



# Understanding the relationship between travel satisfaction and subjective well-being considering the role of personality traits: A structural equation model



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## ABSTRACT

Using a structural equation model, this article examines to what extent subjective well-being or life satisfaction is influenced by travel satisfaction. To avoid confounding, satisfaction with other life domains, personal characteristics and personality traits are included in the model. In addition, the reverse effect of well-being on travel satisfaction is considered. To collect the data needed to estimate the model, a survey was designed and administered face-to-face in January 2015 in Xi'an, China using a random sampling procedure. After controlling for personality traits and significant socio-demographic variables, results indicate that travel satisfaction has a relatively small impact on subjective well-being. The reverse relationship is considerably stronger.

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## 1. Introduction

Since long, subjective well-being, a concept closely related to life satisfaction, happiness and fulfilment has been a topic of research in social and psychological sciences. Subjective well-being expresses people's cognitive and emotional evaluations of their lives. These evaluations include people's emotional reactions to events, their moods, judgments of life satisfaction and fulfilment, and satisfaction with different domains of life such as marriage and work (Diener, Oishi, & Lucas, 2003). Thus, subjective well-being is a multi-dimensional concept that covers many life domains. The concept has been measured using a variety of different scales (Diener, Emmons, Larsen, & Griffin, 1985; Diener & Suh, 1997). As an alternative to the concept of utility, subjective well-being has been proposed as a measure of individuals' benefits in a number of different life domains (Kahneman, Diener, & Schwarz, 1999).

People's satisfaction with different domains of their life thus influences subjective well-being. The effect of satisfaction in a specific domain on overall subjective well-being has been typically explained on the basis of the bottom-up spill over theory of subjective well-being (Sirgy, 2001). This theory posits that affect related to a consumption experience contributes to affecting satisfaction in specific life domains, which in turn influences satisfaction with life at large (Sirgy, Kruger, Lee, & Yu, 2011). Many scholars advocated this bottom-up approach. For example, Mohan-Neill (1995) predicted life satisfaction using variables such as work satisfaction and satisfaction with personal relationships. The results indicated that satisfaction with personal relationships is more predictive of life satisfaction than work satisfaction, although both were significant predictors of life satisfaction. Similarly, Oishi, Diener, Suh, and Lucas (1999) found that value orientation moderates the effects of

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domain satisfaction on overall life satisfaction. Dasgupta and Majumdar (2000), using the bottom-up approach, found that satisfaction with material possessions, family life, self-development, and local government administration have a significant effect on life satisfaction of Calcutta residents. As a final example, Grzeskowiak, Sirgy, Lee, and Claiborne (2006) concluded that satisfaction with housing influences satisfaction in various other life domains, which in turn affects satisfaction with life. In the context of travel, the spill over theory would imply that high travel satisfaction would contribute to high subjective well-being.

In principle, there may also be an effect of overall well-being on travel satisfaction, which would indicate a top-down approach in the study of subjective well-being in the sense that their overall perspective on life may affect how people feel about specific life domains (see, for example, Diener, 1984; Headey, Veenhoven, & Wearing, 1991). Few studies, however, have examined this top-down relationship using empirical data. Abou-Zeid and Ben-Akiva (2011) estimated the effects of overall well-being on commute satisfaction using a structural equations model and found that people who have a high level of overall well-being are likely more satisfied with their commute.

Thus, these studies suggest that an understanding of how domain-specific satisfaction contributes to overall well-being and how overall well-being influences domain satisfaction has been a pertinent topic of research in social sciences and marketing research for many decades. However, the studies in these fields of study have not considered travel satisfaction, even though travel is an important daily consumption and experience. Knowledge about the interrelationship between subjective well-being and travel satisfaction has only recently accrued since the study of travel satisfaction has appeared on the agenda of travel behaviour researchers. Since the last seven years, transportation researchers have examined determinants and effects of travel behaviour (see, for example, Abenoza, Cats, & Susilo, 2017; De Vos, Mokhtarian, Schwanen, Van Acker, & Witlox, 2016; Yang, Zhao, Wang, Liu, & Li, 2015). The interest in the topic is fast expanding.

Although the rapidly growing number of studies in travel behaviour research on travel satisfaction has substantially increased our knowledge about travel satisfaction, limitations of prior research leave open sufficient room for additional research. In this project, we focus our attention on the following relatively unexplored aspects of travel satisfaction in travel behaviour research. First, few studies examined the interrelationships between travel satisfaction and overall well-being by simultaneously considering the relationship between satisfaction with other life domains and overall subjective well-being. The existing partial conceptualisation and analysis may introduce bias in the results, particularly when domains other than travel influence subjective well-being and satisfactions with various life domains are correlated. Thus, in this study, we adopt this more general approach.

Second, prior travel behaviour research has predominantly adopted a hedonic view of well-being. According to this view, researchers have equated well-being with hedonic pleasure based on the contention that people's goal of life is maximizing their amount of pleasure. However, travel and activities during trip also allow people to achieve purpose and meaning of life. This so-called eudemonic well-being has been under-researched in travel behaviour analysis. Thus, rather than focusing on a specific view of well-being, different views were entertained in this study.

Third, personality traits may influence the degree of experienced travel satisfaction and responses to travel satisfaction scales. Diener and Lucas (1999) argued that the strong influence of personality is seen as one of the most replicable and most surprising findings in subjective well-being research. In fact, the correlation between subjective well-being and personality such as extraversion and neuroticism is stronger than correlations with any demographic predictor (Lucas & Fujita, 2000; Steel, Schnnidt, & Shultz, 2008; Richard & Diener, 2009). Personality may capture structural response patterns of individuals. However, personality traits have been largely ignored in studies of travel satisfaction. Thus, in the current study, we included personality scales in the measurement and analysis to allow for personality traits effects moderating the relationships.

