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Affective–symbolic and instrumental–independence psychological motives mediating effects of socio-demographic variables on daily car use

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ABSTRACT

An empirical study investigates the extent to which affective–symbolic and instrumental–independence psychological motives mediate effects of socio-demographic variables on daily car use in Sweden. Questionnaire data from a mail survey to 1134 car users collected in 2007 were used to assess the relationships daily car use as driver or passenger have to sex, household type (single or cohabiting with or without children), and residential area (urban, semi-rural or rural). Reliable measures of affective–symbolic and instrumental–independence motives were constructed. The results show that households with children use the car more than households with no children, that men make more car trips as drivers than women who use the car as passenger more than men, and that households living in rural areas use the car more than households living in semi-rural areas who use the car more than households living in urban areas. An affective–symbolic motive partially mediates the relationship between the number of weekly car trips and sex, the instrumental–independence motive partially mediates the relationships between weekly car use and percent car use as driver and several of the socio-demographic variables (living in urban vs. rural residential area for both measures; sex and living in urban vs. semi-rural residential area for percent car use as driver). Of several other socio-demographic variables (age, employment, and income) affecting car use, only the relationship of the number of cars to percent car use as driver was (partially) mediated by the instrumental–independence motive.

1. Introduction

In the industrialised world the private car is the primary mode of daily travel for a majority of people. This was not the case half a century ago. The forces behind increasing car use are many. At a societal level, increasing mobility is associated with technological development, economic growth, and positive social change. At the individual level, these changes interact with psychological motives resulting in strong individual preferences for cars and car use.

There is a general consensus that car use needs to be reduced in the face of negative impacts on the human environment (Gärling and Steg, 2007), the societal and human costs of traffic accidents (Groeger and Rothengatter, 1998), and the growing health problems caused by car-related sedentary life styles (Dora and Phillips, 2000). Still, the car is difficult to replace because of its many beneficial effects for people, such as comfort and door-to-door flexibility. For many people driving is also in itself a positive and enjoyable activity (Gatersleben, 2007; Mokhtarian, 2005).

Car use depends on access to a car and increases with the number of cars in a household (Gärling and Loukopoulos, 2007). Car use is also related to several socio-demographic variables. It is higher among households in rural areas than among households in urban areas (Stradling, 2007), higher among households with children than households without children (Polk, 2004), and increases with income and employment (Dargay and Hanly, 2007). Men furthermore drive more than women (Polk, 1998, 2004).

Three complementary approaches explaining travel are discernible in transport research. In one approach pioneered by geographers (e.g. Hanson and Schwab, 1995), the focus is on objective descriptions of activity/travel patterns. Structural determinants of these activity/travel patterns are examined, including socio-demographic variables. A second approach emanates from disaggregate travel choice modeling (Ben-Akiva and Lerman, 1985; McFadden, 2001). Its goal is to understand how activity/travel patterns are determined by the *travel choices* made by people in different socio-demographic strata. Consequently, it is believed that the effects of socio-demographic variables need an explanation. A third

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approach (Hagman, 2003) goes further in its attempts at identifying explanations for travel. Its goal is to find *psychological motives* for the travel choices people make.

In line with the last approach, the aim of the present research is to investigate whether psychological motives account for the effects of socio-demographic variables on daily car use. It is assumed, consistent with the second approach, that choices of car use mediate the effects of the socio-demographic variables on car use. These effects should then also be mediated by psychological motives which determine choices of car use.

Previous research has documented two types of psychological motives for car use. One motive is referred to as *instrumental* and is related to travel time, costs, physical effort, and flexibility. Another motive is referred to as *affective–symbolic*, focusing on the affective and symbolic outcomes of driving, such as enjoyment, feelings of status, stress, autonomy, and safety (Anable and Gatersleben, 2005; Jakobsson, 2007; Steg et al., 2001). While some previous studies have succeeded in empirically distinguishing between these motives (e.g. Steg, 2005), other studies suggest that the affective and instrumental motives for car use are not possible to distinguish (e.g. Mann and Abraham, 2006). In a review of previous research, Gatersleben (2007) also posited a third motive referred to as *feelings of independence* found to be related to the positive experiences of using the car.

In accordance with previous research on psychological motives and car use (e.g. Steg, 2005), *affective–symbolic* motives are expected to be more influential on car use among frequent car drivers than *instrumental* and *independence* motives. The latter two motives may play a more important role for car use in rural areas and for multi-person households with children but a weaker role for members of younger, urban, or single households. Despite such expectations inferred from previous research, there is no extant theory from which explicit hypotheses can be derived, except the general hypothesis that psychological motives, due to their effects on choices of car use, mediate the relationship between car use and socio-demographic variables.

