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## Walking behavior across genders in school trips, a case study of Rasht, Iran

Yaser Hatamzadeh<sup>1</sup>, Meeghat Habibian<sup>\*,1</sup>, Ali Khodaii<sup>1,2</sup>

Department of Civil and Environmental Engineering, Amirkabir University of Technology, Tehran, Iran

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### ABSTRACT

Although walking behavior in school trips has been the subject of debate in developed countries in recent years, much remains to be learned about this subject in developing countries. Moreover, despite exploring effects of various factors, research on walking mode choice behavior across genders remains quite limited. The main purpose of this study is to understand reasons behind male-female differences in choosing walking as a mode of transportation in trips to school in the city of Rasht, Iran. Separate binary logit models were developed for boys and girls in trips to school using the data from Rasht household travel survey in 2007. Results show that high school girls are less likely to walk relative to elementary and middle aged girls; but elementary and middle aged boys dislike walking to school relative to high school boys. Results show that regardless of gender, an individual who has a car in his/her household is less likely to walk to school. In this study, different distance intervals (increasing by 0.25 miles) were defined. Results show that both boys and girls are sensitive to trips longer than 0.25 miles in choosing walking. However, the decrease in likelihood of walking is greater among boys than girls. For example, if the distance is between 0.25 to 0.5 miles, the probability of walking to school decreases by 14.8% points for boys and 10.5% points for girls with respect to trips less than 0.25 miles. Altogether, our findings suggest that gender differences need to be addressed if policy makers hope to increase rates of walking in children's trips to school.

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### 1. Introduction

An increase in motorized trips and a decline in individuals' physical activity have become a major concern for many communities. Recently, this issue has led many local and regional authorities to promote non-motorized travel including walking and bicycling in urban areas. Among different trip purposes, school trips have captured significant attention in both public and academic viewpoints. This attention is, understandably, due to the priority that societies and policy-makers, specifically, give to the children. Especially over the last two decades, there has been growing concern over childhood obesity. For example it was reported in 2009–2010 that 17% of US children and adolescents aged 2–19 years were obese (Ogden et al., 2012). Based on new evidence, active transportation to school reduces risk of childhood obesity (Sahlqvist et al., 2012; Cooper et al., 2012; Roth et al., 2012). Promoting active transportation to school has other advantages in terms of

\* Corresponding author. Fax: +98 21 66414213.

E-mail addresses: [y\\_hatamzadeh@yahoo.co.uk](mailto:y_hatamzadeh@yahoo.co.uk) (Y. Hatamzadeh), [Habibian@aut.ac.ir](mailto:Habibian@aut.ac.ir) (M. Habibian), [Khodaii@aut.ac.ir](mailto:Khodaii@aut.ac.ir) (A. Khodaii).

<sup>1</sup> Address: Hafez St., Tehran 15875-4413, Iran.

<sup>2</sup> Fax: +98 21 64543010.

health, economic, environment, transportation and even social justice. Despite these advantages, there have been well-documented declines in walking to school across the globe in recent years (McDonald, 2007) and have led researchers to investigate the effect of a various factors on children's mode choice for the school trip.

