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Journal of Transport & Health

journal homepage: www.elsevier.com/locate/jth

The effect of mobility loss and car ownership on the feeling of depression, happiness, and loneliness

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ARTICLE INFO

Article history:

Received 17 October 2016

Received in revised form

12 November 2016

Accepted 21 November 2016

ABSTRACT

With the conjecture that mobility is affected by both personal impairments and automobile access, this paper examined how difficulty walking, difficulty climbing stairs, and automobile ownership affect subjective wellbeing. Subjective wellbeing was defined by three variables: feeling depressed, feeling happy, and feeling lonely. Data from Americans' Changing Lives, a nationally representative longitudinal survey, were used. The 1st wave in 1986 collected data from 3,617 adults aged 25 and over, and the 5th wave in 2011 collected data from 1,427 persons from the same sample. The data from the waves were pooled and generalized mixed logit models were used to examine the temporal and cross-sectional effects of mobility difficulties on the three subjective wellbeing variables. Separate Heckman probit models were used to examine the effect of automobile ownership. The logit models showed clear evidence of an adverse effect of walking difficulty on depression and happiness, but they showed no effect on loneliness. Climbing difficulty had an effect on depression only in the cross-sectional model and it had no effect on happiness in any model. However, the variable was found to have a highly significant adverse effect on loneliness. The Heckman probit models showed a significant inverse effect of automobile ownership on feeling depressed, but no effect on happiness or loneliness. The study concluded that automobile ownership may have a modest positive effect on persons with walking difficulty.

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1. Introduction

The relation between mobility and subjective or psychological wellbeing has been examined by a number of studies throughout much of the western world using varying datasets and analytical methods. Virtually all studies discussed in the literature review of this paper concluded that understanding the relationship between mobility and subjective wellbeing is important for the longevity and overall health of individuals. Understanding the relationship is particularly important in aging societies like the United States, where mobility loss due to age-related impairments and driving cessation at old age has become a great concern.

In light of the emphasis in past studies about the importance of understanding the relationship between mobility and subjective wellbeing, this study empirically examines how personal mobility affects the feelings of depression, happiness, and loneliness. Considering the importance of the automobile in providing mobility, it also examines how automobile

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<http://dx.doi.org/10.1016/j.jth.2016.11.005>

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Please cite this article as: Deka, D., The effect of mobility loss and car ownership on the feeling of depression, happiness, and loneliness. *Journal of Transport & Health* (2016), <http://dx.doi.org/10.1016/j.jth.2016.11.005>

ownership affects subjective wellbeing. Three variables of mobility are analyzed: (a) the ability to walk a few blocks, (b) the ability to climb stairs, and (c) household automobile ownership. The selection of these three variables was partly dependent on the nature of the survey data used and partly dependent on the relevance of the variables to transportation modes. While walking by itself is a means for traveling short distances and the automobile is the most common travel mode in this country, climbing stairs continues to be an integral part of using fixed-route public transportation despite efforts to make stations and vehicles more accessible.

By using a nationally representative longitudinal survey dataset consisting of five waves, this study examines through two sets of generalized mixed logit models how mobility impairment affects the feelings of depression, happiness, and loneliness. The first set of models examines the relationships using a cohort approach, where the effect of change in mobility between five consecutive waves is examined with the hypothesis that the loss of mobility between waves adversely affects subjective wellbeing. The second set of models examines the relationships using a cross-sectional approach with pooled data from the five waves with the hypothesis that mobility difficulty at any given time adversely affects subjective wellbeing at that time. An additional Heckman probit model is used to examine the effect of automobile ownership on the feelings of depression, happiness, and loneliness with the hypothesis that having access to an automobile enhances subjective wellbeing.

Most studies discussed in the literature review on the relationship between mobility and subjective wellbeing focused on one of the three measures considered by this research. This paper contributes to the body of existing literature by modeling the effect of mobility on all three measures. The results show that people perceive the three measures differently and they are affected differently by different types of mobility difficulties. Another important attribute of the paper is that it presents results from both cohort and cross-sectional analyses and compares the results of the two approaches. Finally, it integrates the concerns in many driving cessation studies with the concerns in personal mobility studies and examines how the availability of an automobile affects subjective wellbeing of individuals, including those with personal mobility difficulties.

The remainder of this paper is divided into four sections. A review of literature on the relationship between mobility and subjective wellbeing and the role of automobile in providing mobility are discussed in [Section 2](#). The first subsection focuses on the subject matter of the studies, whereas the second subsection focuses on the methods used. A description of the data used in the current study is presented in [Section 3](#). The results of the cohort and cross-sectional models examining the effect of mobility impairment on subjective wellbeing are presented in the first two subsections of [Section 4](#), followed by the results of the Heckman probit model examining the effect of automobile ownership in the third subsection. The key findings are summarized and the pathways to improve related research are discussed in [Section 5](#).

2. Literature review

Mobility has been defined differently in different studies, but perhaps the most pertinent definition for this study was provided by [Webber et al. \(2010, p.443\)](#), where it was defined as “the ability to move oneself (e.g., by walking, by using assistive devices, or by using transportation) within community environments that expand from one’s home, to the neighborhood, and to regions beyond.” According to that study, when disabilities limit or prevent walking or climbing stairs, mobility is impaired in all spheres of life, whereas the lack of transportation reduces mobility by limiting participation in out of home activities. Mobility allows people to access places and people, provides exercise and psychological benefits, and allows participation in community activities ([Metz, 2000](#)). Thus the loss or deterioration of mobility can have an adverse effect on the overall wellbeing of people, including their state of mind.

2.1. Studies on mobility and subjective wellbeing

Since the studies that addressed the association between mobility and general welfare are too numerous, this review focuses on only those studies that addressed the association between mobility and depression, happiness, and loneliness. Although depression has a clinical overtone, it has been maintained in the literature that self-reported feeling of depression can be as important as clinical judgment ([Bruce, 2001](#)). Despite the assertion in some studies (e.g., [Bruce, 2001](#); [Lenze et al., 2001](#)) that the relation between physical mobility and depression is mutually reinforcing, past empirical studies almost always examined only unidirectional relationships, some examining the effect of depression on mobility difficulties and others examining the effect of mobility difficulties on depression. It appears from a review by [Mezuk et al. \(2011\)](#) that far more studies have examined the effect of mobility impairments on depression than examining the effect of depression on mobility impairments. [Penninx et al. \(1999\)](#) and [van Gool et al. \(2005\)](#) are examples of studies that found an effect of depression on physical mobility impairment. On the other hand, [Yang and George \(2005\)](#) and [Hirvensalo et al. \(2007\)](#) are examples of studies that found an effect of mobility impairment on depression. Other studies that examined the effect of physical activity and walking, such as [Simonsick et al. \(1999\)](#) and [Strawbridge et al. \(2002\)](#), also showed that having the ability and willingness to move can reduce the feeling of depression.

In addition to the studies that addressed the relationship between physical mobility and depression, some studies in the context of driving cessation also examined the relationship between mobility loss and depression. [Marottoli et al. \(1997\)](#), [Marottoli et al. \(2000\)](#), [Ragland et al. \(2005\)](#), [Windsor et al. \(2007\)](#), and [Edwards et al. \(2009\)](#) are some examples. Except for [Edwards et al. \(2009\)](#), the other studies found strong statistical evidence of an adverse effect of mobility loss due to driving

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