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Commute well-being differences by mode: Evidence from Portland, Oregon, USA

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ABSTRACT

To understand the impact of daily travel on personal and societal well-being, researchers are developing more sophisticated quantitative measures of travel satisfaction. Metrics related to Subjective Well-Being (SWB), defined as an evaluation of one's happiness or life satisfaction, hold promise for better evaluating health impacts of transportation and land-use policies. This article examines commute well-being, a multi-item measure of how one feels about the commute to work, and its associated factors. The measure was adapted from the Satisfaction with Travel Scale originated by [Ettema et al. \(2010\)](#). Data were collected from a web-based survey of workers ($n=828$) in Portland, Oregon, U.S.A. with four modal groups: walk, bicycle, transit and car users. With some modifications from previous research, this research confirms that the commute well-being scale reliably measures commute satisfaction. A multiple linear regression model shows that along with travel mode, traffic congestion, travel time, income, general health, attitudes about travel, job satisfaction and residential satisfaction also play important individual roles in shaping commute well-being. Results in this study add further evidence that people who bike and walk to work are happier with their commutes and are relatively unaffected by traffic congestion compared to bus and car commuters. The findings suggest opportunities for policymakers to more effectively market active transportation policies.

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1. Introduction

Transportation policy goals such as increasing mobility and reducing single occupancy vehicle trips and greenhouse gases do not often account for individuals' well-being explicitly. Because these goals also have limited appeal to the public, transportation research and planning could benefit from focusing more heavily on individuals' travel experiences, such as feelings of freedom, personal safety, and stress ([Gärling and Schuitema, 2007](#); [Anable and Gatersleben, 2005](#); [Ory and Mokhtarian, 2009](#)). These feelings and evaluations can affect people's lives. Commuting has been demonstrated to harm physical health and commute stress often carries over to work and home spheres ([Novaco and Gonzales, 2009](#)). Accounting for subjective well-being (SWB) in travel experiences can improve predictions of future mode choices and help policymakers evaluate positive and negative effects on health and well-being from these choices ([Abou Zeid, 2009](#); [Morris and Guerra, 2015](#)).

This article focuses on "commute well-being" (CWB), a multi-item measure of the experience of commuting to work, and what influences it. Empirical models are estimated that build on a growing body of work covering subjective well being (SWB), satisfaction with travel, and their connections to travel mode (see [De Vos, et al. \(2013\)](#) for a review). This study represents one of the first applications of CWB in the U.S., utilizing data gathered in winter 2012 from commuters who travel to work in central Portland, Oregon via car, public transit, bicycle, and walking. Due to relatively high commute mode shares for bike and transit in Portland (6 and 12 percent of commute trips, respectively, according to the U.S. Census American Community Survey 2009), Portland is a suitable testing ground for evaluating the impact of modes on CWB.

Based on results from previous survey research from Sweden, England, and Canada ([Friman et al., 2013](#), [Gatersleben and Uzzell, 2007](#), [Páez and Whalen, 2010](#)), it is hypothesized that active travelers (walk and bike commuters) have higher commute well-being than bus, rail

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or car commuters, controlling for other variables (i.e. age, income, gender, education, vehicle availability, job satisfaction, residential location satisfaction, and accessibility). *T*-tests, ANOVA and multiple linear regression analyses are used to test this hypothesis.

Subsequent sections are presented as follows: section two briefly presents the development of SWB/satisfaction with travel research in previous literature; section three discusses the data and methods used, including modifications of the CWB measure from previous research; section four presents a description of the sample, the acceptability of the CWB measure, and findings from model estimation results, and; section five offers conclusions and practical implications of the findings, noting limitations and suggestions for further research.

2. Theory

Levels of satisfaction and happiness can have important consequences for people's lives. A growing chorus argues that policies should focus on well-being, rather than economic indicators. Nobel-prize winning psychologist Daniel Kahneman (1999) maintains that SWB measurements could complement conventional tools for measuring benefits and losses in a variety of domains, and in policy analysis. Transportation planning and policy relies heavily on benefit-cost analysis that have sometimes neglected impacts on people (and natural systems) that are difficult to measure or monetize. Dora and Phillips (2000) argues that "Psychosocial variables should become an integral part of impact assessments. This can only happen once appropriate indicators have been identified and methods developed to measure and analyse them" (p. 29). Measurements of travel well-being could be important indicators for impact assessments. They could also provide a measure of livability, a concern for cities competing to attract investment and improve their communities. There are strong ideas developing about the role of pedestrian, bicycle and transit facilities in making communities more livable. However, a better understanding of this role in actual experiences (and decision-making processes) is needed in order to properly plan future facilities that enhance livability.

