



# Why do people like bicycling? Modeling affect toward bicycling

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## ABSTRACT

Studies show that the way an individual feels about bicycling – the degree to which they like bicycling – is an important predictor of whether or not they bicycle. But why do some people like bicycling and others don't? This study explores factors that may influence an individual's liking of bicycling, or more formally, their bicycling affect. We analyze a rich dataset from a cross-sectional survey of residents of six small U.S. cities using an ordered logit model. Results show that bicycling behavior has the strongest association with liking bicycling, with bicycling constraints following as the second most important factor. Individual cognitions, including perceptions and normative beliefs, also play important roles in predicting bicycling affect. Individual measures of the physical environment do not correlate with liking of bicycling, but the perception that biking to various destinations is safe does. Social environment factors influence liking of bicycling as well. Longitudinal research is needed to better understand the reciprocal relationship between bicycling affect and bicycling behavior as well as the effect over time of factors such as the physical environment. Nevertheless, this study offers an initial understanding of the potential determinants of bicycling affect that provides a starting point for further research as well as direction for the development of policies for getting more people on bicycles.

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## 1. Introduction

To encourage bicycling, states and metropolitan areas in the U.S. have allocated a significant proportion of their federal funding for improving the bicycling system over the last two decades (Handy & McCann, 2011). Even so, bicycling accounts for only 1.1% of all trips for all purposes according to 2009 National Household Travel Survey (NHTS) data, a much lower rate than in many European countries (Pucher & Buehler, 2008). Clearly, good infrastructure is not enough: while supportive bicycling infrastructure enhances the opportunity to bicycle, most people still choose not to bicycle. At the same time, good infrastructure is not always necessary: despite of a lack of good facilities, some people still bicycle regularly simply because they like bicycling (Gatersleben & Appleton, 2007).

Indeed, how an individual feels about bicycling – their affect toward bicycling – is an important predictor of whether or not they bicycle. One study shows that liking of bicycling is the most important factor in explaining bicycle ownership and regular use, at least in communities with good bicycle infrastructure to begin with (Handy, Xing, & Buehler, 2010); others show that liking of bicycling is also strongly associated with bicycling distances and the choice of bicycle commuting (Handy & Xing, 2010; Xing, Handy, & Mokhtarian, 2010). Differences in the extent to which people like bicycling may help to explain why bicycling shares are far higher in many European countries than they are in the U.S.

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What factors contribute to differences in affect toward bicycling is not entirely clear. Many Dutch, Danish, and German cities have programs to stimulate interest and enthusiasm for cycling among all age groups (Pucher & Buehler, 2008). While such programs are not as common in the U.S., communities with higher levels of bicycling, such as Davis, CA, Boulder, CO, and Portland, OR, have a shared culture of bicycling (Buehler & Handy, 2008; Pucher, Dill, & Handy, 2010) that may both reflect and foster individual liking of bicycling. Given the significant role of individual attitudes in explaining bicycling behavior, an understanding of the formation of attitudes toward bicycling is important. In particular, where does bicycling affect come from – why do some people like bicycling and others don't?

This study aims to address this question by exploring factors that may influence an individual's liking of bicycling. We review prior studies and relevant theory to develop a conceptual framework of factors influencing bicycling affect, categorized as individual, environmental, and behavioral factors. We analyze a rich dataset from a cross-sectional survey of residents of six small U.S. cities using an ordered logit model to explore which factors are most associated with liking of bicycling. The results offer insights into the potential determinants of bicycling affect that provide a starting point for further research as well as support for the development of policies for getting more people on bicycles.