Thus, this study examines the mutual dependency between travel satisfaction and subjective well-being relative to satisfaction with other life domains, while controlling for personality traits and selected socio-demographic variables. To analyse the direct and indirect relationships between these constructs, a structural equation model is estimated. Our study differs from previous research in the following manners. First, travel satisfaction is measured as a domain of life satisfaction, while most other studies scales focused on travel contexts. Secondly, both hedonic and eudaimonic aspects of well-being are considered, while most other studies adopted a specific, particularly hedonic, view of well-being. Thirdly, the structural equation model developed in our study analysis controls for personality. Finally, this is one of very few academic studies on travel satisfaction in China.

The paper is structured as follows. It starts with a review of the literature on subjective well-being, focusing on definitions, measurement and results. Section 3 then outlines the conceptual framework. Next, Section 4 describes the data collection and measurement scales. The results of the primary analysis of the data, involving exploratory and confirmatory factor analysis, are discussed in Section 5. Section 6 discusses the major results of the structural equation model. Section 7 concludes the paper with a short discussion of major conclusions drawn from this study.

## 2. Literature review

The aim of this review is twofold. First, we will summarize the findings of research that examined the relationship between travel satisfaction and subjective well-being. This summary serves to position our study in the context of previous research and support our arguments about its contribution to the state of the art. Second, we will review previous travel satisfaction research in terms of the measurement of central concepts such as travel satisfaction, subjective well-being and

personality. This discussion serves as the basis for our operational decisions made in the current study regarding the measurement of these concepts.

### 2.1. Travel satisfaction and subjective well-being

Only recently, the travel behaviour research community has jumped on the bandwagon of satisfaction research and started to explore the relationship between travel and subjective well-being (Ettema, Gärling, Olsson, & Friman, 2010; Bergstad et al., 2011; Sirgy et al., 2011; Hansson, Mattisson, Björk, Östergren, & Jakobsson, 2011; Martin, Goryakin, & Suhrcke, 2014). For example, Ettema et al. (2010) built a theoretical framework arguing that participation in activities contributes to subjective well-being and that the positive affect associated with travel has an impact on subjective well-being. Bergstad et al. (2010) found that the effect of satisfaction with daily travel on affective and cognitive subjective well-being is both direct and indirect. Sirgy et al. (2011) developed a model, which described how positive and negative affects associated with specific experiences of a trip influence tourists' life satisfaction. Hansson et al. (2011) found a significant relationship between commuting and health, while Martin et al. (2014) concluded that active travel was correlated with psychological well-being. Therefore, this literature seems to suggest that travel satisfaction is significantly related to subjective well-being. Table 1 shows a summary of the applied well-being constructs.

As evidenced in Table 1, satisfaction with other life domain has rarely been simultaneously considered in these studies and the same applies to personality traits. Because both strongly affect ratings of subjective well-being, ignoring these variables may have biased the results of previous studies on the relationship between travel satisfaction and subjective well-being. In addition, one cannot rule out that subjective well-being influences travel satisfaction.

### 2.2. The concept of subjective well-being

The literature on subjective well-being has been steadily increasing in psychology, sociology and economic research since the 1970 s. Diener (1984) argued that several related terms have been used in different literatures with fuzzy and different meanings. Ryan and Deci (2001) identified two main views of subjective well-being – the hedonic and the eudaimonic view. Kahneman et al. (1999) defined hedonic psychology as the study of “what makes experiences and life pleasant and unpleasant”. In contrast, the eudaimonic view contends well-being is more than pleasure attainment and pain avoidance. The eudaimonic view of well-being focuses on meaning of life, personal growth and self-realization, and defines well-being in terms of the degree to which a person is fully functioning. The term eudaimonic well-being is valuable because it refers to well-being as distinct from happiness.

### 2.3. Measurements of subjective well-being and travel satisfaction

Numerous scales have been designed to measure subjective well-being. Diener et al. (1985) differentiated between single-item measures, such as the self-anchoring ladder (Cantril, 1965), Gwin Scale (Gwin, Veroff, & Feld, 1961) and the Delighted-Terrible Scale (Andrews & Withey, 1976), and multi-item scales such as the Life Satisfaction Index (Neugarten, Havighurst, & Tobin, 1961) and the General Well-being Schedule (Dupuy, 1980). Abou-Zeid (2009) made a distinction between cognitive and affective evaluation. Cognitive evaluation involves respondents rating their satisfaction. In contrast, affective evaluation may be measured by using psychological and physiological measures. Psychological measures are obtained by self-reports or observer ratings. They could be single-item or multiple-item measures and they are the most common type of well-being measures. Physiological measures, such as facial expressions, autonomic and brain measures, are not frequently used but provide an alternative for assessing emotions.

Different scales reflect different views on well-being. In another review of subjective well-being, De Vos, Schwanen, Van Acker, and Witlox (2013) articulated that measurement of hedonic well-being consists of affective components which capture shorter-term feelings such as the Positive and Negative Affect Scale (PANAS) (Watson, Clark, & Tellegen, 1988), the Scale of Positive and Negative Experience (SPANE) (Diener et al., 2010), the Swedish Core Affect Scale (SCAS) (Västfjäll, Friman, Gärling, & Kleiner, 2002; Västfjäll & Gärling, 2007) and cognitive evaluation, which is mostly measured by the Satisfaction with Life Scale (SWLS) (Diener et al., 1985; Pavot & Diener, 1993).

As discussed, few studies have used a eudaimonic view of well-being, which emphasises meaning of life, personal growth and the realisation of the best in oneself (e.g., Stanley et al., 2011; Stanley, Hensher, Stanley, & Vella-Brodrick, 2011). The best-known scale to measure eudaimonic well-being is the Personal Well-being Scale (PWS) (Ryff, 1989), which consists of six dimensions. Other scales include the Questionnaire for Eudaimonic Well-Being (QEWB) (Waterman et al., 2010) and the Flourishing Scale (Diener et al., 2010). McMahan and Estes (2011) combined hedonic and eudaimonic aspects of well-being using the Beliefs about Well-Being Scale. Table 2 summarizes different measurements of hedonic and eudaimonic well-being.

