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How does travel affect emotional well-being and life satisfaction?

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ABSTRACT

Previous research has investigated satisfaction with work commutes. We extend this research by investigating whether satisfaction with all daily travel (including work commutes, school, leisure, and shopping trips) is related to life satisfaction and emotional well-being. A random sample of 367 participants was recruited from three urban areas in Sweden (Karlstad, Göteborg, and Stockholm) varying from a small (appr. 90,000 residents) through a medium (appr. 550,000 residents) to a large population size (appr. 925,000 residents). In a questionnaire the participants reported retrospectively their satisfaction with all daily travel, life satisfaction, and emotional well-being. Direct and indirect effects of travel satisfaction on life satisfaction and emotional well-being were analysed with PLS-SEM. Results showed that satisfaction with daily travel directly influences emotional well-being and both directly and indirectly life satisfaction. It is also found that driving and active modes have more positive effects than public transport.

1. Introduction

Subjective well-being has been investigated by a plethora of research in several different disciplines (Diener et al., 1999; Dolan et al., 2008). Evidence is accumulating that subjective well-being has important consequences for health, longevity, and success in life (Diener and Chan, 2011; Lyubomirski et al., 2005). It is therefore argued (Diener et al., 2009) that public health policies should be informed by research showing what factors influence subjective well-being.

In current research subjective well-being is measured both as an evaluation of satisfaction with life (referred to as a cognitive judgment of life satisfaction) and as emotional well-being (experienced positive versus negative moods or emotions). Although these measures are positively correlated, they partly assess independent aspects (Busseri and Sadava, 2011). Both satisfaction with life and emotional well-being are furthermore related to domain-specific satisfaction (Schimmack, 2008), including satisfaction with work, family life, and leisure (Pinquart and Silbereisen, 2010). Travel has been identified as potentially another domain-specific satisfaction which may affect subjective well-being (Ettema et al., 2010).

Previous research has theoretically and empirically aimed at explaining how everyday travel contributes to subjective well-being. Theoretically, it is assumed that travel enables activity participation that is instrumental for people to achieve important goals in their lives which increases life satisfaction (Ettema et al., 2010). Travel to work, school, and leisure activities are examples of journeys with different characteristics (e.g., travel mode, travel time, and cost) that in varying degrees facilitate activity participation. Some current research (see reviews in De Vos et al., 2013; Ettema et al., 2016) has empirically investigated and verified the relationship between satisfaction with travel and life satisfaction. But travel has also affective components (e.g., anger, stress, tension) (Ettema et al., 2010) which impact on emotional well-being. It is essential then that the influences of travel are jointly evaluated with respect to

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satisfaction with life and emotional well-being.

Our aim in the present study is to investigate the degree to which satisfaction with daily travel contributes to life satisfaction and emotional well-being. Previous research has predominantly focused on commutes to/from work (e.g., Hansson et al., 2011; Olsson et al., 2013; Stutzer and Frey, 2008). The work commute is also the most common type of travel. In Sweden where the present research is conducted, 48% of all trips are work commutes (RVU, 2015). Yet, if the aim is to study the effects of daily travel, other trips should also be included, as they will likewise impact on satisfaction with life and emotional well-being. For instance, in Sweden 32% of all daily travel are recreational trips (including visiting friends, participating in community activities, and patronizing cultural activities), 14% are service trips (e.g., medical care) or shopping trips, and 6% are unspecified trips (RVU, 2015).

Previous research has mainly investigated one of the subjective well-being dimensions at a time. In the present study we investigate the relation of satisfaction with daily travel to both life satisfaction and emotional well-being. Furthermore, we include not only work commutes but daily travel for all other purposes.

The remainder of the paper is organized as follows. After a conceptual analysis of satisfaction with travel, we review in two separate sections findings of studies of the influences of satisfaction with travel on life satisfaction and emotional well-being, respectively. We then report the empirical study that we conducted.

2. Previous research

2.1. Satisfaction with travel

Domain-specific satisfaction is defined as an evaluation of a particular life domain (Delhey, 2014). Similarly to subjective well-being (Diener, 1984; Diener et al., 1999; Diener and Suh, 1997; Kahneman, 1999) satisfaction with travel (which may be a domain-specific satisfaction) includes a cognitive evaluation as well affective evaluations. Consistent with Oliver's (2010) theory of consumer satisfaction, Friman et al. (2013) showed empirically that while a cognitive and two affective evaluations are distinguishable, they are correlated such that they form an overall construct of satisfaction with travel.

The cognitive evaluation is operationalized as a general evaluation of daily travel, independent of travel mode, focusing on quality, that is whether daily travel in general is the best possible, if it works well, and if it has a low or high standard (Friman et al., 2013). For travel by bicycle, factors influencing the cognitive evaluation include, for instance, urban form and travel distance (Heinen et al., 2010), road infrastructure (e.g., availability and quality of bicycle paths or bicycle lanes) (Hunt and Abraham, 2007), safety aspects and travel time (Wardman et al., 2007). For travel by car, cost is an important factor that can be decomposed into the costs of buying, owning, and driving a car (Steg, 2005). Also the functional quality of the car is important for many users. Important factors in public transport are related to ticketing, frequency, and reliability of the service (Redman et al., 2013). Satisfaction with travel time and distance to bus stops are often crucial for continued use of public transport services (Eriksson et al., 2008). With respect to socio-demographic factors, St-Louis et al. (2014) reported that older people experience higher satisfaction with travel in general (see also Böcker et al., 2015; Ettema et al., 2013). Furthermore, men experience higher satisfaction with active travel modes than women (Böcker et al., 2015; St-Louis et al., 2014).

