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# Understanding worthwhile travel time: An empirical study of travel experiences across transport modes

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ABSTRACT

The concept of worthwhile travel time (WTT, Cornet et al., 2022) provides insight into how travellers perceive their travel time. Worthwhileness can be linked to multiple domains, including enjoyment, fitness, and productivity. This study leverages the full open dataset collected by the Woorti app, comprising 38,838 validated trip legs in 8 countries, to empirically substantiate the WTT concept across walking, cycling, public transport, and private motorised travel. Using a structural equation modelling (SEM) approach, we analyse the intertwined relationships among traveller and trip characteristics, experience factors, and travel activities that influence perceived WTT. Our findings reveal that perceived WTT for walking and cycling is higher than for public or private motorised travel. For active modes like walking and cycling, enjoyment impacts perceived WTT more than fitness. Enjoyment is enabled by accompanying someone and listening to audio for walkers, and by thinking and the act of cycling itself for cyclists. For public transport travellers, perceived WTT is determined by personal productivity (browsing the internet, thinking, talking), followed by enjoyment (listening to audio, relaxing, watching/gaming). For private motorised travellers, perceived WTT is determined almost equally by personal productivity (thinking, driving itself) and enjoyment (accompanying someone, talking). Our empirical evidence emphasises the importance of policies that enhance the quality of travel time, such as safe and pleasant infrastructure for walking and cycling, uninterrupted internet access in public transport, and accommodating seating. The paper argues for a more explicit investigation of the factors that make travel time worthwhile, to enable policy makers to better include the enrichment of the travel experience in their decisions.

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## 1. Introduction

The concept of worthwhile travel time (WTT) provides a framework for unpacking and capturing the subjective quality of the travel time experience from the perspective of travellers (Cornet, 2022). WTT distinguishes between three types of value that travellers can gain from the travel time itself: (a) enjoyment of the trip, (b) fitness gained from conducting the trip, and (c) productivity. Travel activities during the trip (i.e., watching a movie, walking, or working) can enable all three types of value for the travellers. Experience factors (e.g. comfort, travel conditions) and traveller and trip characteristics (e.g. age, trip purpose) can influence the perceived value of the trip. The WTT concept draws from various studies across different fields. For example, (a) from a microeconomic perspective, scholars have recognized the positive, intrinsic, or experienced value of travel time (see e.g., Mokhtarian & Salomon, 2001, Milakis et al., 2015), (b) from a psychological perspective, research has shown that travel can be valuable for several reasons, such as transitioning between places, passing time, experiencing a state of flow (see e.g., Jain and Lyons, 2008; Te Brömmelstroet et al., 2021) and (c) from well-being and travel satisfaction perspective, studies distinguish between hedonic value, which refers referring to short-term benefits from travel like pleasure and enjoyment, and eudaimonic value, which involves long-term benefits like personal growth, purpose, and self-realisation (see e.g. De Vos et al., 2015). Although research underpinning the WTT concept has grown in recent years, WTT as a holistic concept of perceived travel experience has not yet been systematically and comprehensively explored in empirical studies (Cornet, 2022). Addressing this gap is important because it provides policymakers with the evidence needed to enhance the travel experience, rather than mainly focusing on reducing travel time and cost. By offering empirical insights into how travellers perceive the worthwhileness of their travel time through enjoyment, fitness, and productivity, this research contributes to rectifying this gap and provides guidance for policy interventions aimed at improving the quality of travel.

This paper fills this need by offering a deep understanding of what drives the worthwhileness of travel time. It provides a comprehensive assessment of travel experience by empirically investigating the concept of WTT across four transport modes (walking, cycling, public transport and private motorised) in eight European countries. The empirical investigation is based on a large, open and European-wide travel experience dataset (Consonni et al., 2020). Data was collected through an app-based implementation of the WTT concept during 2019 (Cornet et al., 2019). The outcomes provide comprehensive, holistic, and concrete evidence on the influencing factors (i.e., experience factors and travel activities while also controlling for traveller and trip characteristics) of perceived WTT, allowing detailed insights into the conditions under which travel time becomes more worthwhile. Earlier papers have employed certain segments of the same dataset offering useful but partial insights on travel experience for long-distance trips (Malichová et al., 2022, N = 733), short-distance (urban) trips (Pourhashem et al., 2023, N = 8506), cycling trips (Hook et al., 2024, N = 8,543), and the perceived value of travel activities aggregated across all modes (Malichová et al., 2022). This paper is the first one that (1) applies the theoretical concept of WTT developed in Cornet et al. (2022) in a complete and consistent way to the empirical investigation of travel experience, including positive and negative experience factors as distinct variables, and (2) employs the full dataset (N = 38,838 validated trip legs after cleaning) covering all geographical areas (urban, suburban and rural) in eight European countries by four different modes. Hence, it ensures a high degree of robustness in the outcomes, taking into consideration both the theoretical underpinnings and empirical data.

The paper is structured as follows. Section 2 provides a description of the WTT concept and an overview of the background literature on each of the WTT components (i.e. travel activities, experience factors, traveller and trip characteristics) summarising the evidence about their association with the quality of the travel experience, travel satisfaction, and subjective well-being. Section 3 presents the data collection and sample, as well as the selected method of structural equation modelling for the empirical analysis. Section 4 describes the outcomes of the study. First, the variation of the perceived WTT and WTT components across transport modes is provided. Then, the outcomes of the path models about the influence of the WTT components on perceived WTT per transport mode are presented. Section 5 comprises the discussion, conclusions, and policy implications per transport mode as well as the limitations of this study and recommendations for future research.

## 2. Background

### 2.1. The concept of WTT

The concept of WTT emerged from research revealing that travellers' do not consider all travel time as wasted (Banister et al., 2019; De Vos et al., 2015; Jain & Lyons, 2008; Ory & Mokhtarian, 2005). For example, Mokhtarian & Salomon (2001) suggested that the overall travel utility does not derive only by the activity at the destination of the trip, but also from the activities that can be conducted during the trip and the activity of travelling itself. The literature provides various reasons and conditions for turning wasted travel time into WTT, such as the opportunity for productive work (Wardman & Lyons, 2016), time-off (Jain & Lyons, 2008), the presence of a co-traveller (Milakis et al., 2015), the empowerment provided by information and communications technologies (Lyons 2019; Wang & Loo 2019; see also Pawlak, 2020 for a review on the topic), crowding conditions and comfort factors (Lyons et al., 2016), traveller attitudes (Ory & Mokhtarian, 2005), trip duration (Milakis & van Wee, 2018), and/or the built environment itself (De Vos et al., 2015).

The proposed concept of WTT distinguishes between three types of value (value domains) that travellers can gain from the travel time itself (Fig. 1, arrow 1): enjoyment, fitness, and productivity. The value is enabled by travel activities during the trip (Fig. 1, arrow 2): (a) enjoyable activities (e.g., watching a movie or talking with a friend or family member) or the joy of the trip activity itself (e.g., relaxing time or enjoying the scenery while driving or cycling), (b) fitness activities (e.g., walking or cycling to work as a way to get exercise), and (c) productive activities (e.g. (completing work or personal tasks). Experience factors (i.e., travel conditions as experienced by the traveller) can affect the ability of travellers to engage in worthwhile activities while travelling (Fig. 1, arrow 3). For

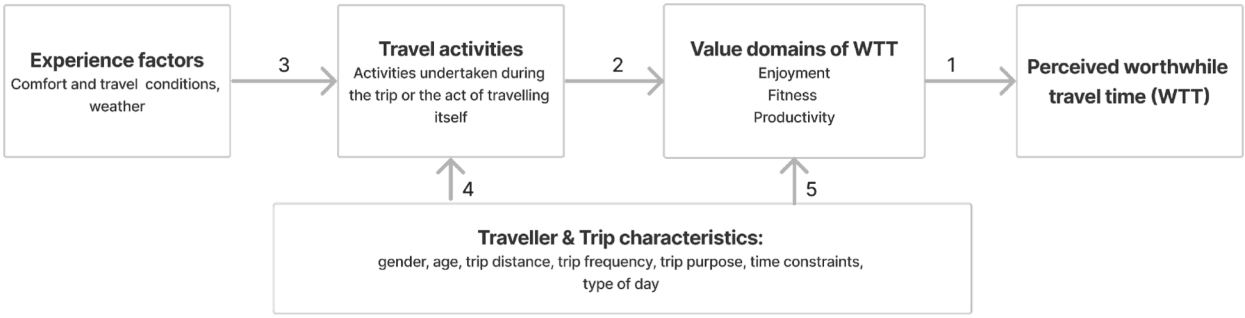


**Fig. 1.** The conceptual model of WTT, adapted from Cornet et al. (2022).

example, when rail travellers can easily find a seat and thus experience their rail trip as not crowded (= experience factor), then they might engage in activities while travelling such as reading a paper or browsing the internet on their smartphone (= travel activities). Finally, the traveller and trip characteristics (e.g. age, gender, trip frequency, trip purpose) could influence both the travel activities that could be undertaken during a trip and the perception of different values of the trip (Fig. 1, arrows 4, 5). For example, in comparison to older travellers, younger people may carry ICT equipment more frequently, enabling them to undertake numerous activities while travelling. Also, genders might perceive value domains differently.

### 2.2. Travel activities

Travel activities are central to ascribing value to the trip itself. Travel activities can contribute both to utilitarian purposes (shorter-term hedonic well-being) as well as to eudaimonic well-being (longer-term development and life satisfaction) (De Vos et al., 2013). Social and entertainment activities in public transport improves satisfaction with the work commute, and so does the ability to engage in physical exercise when cycling or walking to work (Olsson et al. 2013). Longitudinal research on UK trains highlighted the importance of travel time use for travellers to consider their travel time worthwhile and for choosing the train (Lyons et al., 2016). However, Lyons and Urry (2005) warned early on that not all travel activities are equal and that positive value can vary greatly, from 'ultra-productive' ("the use of time on the journey has been more beneficial than had that time been used otherwise") to simply 'killing time' (i.e. activities that counteract stress or boredom), to outright 'counter-productive' ("time use that not only achieves no benefit in itself but also has an adverse effect on time use beyond the journey"). Recent research using an app-based multimodal approach confirmed the importance of conducting activities while travelling to increase trip satisfaction, and concluded that non-productive activities (e.g. relaxing or socialising) were more likely to provide higher satisfaction (Le et al., 2020).

### 2.3. Experience factors

#### 2.3.1. Walking

There are three main groups of factors that impact the quality of the walking experience, and therefore walkability: a) safe infrastructures, b) urban design, and c) weather. The first group of factors involves safe streets and sidewalks (Liao et al., 2022; Singleton, 2019) as well as pavement width and guardrails as buffers from motorised traffic, pavement surface quality and obstructions, lightning, and street parking (Loo, 2021). The second group of factors refers to the enhancement through urban design of the comfort and convenience for pedestrians by decreasing annoyances that can unlock a more fun and friendly experience (Liao et al., 2022; Singleton, 2019) or the ability to engage in activities which are typically considered useful or enjoyable by walkers, such as to relax, reflect, solve problems and daydream while walking (Calvert et al., 2019). Car traffic (including noise and air pollution) can interrupt contemplation by cognitively forcing pedestrians to pay attention to their surroundings (Calvert et al., 2019). Other factors that have been shown to positively affect the walking experience are mixed land use and the proximity of retail services (Cervero & Duncan, 2003), greenery (trees, resting places, scenery) and, quite simply, the directness of the route (Loo, 2021). Finally, the third group of factors comprise, low or high temperatures, wind speed, snowy or raining conditions, but also sunshine that can affect both the travellers' mood and their overall travel satisfaction (Ettema et al., 2017). Walkability preferences may vary with socio-demographic characteristics, particularly distances between home and work locations, income, age and gender (Liao et al., 2022).

