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## Experiences of past school travel modes by university students and their intention of future car purchase

Yasunori Muromachi

Urban Design and Built Environment Graduate Major, Department of Civil and Environmental Engineering, School of Environment and Society, Tokyo Institute of Technology, Nagatsuta-cho, Midori-ku, Yokohama-shi, Kanagawa-ken 226-8503, Japan

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### ABSTRACT

We studied the relationship between experiences of past school travel-mode choice by university students and their intention to purchase a car in future by using the life-oriented approach. We conducted a retrospective questionnaire survey whose respondents were university students of two universities located in the center of the Tokyo Metropolitan Area (TMA), two in the suburbs of the TMA, and three in major local cities outside of it. We asked them to consider their experience of past travel mode for going to upper-level elementary, middle, and high school as well as general-purpose travels from their mobility biography. We also asked about possible factors affecting their future intentions, such as their degree of concern about the environmental damage that car use might entail and their daily use of information and communication technology (ICT) tools. Responses from 351 university students were successfully collected. We found that experience of past bicycle use for going to high school affected the intention of future car purchase positively, while rail use for attending high school showed a statistically significant negative correlation. We also modeled the degree of young university students' intention to purchase a car in future by estimating ordered probit model. As a result, we found that experiences of past school travel by bicycle as high school students showed a positive relation, and of general-purpose travel by rail showed negative relation to intentions of purchasing a car in future. The latter implies that the policy measures for promoting a less car-dependent lifestyle by locating schools in the areas that are easily accessible by rail and conducting mobility management programs for molding school students' experiences of rail travel.

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### 1. Introduction

Less interest in car ownership and use by youth was considered one of the possible reasons for “peak travel” recently observed in some developed countries (Zumkeller et al., 2004; Noble, 2005; Litman, 2006; Metz, 2010; Millard-Ball and Schipper, 2011; Newman and Kenworthy, 2011; Goodwin, 2012). The decrease in license ownership by young adults was monitored and analyzed (Delbosc and Currie, 2013, 2014; Le Vine et al., 2014; Delbosc, 2016). A similar trend was also recently reported in other developed countries (Van der Waard et al., 2013; Hjorthol, 2016; Oakil et al., 2016), and the background of this decline has been discussed internationally (International Transport Forum, 2013; Kuhnimhof et al., 2013). In Japan, a clear trend toward less car ownership and rates of use by young adult males in their twenties has been observed since 1987 (Kuhnimhof et al., 2012). According to the survey conducted by the Japan Automobile Manufacturers Association,

E-mail address: [muromachi.y.aa@m.titech.ac.jp](mailto:muromachi.y.aa@m.titech.ac.jp)

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aside from the economic difficulties currently faced by most young adults, there are other factors that contribute to this trend (Japan Automobile Manufacturers Association, 2009). For example, concerns about the environmental damages which car use might cause, a shift toward ICT-based activities replacing car travel, practical difficulties in obtaining a driving license and maintaining a car, and the emergence of more competitive products such as smartphones might collectively have contributed to the trend. In addition, population migration has continued for more than 70 years in Japan from local cities where a car-dependent lifestyle is prevalent, to larger metropolitan areas such as Tokyo and Osaka where a lifestyle without a car is practicable because of the high quality of public transport services. This shift might contribute to molding the trend of less interest in car ownership and use by young adults. As persons born and raised in the metropolitan area, they are assumed to have experienced a less car-dependent lifestyle for a long time, especially when they went to elementary, middle and high schools by walk, bicycle, or public transport.

However, simple cross-sectional data are not sufficient for identifying the causal relationship between the prevalence of a less car-dependent lifestyle and young adults' experiences of school travel. Recently the life-oriented approach, motivated by a lack of sufficient evidence in the literature about the interrelationships across life domains, was proposed (Zhang, 2015; Zhang, 2017). Using the concepts of the life-oriented approach, Zhang et al. (2011) conducted a survey for investigating eight major life domains including "education and learning," where travel behavior was reported with respect to each domain. They found that for any life domain, variables in that domain were affected by the largest share of variables in the same domain; at the same time, they were also influenced by variables in some other specific domains.

It was also noted that the survey was conducted in the form of a mobility biography (Lanzendorf, 2003; Beige and Axhausen, 2012; Scheiner and Holz-Rau, 2013; Jones et al., 2014; Chatterjee and Scheiner, 2015), by which the history of life choices are traced retrospectively according to the order of life events, and the hypothesis concerning the causal relationship between life events and behavioral changes in the life domains can potentially be tested. The mobility biography enables collection of information from respondents at a particular time when life decisions constrain decisions on travel behavior; as time goes on, travel behavior may gradually influence life decisions. This is the case for the relationship between experiences of past school travel modes by university students and their intention to make a future car purchase. Past school travel, and especially choice of travel mode to elementary school may be one of the earliest cases of travel young adults experience; while the choice itself may be made by the parents or caregivers, later it is likely to mold initial attitudes toward the travel mode used as well as those which are not used. In this regard, we studied the relationship between university students' experiences of past school travel-mode choices and their intentions of making a future car purchase by conducting a retrospective survey on their past choices of school travel modes.

The objectives of this study are to investigate whether past school and general-purpose travels affect a university student's intention to purchase a car in the future and, if they do, to examine the effect of each travel mode on this intention. If the student's experience of school and general-purpose travels by public transport is found to affect his or her intention of future car purchase negatively, it partly proves that population migration from local cities to larger metropolitan areas, such as Tokyo and Osaka, where a car-less lifestyle is practicable, promotes a less car-dependent lifestyle among young adults. This is because it is possible that students born and raised in metropolitan areas have experienced a less car-dependent lifestyle during their elementary, middle, and high school years compared to their counterparts from local cities.

The remainder of the paper is organized as follows: after first positioning this study in the context of previous research on school travel from the perspective of the life-oriented approach, the data collection process that led to the data used for the analysis is discussed. We then report the results of the analysis and provide interpretations. These are followed by the major conclusions from the research.

## 2. Literature review

While Zhang (2015) discussed the life-oriented approach with respect to the influence of the household's car use on the children's future travel behavior and activity participation as well as health management, the literature on school travel from this perspective is quite limited. As Garling and Axhausen (2003) noted, the influence of the household's particular use of a travel mode may mold the children's travel behavior habits, and may break the habit partly or completely at the life event in the future. The life-oriented approach with a mobility biography can contribute considerably to understanding both habit molding and breaking during the course of a life.

In relation to school travel, Mitra (2013) reviewed transportation, urban planning, health and the environmental psychology literature to explore current understandings of school travel behavior, especially from the viewpoint of active school transportation in North America. Mitra (2013) and Mitra and Buliung (2015) discussed the difference in travel behavior between an adult and a child/youth (McMillan, 2007; Copperman and Bhat, 2010; Mitra et al., 2010b), and a child and a youth (Gilbert and O'Brien, 2010; Mitra and Buliung, 2015) including the definition of a walking-friendly built environment (McMillan, 2007; Mitra et al., 2010b; Timperio et al., 2006), and the decision processes that determine whether the child travels independently or is accompanied by an adult (Copperman and Bhat, 2010; McDonald, 2008; Mitra et al., 2010a). In relation to school travel-mode choice, a child's travel mode can often be influenced by a household's residential location choice, and may be influenced by the perceived convenience of travel modes (McMillan, 2007; Panter et al., 2010a).

According to Mitra (2013), some researchers in transportation/urban planning have adopted the activity-travel framework. Only a few have explored the influence of activity-travel constraints on active school travel because of the unavailabil-

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