In addition to these general scales, travel behaviour research has also seen the development of specific scales to measure travel satisfaction. For example, Ettema and his colleagues (2011, 2012) designed a domain-specific scale for travel which is called the Satisfaction with Travel Scale (STS). It is based on the generic Swedish Core Affect Scale (SCAS) (Västfjäll et al., 2002; Västfjäll & Gärling, 2007). De Vos, Schwanen, Van Acker, and Witlox (2015) tested the reliability and structure of the Satisfaction with Travel Scale (STS) using data on leisure trips from Ghent (Belgium) and concluded that the specification

**Table 1**  
Summary of the applied well-being constructs in travel behaviour research.

Study	Sample area	Constructs	Method/Model
Ory and Mokhtarian (2005)	United States	Travel liking Personality Life style	Regression analysis
Spinney et al. (2009)	Canada	Transport mobility benefits Quality of life	ANOVA
Currie et al. (2009, 2010)	Australia	Subjective well-being Transport difficulties Social exclusion	SEM
Duarte et al. (2010)	Web-based	Stated happiness	Multi-linear regression analysis
Abou-Zeid and Ben-Akiva (2011)	Web-based	Commute satisfaction Overall well-being Work well-being Social comparative happiness Commute stress and enjoyment Personality Quality of work environment	SEM
Bergstad et al. (2011)	Sweden	Travel satisfaction Activity satisfaction Affective SWB Cognitive SWB Weekly mood	Regression analysis
Delbosc and Currie (2011a)	Australia	Subjective well-being Transport difficulties Social exclusion	Factor analysis ANOVA
Stanley et al. (2011)	Australia	Subjective well-being Social exclusion Social capital Connection with community	Ordered polychotomous choice model
Stanley et al. (2011)	Australia	Risk of social exclusion Social capital Sense of community Psychological well-being Travel pattern	SEM
Ettema et al. (2011)	Sweden	Travel satisfaction Mood Life satisfaction	ANOVA
Ettema, Friman, Gärling, Olsson, and Fujii (2012)	Sweden	Travel satisfaction In-vehicle activities	Regression analysis
Abou-Zeid, Witter, Bierlaire, Kaufmann, and Ben-Akiva (2012)	Switzerland	Travel satisfaction Attitudes towards car and public transit	Correlation analysis
Archer et al. (2013)	United States	Well-being Activity pattern	Multivariate ordered response model
Ravulaparthi, Yoon, and Goulias (2013)	United States	Subjective well-being Transport mobility	Ordered probit and multinomial logistic regression models
Diana (2012)	Italy	Satisfaction with public transport Frequency of transit use Urban context	Correlations and correspondence analyses
Olsson et al. (2013)	Sweden	Travel satisfaction Life satisfaction	Regression analysis
Abou-Zeid and Fujii (2016)	United States	Travel satisfaction Attitudes towards car and public transit	Ordered logit model

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. Bergstad et al. (2011) and his colleagues constructed the Satisfaction with Daily Travel Scale (SDTS), based on the Satisfaction with Life Scale (SWLS) (Diener et al., 1985; Pavot & Diener, 1993).

#### 2.4. Personality and subjective well-being

Some studies have addressed the research question “Who is happy”. The majority of studies on subjective well-being examined biosocial indicators such as gender and age. Other studies have suggested that personality may be one of the

**Table 2**  
Summary of well-being scales.

Study	Scales
<i>Hedonic Well-being</i>	
Watson et al. (1988)	Positive and Negative Affect Scale (PANAS)
Västfjäll et al. (2002)	Swedish Core Affect Scale (SCAS)
Västfjäll and Gärling (2007)	
Diener et al. (2010)	Scale of Positive and Negative Experience (SPANE)
Ettema et al. (2011)	Satisfaction with Travel Scale (STS)
Ettema et al. (2012)	
De Vos et al. (2015)	
Diener et al. (1985)	Satisfaction with Life Scale (SWLS)
Pavot and Diener (1993)	
Bergstad et al. (2011)	Satisfaction with Daily Travel Scale (SDTS)
International Wellbeing Group, 2006	Personal Well-Being Index (PWI)
Stanley et al. (2011)	
Stanley et al. (2011)	
<i>Eudaimonic Well-being</i>	
Ryff (1989), Ryff and Singer (2008)	Psychological Well-Being Scale (PWS)
Nordbakke and Schwanen (2014)	Personal Well-being
Waterman et al. (2010)	Questionnaire for Eudaimonic Well-Being (QEWB)
Diener et al. (2010)	Flourishing Scale
Ryan and Deci (2000)	Self-determination Theory

strongest determinants of subjective well-being. For example, DeNeve and Cooper (1998) examined 137 distinct personality constructs as correlates of subjective well-being. Many personality traits were significantly associated with subjective well-being. For instance, of the “Big Five” personality traits (Openness to experience, Conscientiousness, Extraversion, Agreeableness and Neuroticism) (Costa & McCrae, 1992), extraversion and agreeableness were positively associated with subjective well-being, whereas neuroticism was negatively associated with it. McCrae and Costa (1991) found that extraversion leads to a positive affect, while neuroticism leads to a negative affect. Openness correlates positively with both positive and negative affect. Agreeableness and conscientiousness have instrumental effects on subjective well-being.

Diener and Lucas (1999) suggested that these big five findings should not come as a surprise because extraversion is characterized by a positive affect and neuroticism is virtually defined by a negative affect. Some researchers have examined the relation of the big five personality traits to psychological well-being. Schmutte and Ryff (1997) found that extraversion, conscientiousness, and low neuroticism were linked with the eudaimonic dimensions of self-acceptance, mastery, and life purpose; openness to experience was linked to personal growth; agreeableness and extraversion were connected to positive relationships; and low neuroticism was associated with autonomy.