Satisfaction with travel also depends on affective evaluations related to context-specific factors including various episodes or events that give rise to momentary affects (Friman, 2004; Kahneman et al., 2004). During bicycling feelings of relaxation and a sense of freedom are reported (Anable and Gatersleben, 2005). For travel by car, positive feelings like experiencing thrill, pleasure, and prestige have been observed but also negative feelings such as stress and aggressiveness (Steg et al., 2001). Feelings of excitement/enthusiasm, joy/happiness, stress/tension, fear, sadness, and anger have been reported among public transport users (Carreira et al., 2013). In agreement with the spectrum of feelings reported in previous research, Friman et al. (2013) posited that satisfaction with travel has two affective components ranging from positive activation (e.g. enthusiastic) to negative deactivation (e.g. bored) and from positive deactivation (e.g. calm) to negative activation (e.g. stressed). Several empirical studies confirm that these two dimensions satisfactorily capture the affect experienced during travel as reported retrospectively (e.g., De Vos et al., 2015; Ettema et al., 2013; Friman et al., 2013).

2.2. Satisfaction with travel and life satisfaction

The bulk of previous research has focused on life satisfaction related to work commuting. The results show that those who regularly travel to work are on average less satisfied with their lives compared to those who work from home in their main job (Office for National Statistics, 2014). These results have been explained differently. One explanation is that people spend too much time on travel. For instance, Stutzer and Frey (2008) showed that people with long commutes to and from work are systematically worse off and report significantly lower life satisfaction (also recently confirmed in a Swedish study by Hansson et al., 2011). The worst effects of commuting were associated with travel times lasting between 60 and 90 min. Another explanation is how people choose to travel. Several studies have shown that people who choose an active commute mode (walking and cycling) evaluate their life as more satisfactory than those who choose to travel by car (e.g. Gatersleben and Uzzell, 2007). A recent longitudinal study (Martin et al., 2014) showed that public transport users report higher life satisfaction over time than car users do. One explanation is that public transport use includes active elements, for instance walking back and forth to the bus stop.

Travel time does not need to be negative but can be filled with meaningful activities or involve social interactions contributing to positive and satisfying experiences (Mokhtarian, 2005). Also other components of the transportation system such as the number of departures or a fair price affect life satisfaction. Access is still another factor. Not being able to travel to attractive places leads to a

sense of alienation that has been found to negatively affect life satisfaction (Currie et al., 2007; Lucas, 2012). In particular for older people (aged 75 and older) a positive relationship has been observed between leisure travel and life satisfaction (Coughlin, 2001).

2.3. Satisfaction with travel and emotional well-being

Emotional well-being is defined as the balance of frequencies of positive and negative affect that people experience in their everyday lives (Diener and Suh, 1997). The affect experienced each time may be a less transient mood or an emotional response to an external event (Russell, 2003). No distinction is made when measuring emotional well-being retrospectively. Mood and emotional responses have been found to vary in two dimensions, a pleasantness-unpleasantness dimension labelled valence and an active–-passive dimension labelled activation (e.g., Russell, 1980, 2003).

Previous research has so far paid less attention to the relation between travel and emotional well-being. An exception is Olsson et al. (2013) who found that work commutes influence the balance of positive and negative affect. Yet, a recent study showed that travel only accounts for a few percent of the variance in daily mood (Morris and Guerra, 2015). A longitudinal study (Martin et al., 2014) showed that travelling by public transport is more beneficial for people's emotional well-being than driving. Feng and Boyle (2013) concluded that long travel time to work is associated with increased risk of mental distress. Jakobsson Bergstad et al. (2011) showed that in Sweden affect associated with out-of-home activities influenced both emotional well-being and life satisfaction, which also has been found in several other countries (in the US reported by Archer et al., 2012; in Canada reported by Spinney et al., 2009; and in Hong Kong reported by Schwanen and Wang, 2014). Friman et al. (2016) found that experiences of critical incidents (e.g., unexpected weather conditions, treatment by staff, and fellow passengers) during travel resulted in changes in mood immediately after travel.

3. The present study

The previous research reviewed above has shown that satisfaction with everyday travel to work is related to life satisfaction as well as to emotional well-being. A short-coming is that measures of life satisfaction and emotional well-being have never been obtained for the same sample reporting all their daily travel. In the present study we address this short-coming by measuring retrospectively in the same sample (i) satisfaction with all daily travel using the Satisfaction with Travel Scale (STS, Ettema et al., 2011; Friman et al., 2013), including both cognitive and affective evaluations, (ii) emotional well-being using mood scales derived from the Swedish Core Affect Scale (SCAS, Västfjäll et al., 2002; Västfjäll and Gärling, 2007), and (iii) life satisfaction using the Satisfaction with Life Scale (SWLS, Diener et al., 1985; Pavot and Diener, 1993). Based on previous findings we develop and test the conceptual model shown in Fig. 1 of how the different constructs are related to each other and to travel attributes and socio-demographic factors.