#### 2.3.2. Cycling

Perceived safety and travelling comfort, and thus safe and pleasant infrastructures are key determinants of cycling experience (Dill & Carr, 2003). Purpose-built, segregated cycling tracks are considered the basis for (perceived) cycling safety, especially for less confident and cautious cyclists, including dedicated safe designs for intersections and roundabouts (Buehler & Dill, 2016; Heinen et al., 2010; Milakis, 2015). Spatial characteristics, microscale attributes and aesthetics can also play a significant role in the cyclists' travel experience and comfort (Milakis & Athanasopoulos, 2014); fewer stops, less crowding, green surroundings and the presence of shopping opportunities (Vedel et al., 2017); green waves, curbs, footrests and skewed rubbish bins alongside cycle tracks (Gössling,

2013); lighting of cycling facilities, including parking (Reynolds et al., 2009); scenery, traffic noise, air pollution and weather conditions (Winters et al., 2011); hilliness and landscape (Heinen et al., 2010); high levels of visibility and reduced stops (Rybarczyk, 2014), and smoothness and quality of the pavement (van Goeverden et al., 2015). Adequate air temperatures (24 °C is considered ideal) naturally also play a significant role (Ettema et al., 2017). Bikeability is dependent on individual factors, habits and preferences (Handy et al., 2014), but also to wider social characteristics such as social norms, cycling cultures and associated political and/or symbolic factors (Pooley et al., 2013; Spinney, 2009).

#### 2.3.3. Public transport

Public transport passengers have potentially more opportunity to use their travel time for personal activities since they are not preoccupied with operating a vehicle. This suggests travel conditions such as onboard services (e.g. internet connectivity, electric outlets, and the presence of tables; Kenyon & Lyons, 2007; Pawlak, 2020) and comfort factors (e.g., crowding and the availability of seating, space and privacy; Cantwell et al., 2009; Shaw et al., 2019) in general are likely to play an important role for unlocking travel time use. Moreover, predictability and reliability of the trip can significantly affect stress levels and travel satisfaction, which are associated with additional trip characteristics such as trip directness, the number of transfers, proximity to stops and stations, and waiting times (Cantwell et al., 2009; Ha et al., 2020; St-Louis et al., 2014; Wener et al., 2003). Few more factors may play an important role but remain somewhat understudied, such as the presence of toilets (Van Acker et al., 2020), vibrations and motion sickness (Malokin et al., 2019), air quality and noise levels (Ma et al., 2021), general cleanliness and lighting (Sukhov et al., 2021), and weather conditions (Ettema et al., 2017). Personal safety is however considered a necessary condition for overall travel satisfaction (Sukhov et al., 2021). However, these results can vary depending on a combination of traveller characteristics and attitudes, with gender, age and income often playing a key role (Lyons et al., 2016; Mokhtarian et al., 2015; Molin et al., 2020; Shaw et al., 2019).

#### 2.3.4. Private motorised

The literature identifies comfort and convenience as the main positive (Schwanen, 2015) and congestion and travel time unpredictability as the main negative experience factors for private car travel (Chatterjee et al., 2020; Ettema et al., 2013). Driving by car is associated with higher stress and mental fatigue, especially due to congestion, than all other modes (Mokhtarian et al., 2015). Yet, congestion does not trade-off personal space as crowdedness does for public transport users. Moreover, safety risks appear to be 'externalised', offset by the sense of control, protection and autonomy driving a car confers (i.e., accidents happen to others) and the pleasure of driving itself (Morris & Guerra, 2014). Traffic, but also weather and lighting conditions have a significant effect on safety perceptions, driver workload, and therefore stress levels (Li et al., 2022). Overall, although flexibility (i.e., convenience), autonomy (i.e., freedom), comfort and privacy (i.e., personal space) are key determinants of car use, these do not necessarily allow car drivers to use their travel time for something useful other than the driving itself (Wadud & Huda, 2021). Car passengers represent a subcategory of car users with a different experience, more similar to that of public transport where most of the enjoyment comes from interacting with fellow passengers (Morris & Guerra, 2014).

### 2.4. Traveller and trip characteristics

The traveller and trip characteristics (e.g. transport mode; trip purpose and duration; the presence of a travel companion; traveller socio-demographics, attitudes and preferences) could influence the relationships between experience factors, travel activities and travel satisfaction. For example, travel satisfaction for commuters on any mode decreases as travel duration increases (Chatterjee et al., 2020), although this relationship appears not to be linear, with satisfaction peaking at around 10 min and significantly dropping beyond 30 min (Humagain & Singleton, 2021; Milakis et al., 2015). Regarding trip purpose, commuters travelling for work are least likely to consider their time use very worthwhile, whereas leisure travellers (and those who read particularly) are most likely to rate their travel time positively (Le et al., 2020; Lyons et al., 2016; Molin et al., 2020). Looking at travellers' socio-demographic characteristics, literature suggests that women are more sensitive to travel quality (Erinne et al., 2022), while younger people appear to care less for the weather conditions and are more likely to have the technological means to engage in digital activities, but also to consider their travel time wasted (Lyons et al., 2016; Shaw et al., 2019). Traveller predispositions to various aspects of a trip can also play an important role in variations of trip satisfaction. Manaugh & El-Geneidy (2013) showed the importance of motivations for exercise, social interaction, environmental issues, and aesthetics to better explain the higher satisfaction of some walkers on their commute. Ory & Mokhtarian (2005) introduced a variety of attitudinal variables (e.g. attitudes towards travelling, the commute, stress, urban density and the environment) together with personality and lifestyle to explain nuances in 'travel liking' assessments.

## 3. Data and methods

### 3.1. Data collection and sample

The data collection lasted from May to December 2019 and took place in 8 European countries: Belgium, Finland, France, Italy, Norway, Portugal, Slovakia and Spain. People aged 16 and over were recruited through an online campaign to download the Woorti mobile application and track their daily travel activities for at least seven consecutive days. The Woorti app was promoted as a tool to help users understand how they experience travel time from the perspectives of productivity, enjoyment, or fitness (Veiga & Bernardino, 2019; 'Woorti' is a short acronym for worthwhile + time + travel). These three value domains were defined and illustrated with examples during the onboarding process when users first opened the app. To avoid bias, questions were formulated in a neutral

way, such as 'was your travel time wasted or worthwhile?', or 'what value did you take from your time on this part of the trip?' (Cornet et al., 2019). In order to attract a diverse cohort of participants and to ensure their continued engagement throughout the data collection process, a range of engagement tools such as incentives, rewards or lottery were employed (Hudák, Cornet, 2019). The process of capturing travel activities was as follows: the travel time, distance and transport mode of every leg of a detected trip were automatically recorded. Once a full trip was registered, the app notified the traveller, requesting to provide further feedback on their travel experience. Travellers were first asked to confirm their transport modes, their trip purposes, whether they faced time constraints, and the trip's typical frequency. Subsequently, they could choose a specific trip leg to provide further feedback, where they were asked to rate the worthwhileness level of their travel time, the value taken from it (productivity, enjoyment, fitness), the travel activities contributing to this value, and finally the most relevant positive and negative experience factors that impacted the quality of their travel time. All questions from the app can be found in Appendix A, and transport modes, travel activities, experiences factors and other decisions and trade-offs made for the survey design are published in Cornet et al. (2019). Overall, 3,300 respondents reported 67,177 door-to-door trips consisting of 158,897 trip legs, which is the unit of our analysis. After data cleaning, the sample was restricted to 38,838 trip legs reported by 2,576 respondents.

Table 1 shows descriptive statistics of the sample's trip and traveller characteristics as used in the analysis, except for 'country of residence' as the analyses are based on a pooled sample.

Special attention was given to data representativeness per country in terms of gender and age during data collection (Hudák & Cornet, 2019). Comparing our sample for age and gender with data from Eurostat for populations older than 16 years old, we find an overall bias towards male population (54.9 % vs 48.2 % in the 8 analysed countries) and, except for Italy, the sample is slightly skewed towards the 25–50 years old population. However, the aim of this paper is to model relationships among multiple variables of the WTT concept in Fig. 1, and therefore representativeness is not needed in all aspects: the key is to have enough variability within the variables (and there is for example enough variability to test gender or age effects). This is also supported by Groves (1989), who mentioned that a small amount of unrepresentativeness is not a problem if a study's concerns are related to model relationships rather than replication of the population.

### 3.2. Methods: Structural equation modelling

The conceptual model in Fig. 1 consists of a complex set of relationships where one variable can be a determinant of another variable (e.g., travel activities influencing the values of travel time) and at the same time be influenced by other variables (e.g., travel activities influenced by experience factors). If this conceptual model were to be written down in mathematical equations, it would look like (Eq. 1).

*WTT* = f (*value domains of WTT)*.

with each value domain = f *(travel activities* + *trip characteristics* + *traveller characteristics)*, and each travel activity = f *(experience factors* + *trip characteristics* + *traveller characteristics)*. (Eq. 1).

Such a system of interrelated relationships with intermediate variables as in Eq. (1) can be estimated using Structural Equation Modelling (SEM). A SEM does not refer to 'independent' and 'dependent' variables like in a regression analysis, but instead distinguishes between 'exogenous' and 'endogenous' variables. Exogenous variables are variables that are not influenced by other variables in the model, while endogenous variables are influenced by other variables in the model. In Fig. 1, the traveller characteristics, trip characteristics and experience factors are considered exogenous variables, while travel activities, values domains and WTT are examples of endogenous variables.