Although personality has been shown to be a major determinant of subjective well-being in the literature, few studies explored the correlation between personality and satisfaction in the travel domain. Ory and Mokhtarian (2005) found that attitudes, personality, and lifestyle are key variables affecting travel liking. Abou-Zeid and Ben-Akiva (2011) found a positive correlation between an organized personality and work commute satisfaction.

### 3. Conceptual framework

Based on our review of the satisfaction literature in travel behaviour research and other fields of inquiry, and a critical reflection of the relevance and applicability of these studies to examine the relationship between travel satisfaction and subjective well-being in a methodologically rigorous manner that avoids various sources of bias, we developed a conceptual framework. Fig. 1 shows the conceptual model that was used to develop the structural equation model that we estimated to examine the influence of travel satisfaction on subjective well-being, and the reverse relationship. As the figure shows, we assume that overall life satisfaction is influenced by domain-specific satisfaction, and vice versa that domain satisfaction may also be influenced by overall life satisfaction. This reflects the idea that the examination of the relationships between travel satisfaction and overall life satisfaction should include satisfaction with other life domains to avoid bias. Satisfaction ratings of life domains may be influenced by judgements of overall life satisfaction. Hence, we assume that overall life satisfaction, domain satisfaction and life evaluation are mutually correlated.

In addition, following findings in social psychology, we assume that personality may influence well-being, or at least the subjective rating of well-being. Depending on particular personality traits, people may differently rate their satisfaction with different life domains and overall life satisfaction.

Finally, we allow for correlations between socio-demographic variables, and personality traits and subjective well-being. Fig. 1 depicts the hypothetical causal model.

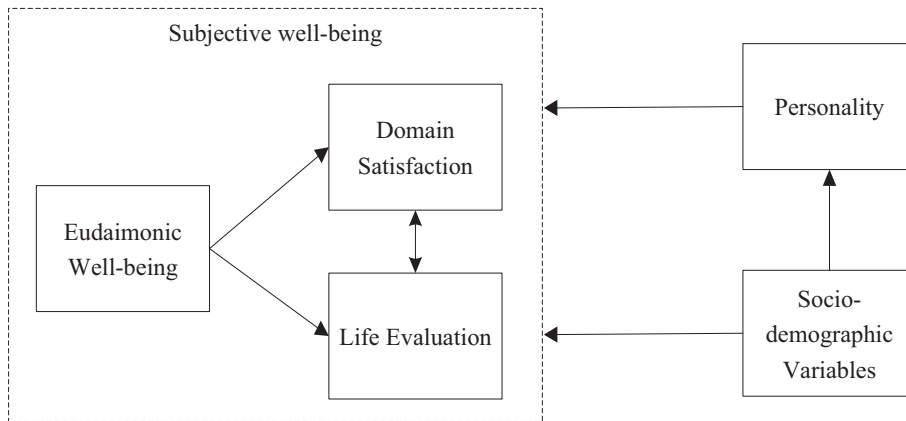


Fig. 1. Conceptual framework.

## 4. Data collection and measurement scales

### 4.1. Procedure

Data for this study were collected in Xi'an city, China. Xi'an is the capital city of Shaanxi province, located in the northwest of China with a population of almost 8.46 million people. The data used in this study were collected in January 2015 using random sampling. A face-to-face interview, based on a structured questionnaire, was used to collect the data. The interviewers consisted of a pool of graduate and master students of Chang'an University, who were specially trained for the interviews. Several versions of the questionnaire were pre-tested. Changes in wording and especially explanation were made until no more critical problems remained. The quality of the returned data, differentiated by interviewer, was monitored and appropriate action was taken if needed. A total of 1445 respondents completed the questionnaire.

The operationalization of the conceptual framework requires data on subjective well-being, which included life satisfaction/evaluation, domain satisfaction and eudaimonic well-being; personality traits and socio-demographic characteristics. The survey included questions pertaining to each of these concepts. First, the questionnaire asked about the respondent personal characteristics including age, gender, type of job, education, household income, etc. Second, respondents were asked to rate themselves on a set of personality traits. Next, trip information and the mood experienced during the travel day were elicited, followed by a segment on overall trip satisfaction and well-being. The next segment prompted respondents to judge the service quality of different transport modes. The last part concerned the measurement of subjective well-being.

To reduce possible correlations due to halo effects between personality traits and mood, and between these constructs and satisfaction, the measurements of these constructs were separated as much as possible. As indicated, first, data on personality traits were collected, immediately after the elicitation of socio-demographic information. Moods were measured separately before the trip diary was constructed. Ratings of satisfactions of trip stages were solicited after retrieving all trip attributes in the trip diary. The minimum duration to completion of a survey was around 1 h, the longest was about two hours. As said, all interviewers worked with the same format of the questionnaire.

### 4.2. Measurement

Our literature review (Table 2) indicated that previous research has relied on different scales to measure subjective well-being. Methodologically, the notion of a scale presumes its generalizability has been proven. In reality, at best partial evidence can be given in the sense that one can never be sure that when a new sample of respondents completes a set of validated items the same or similar reliability will be obtained (see, for example, De Vos et al., 2015). Existing scales have been developed in the American and European context. To the best of our knowledge, the scales have never been validated in a Chinese context. Therefore, rather than uncritically applying an existing scale, we systematically evaluated the relevance of the items of the various scales, translated these into Chinese trying to find the same subtlety and connotations in the choice of words, and explicitly re-analysed the validity and reliability of the resulting scales. Based on the literature, this study measured subjective well-being in terms of three categories: overall life evaluation, eudaimonic well-being and domain satisfaction.