The theoretical framework of the relationships between travel and subjective well-being is adapted from Ettema et al. (2010) and subsequent work by Friman et al. (2013) and De Vos et al. (2013). Their work posits that travel affects well-being, positively and negatively, both through the activities accessed from travel (or not accessed, for some) and the actual travel itself. As mentioned above, people's "travel well-being" is made up of affective (i.e. emotional) and cognitive (i.e. evaluative) components. Their work draws partly on earlier work from Mokhtarian and Solomon (2001) who found that the experience of travel is sometimes valued positively, contrary to what is assumed in most regional travel demand models.

Further work enhanced this theory, noting that people's perceptions of modes affect how much they like travel. (Ory and Mokhtarian, 2009, p. 26). For example, some people simply enjoy bicycling more than others. One study found that those who cycle longer distances on their commutes have more positive attitudes towards bicycling than those who cycle shorter distances on their commutes (Heinen et al., 2011). Travel liking can affect people's mode choices for other trip purposes besides the commute. Schneider (2011) used a mixed logit model to analyze data from people traveling to, from, and within 20 San Francisco Bay Area shopping districts, also found that enjoyment of walking and biking significantly impacts people's choice of walking and bicycling. Additional research is needed to better understand how specific travel attributes affect travel well-being.

This study focuses on only a portion of Ettema et al.'s model, measuring travel well-being from commuting as opposed to other trip purposes. The model integrates the following relationships:

- Indicators of affective and cognitive dimensions of commute well-being;
- How sociodemographic characteristics, residential location, commute mode options and choices relate to well-being;
- How instrumental factors such as travel time, traffic congestion, and bus crowdedness affect commute well-being; and
- How attitudes about travel and commuting interact with mode choice to affect commute well-being.

The addition of measures of socio-demographics, travel preferences, accessibility, and mode choice offers a way to expand Ettema et al.'s (2010) conceptual model. To keep the focus on the above relationships, other relationships in the model, such as participation in activities accessed by travel and its relationships with personal growth, life purpose and life satisfaction are not examined (De Vos et al., 2013). This study focuses on commuting to just one activity - work. The relationship between commute satisfaction and life satisfaction is also beyond the scope of this article.

3. Material and Methods

The survey instrument was developed during fall 2011. Survey questions were developed independently and borrowed from other researchers. Borrowed measures included questions on travel well-being (Ettema et al., 2011) and attitudes and preferences about travel (Ory and Mokhtarian, 2005).

Commute well-being is a composite measure adapted from the Satisfaction with Travel Scale (STS) developed by Ettema et al. (2011) and uses seven questions that measure both affective responses to the commute (i.e. feelings during the commute) and cognitive responses (i.e. evaluations of the commute afterwards). Questions are structured according to the following statement: "Please select the box that best corresponds to your experience during the [most recent commute] trip. For example, if you were very tense, select the box for -3. If you were neither tense nor relaxed, select the box for 0. If you were relaxed, select the box for 3."

Several changes were made to the STS scale in Ettema et al. (2011) in order to simplify the measure and reduce respondent burden. Three questions were removed, two of which (confident/worried and especially alert/tired) did not fit well in other STS studies (Friman et al., 2013; Olsson et al., 2012; De Vos et al., 2015). The wording on four questions was slightly changed. One question related to enjoyment was added based on its theorized relevance to well-being and mode choice (Schneider, 2011). These changes were made following pre-testing of the survey instrument. In addition, while Ettema et al. distinguish between two types of affect (positive activation and positive deactivation) as well as a cognitive evaluation of travel, this study only distinguishes affective from cognitive evaluation items. This was done to simplify the commute well-being measure while retaining its two main dimensions: affective and cognitive. These changes correspond with De Vos et al.'s (2015) recommendations.

Data was collected via web-based surveys that were completed between January 16 and March 7, 2012. Participating organizations were recruited via phone calls and emails to personal contacts and employers (often HR managers) in central Portland. In this study, central Portland includes downtown Portland and a roughly one-mile perimeter that includes the adjacent Lloyd District, Pearl District, Old Town Chinatown, and Central Eastside. Most respondents were recruited via forwarded emails containing information on the study from contacts within their organizations. To increase representativeness of the sample, organizations from different sectors were contacted using the Portland Business Alliance directory. More than 50 organizations were contacted, usually through an email (see Appendix C) to office managers. Over 20 organizations from private, non-profit and public sector agencies

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