**Table 1**
Descriptive statistics for respondents and trip legs.

| Variable | Frequencies |
|---|---|
| Gender[1] (N = 2,576 respondents) | 45.1 % female, 54.9 % male |
| Age (N = 2,576 respondents) | 19.8 % 16 to 24 year; 60.2 % 25 to 49 year; 20.0 % 50 + year |
| Country of residence (N = 38,838 trip legs) | 15.6 % Belgium; 10.1 % Finland; 4.9 % France; 8.3 % Italy; 13.6 % Norway, 9.8 % Portugal, 20.0 % Slovakia, 14.4 % Spain, 3.4 % Other |
| Transport mode (N = 38,838 trip legs) | 34.5 % walking; 22.6 % cycling; 12.6 % public transport[1]; 30.5 % private motorised[2] |
| Trip distance (N = 38,838 trip legs) | 80.5 % less than 15 km; 19.5 % more than 15 km |
| Trip purpose (N = 38,838 trip legs) | 24.3 % home; 35.3 % work & business; 30.3 % maintenance (including shopping, personal tasks & picking up someone); 19.1 % leisure |
| Trip frequency (N = 38,838 trip legs) | 47.2 % regularly; 52.8 % non-regularly |
| Time constraint (N = 38,838 trip legs) | 58,2% yes; 41.8 % no |
| Day of week (N = 38,838 trip legs) | 78.9 % weekday; 21.1 % weekend |
| Temperature (N = 27,594 trip legs) | 36.3 % cool (less than 15 °C); 41.8 % comfortable (15–24.9 °C); 13.1 % warm (25–31.9 °C); 8.9 % uncomfortably hot (32 °C and more) |

1 'public transport' includes train, bus, tram and metro.
2 'private motorised' includes car driver, car passenger, car-sharing, moped, motorcycle and taxi.
[1]In our research and adopted method, gender refers to socially constructed roles, behaviours, and identities of women, men and gender-diverse people that occur in a historical and cultural context and may vary across societies and over time (as per SAGER guidelines). 15 people (0.5%) in the full MoTiV dataset identified as non-binary or "other" along the gender identities spectrum. After data cleaning, the sample did no longer contain trip legs from this category.

In a full SEM, variables can be manifest (i.e., directly observed such as age) or latent variables. Latent variables such as socio-economic status are hypothetical constructs that can only be observed by its underlying indicators such as income, education and profession in this example. In this paper, all key concepts in Fig. 1 will be measured with manifest variables only. Consequently, this paper will estimate a path model which is a special case of a SEM consisting of only manifest variables. We will eventually estimate four path models, one for each transport mode (i.e., walking, cycling, public transport, private motorised) separately.

Fig. 1 also shows how value domains of WTT are the only variables with a direct effect (i.e., a direct arrow or 'path') on WTT. All the other exogenous (i.e., traveller characteristics, trip characteristics, experience factors) and endogenous variables (i.e., travel activities) will have an indirect effect on WTT. This indirect effect can be defined as the impact of one variable on another via one or multiple mediating variables. For example, experience factors will have an indirect effect on WTT via travel activities and value domains of WTT. The magnitude of this indirect effect is then equal to the product of the various direct effects along the entire path from one variable to another. The total effect of one variable on another is then the sum of its direct and indirect effect (if any). However, in this paper, all variables have either a direct or an indirect effect on WTT, but never both. Consequently, the total effect of the value domains on WTT corresponds to its direct effect, and the total effects of the other remaining variables on WTT correspond to their indirect effects.

To estimate a path model (or a SEM), the covariance matrix of the observed data is matched to a model-based estimated covariance matrix usually using Maximum Likelihood (ML) estimation. ML estimation assumes multivariate normal distribution of all endogenous variables, but many of the endogenous variables identified in Fig. 1 violate this assumption. After all, in each path model for each transport mode, experience factors and travel activities are used as binary variables, value domains were re-coded into binary variables, and the continuous variable of WTT is not normally distributed according to Kolmogorov-Smirnov testing. This paper therefore applied ML with bootstrapping as it has proven to be a good solution for the analysis of non-normal data (Byrne, 2010). The path models were estimated using SPSS Amos 28 Graphics.

AMOS offers a wide range of measures to assess model fit. It starts with the $\chi^2$-statistic which measures the difference between the sample-based and the model-based estimated covariance matrices. Small values of $\chi^2$ with a p-value higher than 0.05 (or any other chosen significance level) indicates good model fit. However, the $\chi^2$-statistic is known for easily and falsely rejecting the null hypothesis as its calculation depends on the sample size. Therefore, various alternative model fit measures are used as well. Other measures of absolute model fit are the $\chi^2$-statistic divided by the degrees of freedom (which should be less than 2) and the Root Mean Square Error of Approximation (RMSEA, which should be lower than 0.05). Comparative measures such as the Comparative Fit Index (CFI) and Tucker-Lewis Index (TLI) are another category of model fit measures. Such measures assess the improvement of the hypothesised model over the independence model with unrelated variables. Values higher than 0.9 are generally considered as good model fit. A third type of model fit measures are those that take into account model complexity, e.g. the Parsimonious Normed Fit Index (PNFI) with values higher than 0.7 indicating good model fit.

Because of the complexity of the conceptual model in Fig. 1, we decided to use a stepwise modelling approach. We first estimated the direct effects from trip and traveller characteristics onto the value domains and the direct effects from these value domains on WTT. Only significant relationships were retained (in this case defined as relationships with $p < 0.05$). We then continued with adding the direct effect of travel activities onto the value domains and the direct effect of trip and traveller characteristics on these travel activities. Again, we only retained significant relationships with $p < 0.05$. After that, we added the direct effect of negative and positive

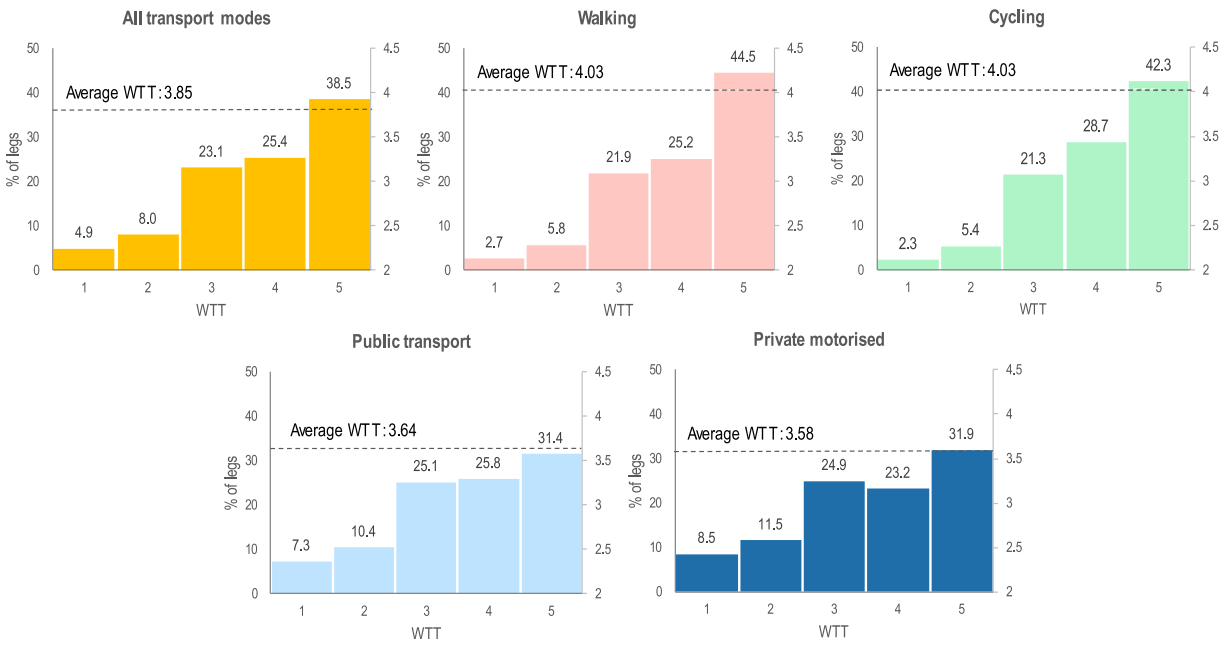


**Fig. 2.** Distribution of perceived WTT ratings per transport mode.

experience factors onto the travel activities, again retaining only significant relationships. Finally, we added covariances among all exogenous variables (i.e., trip characteristics, traveller characteristics, and positive and negative experience factors). We also conducted sensitivity analyses for the path models for 'public transport' and 'private motorised'. After all, 'public transport' combines train, bus, tram and metro trips in a single path model, and 'private motorised' does the same for car driver, car passenger, car-sharing, taxi, moped and motorcycle. However, there may be important mode specific effects. We therefore tested the robustness of our results by re-estimating the final path model for 'public transport' with a smaller sample including train users only and another one with bus/tram/metro (BTM) users only. Similarly, we re-estimated the final path model for 'private motorised' with a smaller sample including car drivers and passengers, a second one with car passengers only and a third one with car drivers only.

## 4. Results

### 4.1. The variation of perceived WTT and WTT components across transport modes

This section describes how key concepts from Fig. 1 (i.e., perceived WTT, value domains, travel activities, and experience factors) were operationalised for the path analysis, and how these key concepts differ across transport modes. Trip and traveller characteristics were described earlier in Table 1.

#### 4.1.1. Perceived WTT

Travellers were asked to indicate the worthwhileness of a trip leg on a 5-point star scale with 1 star meaning 'All travel time was wasted' and 5 stars 'All travel time was worthwhile'. In general, travellers perceived their travel time as more worthwhile (Average WTT = 3.85). For all transport modes, a higher number of trip legs were rated with five stars, which means that respondents generally considered their travel time worthwhile (Fig. 2). However, the distributions for walking and cycling show that the perceived WTT is higher than travelling by public transport or private motorised modes. Up to 71 % of cycling trip legs and 69.7 % of walking trip legs were rated highly worthwhile (four or five stars), contrary to only 58.2 % of public transport trip legs and 54.1 % of private motorised trip legs.

#### 4.1.2. Value domains: Enjoyment, fitness, productivity

Travellers were asked how much value they obtained from their travel time on this trip leg with respect to four domains of value (i.e., enjoyment, fitness, productivity related to personal tasks, and productivity related to paid-work). For each value domain of WTT, they could choose between (0) None, (1) Some and (2) High value. Regardless of any transport mode, people seem to value their trip legs most for enjoyment and least for paid work (Fig. 3). Cycling and walking are highly valued for fitness. In contrast, this value for fitness is very limited for public transport and private motorised modes. While the original variable has three categories, in the subsequent path analysis this will be reduced to two: None (0) versus Some to High value (1) due to limited observations in certain categories and the need to simplify the models.

