Transportation Research Part F 29 (2015) 121–130

Contents lists available at ScienceDirect

Transportation Research Part F

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

How satisfying is the Scale for Travel Satisfaction?

Jonas De Vos [a,*], Tim Schwanen [b], Veronique Van Acker [a,c], Frank Witlox [a]

[a] Geography Department, Ghent University, Belgium
[b] Transport Studies Unit, School of Geography and the Environment, University of Oxford, United Kingdom
[c] Centre for Urban Studies, University of Amsterdam, Netherlands

ARTICLE INFO

Article history:
Received 25 February 2014
Received in revised form 9 January 2015
Accepted 12 January 2015
Available online 20 February 2015

Keywords:
Travel satisfaction
Well-being
Transport mode
Reliability
Ghent
Belgium

ABSTRACT

The Satisfaction with Travel Scale (STS) has recently been developed to measure people's satisfaction with travel. It supposedly consists of two affective and one cognitive dimension. As there have only been a few tests of its reliability and structure to date, this paper reports new tests using data on leisure trips from Ghent (Belgium). Differences in the reliability and structure of the STS by transport mode – car, public transport, bicycling and walking – are also considered. Overall, the results suggest that the specification of a single underlying dimension for affect rather than two offers a superior fit to the Ghent data, both for all modes combined and for car use and cycling separately. For public transport and walking a three-dimensional structure is more appropriate although individuals items do not load on the two affective dimensions as expected. Differences between previous studies and ours are partly caused by differences in how two of the scale's items – alert/tired and confident/worried – are correlated with the other items. Future studies using the STS may want to adapt the structure of STS by omitting some items or replacing them with alternatives as this may reduce respondent burden and increase internal consistency of the STS.

1. Introduction

Well-being and travel satisfaction have recently attracted increased attention in transport-related research (De Vos, Schwanen, Van Acker, & Witlox, 2013). Over the past years authors have therefore developed scales to measure how people perceive their travel. The scale that has been applied most frequently to date is the Satisfaction with Travel Scale (STS). This is based on methods developed to measure subjective well-being (SWB) and was first used by Ettema et al. (2011). SWB is widely assumed to consist of two dimensions (Diener, Emmons, Larsen, & Griffen, 1985; Ettema, Gärling, Olsson, Friman, & Moerdijk, 2013; Ettema et al., 2011): affective well-being refers to an individual's emotional state (i.e., intensity, frequency, and duration of positive and negative affect), and cognitive well-being pertains to an individual's assessment of his/her life in general (i.e., a cognitive judgment of satisfaction with life as a whole). The STS is designed using similar dimensions as SWB and can therefore be seen as a domain-specific version of SWB.

In the STS the items measuring affective well-being (i.e., emotions) during travel are based on the Swedish Core Affect Scale (SCAS) (Västfjäll, Friman, Gärling, & Kleiner, 2002; Västfjäll & Gärling, 2007) and the core affect model by Russell (1980, 2003). According to the core affect approach, emotions can be decomposed into two underlying dimensions.

* Corresponding author at: Geography Department, Ghent University, Krijgslaan 281 S8, B-9000 Ghent, Belgium. Tel.: +32 9 264 45 55.
E-mail addresses: jonas.devos@ugent.be (J. De Vos), tim.schwanen@ouce.ox.ac.uk (T. Schwanen), V.vanAcker@uva.nl, veronique.vanacker@ugent.be (V. Van Acker), frank.witlox@ugent.be (F. Witlox).

http://dx.doi.org/10.1016/j.trf.2015.01.007
1369-8478/

Activation refers to the extent of arousal by environmental cues and varies from *activated* to *deactivated*. The second dimension is called valence and measures the extent of pleasure a person experiences; it ranges from *positive* to *negative*. Like the SCAS, the STS uses two sets of three adjective pairs to measure the intensity, frequency and duration of positive and negative feelings during a trip. The two sets are specific combinations of valence and activation – i.e., positive activation/negative deactivation and positive deactivation/negative activation – and the respective adjective pairs are *enthusiastic*/*bored*, *engaged*/*fed up* and *alert*/*tired*, and *calm*/*stressed*, *confident*/*worried* and *relaxed*/*hurried*. The cognitive part of travel satisfaction is measured in the STS through a set of adverse statements regarding the trip made (i.e., *travel was the best*/*worst I can think of*, *Travel was high*/*low standard* and *travel worked out*/*did not work out well*).