In accordance with previous research (e.g., Böcker et al., 2015; Eriksson et al., 2008; Redman et al., 2013; St-Louis et al., 2014), satisfaction with daily travel is expected to be directly influenced by travel attributes[1] and socio-demographic factors. Emotional well-being is known to be affected by many factors (Diener and Suh, 1997) and in line with previous research suggesting that satisfaction with daily travel is one factor influencing emotional well-being, our model (Fig. 1) posits a direct effect on emotional well-being of satisfaction with travel. Furthermore, it is posited that travel attributes and socio-demographic factors have indirect effects on emotional well-being through satisfaction with travel. In previous research life satisfaction has been shown to be directly related to socio-demographic factors, satisfaction with travel, and emotional well-being (Diener and Seligman, 2004; Pavot and Diener, 2008; Olsson et al., 2013).[2] Our conceptual model further posits that satisfaction with travel has both direct and indirect effects on life satisfaction through emotional well-being, and that socio-demographic factors have both direct and indirect effects on life satisfaction through satisfaction with travel and emotional well-being. Travel attributes, finally, are posited to have indirect effects on life satisfaction through satisfaction with travel and emotional well-being.

4. Method

4.1. Sample

A recruitment company contacted participants for a survey of their experience of the commute to work as measured in a questionnaire sent to smartphones. The results of this survey are reported in Friman et al. (2016). In the present paper we report data obtained from an independent web-based questionnaire mailed to participants from the smartphone study immediately after that they had completed that study.

Of approximately 4000 initially contacted by phone, 367 agreed to participate. Recruitment was made twice, of 210 participants

[1] Note that we only report data on travel mode.

[2] It may be and has been argued that a reverse causality exists in that people who are overall more satisfied with life are also for this reason more satisfied with different domains of life. Although Schimmack (2008) empirically refutes a simple "top-down" (life satisfaction causing domain satisfaction) model, he concludes that the evidence supports both "top-down" and "bottom-up" (life satisfaction caused by domain satisfaction) models. As we have argued, travel is one domain of life satisfaction and the reverse causality may apply. Our data do however not allow us to distinguish between the two directions of causality, only that they do not refute the direction we propose and test. De Vos (2017) performed an approximate test of causal direction on cross-sectional data concluding that satisfaction with travel has an indirect effect on life satisfaction, thus tentatively rejecting a reverse causality.

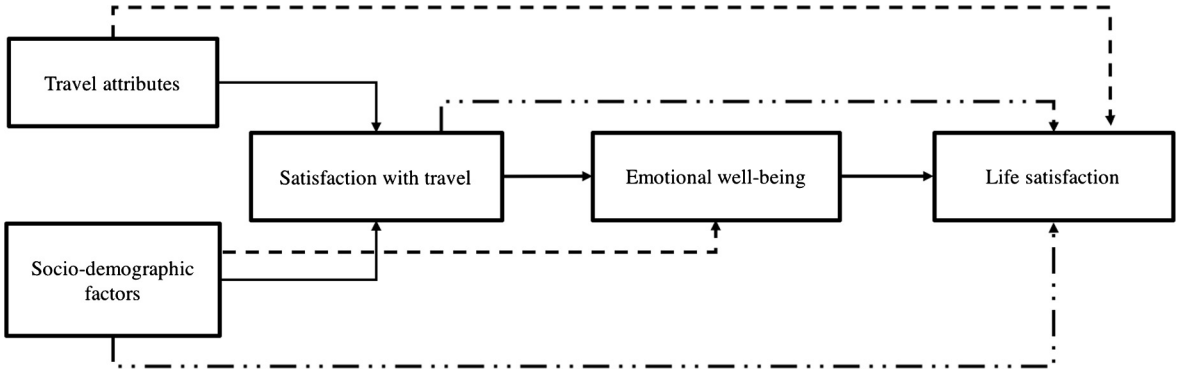

Fig. 1. Proposed direct effects (solid line), indirect effects (broken line), and both direct and indirect effects (broken and dotted line).

in late February 2014, and of another 157 participants in early June 2015. Approximately equal numbers were sampled for three urban areas in Sweden (Stockholm with a population of approximately 900,000 residents, Göteborg with a population of approximately 500,000 residents, and Karlstad with a population of approximately 90,000 residents). sex, and the primary modes of car, public transport, and cycling or walking. Sample descriptives are given in Table 1.

4.2. Procedure

The questionnaire consisted of questions about socio-demographic factors (age, sex, income, and household composition), as well as travel attributes (frequency of use of different travel modes per week). As described below, satisfaction with everyday travel, emotional well-being during the last month, and life satisfaction, were also reported.