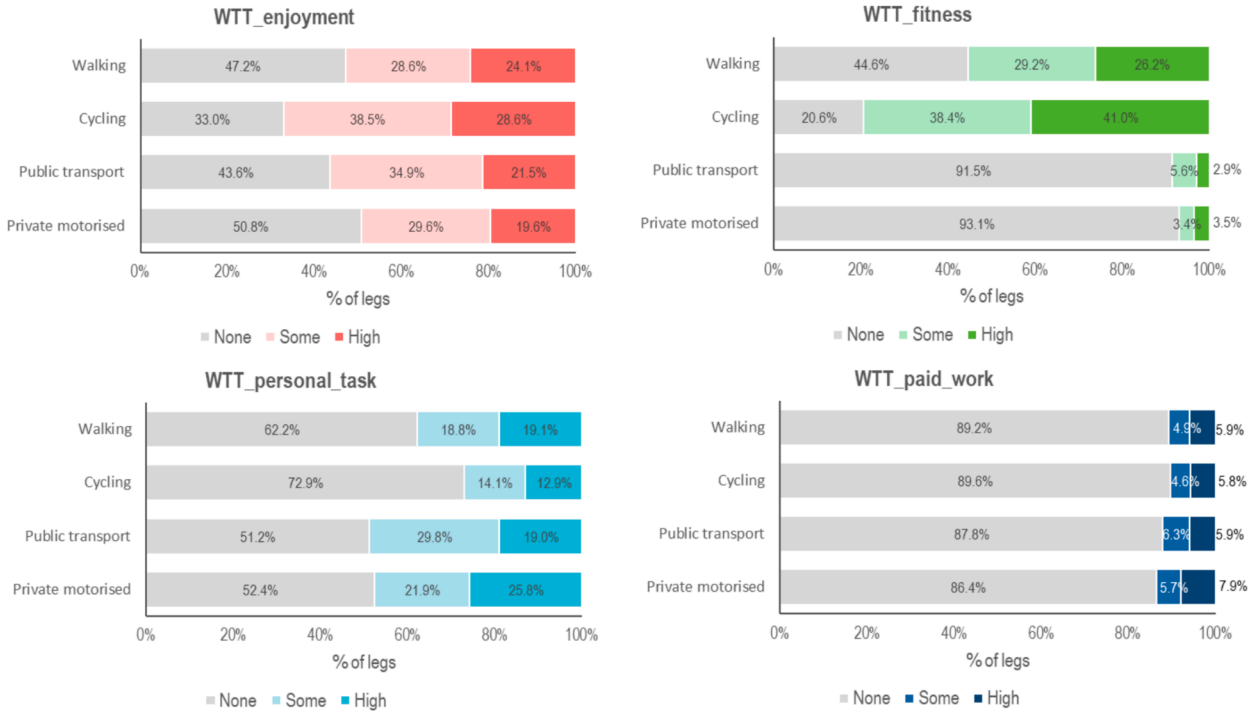


**Fig. 3.** Contribution of values domains to WTT per transport mode.

#### 4.1.3. Travel activities

Travellers were asked to select all travel activities (from a predefined list per transport mode) that have contributed to the valuation of their trip leg. 28.1 % of the people who walk reported that walking itself had contributed to their perceived value of travel time. The value from travelling itself is also high for cyclists, where 43.9 % reported 'the cycling itself' as contributing to WTT. Other valuable activities frequently reported by active mode users are accompanying someone, thinking, and talking (Fig. 4). Public transport users mainly value browsing the internet (13.3 %), listening to audio (12.1 %) and thinking (11.7 %) while travelling. Private motorised mode users mainly value accompanying someone (18.7 %), talking (13.2 %), listening to audio (12.5 %) and the act of driving itself (12.9 %).

#### 4.1.4. Experience factors

Travellers were asked if certain experience factors (from a predefined list per transport mode) contributed positively or negatively to the quality of their travel time. Travellers reported positive factors more frequently than negative ones, which aligns with the overall assessment of WTT (Fig. 5). For walking, travellers selected most often simplicity of the route (37 %), weather (30 %) and road path availability (26 %) as positive experience factors. On the contrary, crowdedness and congestion (8 %), noise (7 %), air quality and temperature (7 %), and cars and other vehicles (7 %) were the most frequently selected negative experience factors. For cycling, today's weather (39 %) and simplicity of the route (38 %) were the most chosen positive experience factors, followed by road path availability and safety (29 %), while cars and other vehicles (21 %), road path availability and safety (17 %) and air quality and temperature (17 %) were mentioned as negative experience factors. In the case of public transport, the presence of a toilet appears to be especially positively valued (59 %). In addition, the simplicity of the route (39 %) and predictability of travel time (35 %) were also very often perceived positively, while privacy (12 %), noise (11 %), other people (11 %) and crowdedness and seating (11 %) were most often considered as negative experience factors by public transport users. Private motorised mode users most frequently selected simplicity of the route (36 %), vehicle quality (26 %) and today's weather (24 %) as positive experience factors, and traffic congestion (11 %), today's weather (7 %) and cars and other vehicles (7 %) as negative experience factors. This list of positive and negative experience factors per transport mode is quite long. To avoid unnecessary complexity to the path models, we decided to include only those experience factors which proportion was higher than the median of all experience factors.

### 4.2. The influence of WTT components on perceived WTT per transport mode: Path model results

The model fit of each path model is considered adequate to good, based on CFI (> 0.9) and RMSEA (< 0.05) in particular. PNFI values are below threshold in every case, but this is not surprising given the complexity of the path models. For each transport mode, we first describe the direct effect of the value domains on WTT, then how these value domains are determined by travel activities

