 2014).

Studies in Western cities have shown that fewer than a half of all ACS trips are by walking or bicycling mode even for distances under one mile (Martin et al., 2007; Rothman et al., 2014b; Salmon et al., 2007). Little is known about the pattern of school commuting in mainland China where physical inactivity has increased among children in recent decades (Kerr et al., 2016; Zong and Li, 2014). Urban planning guidelines recommend that the service area of a primary school is at around 500 m radius buffer, and a middle school is at 1000 m (Shenzhen Planning and Land Resource Committee, 2017). With the planning guidelines, the “attending nearby school” policy restricts primary school admission to children living within a defined catchment neighborhoods based on parental hukou (household registration) and housing ownership (Feng and Lu, 2013), which ensures that children in mainland China live within walking distance of an affiliated primary school. Fig. 1 illustrates an example of the catchment neighborhoods for a primary school in Shenzhen, China. Education resource planning in China is strikingly different from many Western countries, where parents can often choose which schools their children attend, with often only families with limited resources (e.g., fewer cars) sending their children to the local school (Bostock, 2001; Goodman et al., 2012). However, there is limited research assessing the proportion of children in China who live within walking distance to school who actively commute.

Previous studies have attempted to promote physical activity of children by focusing on time at school or leisure time activities. Research has

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