Satisfaction with travel. Travel satisfaction was measured with the STS (Friman et al., 2013; Ettema et al., 2011) using three adjective scales for each of a cognitive evaluation (CE), an affective experience of enthusiasm versus boredom (Positive Affect and Negative Deactivation or PAND), and an affective experience of relaxation versus stress (Positive Deactivation and Negative Activation or PDNA). The question *"How would you describe your experience of your daily travel for all purposes?"* was answered by ratings of CE, PAND and PDNA on the three bipolar 7-point scales ranging from −3 to 3 with end-points defined by the adjective pairs shown in Table 2. Indexes were constructed by averaging (CE: Mean = 1.26; Standard Deviation = 0.98, Skewness = −0.41, α = 0.83; PAND: Mean = 0.37; Standard Deviation = 0.97, Skewness = 0.19, α = 0.78; PDNA: Mean = 0.99; Standard Deviation = 1.05, Skewness = −0.28, α = 0.79).

Table 1
Sample descriptive.

	Stockholm (Large)	Göteborg (Medium)	Karlstad (Small)	Mean
Number of participants	101	127	139	367[a]
Women (%)	68.3	60.6	60.4	62.7
Age in years (M/Sd)	42.4/11.2	41.8/12.0	39.4/12.4	41.0/12.0
Household composition (%)				
Single household without children	20.8	18.1	26.6	22.1
Single household with children	10.9	5.5	10.1	8.7
Cohabiting household without children	17.8	19.7	20.9	19.6
Cohabiting household with children	50.5	55.9	41.7	49.0
Missing (%)	–	0.8	0.7	0.5
Income (%)				
< 20,000[b]	9.9	13.4	22.3	15.8
20,000–24,999 SEK	5.0	8.7	18.0	11.2
25,000–29,999 SEK	18.8	21.3	26.6	22.7
30,000–34,999 SEK	19.8	22.0	12.2	17.8
35,000–39,999 SEK	16.8	16.5	5.8	12.6
≥40,000 < SEK	29.7	18.1	14.4	19.9
Missing (%)	–	–	0.7	0.3
Mode use (%)				
Car as main mode (driver and/or passenger)	17.8	31.7	33.6	28.1
Public transport as main mode (bus, tram, subway)	36.6	22.2	9.7	21.3
Active travel as main mode (walk/bicycle)	16.8	17.5	31.3	21.9
Combination of modes (multiple main modes)	29.7	27.8	25.4	27.0
Missing (%)	–	0.8	3.6	1.6

[a] Sums.
[b] SEK (Swedish Crowns) approximately equal to USD 0.125.

Table 2
Adjectives and corresponding dimensions for the nine bipolar items in the Satisfaction with Travel Scale. (Translated from the Swedish.)

Left end-point (−3)	Dimension	Right end-point (3)
Very stressed	PDNA	Very relaxed
Very bored	PAND	Very enthusiastic
Worked very poorly	CE	Worked very well
Very tired	PAND	Very alert
Held low standard	CE	Held high standard
Very worried	PDNA	Very calm
Very hurried	PDNA	Very confident
Worst imaginable	CE	Best imaginable
Very fed-up	PAND	Very engaged

Emotional well-being. Emotional well-being (EWB) during the last month was measured by asking participants to rate how frequently (never [0], rarely [1], sometimes [2], often [3], or very often [4]) they had felt different intensities (slightly, moderately or strongly) of four mood states defined as glad/joyful/pleased, sad/depressed/displeased, active/alert/awake, and passive/drowsy/sleepy (SCAS, Västfjäll et al., 2002; Västfjäll and Gärling, 2007). A valence index was constructed by multiplying the frequency ratings with intensity (1 for slightly, 2 for moderately, and 3 for very), then summing with opposite signs for glad/joyful/pleased and sad/depressed/displeased, and finally averaging (Mean = 9.16; Standard Deviation = 5.81, Skewness = −0.49). An analogous procedure was followed to construct an activation index (Mean = 5.61; Standard Deviation = 6.79, Skewness = −0.40).

Satisfaction with life. The SWLS (Diener et al., 1985; Pavot and Diener, 1993) was used to measure satisfaction with life. It consists of the following statements asking participants to indicate how much they agree to each on 7-point Likert-type scales ranging from *"Doesn't agree at all"* (−3) to *"Agree completely"* (3)*: "The conditions of my life are excellent," "In most ways my life is close to my ideal," "I am satisfied with my life," "So far I have gotten the important things I want in life,"* and *"If I could live life over, I would change almost nothing."* (Mean = 26.25; Standard Deviation = 5.01, Skewness = −0.69, α = 0.87).

4.3. Analyses

A set of OLS multiple linear regression analyses are first performed with the dependent variables STS, EWB, and SWLS and the sociodemographic variables, travel mode, urban area, and season as independent variables. These analyses are used to identify and exclude independent variables failing to have significant effects on the dependent variables. By doing this the statistical power would increase in the subsequent analysis. Since in this analysis the different components of STS and the emotional well-being were used as indicators of latent variables, it was also important to determine in the linear regression that the effects on these were the same. Second, the software SmartPLS 3.0 (Hair et al., 2016; Ringle et al., 2015) is used to estimate direct effects, indirect effects, and total effects implied by the conceptual model (Fig. 1). SmartPLS is a software package developed to estimate partial least-square structural equation models (PSL-SEM) in which linear composites of observed variables are proxies for latent variables (Henseler et al., 2015). PLS-SEM is a robust method to analyze small-sample data having non-normal distributions (Hair et al., 2012).