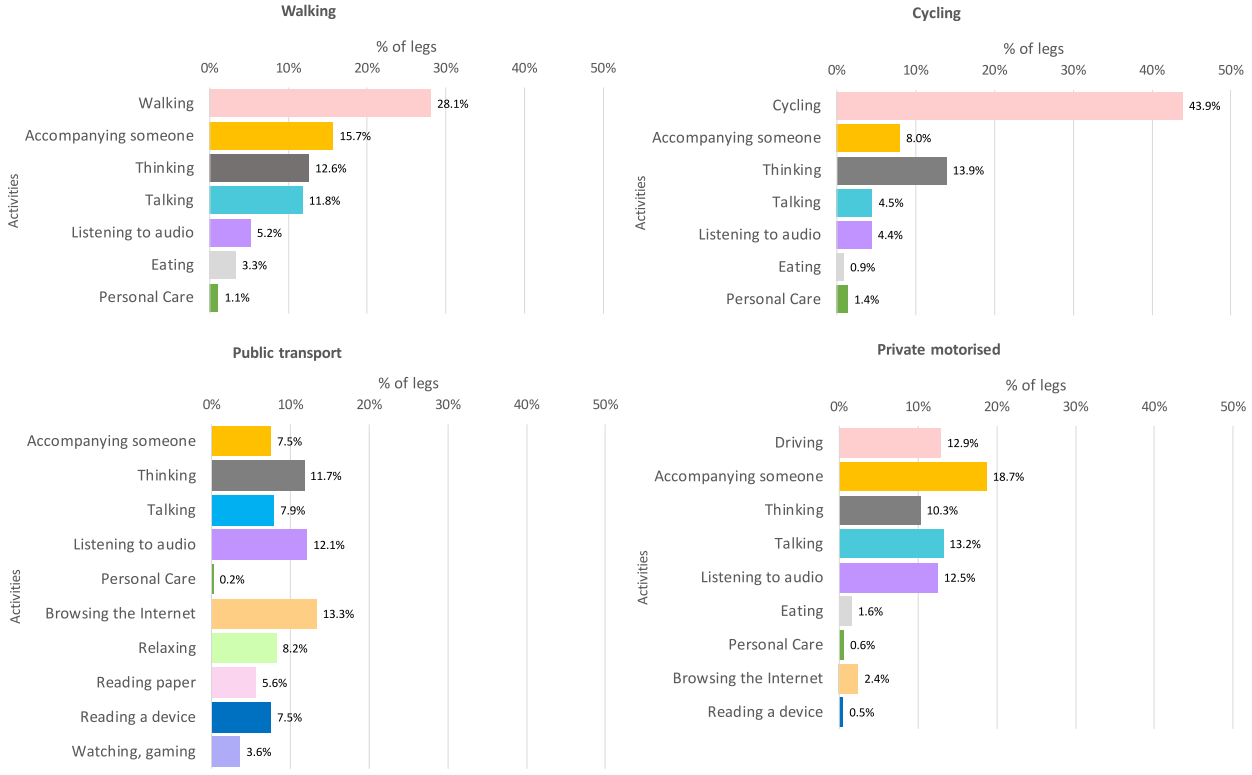


**Fig. 4.** Frequency of valuable activities per transport mode performed during travelling.

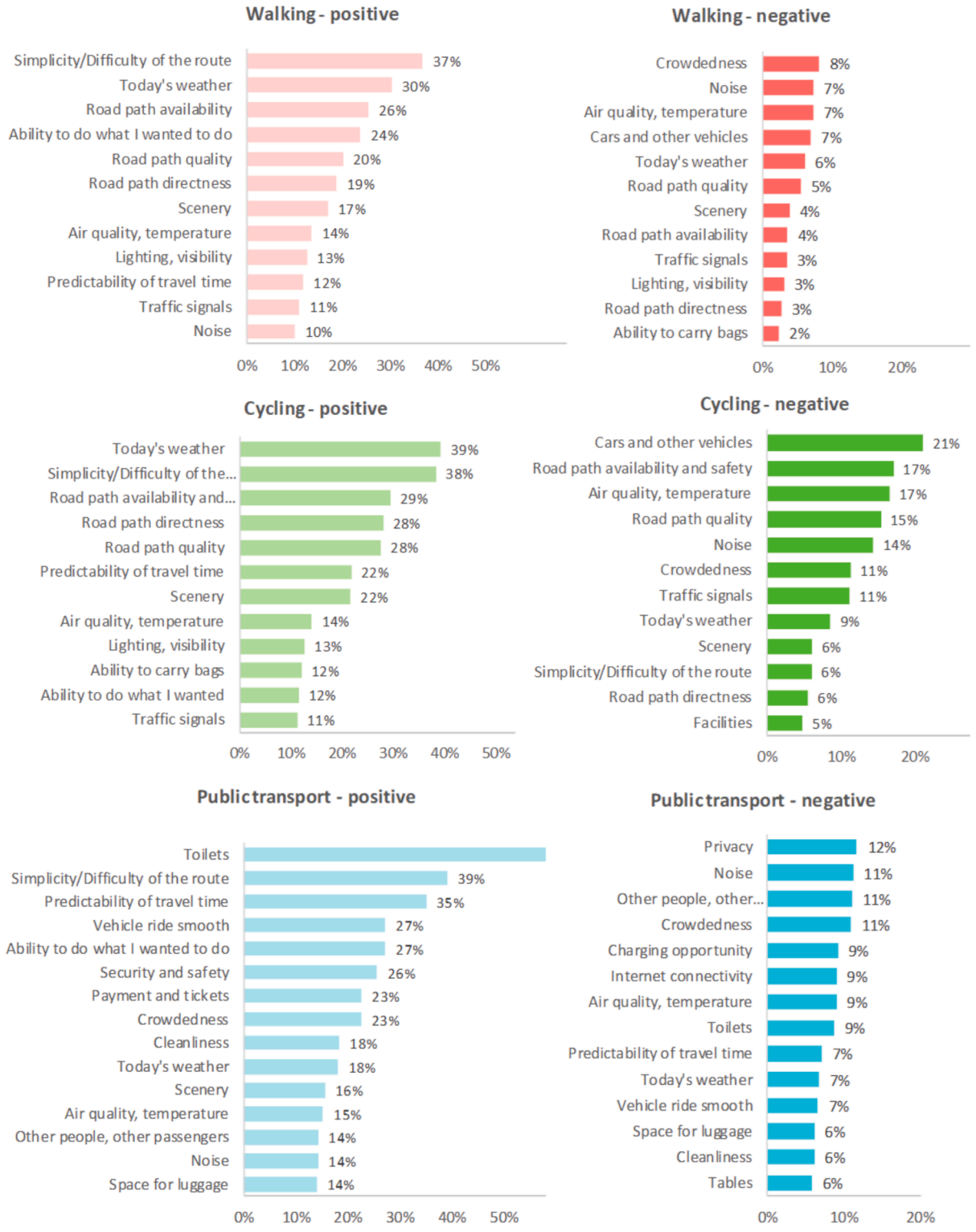


**Fig. 5.** Frequency of positive and negative experience factors per transport mode.

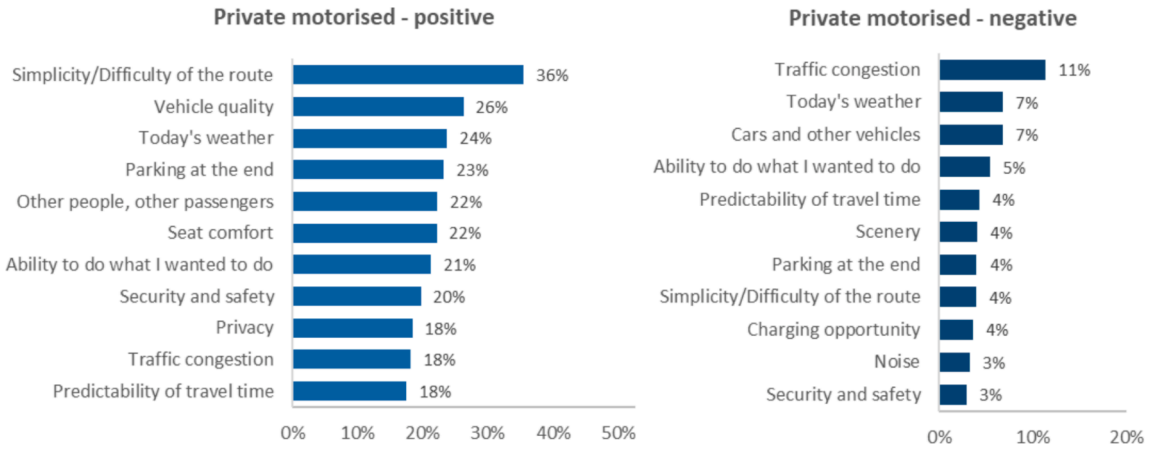


**Fig. 5.** (*continued*).

resulting in an indirect effect of these travel activities on WTT, and finally how experience factors enable the participation in certain travel activities also resulting in an indirect effect on WTT (see Fig. 1).

#### 4.2.1. Walking

***The direct effect of value domains on perceived WTT of walking trips.***

All value domains have a significant and positive effect on the perceived WTT of walking trips, but they differ in importance. The value of enjoyment is most important (β = 0.211), followed by productivity related to personal tasks (β = 0.153), fitness (β = 0.100) and finally productivity related to paid work (β = 0.081) (Table 2). At first sight, this looks somewhat opposite to the findings based on the average scores of each value domain per transport mode (Fig. 2). Indeed, Fig. 2 showed that pedestrians value their trips mainly for fitness reasons and not enjoyment. However, although fitness is a significant contributor to WTT, *changes* in 'fitness' levels would lead to smaller increments in WTT than changes in 'enjoyment'. One should remember that a high average score of a value domain does not automatically mean that this value domain is also strongly correlated with WTT, and only value domains with strong correlations with WTT will eventually result in larger standardised effects in the path analysis.

***The indirect effect of travel activities on perceived WTT of walking trips.***

Travel time by walking is perceived as worthwhile mainly because of the travel activities of talking (β = 0.031), listening to audio (β = 0.028), and thinking (β = 0.024) (Table 2). Appendix BI offers more in-depth insights into where those indirect effects come about. It shows how talking first has a direct effect on the value of enjoyment (β = 0.088) and, almost to the same extent, to the value of productivity related to personal tasks (β = 0.080)). These two value domains then in turn have a direct effect on WTT (β = 0.211 for enjoyment, β = 0.153 for productivity related to personal tasks). The combination of all these different paths from talking to WTT ultimately explains the indirect effect of talking on WTT (β = 088 * 0.211 + 0.080 * 0.153 = 0.031). In a similar way, Appendix BI shows how listening to audio also directly affects the value of fitness (β = 0.043), but this is less important compared to its direct effect on the value of enjoyment (β = 0.115). Thinking has a direct effect on all four value domains and it is especially important for the values of fitness (β = 0.054) and productivity (β = 0.059 for personal tasks, β = 0.050 for paid work) compared to the value of enjoyment (β = 0.025).

As the value of enjoyment appeared most important to increase WTT of walking trips (see previous section), we could also focus on the travel activities that significantly contribute to this specific value domain only. In order of importance, these are the travel activities of accompanying someone (β = 0.125), listening to audio (β = 0.115), talking (β = 0.088), eating (β = 0.027), thinking (β = 0.025) and browsing the internet (β = 0.020).

***The indirect effect of experience factors on perceived WTT of walking trips.***

Travel time by walking is perceived as more worthwhile mainly because of the positive experience factors today's weather (β = 0.010), ability to do what one wanted to do (β = 0.009), simplicity of the route (β = 0.004), and – rather surprisingly – the negative experience factor of air quality and temperature (β = 0.004). It is perceived as less worthwhile due to the negative experience factors of lighting and visibility (β = -0.002), and scenery (β = -0.002) (Table 2). The most important pathways through which experience factors influence WTT of walking trips are as follows: (Appendix BI):

- If today's weather is perceived as positive, it stimulates the probability of accompanying someone (β = 0.090) while walking. This in turn, determines the value of enjoyment (β = 0.090 * 0.125), and ultimately has a positive impact on WTT of the walking trip (β = 0.090 * 0.125 * 0.211 = 0.0024). Note that this indirect effect of today's weather on WTT does not equal the one reported in Table 2. That is because several other paths exist through which today's weather has an effect on WTT. However, the path described here is the most important one. This also applies to the following experience factors explained here.

**Table 2**
Standardised effects on WTT of walking, cycling, public transport and private motorised trips.

| | Walking | Cycling | Public transport | Private motorised |
|---|---|---|---|---|
| *Direct effect of value domains on WTT* | | | | |
| Enjoyment | 0.211** | 0.274** | 0.238** | 0.279** |
| Fitness | 0.100** | 0.105** | 0.048** | 0.061** |
| Productivity related to paid work | 0.081** | 0.118** | 0.135** | 0.137** |
| Productivity related to personal tasks | 0.153** | 0.105** | 0.272** | 0.304** |
| *Indirect effect of travel activities on WTT via value domains* | | | | |
| Accompanying someone | 0.020** | 0.019** | 0.019** | 0.047** |
| Browsing the internet | 0.011** | n.s. | 0.047** | 0.018** |
| Eating | 0.012** | 0.012** | n.s. | 0.019** |
| Listening to audio | 0.028** | 0.021** | 0.032** | 0.023** |
| Personal care | 0.011** | 0.010** | 0.018** | 0.019** |
| Reading device | n.a. | n.a. | 0.028** | 0.007** |
| Reading paper | n.a. | n.a. | 0.024** | n.s. |
| Relaxing or sleeping | n.a. | n.a. | 0.027** | n.s. |
| Talking | 0.031** | 0.008** | 0.034** | 0.036** |
| Thinking | 0.024** | 0.034** | 0.047** | 0.045** |
| Walking/Cycling/Driving itself | 0.018** | 0.034** | n.a. | 0.049** |
| Watching video, gaming | 0.018** | n.a. | 0.012** | n.s. |
| *Indirect effects of positive experience factors on WTT via travel activities and value domains* | | | | |
| Ability to carry bags | b.m. | 0.003** | n.a. | n.a. |
| Ability to do what I wanted to do | 0.009** | 0.005** | 0.009** | 0.022** |
| Air quality, temperature | n.s. | 0.001** | 0.001 | b.m. |
| Crowdedness, seating | n.a. | n.a. | 0.015** | n.a. |
| Lighting, visibility | −0.002** | −0.002** | n.a. | n.a. |
| Noise | 0.001** | b.m. | −0.004** | b.m. |
| Other people, other passengers | b.m. | b.m. | −0.001 | 0.008** |
| Parking at the end | b.m. | b.m. | n.a. | −0.004** |
| Payment and tickets | n.a. | n.a. | −0.008** | n.a. |
| Predictability of travel time | −0.002** | −0.000 | −0.002** | −0.010** |
| Privacy | n.a. | n.a. | b.m. | −0.004** |
| Road path availability | 0.001** | 0.003** | n.a. | n.a. |
| Road path directness | −0.001* | n.s. | n.a. | n.a. |
| Road path quality | 0.001* | −0.000** | n.a. | n.a. |
| Scenery | 0.003** | 0.004** | n.s. | b.m. |
| Seat comfort | n.a. | n.a. | n.a. | 0.005** |
| Security and safety | n.a. | n.a. | 0.008** | 0.005** |
| Simplicity/Difficulty of the route | 0.004** | 0.006** | 0.002** | 0.004** |
| Space for luggage | n.a. | n.a. | 0.008** | b.m. |
| Today's weather | 0.010** | 0.009** | 0.009** | 0.001** |
| Toilets | n.a. | n.a. | 0.013** | n.a. |
| Traffic congestion | n.a. | n.a. | n.a. | 0.002** |
| Traffic signals | −0.002** | −0.004** | n.a. | n.a. |
| Vehicle quality | n.a. | n.a. | n.a. | 0.014** |
| *Indirect effects of negative experience factors on WTT via travel activities and value domains* | | | | |
| Ability to carry bags | +0.000 | b.m. | n.a. | n.a. |
| Ability to do what I wanted to do | b.m. | b.m. | b.m. | −0.001** |
| Air quality, temperature | 0.004** | n.s. | n.s. | b.m. |
| Cars and other vehicles | +0.000 | n.s. | n.a. | −0.002** |
| Charging opportunity | n.a. | n.a. | −0.007** | n.s. |
| Crowdedness, seating | −0.001** | −0.001* | 0.006** | n.a. |
| Facilities | b.m. | −0.005** | n.a. | n.a. |
| Internet connectivity | n.a. | n.a. | 0.001 | n.a. |
| Lighting, visibility | −0.002** | b.m. | n.a. | n.a. |
| Noise | 0.001** | 0.001* | n.s. | −0.000 |
| Parking at the end | n.a | b.m. | n.a. | +0.000 |
| Predictability of travel time | b.m. | b.m. | n.s. | −0.005** |
| Road path availability | 0.001** | n.s. | n.a. | n.a. |
| Road path directness | +0.000 | 0.002** | n.a. | n.a. |
| Road path quality | 0.000 | n.s. | n.a. | n.a. |
| Scenery | −0.002** | 0 | n.s. | −0.002** |
| Security and safety | n.a. | n.a. | b.m. | 0.001* |
| Space for luggage | n.a. | n.a. | 0.001** | b.m. |
| Simplicity/Difficulty of the route | b.m. | 0.002** | b.m. | −0.000** |
| Today's weather | n.s. | −0.000 | 0.001 | −0.007** |
| Toilets | n.a. | n.a. | 0.001 | n.a. |
| Traffic congestion | n.a. | n.a. | n.a. | n.s. |
| Traffic signals | .s. | −0.004** | n.a. | n.a. |
| *Indirect effects of traveller's characteristics on WTT via travel activities and value domains* | | | | |