#### 4.2.1. Overall life satisfaction/evaluation

Four questions and five statements were used to measure life satisfaction. The four questions are: (1) Imagine a ladder with steps numbered from 0 at the bottom to 10 at the top. The top of the ladder represents the best possible life for you and the bottom of the ladder represents the worst possible life for you. On which step of the ladder would you say you per-

sonally feel you stand at this time? (2) Overall, how satisfied with your life were you five years ago? (3) As your best guess, overall how satisfied with your life do you expect to feel in five years' time? (4) Overall, to what extent do you feel the things you do in your life are worthwhile?

The five statements about life evaluation are (1) In most ways my life is close to my ideal; (2) The conditions of my life are excellent; (3) I am extremely satisfied with my life; (4) So far I have gotten all important things I want in life; (5) If I could live my life over, I would change almost nothing. Values again ranged from 0 ("strongly disagree") to 10 ("strongly agree").

#### 4.2.2. Eudaimonic well-being

Eudaimonic well-being was measured on the basis of eight statements: (1) I lead a purposeful and meaningful life; (2) My social relationships are supportive and rewarding; (3) I am engaged and interested in my daily activities; (4) I actively contribute to the happiness and well-being of others; (5) I am competent and capable in the activities that are important to me; (6) I am a good person and live a good life; (7) I am optimistic about my future; (8) People respect me. Respondents were invited to answer these questions using a ten point scale, ranging from 0 ("strongly disagree") to 10 ("strongly agree").

#### 4.2.3. Domain satisfaction

Individuals are assumed to rate their overall life satisfaction by cognitively integrating their satisfaction ratings for various life domains. A total of fourteen questions about satisfaction with different life domains were included in our questionnaire: standard of living, health, achievements in life, personal relationships, safety at home, safety out of home, relationship with neighbours, relationship with friends, relationship with colleagues, future security, the amount of time you do the things that you like, quality of local environment, work and general travel experience. Values ranged from 0 ("not at all satisfied") to 10 ("extremely satisfied").

#### 4.2.4. Personality traits

Researchers have relied on a variety of psychometric scales for measuring personality traits, including the Ten-Item Personality Inventory (TIPI), which is a very brief measure of the Big-Five personality domains (Gosling, Rentfrow, & Swann, 2003). This instrument is useful in situations when fewer items are needed, or researchers can tolerate the somewhat diminished psychometric properties associated with such limited items instruments. For each item, we systematically assessed whether we could reason the relationship between the personality trait and travel satisfaction. Ultimately, we selected six out of the ten-items: critical, self-disciplined, impatient, reserved, easy-going and calm. We assumed that these personality traits may systematically affect people's experience of travel and/or their ratings of travel satisfaction.

Respondents were asked to rate the extent they agree or disagree with personality statements such as "I see myself as critical." on an 11-point scale, ranging from "disagree strongly" to "agree strongly". Thus, for reasons similar to the measurement of satisfaction, single-item scales were used to measure the different personality traits. While this approach is clearly problematic in diagnostic, psychometric studies, we argue it offers sufficiently robust information to analyse the effect of self-reported personality traits on travel satisfaction and subjective well-being.

#### 4.2.5. Socio-demographic characteristics

The following socio-demographic characteristics were measured: age (year), gender (0 = female; 1 = male), household size (number of persons living in your family), household income (nine classes ranging from lower than 500 RMB to more than 20000 RMB), education (five classes ranging from lower than high school to master or doctoral degree), job type (six classes including fix schedule full time employed, flexible schedule full time employed, part time employed, full time student, part time student and unemployed).

## 5. Preparatory data analysis

### 5.1. Sample description

The survey was administered face to face to a random sample of 1464 respondents. Missing values, outliers, and the distribution of all measured variables were examined to purify the data. After data cleaning, 1445 respondents were used in the analyses. Distributions of characteristics of the sample are shown in Table 3. It demonstrates that 46% of the sample is between 25 and 35 years of age, 28% is between 18 and 25 years old, while only 3% of the sample is older than 55. Table 3 also shows that 54% of the sample is female, while 46% is male. 32% of the sample is living in 3 person households, while 23% is living alone. Even though 63% of the sample has a professional education, income levels are medium (2000–6000 RMB). More than half of the sample (51%) is employed full time (fixed schedule).

### 5.2. Validation

In order to validate the scales and assess the formulated conceptual framework, an exploratory factor analysis (EFA) was conducted using half of the sample based on three theoretical constructs: (1) eudaimonic well-being; (2) life evaluation; and (3) the different domain-specific satisfactions. The results of the EFA, using varimax rotation and a factor loading of 0.40 as

**Table 3**  
Descriptive statistics of the sample (N = 1445).

	Observations	Percentage
<i>Age</i>		
<18	17	1%
18–25	410	28%
25–35	672	46%
35–45	211	15%
45–55	95	7%
≥55	40	3%
<i>Gender</i>		
Male	669	46%
Female	776	54%
<i>Household size (person)</i>		
1	337	23%
2	199	14%
3	460	32%
4	281	20%
5	121	8%
≥6	47	3%
<i>Household income (RMB/Month)</i>		
<2000	148	10%
2000–6000	687	48%
6000–10000	393	27%
10000–20000	208	14%
>20000	9	1%
<i>Education</i>		
Lower than high school	89	6%
High school	303	21%
Professional courses	910	63%
Bachelor	128	9%
Master/PhD	15	1%
<i>Job type</i>		
Full time employed (fixed schedule)	738	51%
Full time employed (flexible schedule)	304	21%
Part time employed	58	4%
Full time student	280	20%
Part time student	60	4%
Unemployed	5	0%

the threshold to retain items in a factor, led to three independent factors as shown in Table 4: (1) eudaimonic well-being; (2) social network satisfaction; and (3) life evaluation.