5. Results

5.1. Regression analyses

OLS multiple linear regression analyses with sociodemographic variables, travel modes, urban areas, and season as independent variables were performed for each of the three STS dimensions (CE, PAND, and PDNA), for the two EWB dimensions (valence and activation), and for SWLS. As can be seen in Table 3 (marked in bold face), age and travel mode are significant determinants of all constructs (STS, EWB and SWLS). For SWLS, being a woman, living together with someone, and the size of urban area are in addition significant. Neither having children, income or season (winter or spring) are significant. These three variables were therefore excluded from further analyses.

5.2. PLS-SEM analysis

Previous research has shown that the three dimensions of STS (CE, PAND, and PDNA) form an overall construct of travel satisfaction (Friman et al., 2013), and that activation and valence are dimensions of EWB that can be added to form a single dimension from pleasant activation to unpleasant deactivation (Västfjäll and Gärling, 2002). The preceding regression analyses also confirmed no important different effects of sociodemographic variables, travel modes, urban areas, and season. Before testing our model we therefore posited one latent STS-variable of the three manifest STS-dimensions and one latent EWB-variable of the activation and valence dimensions. The five items of SWLS have previously been shown to form one dimension (Diener et al., 1985) and therefore SWLS was posited to be a third latent variable. A requirement for accurate estimates of effects on the latent variables (STS, EWB, and SWLS) is that their reliability, convergent validity, and discriminant validity are acceptable. The Fornell-Larcker criterion and the

Table 3
OLS regression analyses of satisfaction with travel (STS), emotional well-being (EWB) and life satisfaction (SWLS) with sociodemographic, season, mode, and urban area as dependent variables.

	STS									EWB						SWLS		
	Bad vs good quality			Bored vs enthusiastic			Stressed vs relaxed			Valence			Activation					
	b	t	p	b	t	p	b	t	p	b	t	p	b	t	p	b	t	p
Sex	0.041	0.77	0.443	0.069	1.35	0.176	−0.067	−1.22	0.223	−0.012	−0.21	0.831	0.043	0.82	0.416	0.165	3.27	0.001
Age	**0.269**	**4.43**	**< 0.001**	**0.312**	**5.37**	**< 0.001**	**0.273**	**4.36**	**< 0.001**	**0.125**	**1.97**	**0.050**	**0.191**	**3.13**	**0.002**	**0.145**	**2.51**	**0.013**
Child	−0.020	−0.42	0.444	0.031	0.54	0.590	0.013	0.21	0.836	0.048	0.69	0.493	0.002	0.04	0.971	−0.036	−0.63	0.527
Cohabiting	−0.003	0.002	0.772	0.046	0.85	0.397	−0.003	−0.06	0.955	0.070	1.19	0.235	0.040	0.71	0.477	0.314	5.83	< 0.001
Income	−0.098	−0.60	0.509	−0.005	−0.08	0.938	−0.106	−1.53	0.126	−0.002	−0.02	0.982	0.116	1.72	0.086	0.087	1.36	0.175
Season	−0.026	−0.50	0.764	−0.005	−0.10	0.923	0.015	0.29	0.773	0.073	1.37	0.171	0.037	0.72	0.473	−0.027	−0.55	0.584
Multiple vs single modes	0.007	0.13	0.894	−0.033	−0.68	0.496	0.040	0.76	0.446	0.066	1.25	0.213	0.040	0.79	0.430	0.081	1.67	0.095
Active vs passive modes	**0.198**	**3.87**	**< 0.001**	**0.230**	**4.69**	**< 0.001**	**0.065**	**1.22**	**0.222**	**0.068**	**1.27**	**0.205**	**0.155**	**3.01**	**0.003**	**0.111**	**2.28**	**0.023**
Car vs public transport	**0.123**	**2.18**	**0.030**	**0.099**	**1.83**	**0.068**	**0.070**	**1.20**	**0.231**	**0.055**	**0.93**	**0.351**	**0.056**	**0.98**	**0.326**	**0.018**	**0.34**	**0.736**
Large vs other urban area	−0.052	−0.97	0.335	0.024	0.47	0.641	0.024	0.43	0.666	−0.065	−1.16	0.247	−0.018	0.33	0.744	−0.033	−0.64	0.524
Medium vs small urban area	−0.074	−1.43	0.154	−0.091	−1.82	0.070	−0.041	−0.77	0.444	0.029	0.54	0.588	−0.100	−1.92	0.056	−0.104	−2.01	0.037
Adj R^2	**0.110**			**0.184**			**0.049**			**0.034**			**0.101**			**0.188**		

Table 4
Composite Reliability (CR), Average Variance Extracted (AVE), Heterotrait-Monotrait correlation ratio (HTMT) (upper triangular matrix in italics), and product-moment correlations (lower triangular matrix) for the latent variables Satisfaction with Travel Scale (STS), Emotional Well-Being (EWB), and Satisfaction with Life Scale (SWLS).