(*continued on next page*)

**Table 2** (*continued*)

| | Walking | Cycling | Public transport | Private motorised |
|---|---|---|---|---|
| Gender, female | −0.000 | 0.003 | −0.019** | −0.006** |
| Age, 16–24 (ref.: 25–49) | 0.013** | 0.010** | 0.016** | 0.067** |
| Age, 50 and more (ref.: 25–49) | −0.015** | −0.039** | −0.024** | +0.000 |
| *Indirect effects of trip characteristics on WTT via travel activities and value domains* | | | | |
| Distance, 15 km and more | 0.004** | 0.022** | 0.028** | 0.036** |
| Trip frequency, non-regularly | 0.008** | −0.007* | −0.006 | 0.003 |
| Trip purpose, work related | 0.002 | 0.028** | 0.050** | −0.016** |
| Trip purpose, maintenance related | 0.004 | 0.017** | 0.038** | 0.023** |
| Trip purpose, leisure | 0.008** | −0.003* | 0.030** | −0.010** |
| Weekend | 0.013** | 0.016** | 0.007 | 0.023** |
| Time constraint, yes | −0.008** | −0.01** | −0.018** | −0.026** |
| Weather: rain | 0.016** | 0.025** | 0.030** | 0.024** |
| Temperature, cool (ref.: comfortable) | 0.011** | −0.006* | −0.007** | 0.010** |
| Temperature, warm to hot (ref.: comfortable) | −0.024** | −0.04** | −0.020** | −0.024** |
| *Model fit* | | | | |
| $Chi^2$ (df) p | 8065.898 (346) 0.000 | 6846.659 (334) 0.000 | 4001.290 (420) 0.000 | 9048.229 (368) 0.000 |
| $Chi^2$ / df | 23.312 | 20.499 | 9.527 | 24.588 |
| RMSEA | 0.041 | 0.047 | 0.042 | 0.045 |
| CFI; TLI | 0.945; 0.829 | 0.930; 0.782 | 0.935; 0.833 | 0.926; 0.783 |
| PNFI | 0.302 | 0.299 | 0.361 | 0.314 |
| $R^2$ | 8.5 % | 11.0 % | 15.4 % | 18.8 % |

*p ≤ 0.05; ** p ≤ 0.01.
b.m. = experience factor below median and therefore not considered in the path model.
n.a. = travel activity or experience factor is not applicable for this transport mode and therefore not considered in the path model.
n.s. = direct effect of travel activity on value domains (or direct effect of experience factor on travel activities) tested but found insignificant at 95 % and therefore deleted from the path model.

- If one can do what they wanted to do, it stimulates the probability of thinking while walking (β = 0.134). This in turns, determines the value of productivity related to personal tasks (β = 0.134 * 0.059), and ultimately has a positive impact on WTT of the walking trip (β = 0.134 * 0.059 * 0.153).
- If the simplicity of the walking trip is perceived as positive, it stimulates the appreciation of walking activity in itself (β = 0.101). This in turns, determines the value of fitness (β = 0.101 * 0.149), and ultimately has a positive impact on WTT of the walking trip (β = 0.101 * 0.149 * 0.100).
- If air quality and temperature are perceived as negative, it stimulates the appreciation of walking as an activity in itself (β = 0.075). This in turns, determines the value of fitness (β = 0.075 * 0.149), and ultimately has a positive impact on WTT of the walking trip (β = 0.075 * 0.149 * 0.100). This path indicates that even when air quality or temperature are perceived negatively, it can still lead to a positive experience of travel, particularly when walking is considered for fitness.
- If lighting and visibility are perceived as negative, it discourages pedestrians from thinking while walking (β = -0.022). This in turn lowers the value of productivity related to personal tasks (β = -0.022 * 0.059), and ultimately has a negative impact on WTT of the walking trip (β = -0.022 * 0.059 * 0.153).
- If scenery is perceived as negative, it makes pedestrians reluctant to accompany someone while walking (β = -0.042). This in turn lowers the value of enjoyment (β = -0.042 * 0.125), and ultimately has a negative impact on WTT of the walking trip (β = -0.042 * 0.125 * 0.211).

As the travel activity of talking is considered most important for WTT of walking trips, we could also focus on the experience factors that significantly contribute to this travel activity. In order of importance, these are the positive experience factors of today's weather (β = 0.073), simplicity of the route (β = 0.054), scenery (β = 0.041), predictability of travel time (β = -0.034), ability to do what one wanted to do (β = 0.031), and quality of roads and paths (β = 0.030) (Appendix BI). Thus, it seems that people are more likely to talk while walking when their walking trip happens in a pleasant setting (witness the importance of weather, scenery and quality of roads and paths).

***The indirect effect of traveller and trip characteristics on WTT of walking trips.***

There appears to be no significant influence of gender on WTT of walking trips, while it is mainly the younger age group who values walking trips more (Table 2). Of all trip characteristics, weather conditions in particular appear to be most important. Surprisingly, walking on a rainy day appears to be associated with higher ratings of WTT (β = 0.025). This is because despite the rain, it still encourages people to participate in a variety of travel activities (i.e., accompanying someone, listening to audio, thinking, and enjoying the walking activity itself, see Appendix BI) which then contributes to value domains and the overall WTT of walking trips. Walking during the weekend also appears to have an equivalent influence on WTT of walking trips (β = 0.013). Other significant trip characteristics – are the trip distance (β = 0.004) and trip regularity (β = 0.008). WTT of walking trips is higher for longer and less regular trips.

### *4.2.2. Cycling*

***The direct effect of value domains on WTT of cycling trips.***

WTT of cycling trips is significantly and positively influenced by all four value domains, and in particular by the value of enjoyment

(β = 0.274) (productivity related to paid work: β = 0.118, productivity related to personal tasks: β = 0.105, fitness: β = 0.105) (Table 2). Like walking, the standardised coefficient of 'enjoyment' is more than double the ones of the other value domains.

***The indirect effect of travel activities on WTT of cycling trips.***

Thinking and the act of cycling are the two most important travel activities determining the WTT of cycling trips (β = 0.034 for both) (Table 2). This is because thinking not only stimulates the value of enjoyment (β = 0.083), but also the value of productivity related to personal tasks (β = 0.069) and fitness (β = 0.039) (Appendix BI). These three value domains then in turn have a direct effect on WTT (β = 0.274 for enjoyment; β = 0.105 for productivity related to personal tasks; β = 0.105 for fitness). The combination of all these different paths from thinking to WTT ultimately explains the indirect effect of thinking on WTT (β = 0.083 * 0.274 + 0.069 * 0.105 + 0.039 * 0.105 = 0.034). In a similar way, Appendix BI shows how the act of cycling itself also directly affects the value of fitness (β = 0.130), and this is even more important than its direct effect on the value of enjoyment (β = 0.074).

As with walking, the value of enjoyment is also the most important value domain of cycling trips (see previous section). We already mentioned that this value domain is directly influenced by the travel activities of thinking (β = 0.083) and the act of cycling itself (β = 0.074), but there are other travel activities with a significant but admittedly smaller influence on the value of enjoyment. In order of importance, these are the travel activities of accompanying someone (β = 0.066), listening to audio (β = 0.062), eating (β = 0.025), and personal care (β = 0.022).

***The indirect effect of experience factors on WTT of cycling trips.***

Travel time by bicycle is perceived as more worthwhile mainly because of the positive experience factors of today's weather (β = 0.009), simplicity of the route (β = 0.006), and the ability to do what one wanted to do (β = 0.005). It is perceived as less worthwhile due to the negative experience factors of facilities (β = -0.005), and traffic signals (β = -0.004) (Table 2). The most important pathways through which experience factors influence WTT of cycling trips are as follows (Appendix BI):

- The most important paths from these three positive experience factors all run via the appreciation of the cycling trip itself (β = 0.151 for today's weather; β = 0.098 for simplicity of the route; β = 0.042 for the ability to do what one wanted to do), which then positively influences the value of enjoyment, and ultimately results in a positive impact on WTT of the cycling trip.
- The most important path from traffic signals to WTT runs via the appreciation of the cycling trip (β = -0.080), but it lowers this appreciation (and then continues via the value of enjoyment to WTT). When facilities are considered negatively, it mainly lowers the likelihood of thinking while cycling (β = -0.097, and then also continues via the value of enjoyment to WTT).

As the travel activities of thinking and the act of cycling itself are considered equally most important for WTT of cycling trips (see previous section), we could also focus on the experience factors that significantly contribute to these two travel activities. For the travel activity of thinking, these positive experience factors are – in order of importance – ability to do what one wanted to do (β = 0.083), ability to carry bags (β = 0.080), simplicity of the route (β = 0.075), today's weather (β = 0.064), scenery (β = 0.061), and traffic signals (β = -0.051) (Appendix BI). For the travel activity of cycling itself, these positive experience factors are – in order of importance – today's weather (β = 0.151), simplicity of the route (β = 0.098), traffic signals (β = -0.070), scenery (0.055), lighting and visibility (β = -0.047), ability to do what one wanted to do (β = 0.042), and availability and safety of roads and paths (β = 0.034).

***The indirect effect of traveller and trip characteristics on WTT of cycling trips.***

Similar to walking, there is again no significant influence of gender on WTT, while age, on the other hand, has a significant influence with a higher WTT of cycling trips among younger than older respondents (Table 2). Of all trip characteristics, weather conditions are again important. Cycling on a rainy day is nevertheless associated with higher ratings of WTT (β = 0.025). This is because cyclists still participate in travel activities such as listening to audio and enjoying the cycling activity itself, and they still value the cycling trip directly for paid and personal work (Appendix BI). Temperature is again important, but now both cool and warm temperatures appear to have a negative impact on WTT (β = -0.006 and −0.040 respectively). Longer cycling distances (β = 0.022), cycling trips for work (β = 0.028) and for maintenance (β = 0.017), and cycling during the weekend are all associated with higher ratings of WTT. Trip characteristics such as trip regularity, leisure trip purpose and time constraints all have a significant indirect effect on WTT of cycling trips, but are less important.

#### *4.2.3. Public transport*

***The direct effect of value domains on WTT of public transport trips.***

All four value domains have again a significant and positive effect on WTT. However, the order of importance based on their standardised coefficients looks different compared to those for active transport. The value of travelling by public transport can be influenced primarily by changes in the productivity related to personal tasks (β = 0.272), followed by changes in enjoyment (β = 0.238) and productivity related to paid work (β = 0.135), and not surprisingly much less for fitness (β = 0.048) (Table 2). Moreover, sensitivity analyses show that the value of fitness only matters for BTM users and not for train users, while the other value domains have comparable effects for both types of public transport.

***The indirect effect of travel activities on WTT of public transport trips.***

Travel time in public transport is perceived as worthwhile mainly because of the travel activities of browsing the internet and thinking (both have β = 0.047), talking (β = 0.034) and listening to audio (β = 0.032) (Table 2). These indirect effects exist because travel activities such as browsing the internet, thinking and talking first impact on personal productivity (β's are respectively 0.139, 0.127, 0.088) and to a lesser extent on the value of enjoyment (β's are respectively 0.038, 0.054, 0.040) (Appendix B3). Contrary to the other travel activities, listening to audio only has a significant influence on the value of enjoyment (β = 0.133) and not on any of the other value domains.