Important in these results is the fact that respondents seem to differentiate between hedonic and eudaimonic interpretations of subjective well-being. Moreover, the different questions related to satisfaction with social network relationships loaded on a single different factor. Other domain-specific satisfactions do not show strong communalities, suggesting they may be judged independently from other domain satisfactions, which is a positive finding.

After the EFA procedure, a confirmatory factor analysis (CFA) specifying the posited relationships of the observed indicators to the latent variables, was conducted using the other half of the sample (Table 5). The following goodness of fit indices were obtained: Chi square/df = 4.098, Comparative Fit Index (CFI) = 0.944, Tucker Lewis Index (TLI) = 0.934, Standardized Root Mean Square Residual (SRMR) = 0.042. These statistics support the validity of the constructed scales.

## 6. Structural equation model

Based on our conceptual framework and the results of the factor analyses, we estimated the corresponding structural equation model. The primary interest is in the relationship between travel satisfaction and overall subjective well-being without making any a priori claims regarding the direction of causality. Because subjective well-being may also be influenced by satisfaction with other life domains, these were also included in the analysis. As discussed, a distinction was made between hedonic and eudemonic subjective well-being. Personality was included in the model based on the hypothesis that particular personality traits may influence satisfaction ratings. Finally, we examined the effect of several socio-demographic variables. As we only found consistent effects for age and gender, the reported results of the structural equation model only include these variables.

The estimated structural equation model and the standardized coefficients of the estimated relationships are shown in Tables 6–8. Table 9 list the calculated goodness of fit measures. It shows that all measures meet commonly used criteria for a good fit.



**Table 4**  
Results of the exploratory factor analysis (N = 722).

Latent variables and Measured indicators	Factor loading	Explained variance	Mean (St. Dev)
<i>Eudaimonic well-being</i>		21.038	
I lead a purposeful and meaningful life.**	0.606		6.95 (1.963)
My social relationships are supportive and rewarding.**	0.555		6.93 (1.971)
I am engaged and interested in my daily activities.**	0.634		6.68 (2.085)
I actively contribute to the happiness and well-being of others.**	0.636		6.80 (1.938)
I am competent and capable in the activities that are important to me.**	0.630		6.92 (1.778)
I am a good person and live a good life.**	0.566		7.55 (1.771)
I am optimistic about my future.**	0.547		7.65 (1.808)
People respect me.**	0.603		7.61 (1.597)
<i>Social network satisfaction</i>		16.044	
How satisfied are you with your friends?*	0.856		8.32 (1.416)
How satisfied are you with your colleagues?*	0.675		7.95 (1.668)
How satisfied are you with your personal relationships?*	0.633		7.81 (1.611)
How satisfied are you with your neighbours?*	0.486		7.36 (2.173)
<i>Life evaluation</i>		14.604	
In most ways my life is close to my ideal.**	0.699		6.34 (1.960)
The conditions of my life are excellent.**	0.801		5.99 (1.955)
I am extremely satisfied with my life.**	0.727		6.33 (2.047)
<i>Please imagine a ladder with steps numbered from 0 at the bottom to 10 at the top. The top of the ladder represents the best possible life for you and the bottom of the ladder represents the worst possible life for you.</i>			
On which step of the ladder would you say you personally feel you stand at this time?	0.551		6.94 (1.667)
<b>Total variance explained</b>		51.687	

Notes:

Rotation method: Varimax.

Kaiser-Meyer-Olkin Measure of Sampling Adequacy = 0.916.

\* Scale: 0 = not at all satisfied, 10 = extremely satisfied.

\*\* Scale: 0 = strongly disagree, 10 = strongly agree.

Tables 6–8 show the results of the estimated structural equation model. All coefficients of the measurement components of the SEM are nonzero and significant at conventional levels. The final model consists of 16 endogenous variables: life evaluation, eudaimonic well-being, social network satisfaction, satisfaction with the various domains, including travel satisfaction, and personality traits self-disciplined, calm, reserved, and easy going. Age and gender are the exogenous variables in the model.

### 6.1. Measurement model

The SEM model measures the latent variable eudaimonic well-being based on 8 statements; all coefficients exceed 0.6, indicating that all statements are strongly correlated with eudaimonic well-being. The latent variable “Overall life satisfaction/evaluation” is measured in terms of three life evaluation statements: “In most ways my life is close to my ideal ( $\lambda = 0.769$ )”, “I am extremely satisfied with my life ( $\lambda = 0.758$ )” and “The conditions of my life are excellent ( $\lambda = 0.739$ )”; and one life evaluation question “On which step of the ladder would you say you personally feel you stand at this time ( $\lambda = 0.726$ )”. The latent variable “Social network satisfaction” is measured in terms of four domain satisfaction items: personal relationships ( $\lambda = 0.771$ ), relationship with friends ( $\lambda = 0.722$ ), relationship with colleagues ( $\lambda = 0.684$ ) and relationship with neighbours ( $\lambda = 0.579$ ).

### 6.2. Structural model

Table 6 shows the interrelations between the subjective well-being constructs. First, eudaimonic well-being is positively related to life evaluation ( $\beta = 0.694$ ). Because life evaluation measures hedonic well-being, this result is consistent with our hypothesis that eudaimonic well-being affects hedonic well-being. For the relationship between eudaimonic well-being and life domain satisfaction, results show that eudaimonic well-being has positive and significant effects on social network satisfaction ( $\beta = 0.496$ ), living standard satisfaction ( $\beta = 0.291$ ), future security satisfaction ( $\beta = 0.213$ ), satisfaction of the amount of time you do what you like ( $\beta = 0.209$ ), and work satisfaction ( $\beta = 0.434$ ). Individuals with higher eudaimonic well-being are more likely to be satisfied with their social network, living standard, future security, the amount of time do what you like and work. Likewise, the correlations between life evaluation and domain satisfaction are positive. Results show that life evaluation positively impacts satisfaction with health ( $\beta = 0.282$ ), life achievement ( $\beta = 0.650$ ), safety at home ( $\beta = 0.471$ ), safety out of home ( $\beta = 0.260$ ), future security ( $\beta = 0.229$ ), the amount of time you do what you like ( $\beta = 0.270$ ), environment quality ( $\beta = 0.262$ ), and travel ( $\beta = 0.287$ ). It indicates that the effect of life evaluation on life achievement satisfaction is the strongest of all life domains. Work satisfaction significantly influences life evaluation ( $\beta = 0.185$ ), but satis-

