



# How time-use and transportation barriers limit on-campus participation of university students

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## ABSTRACT

Success in postsecondary education is related to the amount of time spent on campus. The more often students attend class and access on-campus learning resources, the better their grades and the lower their dropout rates. Despite the importance of on-campus participation in student outcomes, some students living in large cities face tremendous transportation and time-use barriers that make it difficult to spend more time on campus. Accordingly, the objective of this paper is to examine the mobility factors that prevent students from attending their campuses in the Greater Toronto Area (GTA). Specifically, we examine student disparities in barriers to participate based on where they live, their mobility options, as well as the time constraints of their daily activity patterns (e.g. part time work). Data is drawn from a 1-day travel survey of students across seven university campuses in the GTA. This is augmented with computationally derived transport accessibility factors. Multivariate logistic regression models are then employed to uncover the mobility-related determinants for a) if students feel commuting discourages them from travelling to campus; b) if students pick courses based on their commute; c) if commuting discourages students from participating in university organized activities; and d) how many days per week a student visits campus. The results of these models fuel a discussion of how to limit mobility-related barriers to postsecondary student participation.

## 1. Introduction

Time is a finite resource. The more time postsecondary students spend commuting or partaking in employment, the less time they have to attend class or study, limiting their academic potential (Tinto, 1993; Tinto, 1999). Research on the deterrents of on-campus participation have focused on time-use factors like employment or taking care of family (Reay et al., 2002; Bozick, 2007). Yet in large metropolitan areas, transportation related factors, like limitations in accessibility and mobility, can be a barrier to activity participation (McCray and Brais, 2007; Lucas, 2012).

Accordingly, the objective of this paper is to uncover how both time-use and transportation related factors potentially limit students from travelling to campus, accessing on-campus educational resources, and participating in on-campus activities. Data is drawn from a 2015 travel survey of students across seven University campuses in the Greater Toronto Area (StudentMoveTO, 2015) and additional transport accessibility and transit level-of-service variables were derived via custom-built multi-modal network graphs. From the survey, the majority of students indicate that their commutes discourage them from travelling to campus and participating in on-campus organized

activities. Multivariate logistic regression models are employed to examine the factors affecting weekly commute frequency as well as the probability of a student responding yes or no to a series of questions of whether commutes discourage on-campus participation. Findings show that after controlling for socio-demographic and educational factors, durations of home-campus trips and employment hours per week have significant negative effect on how often students travel to and participate in activities on campus. This leads to policy recommendations directed at reducing these transportation barriers, including better scheduling of transit service at campuses, more affordable transit fares, encouraging active modes of transport, and decreasing the costs of on-campus housing.

The paper is outlined as follows: the first section provides background on how on-campus participation affects student outcomes, postsecondary student travel behaviour, and how transportation can be a barrier to activity participation; the second section outlines the data and study area; the third section provides description of the methodology and outputs of the analysis; and the fourth is a discussion of results with focus on how to limit mobility-related barriers to postsecondary student participation.

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## 2. Background

On-campus participation has been shown to be correlated with better grades and fewer drop-out rates (Tinto, 1993). The more time students are at campus, the more time they have to attend class, visit libraries, and access other on-campus educational resources. Furthermore, attending campus increases opportunity for building peer-networks, interacting with professors and other academic staff, and engaging in extra-curricular activities. These on-campus social activities can enrich learning and increase potential opportunities when entering the job market (Tinto, 1999). At a broader level, increased on-campus participation can improve the quality of University education in a region, result in a better prepared labour force, and a more educated population.

From a zero-sum perspective, time spent on campus can be limited by time spent doing other activities. The more time students spend at other non-campus oriented activities, the less time students have to attend class, study, and access on-campus learning resources (Bozick, 2007). Research on the deterrents of on-campus participation have focused on how time spent in activities like employment or taking care of family limit time spent on-campus. Postsecondary students typically do not have the qualifications for well-paying employment, and are usually in lower-income brackets. Many students need to partake in relatively low paying part-time work to fund their education. The increased time spent working limits the time directed towards education. In one study, Bozick (2007) analyzed a dataset of ten thousand first-year students across multiple postsecondary institutions in the United States and found that a lack of economic resources for some students results in them having to partake in more employment, limiting the time they can study and attend class, and increased the likelihood to drop out of school. In another study, Dwyer et al. (2013) used a longitudinal survey of youth in the United States and found that those who have compounded debt from tuition payments, and need to take employment to relieve their debt, have a greater risk of dropping out. Other research has examined the barriers to educational participation for students with greater household responsibilities. For example, Reay et al. (2002) conducted detailed interviews of mature students in London, U.K. and found that students who have increased household responsibilities, and in particular have dependent children, are more prone to dropping out of school because they have less time to focus on education. This is often compounded with the necessity of part-time employment to pay for education as well as the cost of living for more than one person (Reay et al., 2002).