In the previous section, we identified the value of productivity related to personal tasks as the most important value domain for WTT of public transport trips. This value originates from travel activities such as browsing the internet, thinking and talking as explained above, but also exists because of other travel activities such as reading on a device (β = 0.082), reading on paper (β = 0.065), watching or gaming (β = -0.030), and personal care (0.027).

Sensitivity analyses clarify that travel activities contribute to WTT, but especially for BTM users. In the analysis of train users, several travel activities (i.e., accompanying someone, personal care, reading on paper, relaxing, talking) were found to no longer have a significant indirect effect on WTT.

***The indirect effect of experience factors on WTT of public transport trips.***

Travel time in public transport is perceived as more worthwhile mainly because of the positive experience factors of crowdedness and seating (β = 0.015), toilets (β = 0.013), ability to do what one wants to do (β = 0.009) and today's weather (β = 0.009), and surprisingly also because of the negative experience factor of crowdedness and seating (β = 0.006). It is perceived as less worthwhile due to the negative experience factors of charging opportunity (β = -0.007) (Table 2). The most important pathways through which experience factors influence WTT of public transport trips are as follows (Appendix B3):

- If crowdedness and seating is perceived positively (probably meaning that one was seated during that particular public transport trip), it stimulates the participation in many travel activities (i.e., browsing the internet β = 0.045, listening to audio β = 0.087, relaxing β = 0.097, thinking β = 0.081, reading on a device β = 0.066, reading on paper β = 0.057, and watching or gaming β = 0.051). The other positive experience factors have a similar effect, but on a less diverse range of travel activities.
- The most important path from crowdedness and seating as a positive experience factor to WTT runs via thinking and then the value of productivity related to personal tasks (β = 0.081 * 0.127 * 0.272 = 0.0028). The same path also appears to be most important for the positive experience factor of being able to do what one wants to do.
- The most important path from toilets to WTT runs via browsing the internet and then the value of productivity related to personal tasks (β = 0.085 * 0.139 * 0.272 = 0.0032).
- The most important path from today's weather to WTT runs via talking and then again via the value of productivity related to personal tasks (β = 0.199 * 0.088 * 0.272 = 0.0048).
- If crowdedness and seating is perceived negatively, it can still stimulate participation in certain travel activities (i.e., thinking β = 0.057, reading on a device β = 0.054, and reading on paper β = 0.050). This path indicates that even when travel conditions are not attractive, some travellers engage in some activities, possibly to shield themselves from the crowd or simply to kill time.
- The most important path from charging opportunity (as a negative experience factor) to WTT runs via reading on a device: if charging opportunities are lacking in public transport, it lowers the likelihood to read on a device (β = -0.093), which then lowers the value of personal productivity (β = -0.093 * 0.082) and eventually lowering the WTT of public transport trips (β = -0.092 * 0.082 * 0.272 = -0.0021).

As the travel activities of browsing the internet and thinking are considered equally most important for WTT of public transport trips (see previous section), we could also focus on the experience factors that significantly contribute to these two specific travel activities. For the travel activity of browsing the internet, positive experience factors are – in order of importance – today's weather (β = 0.090), toilets (β = 0.085), other people and passengers (β = -0.054), and crowdedness and seating (β = 0.045) (Appendix B3).

For the travel activity of thinking, positive experience factors stimulating this travel activity are space for luggage (β = 0.100), security and safety (β = 0.086), crowdedness and seating (β = 0.081), toilets (β = 0.072), and the ability to do what one wants to do (β = 0.061). On the other hand, some experience factors prevent the engagement in thinking while travelling in public transport. These are the positive experience factor of payment and tickets (β = -0.091) and the negative experience factor of a charging opportunity (β = -0.057).

Sensitivity analyses show how some positive experience factors are no longer significant for train users (i.e., ability to do what I wanted to do, noise, predictability of travel time, simplicity), while they remain important for BTM users. This is also the case for negative experience factors, although this is for far fewer factors (i.e., charging opportunity, space for luggage).

***The indirect effect of traveller and trip characteristics on WTT of public transport trips.***

Gender has a significant indirect effect on WTT of public transport trips with lower ratings for women compared to men (Table 2). Women are less likely to participate in travel activities, and in particular, they are less likely to listen to audio, to relax and to read on a device while using public transport compared to men (Appendix B3). Similar to active transport, young age groups have higher WTT of public transport compared to older age groups. Using public transport on a rainy day is associated with higher ratings of WTT (β = 0.030). Cool and warm temperatures have a significant indirect effect, but it is less important compared to other trip characteristics (β = -0.007 and −0.020 respectively). Longer trips are associated with higher ratings of WTT (β = 0.028). The same applies for work (β = 0.050), maintenance (β = 0.038) and leisure trips (β = 0.030).

#### *4.2.4. Private motorised trips*

***The direct effect of value domains on WTT of private motorised trips.***

All four value domains have a significant and positive effect on WTT for private motorised trips. The order of importance of the four different value domains is remarkably similar to that of public transport trips. For private motorised trips, the most important value appears to be productivity related to personal tasks (β = 0.304), closely followed by enjoyment (β = 0.279), and then to a lesser extent productivity related to paid work (β = 0.137) and finally fitness (β = 0.061) (Table 2). A similar pattern was found for the different forms of private motorised trips in the sensitivity analyses.

***Indirect effect of travel activities on WTT of private motorised trips.***

Travel time of private car trips is perceived as worthwhile mainly because of the travel activities of the act of driving itself (β = 0.049), accompanying someone (β = 0.047), thinking (β = 0.045), and talking (β = 0.036) (Table 2). The indirect effects of these travel activities arise from the interaction with all four value domains, but contrary to other transport modes there is not always a clear pattern. For example, many of these travel activities have a positive impact on the value of productivity related to personal tasks, but to varying degrees. The act of driving and thinking are the only two travel activities that primarily influence personal productivity (both have β's = 0.106) (Appendix B4). Accompanying someone has the strongest influence on enjoyment (β = 0.082), followed by personal productivity (β = 0.074) and finally fitness (β = 0.034). Talking has the strongest influence on enjoyment first (β = 0.069), followed by productivity related to paid work (β = 0.040) and finally personal productivity (β = 0.036).

As the value of productivity related to personal tasks appeared most important for WTT of private car trips (see previous section), we could also focus on the travel activities that significantly contribute to this value domain only. We already mentioned the importance of thinking and the act of driving (both have β's = 0.106). Other travel activities also have a significant influence on this value domain, but to a lesser extent: accompanying someone (β = 0.074), talking (β = 0.036), browsing the internet (β = 0.026), personal care (β = 0.023), and reading on a device (β = 0.022).

Sensitivity analyses indicated, however, some interesting differences between car drivers and passengers. While driving itself is the most important travel activity influencing WTT for car drivers (β = 0.060), the indirect effect of this travel activity on WTT is no longer significant for car passengers. Other important travel activities for car drivers are – in order of importance – accompanying someone (β = 0.052), thinking (β = 0.051) and listening to audio (β = 0.032). For car passengers this is talking (β = 0.039), thinking (β = 0.025) and accompanying someone (β = 0.020).

***The indirect effect of experience factors on WTT of private motorised trips.***

Travel time of private motorised trips is perceived more as worthwhile mainly because of the positive experience factors of the ability to do what one wants to do (β = 0.022), vehicle quality (β = 0.014), and predictability of travel time (β = -0.010) (Table 2). It is perceived as less worthwhile due to the negative experience factors of today's weather (β = -0.007), predictability of travel time (β = -0.005), and scenery (β = -0.002). The most important pathways through which experience factors influence WTT of private car trips are as follows (Appendix B4):

- The ability of someone to do what they want to do, but also the vehicle quality increases the likelihood of many travel activities (e.g., accompanying someone, eating, listening, personal care, talking, thinking, the act of driving itself), with the most important path running via the activity of accompanying someone to the value of enjoyment to WTT.
- Similar to the positive experience factors, the most important paths of the three negative experience factors all run via the value of enjoyment to WTT but they all start with different travel activities. Perceiving today's weather as negative seems to discourage accompanying someone (β = -0.067), while negative perceptions of predictability of travel time and scenery decrease the likelihood of browsing the internet (β = -0.025), respectively thinking (β = -0.040).

As the travel activities of driving itself and accompanying someone are considered equally most important for WTT of private motorised trips (see previous section), we could also focus on the experience factors that significantly contribute to these two particular travel activities. For the activity of driving itself, positive experience factors are – in order of importance – other people, other passengers (β = -0.120), simplicity of the route (β = 0.081), ability to do what one wants to do (β = 0.063), vehicle quality (β = 0.061), seat comfort (β = 0.055), predictability of travel time (β = -0.054), cars and other vehicles (β = -0.042) security and safety (β = 0.036), and parking at the end (β = 0.026) (Appendix B4).

For the travel activity of accompanying someone, positive experience factors stimulating this travel activity are other people, other passengers (β = 0.224), ability to do what one wants to do (β = 0.089), and vehicle quality (β = 0.064). However, when private car users positively value their trip for privacy (β = -0.053), they are not surprisingly less likely to accompany someone. When today's weather (β = -0.067) and the predictability of travel time (β = -0.034) is experienced negatively, it seems that private car users are more likely to travel alone.

Sensitivity analyses, however, indicate that several experience factors are only significant for car drivers and not for car passengers. For positive experience factors, this was the case for the ability to do what I wanted to do, parking at the end, predictability of travel time, privacy, seat comfort, security and safety, simplicity. For negative experience factors, this was the case for the ability to do what I wanted to do, cars and other vehicles, predictability of travel time, scenery.

#### *4.2.5. The indirect effect of traveller and trip characteristics on WTT of private motorised trips*

Gender has a significant indirect effect on WTT of private car trips with women being less positive compared to men (Table 2). Women are less likely to participate in a variety of travel activities (in this case: eating, talking and the activity of driving itself) (see Appendix B4). However, sensitivity analyses show that this is mainly the case for car drivers. For car passengers, no significant indirect effect of gender on WTT was found. Younger people have again higher WTT ratings as they are more likely to participate in various travel activities compared to older people, positively contributing to the four value domains and overall WTT of private car trips. Travelling by private car during the weekend is associated with higher ratings of WTT, although the results of the sensitivity analyses indicate that this may be true for car drivers only and not for car passengers. A positive indirect effect on WTT was also identified for trips longer than 15 km (β = 0.036) and maintenance trips (β = 0.023). On the contrary, work (β = -0.016) and leisure trips (β = -0.010) are associated with lower ratings on WTT. Like all transport modes, using cars on a rainy day contributes to higher ratings of WTT (β = 0.024), while warm temperatures negatively affect WTT (β = -0.024).