**Table 5**  
Results of the confirmatory factor analysis (N = 723).

Latent variables and Measured indicators	STDYX Standardized Loadings (S.E.)
<i>Eudaimonic well-being</i>	
I lead a purposeful and meaningful life.**	0.691 (0.022)
My social relationships are supportive and rewarding.**	0.698 (0.021)
I am engaged and interested in my daily activities.**	0.724 (0.020)
I actively contribute to the happiness and well-being of others.**	0.673 (0.023)
I am competent and capable in the activities that are important to me.**	0.698 (0.021)
I am a good person and live a good life.**	0.705 (0.021)
I am optimistic about my future.**	0.750 (0.019)
People respect me.**	0.739 (0.019)
<i>Social network satisfaction</i>	
How satisfied are you with your friends?	0.735 (0.023)
How satisfied are you with your colleagues?	0.758 (0.022)
How satisfied are you with your personal relationships?	0.692 (0.025)
How satisfied are you with your neighbours?	0.594 (0.029)
<i>Life evaluation</i>	
In most ways my life is close to my ideal.**	0.823 (0.025)
The conditions of my life are excellent.**	0.769 (0.018)
I am extremely satisfied with my life.**	0.879 (0.013)
<i>Please imagine a ladder with steps numbered from 0 at the bottom to 10 at the top. The top of the ladder represents the best possible life for you and the bottom of the ladder represents the worst possible life for you.</i>	
On which step of the ladder would you say you personally feel you stand at this time?	0.669 (0.023)

## Notes:

\* Scale: 0 = not at all satisfied, 10 = extremely satisfied.

\*\* Scale: 0 = strongly disagree, 10 = strongly agree.

faction for other life domains does not show significant effects. This indicates people who are more satisfied with their work will achieve higher overall life satisfaction.

Travel satisfaction, as a domain of life satisfaction, is the focal point of this study. Results show that travel satisfaction does not significantly influence life evaluation; however, life evaluation strongly influences travel satisfaction ( $\beta = 0.287$ ).

Table 6 also shows positive relationships between satisfactions for different life domains. Results show that satisfaction of social network is correlated with health satisfaction ( $\beta = 0.290$ ). In turn, health satisfaction is correlated with satisfaction of safety out of home ( $\beta = 0.106$ ). Similarly, satisfaction with life achievements shows a positive relationship with satisfaction with living standard ( $\beta = 0.321$ ) and future security ( $\beta = 0.144$ ). Satisfaction of safety at home shows a significant relation with satisfaction with social network ( $\beta = 0.165$ ). The satisfaction with future security is significantly correlated with the satisfaction with safety out of home ( $\beta = 0.144$ ). The satisfaction of amount of time you do what you like has a significant relationship with satisfaction with social network ( $\beta = 0.125$ ). The satisfaction with environment quality is significantly related to satisfaction with safety out of home ( $\beta = 0.157$ ), future security ( $\beta = 0.111$ ) and the amount of time you do what you like ( $\beta = 0.154$ ). Finally, travel satisfaction shows a significant relationship with the satisfaction with future security ( $\beta = 0.086$ ) and the amount of time you do what you like ( $\beta = 0.067$ ).

Table 7 shows the effect of personality traits and socio-demographic variables on subjective well-being. The model shows that personality traits do have a significant effect on eudaimonic well-being and domain satisfaction. Particularly, eudaimonic well-being is positively influenced by personality traits self-disciplined ( $\beta = 0.188$ ), easy-going ( $\beta = 0.138$ ) and calm ( $\beta = 0.102$ ). In contrast, the personality trait "impatient" negatively influences eudaimonic well-being ( $\beta = -0.064$ ). This suggests that self-disciplined, easy-going and calm people are more likely to lead a meaningful and purposeful life. As might be expected, people who are impatient are less likely to achieve their life purposes. As for the effects of personality on domain satisfactions, a self-disciplined personality has positive effects on satisfaction with the living standard ( $\beta = 0.064$ ) and health ( $\beta = 0.073$ ). An impatient personality has a negative effect on satisfaction with health ( $\beta = -0.073$ ). An easy-going personality has positive effects on satisfaction with health ( $\beta = 0.074$ ) and the amount of time you do what you like ( $\beta = 0.061$ ). Finally, a reserved personality has a positive effect on environment satisfaction ( $\beta = 0.128$ ).

Age and gender also influence subjective well-being constructs. Age is positively correlated with eudaimonic well-being ( $\beta = 0.129$ ) and negatively correlated with health satisfaction ( $\beta = -0.119$ ) and safety at home ( $\beta = -0.060$ ). Gender positively influences satisfaction with safety out of home ( $\beta = 0.083$ ).

There is also evidence of effects of age and gender on personality traits (Table 8). Age has a positive effect on a self-disciplined personality ( $\beta = 0.150$ ), a reserved personality ( $\beta = 0.122$ ), and a calm personality ( $\beta = 0.226$ ) while it has a negative effect on an easy-going personality ( $\beta = -0.120$ ). Gender has a positive effect on a self-disciplined personality ( $\beta = 0.095$ ), an easy-going personality ( $\beta = 0.066$ ), and a calm personality ( $\beta = 0.082$ ). Older people tend to be more self-disciplined, reserved and calm, but less easy-going than younger people. Men tend to be more self-disciplined, easy-going and calm than women.