Latent variable			HTMT/correlations		
	CR	AVE	STS	EWB	SWLS
STS	0.86	0.72		*0.59*	*0.47*
EWB	0.85	0.74	0.43		*0.60*
SWLS	0.91	0.66	0.39	0.44	

assessment of the cross-loadings commonly used for this purpose were recently shown by Henseler et al. (2015) to be insufficiently sensitive. In line with their recommendations for PLS-SEM, we therefore calculated heterotrait-monotrait correlation ratios (HTMT) between STS (with all the CE, PAND, and PDNA scales as indicators), EWB (with the valence and activation indexes as indicators), and SWLS (with all the five items as indicators). The results are shown in Table 4. The observed HTMT < 0.70 indicates that discriminant validity is acceptable. The table also shows composite reliability (acceptable value > 0.70), convergent validity (measured by Average Variance Extracted or AVE, with an acceptable value > 0.50), and product moment correlations between the three latent variables. Since reliability, convergent validity, and discriminant validity are satisfactory, we proceed to estimate direct, indirect, and total effects of the independent variables not excluded in the preliminary regression analyses.

After confirming that the construct measures were valid and reliable we assessed the significance of the path model relationships among the constructs by using a bootstrapping procedure with a resample size of 5000. The standardized root mean square residual (SRMR) (Henseler et al., 2015) were used to assess approximate model fit. The calculated value of 0.037 ($\pm$ 0.005) is well below the cut-off value of 0.080 (Hu and Bentler, 1999) indicating a good fit.

The full estimation results with the paths from the proposed conceptual model are given in Table 5. Fig. 2 displays the significant direct and indirect effects, as well as adjusted R^2 for the regression models. The results support the proposed conceptual model (Fig. 1) in that direct effects of age and mode on STS are significant, with age and active modes having positive coefficients, and public transport (PT) having a negative coefficient. STS also has an expected significant direct effect on EWB and indirect effects of age and mode on EWB through STS (positive for active modes and negative for PT). The expected direct effects of STS and EWB on SWLS are significant. Cohabiting and being a woman have significant direct effects on SWLS with positive signs. As expected, the indirect effect of STS on SWLS through EWB is significant.

6. Discussion

The present study aimed at investigating whether satisfaction with daily travel for multiple purposes influences both emotional well-being and life satisfaction. A model of these relationships was proposed and estimated using survey data obtained from users of different primary travel modes (active mode users, car users, and public transport users) in three different Swedish cities varying substantially in population size. The survey was launched during both winter and summer but no season effects were significant. Reliable and valid measures were obtained of satisfaction with travel (STS), emotional well-being (EWB), and life satisfaction (SWLS), and the estimated model fit were good. In the estimated model emotional well-being is directly related to satisfaction with travel and life satisfaction. Life satisfaction is directly and indirectly through emotional well-being related to satisfaction with travel. The direct effect may reflect the instrumental value of travel and the indirect effect how one feels during travel. This is consistent with the theoretical model presented in Ettema et al. (2010) and with previous findings obtained for work commutes (e.g., Olsson et al., 2013).

In line with previous subjective well-being research (Diener and Diener McGavran, 2008), we found that cohabiting people are more satisfied with their lives than people who are living on their own. In previous research sex differences in life satisfaction have usually not been observed (e.g., Myers and Diener, 1995), but we find that women have a higher life satisfaction than men. This may be explained by the contemporary trend toward gender equality that has been suggested to have a positive impact on women's subjective well-being (Inglehart, 2002). Contrary to many studies (Diener et al., 1999; Dolan et al., 2008), only indirect effects of age on life satisfaction are observed. We have no explanation for this.

It has previously been found that older people tend to be more satisfied with their daily travel than younger people (Böcker et al., 2015; Ettema et al., 2013; St-Louis et al., 2014). We confirm and extend this finding by showing that age has a direct effect on satisfaction with travel as well as an indirect effect on emotional well-being through satisfaction with travel and an indirect effect on life satisfaction through emotional well-being. This suggests that part of the direct and indirect effects of STS on SWLS is due to the fact that older people in our sample evaluate both their domain specific satisfaction (STS) and general well-being (EWB and SWLS) more positively.

Active travel (cycling or walking) has been found to have a more positive effect than passive travel (car or public transport) on satisfaction with daily travel (De Vos et al., 2013), emotional well-being (Morris and Guerra, 2015), and life satisfaction (Martin et al., 2014). Our results are consistent with these findings. Travel mode (both active versus passive modes and car versus public transport) has direct effects on satisfaction with travel, indirect effects on emotional well-being through satisfaction with travel, and indirect effects on life satisfaction through emotional well-being. These findings suggest that active travel has benefits that extend beyond the travel domain, and are therefore not accounted for by STS. These benefits thus have a direct bearing on EWB and SWLS

Table 5
Standardized estimates (β), 95% confidence intervals (CI), and *p* values for total, direct, and indirect effects of all paths in the PLS-SEM.

