



Factors associated with students' parking-pass purchase decisions: Evidence from an American University



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ARTICLE INFO

Article history:

Received 20 September 2014

Received in revised form

4 July 2015

Accepted 5 July 2015

Keywords:

Car use habits

Parking pass

Built-environment

Environmental beliefs

University students commuting

Gender

UNCG

ABSTRACT

The primary objective of this research is to provide an in-depth understanding about factors affecting university students' parking-pass purchase decisions by integrating concepts and variables developed in various disciplines. A sample of 2253 undergraduate students at the University of North Carolina at Greensboro (UNCG) collected through a web-based survey is used for this study. Results from cross-tabulation analysis and logistic regression indicate that parking-pass purchase decisions are largely determined by students' car ownership, daily car-use habits, and faster mobility needs despite viable alternatives. Conversely purchase decisions have little relation to gender, race/ethnicity, income, and environmental concerns. Holding a parking pass fulfilled students' aspirations seeking safety, reliability, flexibility, spontaneity, and mobility. Most importantly, socio-economic status and psychological motives of car use have the greatest magnitude of predicting parking-permit purchases, while the built environment where students live has a minor influence.

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1. Introduction

Concerns over climate change have brought consensus on reducing greenhouse gas (GHG) emissions on American college and university campuses (*American Colleges and Universities President's Climate Commitment (ACUPCC), 2007*). Acknowledging this responsibility, the University of North Carolina (UNC) system is mandated to be carbon neutral by AD 2050 (*McDonald, 2013*). Since transportation-related GHG emissions are currently the second largest contributor of a university's carbon footprint (*Bonham and Koth, 2010*), substantial measures have been adopted including alternative transportation to campus and no additional parking capacity for reducing the domination of auto-commuting. The expectation is that these measures will encourage students to switch their travel-mode choices away from single-passenger car drivers. However, these passive-approach policies have had limited success in changing university students' commuting behaviors (*Miralles-Guasch and Domene, 2010*), suggesting intervention is required to make significant changes in transportation mode choices.

Previous studies (e.g., *Balsas, 2003; Shannon et al., 2006; Delmelle and Delmelle, 2012*) suggest parking permit possession is a critical factor for university students' travel-mode choice decisions. Hence, parking space reduction intervention strategy seems

to be the most effective to reduce car use as it is the case in Europe, yet there has been limited implementation of this strategy in the U.S. From a transportation-equity perspective, reducing parking space capacity is an ineffective strategy, unless adequate alternatives are provided. Raising parking prices has also been proposed to change travel-mode choices from cars. However, the effectiveness of this program is low (*Shiftan and Golani, 2005; Watters et al., 2006*) and even may have negative consequences (*Shiftan and Burd-Eden, 2001*) as higher parking prices may be a factor in students' decisions on which university to attend. Therefore, if parking scarcity was among the challenging issues that many university campuses across the U.S. faced in the last quarter of 20th century (*Shoup, 2005*), a challenging task in the 21st century at American universities will be reducing on-campus parking spaces.

An in-depth understanding about the factors influencing students' parking-pass purchase decisions is necessary to implement successful measures for reducing campus parking space. Ignoring this issue is worrisome since successful implementation of modal switch seems to be influenced by the availability of campus parking spaces (*Shoup, 2005*). Thus, the primary objective of this research is to evaluate factors that increase the odds of parking-pass purchase decisions among university students by integrating concepts and variables developed for explaining car-use behaviors in multiple disciplines. While numbers of previous research have investigated the effect of availability of parking spaces and prices

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on car use (e.g., [Shiftan and Burd-Eden, 2001](#); [Shiftan and Golani, 2005](#)), this research evaluates how parking-permit purchase decisions are impacted by a suite of factors including socio-economic and demographic, built environment, psychological (e.g., perceived mobility necessity needs, instrumental or symbolic-affective motives), habitual, and environmental beliefs based on data collected at the University of North Carolina at Greensboro (UNCG).

2. Literature review

There is a paucity of research for understanding university students' parking-pass purchase decisions. Though various disciplines including geography, transport and urban studies, social psychology, environmental science, and economics have tried to isolate the motive(s) of car use based on disciplinary perspective, the existing literature does not indicate whether car use and parking-pass purchase decisions are determined by the same factor(s). Thus, it is essential to discuss a complex combination of factors for reliance on cars for developing an appropriate conceptual framework of this research.

2.1. Urban form, parking policies and car use

There is consensus in the literature that low-density built environments with differing land uses and absent of sidewalks and bike lanes are the primary reasons for car use ([Sultana and Weber, 2007](#); [Ewing and Cervero, 2010](#)). Many university campuses have developed transportation-network facilities conducive to alternative-mode choices ([Balsas, 2003](#)), but a lack of similar off-campus facilities also may affect university students' commute-mode choices ([Miralles-Guasch and Domene, 2010](#)). Studies that identified obstacles for cycling on university campuses (e.g., [Shannon et al., 2006](#); [Bonham and Koth, 2010](#)) confirm that distance between homes to campus accounts for increased car use. As a result, distance is a crucial urban built environment factor for understanding, describing and predicting students' commuting mode choice.