**Table 6**  
Standardized direct effect between subjective well-being variables ( $N = 1445$ ).

Variables	Life evaluation	Social network	Living standard	Health	Life achievement	Safety at home	Safety out of home	Future security	Amount of time do what you like	Environment quality	Work	Travel
<i>Overall well-being</i>												
Eudaimonic well-being	0.694	0.496	0.291					0.213	0.209		0.434	
Life evaluation				0.282	0.650	0.471	0.260	0.229	0.270	0.262		0.287
<i>Domain satisfaction</i>												
Social network				0.290								
Health							0.106					
Life achievement			0.321					0.144				
Safety at home		0.165										
Future security							0.144					
Amount of time do what you like		0.125										
Environment quality							0.157	0.111	0.154			
Work	0.185											
Travel								0.086	0.067			

Note: Significant at 0.05 level.

**Table 7**  
Standardized direct effect of personality and socio-demographic variables on subjective well-being ( $N = 1445$ ).

Variables	Eudaimonic well-being	Living standard	Health	Safety at home	Safety out of home	Amount of time do what you like	Environment quality	Travel
<i>Personality</i>								
Self-disciplined	0.188	0.064	0.073					0.106
Impatient	-0.064		-0.073					
Easy-going	0.138		0.074			0.061		
Reserved							0.128	
Calm	0.102							
<i>Socio-demographics</i>								
Age	0.129		-0.119	-0.060				
Gender					0.083			

Note: Significant at 0.05 level.

**Table 8**  
Standardized direct effect of socio-demographic variables on personality traits ( $N = 1445$ ).

Variables	Self-disciplined	Reserved	Easy-going	Calm
<i>Socio-demographics</i>				
Age	0.150	0.122	-0.120	0.226
Gender	0.095		0.066	0.082

Note: Significant at the 0.05 level.

**Table 9**  
Goodness of fit measures for the structural equation model ( $N = 1445$ ).

Goodness of fit measure	Index	Criteria
$\chi^2/df$	3.573	<5.0
RMSEA	0.042	<0.08
SRMR	0.038	<0.05
CFI	0.937	>0.9
TLI	0.925	>0.9

Notes:  $\chi^2$  = Chi-square; df = degree of freedom; RMSEA = root mean square error of approximation; SRMR = standardized root mean square residual; CFI = comparative fit index; TLI = Tucker Lewis index.

## 7. Discussion and conclusions

This study, one of the first of its kind and scope in China, was conducted to better understand the relationship between travel satisfaction and subjective well-being. Taking a more comprehensive perspective than typical previous studies on this topic in transportation research, this study (i) includes both hedonic and eudaimonic measure of subjective well-being, (ii) allows for mutual dependency between travel satisfaction and subjective well-being, (iii) acknowledges that subjective well-being is influenced by people's interdependent satisfactions with different domains of life, and (iv) allows for possible influence of personality traits on satisfaction ratings.

The empirical results of this study show that travel satisfaction does not significantly influence life evaluation, but life evaluation strongly influences travel satisfaction. This may be a disappointing result in the sense it suggests daily travel is less influential for subjective well-being than other domains such as work, health and personal relationships. On the other hand, we would be surprised if a different result would have been obtained.

This finding is not in line with selective earlier research. Even though some empirical work studies the impact that transport may have on well-being (Steg & Gifford, 2005; de Groot & Steg, 2006; Delbosc & Currie, 2011a; Delbosc & Currie, 2011b; Delbosc & Currie, 2011c; Bergstad et al., 2012; Delbosc, 2012; Archer, Paleti, Konduri, Pendyala, & Bhat, 2013), very little work has directly studied the relationship between travel satisfaction and overall well-being. Despite the small body of extant studies regarding the effect of travel satisfaction on overall well-being, some studies have empirically demonstrated that travel well-being contributes to overall well-being or quality of life. For example, Spinney, Scott, and Newbold (2009) found significant association between transport mobility benefits and quality of life. Bergstad et al. (2011) found the effect of satisfaction with daily travel on affective and cognitive subjective well-being is both direct and indirect. However, few studies treated subjective well-being as an exogenous variable (Abou-Zeid & Ben-Akiva, 2011). Abou-Zeid and Ben-Akiva (2011) found a positive impact of overall well-being on commute satisfaction, but the effect is not significant.

Our study focused on general satisfaction with daily travel and thus extends the knowledge derived from prior research on travel satisfaction, which focused on the relationship between subjective well-being and types of trips, such as leisure trips (Sirgy et al., 2011) and commute trips (Olsson, Gärling, Ettema, Friman, & Fujii, 2013; Mao, Ettema, & Dijst, 2016; Ye & Titheridge, 2017).

Personality traits are found to impact travel satisfaction in this study. The inclusion of personality traits may in part explain our main finding, relative to other studies. Moreover, only some socio-demographic variables are shown to affect travel satisfaction, but only indirectly. For example, age and gender indirectly influence travel satisfaction through self-disciplined personality.

Travel satisfaction is shown to affect satisfaction with other life domains such as satisfaction with the amount of time you do what you like. This supplements previous findings that commute satisfaction has a positive and significant effect on work well-being (Abou-Zeid & Ben-Akiva, 2011).

Finally, we should highlight some limitations of the current study. First, the analyses reported in this paper concern general travel satisfaction and its relationship with subjective well-being. Future research should explore trip satisfaction and trip stage satisfaction. Second, this study is only concerned with a single city in China. Further investigation in different cities and countries is necessary to better understand any spatial, cultural and wealth differences in travel satisfaction and its relative influence on subjective well-being. Furthermore, this research mainly discusses the cognitive aspect of subjective well-being. Moods and emotional aspects of subjective well-being can be added in future studies.

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