	STS			EWB			SWLS		
	β	± 95%CI	p	β	± 95%CI	p	β	± 95%CI	p
Total effects									
Cohabiting (No = 0, Yes = 1)	0.01	0.10	0.876	< 0.01	0.05	0.876	0.28	0.09	< **0.001**
Sex (man = 0, woman = 1)	0.04	0.09	0.460	0.02	0.03	0.467	0.15	0.09	**0.001**
Age	0.31	0.11	< **0.001**	0.14	0.06	< **0.001**	0.16	0.10	**0.002**
Large (2) vs Other urban area (Medium = −1, Small = −1)	−0.01	0.09	0.854	< −0.01	0.04	0.855	< −0.01	0.08	0.947
Medium (1) vs Small (−1) urban area	−0.09	0.09	0.058	−0.04	0.04	0.066	−0.10	0.09	**0.043**
Multiple (3) vs Single modes (Active = −1, Car = −1, PT = −1)	< −0.01	0.09	0.961	< −0.01	0.04	0.961	< −0.01	0.03	0.961
Active (2) vs Passive modes (Car = −1, PT = −1)	0.20	0.10	< **0.001**	0.09	0.05	< **0.001**	0.07	0.04	**0.001**
Car (1) vs PT (−1) modes	0.11	0.10	**0.030**	0.05	0.04	**0.033**	0.04	0.04	**0.043**
Satisfaction with Travel Scale (STS)				0.44	0.09	< **0.001**	0.35	0.09	< **0.001**
Emotional Well-Being (EWB)							0.31	0.10	< **0.001**
Direct effects									
Cohabiting (No = 0, Yes = 1)	0.01	0.10	0.876				0.28	0.09	< **0.001**
Sex (men = 0, women = 1)	0.04	0.09	0.460				0.14	0.08	**0.001**
Age	0.31	0.11	< **0.001**				0.05	0.09	0.348
Large (2) vs Other urban area (Medium = −1, Small = −1)	−0.01	0.09	0.854				< 0.01	0.08	0.993
Medium (1) vs Small (−1) urban area	−0.09	0.09	0.058				−0.07	0.08	0.145
Multiple (3) vs Single modes (Active = −1, Car = −1, PT = −1)	< −0.01	0.09	0.961						
Active (2) vs Passive modes (Car = −1, PT = −1)	0.20	0.10	< **0.001**						
Car (1) vs PT (−1) modes	0.11	0.10	**0.030**						
Satisfaction with Travel Scale (STS)				0.44	0.09	< **0.001**	0.21	0.09	< **0.001**
Emotional Well-Being (EWB)							0.31	0.10	< **0.001**
Indirect effects									
Cohabiting (No = 0, Yes = 1)				< 0.01	0.04	0.876	< 0.01	0.04	0.878
Sex (men = 0, women = 1)				0.02	0.04	0.467	0.01	0.03	0.458
Age				0.14	0.06	< **0.001**	0.11	0.05	< **0.001**
Large (2) vs Other urban area (Medium = −1, Small = −1)				< −0.01	0.04	0.855	< −0.01	0.04	0.856
Medium (1) vs Small (−1) urban area				−0.04	0.04	0.066	−0.03	0.03	0.069
Multiple (3) vs Single modes (Active = −1, Car = −1, PT = −1)				< −0.01	0.04	0.961	< −0.01	0.03	0.961
Active (2) vs Passive modes (Car = −1, PT = −1)				0.09	0.05	< **0.001**	0.07	0.04	**0.001**
Car (1) vs PT (−1) modes				0.05	0.04	**0.033**	0.04	0.04	**0.043**
Satisfaction with Travel Scale (STS)							0.14	0.05	< **0.001**

Note. PT is short for public transport.

and may include aspects like a better physical and mental health and place and community attachment.

Travel by car and active modes are more satisfying than travel by public transport. No significant effect of city is obtained. But why are car travel and active modes more attractive than public transport? A general assessment is that in all the cities public transport is well developed. However, in recent years the population has increased in Stockholm by 40,000 residents per year causing crowding in public transport. Approximately 60% of all disruptions in public transport (e.g., problems with signals and lack of priority lanes) are related to low infrastructure capacity. Göteborg and Stockholm have implemented road tolls but it is probably still beneficial to own and drive a car in these cities. A public housing programme implemented in Sweden during 1965–1974 ("the Million Programme") favors the car extensively. Residential neighborhoods in Karlstad, Göteborg, and Stockholm thus have parking lots accessible to the home while bus stops are often located further away making the car at a shorter walking distance an attractive alternative. The car is furthermore still very comfortable compared to public transport. These explanations are not in any way unique to Sweden but can be found in many other cities (e.g., Jeekel and Grieco, 2013).