## 2. Literature review and conceptual framework

Attitude is the mental evaluation of an object or concept. A widely accepted definition is that attitude has three elements: cognition, affect, and conation (Day, 1972). The cognitive element denotes a person's perceptions, specifically, their knowledge, opinions, beliefs, and thoughts about the object (Fishbein & Ajzen, 1975). It also includes normative beliefs, what a person or society thinks should be done (Fishbein & Ajzen, 1975). Normative beliefs differ from general cognitive beliefs in this way: the former refer to social or personal judgments with respect to the object, whereas the latter are perceptions of properties inherent to the object (often tangible aspects). The affective or feeling element of attitude reflects whether an individual likes or dislikes an object or concept (Day, 1972). Finally, the conative element refers to a person's intention: "The respondent's willingness or intention to do something with regard to the object of the attitude" (Sudman & Bradburn, 1982). Among the three elements, affect is regarded by most theorists as the core element of attitude although it derives from the cognitive element (Day, 1972). In our analysis, we focus on affect as the dependent variable and treat cognitive elements as explanatory variables.

Previous studies on bicycling have examined the importance of attitude in explaining intention to bicycle or bicycling behavior. Some treat cognitive and affect elements as separate influences (Handy & Xing, 2010; Milakis, 2014; Xing et al., 2010) while others treat them together as one explanatory factor (Dill, Mohr, & Ma, 2014; Fernández-Heredia, Monzón, & Jara-Díaz, 2014; Passafaro et al., 2014). For example, employing structural equations modeling, Dill et al. confirms that attitude, defined as a latent factor comprising both affect and cognitive elements (i.e. "I like riding a bike", "I prefer to bike rather than drive whenever possible", and "bicycling can sometimes be easier for me than driving"), plays an important role in explaining bicycling (Dill et al., 2014). Another study employed the same method to generate two latent attitudinal factors, "positive anticipated emotions" (happy, excited, glad, satisfied, self-assured, etc.) and "Negative anticipated emotions" (angry, strained, disappointed, etc.) associated with bicycling for daily travel in Rome (Passafaro et al., 2014). These studies provide insights into the nature of bicycling attitudes and their importance in explaining bicycling.

They also point to potential sources of bicycling affect. Passafaro et al. show that affect elements mediate the influences of cognitive elements on the desire to bicycle, thereby pointing to cognitions as a source of affect (Passafaro et al., 2014). Similarly, Dill et al. conclude that the built environment affects bicycling indirectly through its effect on attitudes, suggesting that the built environment is another potential source of bicycling affect (Dill et al., 2014). Two qualitative studies provide other insights about the sources of bicycling affect. A study using in-depth interviews about bicycling over the course of the participants' lives shows that attitudes towards bicycling evolve as children age, with attitudes in high school being an especially strong predictor of attitudes as an adult (Underwood, Handy, Paterniti, & Lee, 2014). A second study using the same set of in-depth interviews concluded that negative bicycling experiences do not have a strong influence on attitudes, but rather that attitudes have a strong influence on the response to negative experiences (Lee et al., 2015). These two studies suggest that bicycling affect may form early in life and remain relatively stable, and they also hint at a potential important effect of the social environment on bicycling affect, particularly for high school students. Work in other fields shows that social norms provide guidance on whether or not behaviors are approved of through perceptions of how other people are actually behaving, as well as expectations as to how an individual should behave (Perkins, 2002). It is possible that affect mediates between the social environment and behavior, just as it mediates between the physical environment and behavior.

Findings from travel behavior studies more generally provide direction for our conceptual framework by pointing to specific factors that may influence bicycling affect. Hartgen argued that the traveler's liking of a mode (i.e. affect) stems from his awareness and perceptions of the mode's attributes (i.e. cognition) (Hartgen, 1974). Dobson et al. show that affect for bus is a function of socio-demographics (number of driver's licenses in a household), cognition (perception of attributes and availability of bus service), and behavior (taking the bus) (Dobson, Dunbar, & Smith, 1978). Collantes and Mokhtarian offered a conceptual model in which affinity for travel, or travel liking, is influenced by objective mobility (measured in terms of frequency of trips, average trip distance, total distance traveled, and total travel time), subjective mobility (people's subjective assessments of their actual mobility), personality and lifestyle, travel constraints, and other travel attitudes (Collantes & Mokhtarian, 2002). A related study modeling affect toward travel showed that attitudes and personality are more important determinants of travel liking than objective travel amounts (Ory & Mokhtarian, 2005).

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