The specific aim of the present study is thus to determine whether the psychological motives for car use mediate the relationships between car use and such socio-demographic variables that are known to affect car use. Both measures of car use and motives for car use are obtained from questions in a mail survey conducted in Sweden where car access is high (Swedish Institute for Transport and Communications Analysis, 2007). In the Swedish population 82% men and 70% women have access to one or more cars. A car is used at least once a week by 90% of the households, and for 64% of the total distance travelled the car is the primary travel mode.

2. Methods

Between October and November 2007 a questionnaire was mailed to a sample of 3000 Swedish residents consisting of approximately 1000 randomly selected from each of metropolitan areas with more than 200,000 residents, semi-rural areas with between 20,000 and 200,000 residents, and rural areas with less than 20,000 residents. A total of 1332 usable questionnaires were obtained (representing a response rate of 44.4%). Respondents were selected for the analyses if they stated in the questionnaire that they have a driving license and access to a car. This resulted in a sample of 1134 respondents. A description of the sample is given in Table 1.

The questionnaire was sent by regular mail including a free-of-charge return envelope. It took about 15 min to answer. The respondents were offered the possibility of obtaining two lottery tickets in compensation for their participation. A combined thank-you and reminder card was sent after approximately 1 week giving respondents the option to answer the questionnaire via the web. About 5% of the usable questionnaires were obtained in this way.

The questionnaire comprised several modules covering also issues that will be reported elsewhere (Jakobsson Bergstad et al., submitted for publication-a,b). The modules providing the data for the present analyses consisted of (1) answers to 32 statements related to the, affective–symbolic, instrumental, and independence psychological motives for car use (adapted from Steg (2005), see Table 2) obtained on seven-point rating scales ranging from "totally disagree" (0) to "agree completely" (6), (2) questions about the frequency of performance of daily activities[1] and whether a car was used as a driver or passenger to travel to these activities,[2] and (3) questions about socio-demographic factors including sex, age, cohabiting status, presence of children, education, employment, income, number of cars, and annual driving distance.

3. Results

Table 2 displays means, standard deviations, skewness, and inter-correlations of the ratings of the motives. The conditions for performing a principal component analysis (PCA) were met in that some correlations were larger than .30, the Kaiser–Meyer–Oklin measure exceeded .60, and the Bartlett's test of sphericity was statistically significant ($p < .001$) (Hair et al., 2006). Two components were extracted in the PCA and submitted to an oblique (oblimin) rotation. The two components accounted for 41.5% of the total variance. After removing seven items with component loadings less than .30 or communalities less than .50, an additional PCA extracted two components explaining 46.8% of the variance. The component loadings after rotation are shown in Table 3. As may be seen, the first component loads on affective–symbolic motives, whereas the second component loads on both instrumental and independence motives for car use. A reliable scale of affective–symbolic motives were constructed by averaging across the ratings with high loadings ($\geqslant .54$, boldface in the table) only on the first component (Cronbach's $\alpha = .91$), and a reliable scale of instrumental–independence motives were constructed by averaging across the ratings with high loadings ($\geqslant .51$, boldface in the table) only on the second component (Cronbach's $\alpha = .87$).

In order to determine the effects of the socio-demographic variables on the measures of the affective–symbolic and the instrumental–independence motives, two OLS multiple linear regression analyses were performed (see Table 4). The independent variables were sex, age (36–54 years vs. 18–35 years and 55+ years vs. 18–35 years), having children or not, cohabiting or not, education (university degree vs. no university degree), employment (percent of full-time), income (coded 1–6), residential area (rural vs. urban and semi-rural vs. urban) and number of cars. In each analysis the motive not used as a dependent variable was entered as an independent variable in order to control for its influence on the other independent variables. Table 4 shows that several of the independent variables had a significant effect on both the symbolic–affective and instrumental–independence motives, accounting for 22% and 19% of the variance, respectively.

[1] These included the most frequently reported out-of-home activities in the Swedish national travel surveys including *work or study*; *purchases of non-durables*; *other purchases*; *participating in sports; exercise or outdoor activities*; *participating in out-of-home hobbies; religious, course or club activities*; *visiting relatives and friends*; *visiting restaurants; cafés or entertainment/cultural events*; *picking up or leaving children at school or day care centre*; and *participating in children's leisure activities*.

[2] For each activity respondents reported how many times during the previous week (never, one, two, three, four, five, or more than five times) they had travelled by car (as driver or passenger) or used any other travel mode with the purpose of performing the activity.