Income, having children, and season had no significant effects. Income has generally less effect on life satisfaction than other factors in Sweden (Fors and Brülde, 2011) due to small income differences. Furthermore, there is in general no consistent finding for the effect of having children on life satisfaction (Pollmann-Schult, 2014). Season and travel behavior are found to be related in previous studies (see Böcker et al., 2015; Sabir et al., 2008; Liu et al., 2015), but less is known about seasonal effects and travel satisfaction or mood changes during travel. One possible explanation of our observed lack of effects is that season variations are less important than the daily weather (e.g., Denissen et al., 2008). Bad weather in the summer is as negative as bad weather in the winter according to this reasoning. Previous research has not focused on daily travel which is an important part of people's routines. Seasons may not have large impact on satisfaction with travel and emotional well-being since people adapt to varying conditions through

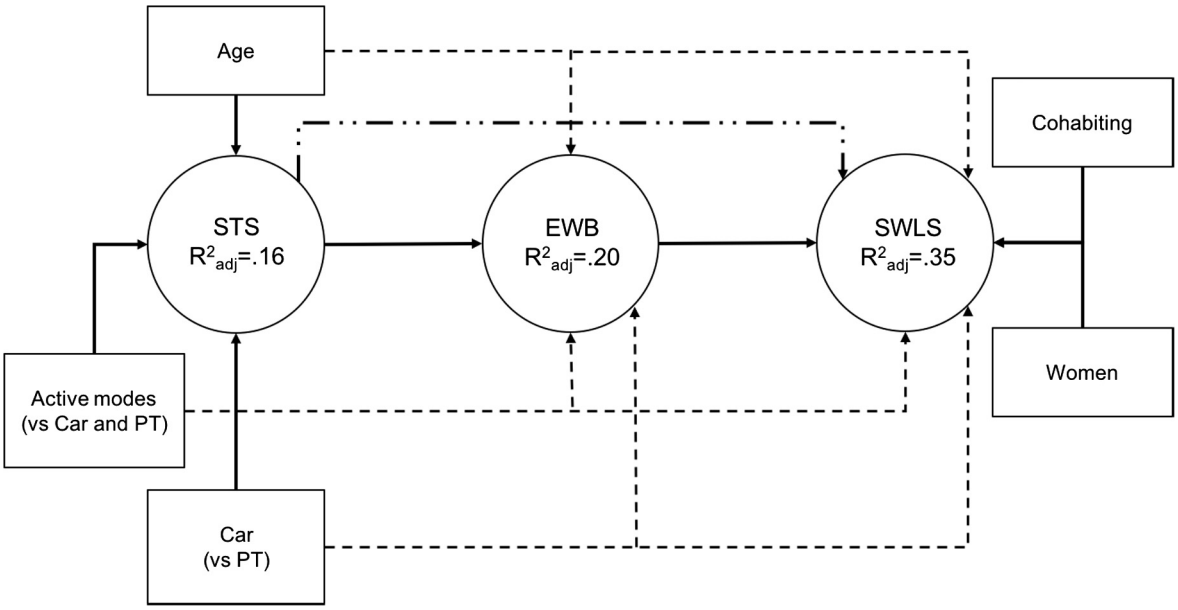

Fig. 2. Significant direct effects (solid lines), indirect effects (broken lines), both direct and indirect effects (broken and dotted lines), and adjusted R^2 from the PLS-SEM.

changes in clothing, use of equipment, or simply by switching travel mode. Another explanation is the use of retrospective measures. When people are asked to recall previous experiences they reconstruct their memories (Fredrickson, 2000) and as a result they may misremember how they felt a particularly hot or rainy day. Future research should include a broader range of weather parameters (e.g., temperature, sunlight, wind) to study the effects of daily weather changes on people's satisfaction with travel and emotional well-being.

We finally acknowledge some limitations. Past research investigating emotion and cognition provide compelling evidence that people have difficulties to recall affective experiences. A recommendation for future research is thus to use on-line measures of affective evaluation of travel to minimize possible memory biases. Furthermore, data on objective travel time were not included. Thus, we do not know for how long participants used different travel modes. As is common in all social science, it is difficult to draw conclusions about causal effects. Experimental studies are desired to infer causal directions. Such experiment would be a valuable complement to our research in order to justify stronger policy recommendations.

7. Conclusion

Our study demonstrates that everyday travel affects emotional well-being as well as life satisfaction. This is an important finding that should have implications for how to plan infrastructure and cities in the future. Active transport is preferable if the goal is to enhance emotional well-being and life satisfaction. Not only has active transport a direct positive impact on travel satisfaction but indirect effects on emotional well-being and satisfaction with life. It also has direct impacts on emotional well-being and satisfaction with life, which indicate that there are travel-related benefits. As public transport use clearly has a negative effect on travel satisfaction, emotional well-being and satisfaction with life, it is necessary to improve public transport with the aim of providing levels of subjective well-being comparable with the private car. The question then is how to turn public transport to an attractive alternative? Friman and Gärling (2017) discuss and summarize a number of supportive policies that need to be implemented. It is necessary to focus on urban structure since it is easier to provide public transport with high frequency and reliability in denser cities. In order to succeed it is therefore important to implement land use policies that promote compact mixed-use developments. Service quality and frequency are factors known to influence public transport use as well as attractive fares and convenient ticketing. Full multimodal and regional integration in combination with different restrictions on car use will not only promote public transport but also active modes. For a human-centered society, it is important to focus on evidence-based quality improvements that have a direct positive effect on people's emotional well-being and life satisfaction.

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