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## Perception of barriers for the use of bicycles

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### Abstract

The objective of the research described in this article was to evaluate the perception of a group of individuals with respect to barriers that may hinder the use of bicycles for commuting. Data collection was carried out with 380 college students in three Brazilian cities. In order to assess the perception of barriers, a questionnaire, based on the dimensions of the Theory of Planned Behavior, was prepared. The selection of the barriers to be used in the survey was made after a review of several papers published in referenced periodicals and included: lack of cycling infrastructure, lack of safety, distance to be travelled, physical fitness, slopes and climate. The results show that the strongest perceived barrier (smallest behavioral control) in all three cities is the lack of dedicated cycling infrastructure. This result emphasizes how important an adequate cycling network is for encouraging and increasing the use of bicycles for commuting. The analysis of the size of cities versus the perceived behavioral control revealed that the larger the city the lower the level of behavioral control (stronger barriers).

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### 1. Introduction

In recent decades, the bicycle has played a more and more important role in transport policies due to its environmental benefits, both for traffic and for cyclists' health. It is a non-polluting, flexible, economical vehicle and a big booster for the user's health. The inclusion of bicycles as a regular mode of transport in urban

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displacements must be addressed considering the concept of Sustainable Urban Mobility (Brazilian Ministry of Cities, 2007).

From this perspective, the theme of sustainable mobility appears among the top concerns of public policies related to urban transport and should be integrated with other urban policies, with the ultimate goal of prioritizing the citizens and the fulfillment of their desires and needs, improving the general conditions of displacements in cities.

In this scenario, Brazilian Government Agencies, responsible for the urban planning and transport sectors, have played an important role in promoting sustainable urban mobility. Many cities are now investing in cycling projects, encouraged mainly by resources made available by the Ministry of Cities' Program Bicycle Brazil (Brazil, 2007). This program promotes the bicycle as a sustainable mode of transport, which helps reducing the number of motor vehicles in cities, preserving the environment, the health of the population and influencing the economy.

However, this government effort by itself may not be enough to ensure greater participation of the bicycle in the modal split of Brazilian cities. It is also necessary to identify the individual's perception about the barriers regarding the use of bicycles as a mode of transport. The literature presents a large set of factors that individuals may consider possible barriers to cycling, including: travel time, stress, too much traffic, perception of insecurity, lack of physical fitness, personal factors (e.g., lack of time), necessity of traveling at night, inconvenience, lack of adequate infrastructure for cyclists, climate factors and topography.

The success of policies and campaigns to reduce car use depends largely on understanding the factors that influence an individual's modal choice. Usually, however, the proposals to encourage the use of transit and non-motorized transportation, have been based on informal conceptualizations, designed without prior research and focused mostly in providing information about the negative consequences of using automobiles.

Such information is not generally sufficient to change behaviors. It has been already verified that the reason why an individual decides to use the automobile has little to do, for example, with their knowledge about the environmental impacts of the extensive use of cars (Anable, 2005; Abrahamse et al, 2009). Indeed, it has been found that there is a complex interaction between many factors when an individual makes a choice: beliefs, values, emotions, attitudes and other personal characteristics (Bamberg et al, 2003; Chen and Chau, 2011).

In many countries, where bicycles are more frequently used, the university students are one of the groups of people who use bicycles more frequently. This does not happen in Brazil where most students use cars for commuting to college.

What encouragements would make Brazilian university students commute to college by bicycle? What are the obstacles they perceive not to adopt this mode of transport? For the bicycle to be more frequently used, it is necessary to understand their perceptions of the barriers and obstacles that prevent cycling.

Several models which have been proposed to analyze the complex interaction between the individuals' behavior and their personal characteristics are based on the Theory of Planned Behavior (Ajzen, 1991). Willis et al (2013) present a comprehensive review of the use of this theory in studies related to cycling.

In this context, the objective of this paper is to describe a survey that has been developed with a sample of students of public colleges in Brazilian medium-sized cities, in order to identify the barriers that may hinder the use of bicycles as a mode of transport, using the constructs of the Theory of Planned Behavior.

## 2. The Theory of Planned Behavior

The Theory of Planned Behavior (TPB) is one of the most important theories concerning the investigation of human behavior. It was proposed by social psychologist Icek Ajzen in 1985. TPB has been widely used and has shown good results for research in several areas of knowledge, including transportation.

This theory argues that a behavior is determined by the intention to adopt the behavior, which depends on a value judgment based on beliefs that the individual possesses (Ajzen, 1985).

The intention plays a key role in the TPB, because it assembles the motivational elements that influence behavior. The intention indicates how much the individual is willing to try and how much effort he is willing to make in order to perform an action (Lopez Jr., 2004).

Three prior independent determinants comprise the intention: (1) The attitude toward the behavior (the individual's assessment of how beneficial the behavior can be), (2) Subjective norms, which correspond to the

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