While walking has become a critical research topic in developed countries, it has not received enough attention in developing countries such as Iran. This study tries to overcome the gap in the current literature by studying the walking behavior to school within a typical city in Iran, Rasht. According to Rasht household travel survey in 2007 (Rasht comprehensive transportation planning study, 2011), 13.48% of all daily trips made were school trips apart from trips for the purpose of returning to home which consisted 49% of all trips. Moreover, it seems likely that travel behaviors are different among male and female students. The reasons behind male-female differences in choosing walking as a mode of transportation have not been well established, and mainly some recent studies have addressed this issue (e.g., (McDonald, 2012; Hsu and Jean-Daniel, 2014; Guliani, 2015)). Previous research on gender differences in travel behavior has used various theories and assumptions to explain the empirical evidences. For example, theoretical perspectives could be broadly classified into clusters such as theories of internalized gender differences, theories of gendered structural contexts, and theories of socially constructed gender differences which are used to explain gender differences in travel behavior (Boarnet and Hsu, 2015). However, the main motivation of this study for focusing on genders categories is that in Iran, schools are segregated by sex and boys and girls go to separated schools. Hypothetically, decision to choose walking as a mode of transportation to school may vary by gender. Furthermore, gender differences in travel behaviors in Iran, are partly because of cultural specification. It is worth noting that although females in Iran, are not faced with any limitations and barriers regarding physical activity and social interaction, Iranian families may be more culturally conservative in allowing their girls to be as freely present socially as males, at least during the school years (Ermagun and Samimi, 2012; Hatamzadeh et al., 2014). Therefore, girls may view factors affecting walking to school differently relative to boys. These motivated us to investigate walking behaviors, with a special focus on gender differences. A comparison between covariates that are expected to influence walking mode choice tendencies across genders is beneficial in evaluating candidate policies for promoting walking as a mode of transportation.

## 2. Literature Review

Numerous studies have investigated the effect of a wide range of factors on children's mode choice for the school trip and suggested a range of policies to be considered by the policy-makers. Prior researches on the effect of individual's age on traveling to school by active-transport have come to different conclusions. While some studies found a negative sign for the age variable (McDonald, 2008; Wilson et al., 2010), others found that with an increase in age (as children get older), the propensity for choosing active modes of transportation increases (Yeung et al., 2008; Pabayo et al., 2011; Su et al., 2013). There are also some studies which found no significant relation between age and choosing active modes in trips to school (Ermagun and Samimi, 2012). In another study among US youth, it was indicated that the likelihood of walking declines during high school but with insignificant effect (McDonald, 2008). This study shows that the effect of age was only significant for children between 5 and 14 years (elementary and middle school).

Walking behaviors are also affected by individual's gender. Many studies on trips to school have found that girls are less likely to walk than boys (McDonald, 2008; McMillan et al., 2006; Marten and Olds, 2004; Johnson et al., 2010). Cooper et al. in a study on five urban primary schools in Bristol, England suggested that gender played an important role in the likelihood that youth would walk to school, with boys being more likely to walk to school and also engage in physical activity after school (Cooper et al., 2003). Also, in a study by Evenson et al. in North Carolina it was found that rates of walking were generally higher for older boys (in high school) who were non-white, had a lower body mass index, and had parents that were infrequently home after school (Evenson et al., 2003). Despite the mentioned studies, there are some studies which do not confirm that boys are more likely to walk to school than girls (Ermagun and Samimi, 2012; Wilson et al., 2010; Bopp et al., 2012). Furthermore, several studies, have not found any association between gender and children's walking to school (e.g. Su et al., (2013; Carlin et al., 1997). It is worth noting that the two latter studies are on children who are quite young (at elementary school level in southern California and two cities in Australia respectively) and Su et al. has mentioned that gender differences at this age may not yet be large enough to be significant in influencing the rate of children's walking to school (Su et al., 2013).

Previous studies indicate that household characteristics including household structure influence travel behavior. It has been reported in some studies that household interactions are important in the decision to walk to school (McDonald, 2008; Yarlagadda and Srinivasan, 2007; Park et al., 2013). The relationship between walking or bicycling to school and the walking habits of parents or caregivers was examined in a study using a statewide pedestrian survey of New Jersey residents. It was found that the more frequently parents engage in walking activity, the more likely a child engages in active travel for the school trip (Park et al., 2013). McDonald found that the probability of younger children walking or bicycling to school decreases when their mother commuted to work in the morning. However, this had no statistically significant effect on high school students' likelihood to use active modes (McDonald, 2008). Furthermore, McDonald found that the work and travel behavior of fathers had a less significant impact on students' use of active modes for school.

The effects of opportunities or constraints on household transportation options and household income on walking mode choice of students have also been investigated previously. These studies mostly indicate that children of parents with lower

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