Although the core affect approach has strong roots in psychological research (e.g., Yik, Russel, & Steiger, 2011), not all scales try to measure the affective aspects of well-being by using the affect circumplex defined by a valence and activation dimension (Ettema et al., 2011; Russell, 1980, 2003). Since it is commonly assumed that the affective component of (hedonic) well-being consists of the presence of positive feelings and the absence of negative feelings (see, for instance, Diener, 2009), it could be argued that valence (ranging from negative to positive) is a more important dimension than activation (ranging from deactivation to activation) when measuring affective well-being. This train of thought has resulted in scales measuring the affective component of well-being by only using valence and not activation, including the commonly used Positive and Negative Affect Scale (PANAS) (Watson, Clark, & Tellegen, 1988) and the more recent Scale of Positive and Negative Experience (SPANE) (Diener et al., 2010). It is therefore interesting to analyse the STS-items measuring affect during travel and see whether a subdivision of affects along the two constitutive dimensions of the affect circumplex is appropriate, or whether an alternative, such as combining all affective items into one dimension of valence, is more applicable.

So far studies have computed STS scores by averaging the scores across individual items for the three dimensions of positive activation/negative deactivation, positive deactivation/negative activation, and cognitive evaluation (Ettema, Friman, Gärling, Olsson, & Fujii, 2012; Ettema et al., 2011, 2013; Friman, Fujii, Ettema, Gärling, & Olsson, 2013; Olsson, Gärling, Ettema, Friman, & Fujii, 2013). Recently, Ettema et al. (2013) (using 256 Dutch car drivers), Friman et al. (2013) (using 951 residents from Stockholm, Göteborg and Malmö (Sweden)) and Olsson, Friman, Pareigis, and Edvardsson (2012) (using 1000 public transport users from Karlstad and Göteborg (Sweden)) have tested the reliability of the STS with two affective and one cognitive dimension, using values of Cronbach's alphas and structural equation modelling (i.e., confirmatory factor analyses). These studies state that STS consists of three underlying dimensions. Although Ettema et al. (2013) and Friman et al. (2013) state that travel satisfaction is measured adequately by the aforementioned nine items, Olsson et al. (2012) suggests excluding two of the nine items from STS. Friman et al. (2013) have also analysed whether the structure of STS's underlying dimensions varies according to transport mode used, and their analysis on data from Stockholm, Göteborg and Malmö suggests this not to be the case.

Further tests on the underlying structure and reliability of the STS using different data are nonetheless desirable. Doing so, we will test whether dividing the affective dimension of STS in two sub dimensions (according to valence and activation) is the best choice, or whether other alternatives such as combining all affective components in one dimension (varying according to valence) is more appropriate. Not only is the STS likely to be used increasingly given the increasing interest in travel satisfaction among transport researchers; the original formulation also consists of nine items, which means a sizable burden for individual respondents. If the STS is embedded in a much broader (travel behaviour) study, or if satisfaction is measured for different types of trips in one and the same survey, then respondent burden is likely to be an issue. The possibility to reduce the length of STS should therefore be considered carefully. In this study we will test the reliability and analyse the underlying dimensions of the STS using Cronbach's alphas, correlation matrices and factor analyses for leisure trips in Ghent, Belgium. Given the considerable interest in the relationship between travel satisfaction and transport mode used, we will also consider whether the structure of the STS differs by mode of transport (car, public transport, bicycle, walking). The focus on travel satisfaction by transport mode follows from the observation in previous studies that the use of specific modes is amongst the strongest differentiators in the level of travel satisfaction. Various studies have shown that active travel generates the highest levels of travel satisfaction, while public transport users' experience is most negative (Abou-Zeid, 2009; De Vos, Mokhtarian, Schwanen, Van Acker, & Witlox, 2015; Duarte et al., 2010; Ettema et al., 2011; Friman et al., 2013; Olsson et al., 2013). Various studies have also indicated that other aspects of travel behaviour are associated with the level of travel satisfaction (De Vos et al., 2013; Ettema, Gärling, Olsson, & Friman, 2010). These include trip duration (Ettema et al., 2012; see also Stutzer & Frey, 2008); the activities people perform during a trip (Ettema et al., 2013); and the environmental conditions in which travel is undertaken. Unexpected events (delays), cleanliness, safety and social interaction affect satisfaction with public transport trips, while crowdedness and presence of trees/flowers are known to influence satisfaction with walking trips and levels of safety and congestion satisfaction with car trips (Ettema et al., 2013; see also Friman, Edvardsson, & Gärling, 1998, 2001; Stradling, Anable, & Carreno, 2007).

2. Data

Data from an Internet survey on travel satisfaction, residential location choice and well-being are employed. We stratified Ghent's total population based on residential neighbourhood so that we can examine differences in travel behaviour, travel experience and so forth between people living in urban neighbourhoods and those in suburban neighbourhoods. Although not applicable to the current study, this distribution method makes it possible to use the residential neighbourhood as an