Parking policies have traditionally been treated as exogenous variables regarding travel behavior research and only recently have been considered as critical factors related to travel-mode choice analysis ([Van Exel and Rietveld, 2009](#)). However, this topic has been gaining attention for managing car ownership and car use in Western Europe and to a lesser degree in the U.S.A. Using case studies of eight employers in Los Angeles, [Shoup \(2005\)](#) investigated how employer-provided parking affects employees' mode choices and found that free and low-priced parking increases workers' car use. Economic incentive programs such as "parking cash out" – where workers were paid the amount that their company subsidized for parking, if they chose not to drive to work – were successful and more effective than providing free-transit. Yet, this program was criticized for being long-term financially unfeasible and generally unappealing to higher income groups ([Shiftan and Golani, 2005](#); [Watters et al., 2006](#)).

A number of studies also identified that parking space availability and cost partially affect car ownerships and housing locations, and mode choices in household activities ([Habib et al., 2012](#); [Guo, 2013](#)). Free and available on street-parking encourages private car ownerships and car uses among households' found in a study based on New York City ([Guo, 2013](#)). Parking choice is a key factor nested within households' activity scheduling process in Montreal, Canada ([Habib et al., 2012](#)). University campuses with the highest number of parking spaces had the lowest percentages of non-motorized transportation; thus, reducing the availability of parking spaces and/or increasing prices leads to decreases in

automobile use in favor of switching to other more sustainable-mode choices ([Balsas, 2003](#)). A recent case study based on an American university revealed that holding a parking permit is the greatest predictor of the university students' commuting behavior ([Delmelle and Delmelle, 2012](#)). Some studies also identified that if parking prices become an affordability issue, students will consider switching transportation mode from cars ([Toor and Havlick, 2004](#); [Delmelle and Delmelle, 2012](#)). The case studies based on developed countries around the world reveal the same results: reducing availability of parking spaces and/or increasing prices leads to decreases in automobile use in favor of switching to other more sustainable-mode choices ([Shiftan et al., 2003](#); [Van Exel and Rietveld, 2009](#); [Kodransky and Hermann, 2011](#)).

2.2. Psychological and environmental values/attitudes and car use

Research from behavioral social psychology has identified psychological factors associated with car dependency including perceived mobility needs, instrumental-reasoned motives, and symbolic-affective motives ([Steg, 2005](#); [Lois and Lopez-Saez, 2009](#)). The instrumental-reasoned motives related to car use are speed, shorter travel times, flexibility, and convenience. Symbolic-affective motives are not explicitly studied as people are unlikely to admit that symbolic and affective aspects make car use more attractive. Symbolic values refer to the identity of a person such as social position, status, power, or expressing of one's self-identity ([Steg, 2005](#)). In contrast, affective motives refer to emotions evoked by driving a car such as feeling control of one's life and sense of freedom ([Steg, 2005](#)).

Individuals valuing cars as a higher mobility necessity use cars more often because they perceive alternative transportation modes as insufficient to meet their needs for flexibility and spontaneity. Thus, perceived mobility necessity can be more influential than actual mobility needs ([Haustein and Hunecke, 2007](#)). [Steg \(2005\)](#) examined the relative importance of symbolic affective as opposed to instrumental motives of car use by collecting data through a questionnaire survey in two cities in the Netherlands and concluded that car use fulfilled both the instrumental functions and symbolic and affective motives. [Lois and Lopez-Saez \(2009\)](#) concluded that neither mobility needs nor symbolic motivations have a direct effect on car use in Spain except when mediated by affective motivations. Thus, if a person scores high on car issues such as either speed and freedom or power and status, they are more inclined to use a car for daily travel if such appraisal caused positive affective experiences.

Daily transportation-mode choices are habitual and not always from the deliberation of alternative choices ([Bamberg and Schmidt, 2003](#); [Gardner and Abraham, 2007](#); [Haustein et al., 2009](#)). Based on a longitudinal study at the University of Giessen in Germany where prepaid bus tickets were given to the students as an intervention method, [Bamberg and Schmidt \(2003\)](#) found increased positive attitudes towards bus use and concluded that habitual mode-choice decision can be significantly altered by targeting one or more interventions. A meta-analysis that synthesized the findings of 23 studies also identified the strong effect of habit on car-use behavior ([Gardner and Abraham, 2007](#)). Researchers concluded that prior travel-mode choice contributes future travel behavior if circumstances remain stable ([Haustein et al., 2009](#); [Van Exel and Rietveld, 2009](#)).

Additional transportation research has included environmental attitudes to predict car use revealing that environmental value orientation is correlated with pro-environmental behavior and people's willingness to reduce car use ([Anable, 2005](#)). Other findings argued that despite environmentalists' positive attitudes towards the environment and favorable opinions towards alternative-transportation modes, these individuals do not necessarily

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