Continuing from a zero-sum perspective, the time spent commuting could also limit participating in on-campus activities. Post-secondary students face their own specific transport related barriers that are different from other groups. University campuses are only located at certain locations and students thus have limited locational choice of where to go to school, and because of economic restrictions, many are limited in terms of their choice of housing as well as the mobility options available to them (Abercrombie, 1974; Bozick, 2007; Kamruzzaman et al., 2011). This can result in long commutes reducing time spent on-campus. This problem is potentially compounded for universities in large metro areas, since home-campus commutes can be longer, more expensive, and more stressful than universities in smaller towns. Moreover, schedules of postsecondary students are more flexible than high school students or traditional fixed-location employees. Postsecondary students have less mandatory in-class time, some freedom to select and structure their own timetables, and they can choose how much time to spend on campus and participate in extra-curricular activities, educational or social. On the one hand, this flexibility may provide students with the ability to juggle multiple demands on their time, precarious access to mobility tools, or long commutes, to enable participation in on-campus activities. On the other hand, we hypothesize that if students have poor access to their campuses, increased flexibility could potentially discourage students to visit campus

as participation is not usually mandatory, causing them to miss class, not access other optional on-campus educational resources, and limit them in building social networks.

In recent years, there has been an increase in transportation research focusing on the linkages between (in)accessibility, activity participation, and social exclusion (McCray and Brais, 2007; Lucas, 2012). Transport-related accessibility refers to the capability of a city to provide opportunities for interaction, including the exchange of information, goods, labour, and services. This includes access to postsecondary education. Accessibility varies by a number of factors like land use patterns, travel mode, time of day, and socioeconomic status (e.g. can someone afford to travel). From a time geography approach, a person's path and participation in activities throughout a day is structured by having to be at certain places at certain times, while potential movement and activity in the intermediary periods is limited to varying extents depending on available transport networks (Hägerstrand, 1970). Ample research has shown that activity participation can be constrained by social, spatial, and temporal accessibility restrictions (Cullen and Godson, 1975; Hanson, 1982; Miller, 1991). Low levels of accessibility can limit the opportunities available to people, deters participation, and can even foster social exclusion (McCray and Brais, 2007; Grengs, 2015). The social outcomes of transportation planning have increasingly become a pertinent objective for transport policy officials and researchers (Lucas, 2012; Martens, 2016). Certainly, completely equitable access is unattainable since space is never uniform in terms of its relative distance to location based opportunities. But good transportation policy, and good urban form more generally, should attempt to minimize accessibility inequalities, particularly if they exist along socioeconomic cleavages (Lynch, 1981; McCray and Brais, 2007).

Measuring access in urban systems is complicated by multiple travel modes, activity types, time constraints, and mobility options (Cullen and Godson, 1975). Accessibility is often analyzed using geographic information systems, and in particular, network analysis (Miller, 1999). These technologies can also be extended temporally to map and analyze urban accessibility to incorporate the inherent temporal variations in accessibility within transit schedules (Lei and Church, 2010). Increased capabilities in computation in recent years have facilitated minute-by-minute analysis of the temporal variations inherent in transit schedules, which can be used to compute measurements of average accessibility over certain time periods, like a morning commute (Owen and Levinson, 2015; Farber and Fu, 2017). This can also be extended to look at the attributes of a trip. For some people, transit trips can seem less desirable if they include multiple transfers or longer walking distances, even if the overall journey time is the same (Kittelson and Associates, 2003).

There have been several projects which have examined the travel behaviour of university students specifically. Several studies have focused on examining their mode choice behaviour, in particular analyzing the propensity of students to travel via active modes due to the costs associated with transit and driving (Shannon et al., 2006; Delmelle and Delmelle, 2012; Lundberg and Weber, 2014; Moniruzzaman and Farber, 2018). Fewer studies have focused on analyzing students' activity participation rates. An early approach was conducted by (Abercrombie (1974)), who examined the daily activity patterns of students in London, UK. Their analysis consisted of categorizing activities (e.g. school, work, shopping, leisure) and then examined how participation in these activities varied over the course of a day and for different demographic groups (Abercrombie, 1974). More recent studies have examined how distance to campus limits scholastic participation. A survey of over 100,000 students in the United States indicated that students who live on-campus are more likely to be engaged in some academic activities than students who commute (Kuh et al., 2001). In Canada, (Frenette (2004), Frenette (2006)) analyzed how proximity to Universities limits initial enrolment, particularly for students from lower income families, primarily because of the costs

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