## 5. Discussion, conclusions and policy implications

This paper empirically explored the concept of perceived WTT, according to which a range of human experience factors stimulate various travel activities and consequently add value to the travel experience. Using a large dataset of 38,838 validated, mode-specific trip legs in 8 European countries, the paper analysed the perceived levels of WTT for different transport modes, revealing the mechanisms and paths through which the traveller and trip characteristics, experience factors, and travel activities could influence perceived WTT. A number of conclusions and policy implications can be drawn, which we present here.

### 5.1. Travel experience across modes

Our findings unequivocally support the literature suggesting that travel time is more than just "wasted time" (Jain and Lyons, 2008; Milakis et al., 2015, 2018; Mokhtarian and Salomon, 2001): for all travellers and for the four types of modes under scrutiny – walking, cycling, public transport and private motorised – worthwhileness of travel time varies substantially and can be explained by a wide range of elements. Four distinct value domains were explored – productivity related to paid work, productivity related to personal tasks, enjoyment and fitness – and all were found to be positively correlated with WTT in all modes. When addressing the question 'what value domain, if improved, would lead to larger changes in WTT?', enjoyment is the most important for active transport, and second for public transport and private motorised. Productivity for personal tasks is especially important for public transport and private motorised (more so than for paid work). In terms of socio-demographic characteristics, younger age groups tend to have higher WTT ratings consistently over all transport modes, whereas the opposite holds true for older age groups.

### 5.2. Walking

Improving the enjoyment of a walking trip is likely to have the largest impact on WTT, double that of the importance of fitness. While fitness is, as expected, a main contributor of WTT for active modes (see Fig. 3), improving the fitness value domain would have a smaller impact on WTT than improving other domains – indicating perhaps that fitness is somewhat intrinsic to those modes. Improving the ability to undertake personal tasks while walking is also more likely to increase WTT. Our results point towards two categories of travellers: those valuing accompanying someone else while walking, and those for whom walking is more a solitary experience. For both cases, talking (to someone or on the phone) is a valuable activity. The mere act of thinking was also among the main contributors, as well as listening to audio. All these activities can be enabled by policy focusing on improving the availability, quality, directness, scenery, and lighting of roads and paths, and by reducing external stresses such as crowdedness, noise, air pollution, and the presence of vehicles. Although rain does not seem to discourage most walkers, hot weather can act as a disincentive. This could be addressed by providing adequate protection from sun and heat with shading or treetops, for example. Overall, our results are in agreement with the literature which stresses the importance of safety and comfort, particularly the provision of a pleasant setting in improving the attractiveness and value of walking beyond the inherent health benefits it provides (Liao et al., 2022; Singleton, 2019).

### 5.3. Cycling

For cycling, the value of enjoyment is more than double that of fitness. We find this entirely plausible and in fact revealing for the development of planning tools and policy: if the goal is to increase the attractiveness of cycling, the focus should be placed on capturing enjoyment factors (fitness – the health benefits – are already there to grab). Compared to walking, this mode distinguishes itself by the importance of the activity of cycling itself. An important 'add-on' activity for cyclists (other than cycling itself) is the ability to 'think' while cycling. Thinking requires a level of peace of mind, and the absence of unwanted physical, cognitive or emotional stressors to allow for the mind to wander. As poor facilities and traffic signals have a negative impact on thinking, policy could focus on reducing distractions related to the cycling itself e.g. replacing red lights by green waves, clearly separating car and pedestrian traffic from cycle lanes, providing high quality, smooth, barrier- or obstacle-free lanes, and ensuring a pleasant, inspiring environment and scenery following human-scale design practices i.e. providing a diversity of details that please without bothering the mind, and inversely, avoiding long, monotonous and unsafe bike paths alongside busy roads. Our results are in agreement with the literature about the importance of safe, continuous and pleasant infrastructures (Dill & Carr, 2003), suggesting also more effort could be put to incorporate "reducing distractions" in the design of cycling infrastructures as a whole (Gössling, 2013; Vedel et al., 2017). Although rain does not appear to dampen cyclists' enthusiasm against expectations, the negative impact of cold or hot weather suggests measures designed to protect cyclists from cold wind or direct sunlight are relevant. Finally, our outcomes confirm the richness of individual characteristics, habits and preferences associated with cycling experience (see Handy et al., 2014; Milakis et al., 2015), suggesting the need for a more detailed approach in the cycle planning practice to better distinguish between different types of cyclists.

### 5.4. Public transport

Time in public transport can be valued for multiple reasons (personal productivity, enjoyment and to a lesser extent paid-work related to productivity) and might therefore attract different types of users. The perceived WTT of public transport is more likely to increase if services enable people to undertake personal tasks and to enjoy the journey i.e. to do tasks that are not related to paid work. This is an important finding to add to the Value of Travel Time Savings (VTTS) literature which has focused more on paid work productivity, e.g. via the Hensher equation (see Wardman et al. 2016; Wardman & Lyons, 2016; Batley et al, 2019) as opposed to

personal productivity. Firstly, we find that digital activities such as browsing the internet and reading on a device are more important than activities such as thinking or talking. Reading, in particular, has been highlighted in earlier research as one of the key activities leading to major reductions in the value of travel time for train travellers, either as commuters (about 31 %) or as leisure travellers (about 47 %) (Molin et al., 2020). Although it remains unclear to what extent those digital activities are truly engaging or done simply to kill time, ensuring uninterrupted internet access and providing charging opportunities are key policies that can improve the attractiveness of public transport. Abeille et al. (2022) showed that reliable information about the existence of such facilities is critical for travellers, so that they can plan ahead the type of activities they would like to perform, and thus be productive even without, for example, an internet connection. Secondly, results about the importance of reduced levels of crowdedness and the availability of seating are in agreement with the literature (Cantwell et al., 2009; Lyons et al., 2016; Shaw et al., 2019). To this, we add the importance of (clean) toilets. Overall, policies that ensure basic comfort enable the participation in many and diverse travel activities, which in turn increases WTT in public transport. Finally, we note a clear need for a gendered approach in public transport planning and appraisal, particularly to address concerns of women, who according to our results, are less likely to participate in travel activities, and therefore less likely to judge their travel time as valuable in the current mobility context.

### 5.5. Private motorised

Private motorised modes users value their travel time primarily for personal productivity (as time out for thinking or as an opportunity for talking to other passengers or on the phone) and for enjoyment (usually when accompanying someone or talking). Personal comfort factors such as quality and safety of the vehicle, seat comfort and privacy are key positive conditions, but the value they provide is balanced out by congestion, other vehicles, and the lack of parking, which is largely in agreement with the literature (Chatterjee et al., 2020; Ettema et al., 2013). We note that congestion and other passengers negatively influence the joy of driving, showing that some people like the act of driving, but especially when they are alone in their cars and in free flow road conditions. From a policy perspective, this may have implications for the various futures imagined for the role of the car. Car-sharing, for example, would benefit from high quality and comfortable vehicles, as well as plentiful (even dedicated) parking opportunities. But considering the value of privacy and the preference for solitary travel, car-pooling (with a driver or in automated vehicles) faces higher adoption barriers, particularly when sharing a confined space with strangers. Moreover, automated vehicles, even if not shared, are likely to reduce the 'joy' of solitary drivers. Yet, privately owned automated vehicles are expected to lower the valuation of travel time by facilitating activities related to productivity and leisure (Pudāne & Correia, 2020). Finally, there is likely to be value in considering interventions from a wider, multimodal perspective. For example, constraining private car use (automated or not) and reducing the associated negative implications such as noise, air pollution, or simply the vehicle objects as physical and visual obstructions, would improve the travel experience of greener modes such as cycling and walking.

### 5.6. Limitations and future research

Future data collection on travel time experience could benefit from methodological improvements. In survey design, revising the nature of the WTT and value domain assessment variables might be useful: although they were respectively captured as an ordinal 5-star variable and a 3-level Likert scale for simplicity, travel time worthwhileness and value are more akin to continuous variables, better captured by sliders for example. Regarding experience factors, hitting the right balance between capturing nuances, frustrating respondents with too few or too many choices, and analysing results can be problematic. For example, factors like bicycle path availability, safety, quality, directness, simplicity of the route, traffic lights and crowdedness might be relevant, but such fine categories could dilute the results. There is also the risk of misinterpretation of some of the questions, for example, 'the ability to do what I want' was specified to be 'while travelling', but respondents may have interpreted it as simply the convenience and freedom of this specific mode. Similarly, although attention was paid to name experience factors in a neutral way, interpreting positive and negative experience factors can be difficult. Addressing conceptual gaps, like distinguishing between time-killing and valuable activities, and clarifying the opportunity cost of engaging in alternative, more valuable activities across all modes is necessary, since the tool only captured actual, not desired activities under ideal travel conditions. Integrating questions about the type and satisfaction with activities before and after travelling could allow even deeper insights into the travel experience and perceived value in accordance with the "activity envelope" concept (Rasouli & Timmermans, 2014; Pawlak et al., 2017).

This research suggests the need for refined grouping and analysis of travellers beyond just socio-demographic characteristics like age and gender. The cycling section showed that subjective influencers such as habits, preferences, and attitudes in addition to objective socio-demographic characteristics will influence travellers' behaviours. Therefore, a more finely grained understanding of national or regional culture and attitudes towards existing or new door-to-door travel options and the use of travel time could increase the explanatory power of our model and help tailor policies for specific regions. Because data collection aimed to reach the same number of respondents from each participating country (N = 500), the dataset is not proportional to each country's population, with Belgium, Slovakia and Spain more represented in the analysis. We recognise the multiple possible differences between countries that could have affected results. However, controlling at a country level would have multiplied the number of models, would require bigger sample sizes for certain countries in this dataset, and would not necessarily offer additional insights into the outcomes for the purpose of this paper. Additionally, choosing a country as a key distinguishing variable is not without its own problems and the same logic can be said to differences between regions, between cities, between urban vs rural environments etc. As we do not aim to make country-specific policy recommendations, we have chosen to exploit the data at an aggregate, European, 8-country level. Nevertheless, more specific possible variations among countries, such as weather and temperature, were still controlled for in our analysis. In addition to

country or region-specific analyses, analyses for specific target groups are also needed. Children are missing from this dataset. What their preferences are or what makes their travel time valuable is rarely taken into consideration in transport planning. Such research could be particularly relevant at a time where one leading vision for their school run is to strap them in an automated car.

In terms of analytical methods, path analysis in SEM is shown to be a powerful tool to analyse multiple variables all at once. In this paper, the descriptive analysis (section 4.1) showed the most frequent (i.e. most often reported) factors or activities, and the SEM analysis showed those that significantly contributed to adding value and to what extent (i.e. strongest correlation with WTT). This approach provides deeper insights for this type of complex dataset. Yet, we also made simplifications which are worth pointing out: for example, the data collection consisted of 27 distinct transport modes (Cornet et al. 2019), which we grouped under four broad categories. Future SEM analysis could provide more mode-specific policy recommendations by distinguishing between different types of public transport modes (e.g. road-based vs rail), by disaggregating car users and car passengers, or by comparing different types of active and electromobility (e.g. bicycles vs e-bikes).

Regarding future research, the role of perceived quality of travel time in transport project planning and appraisal has often been rather implicit, not yielding itself easily to act as a policy lever, in contrast to the role of time savings. The end goal of exploring WTT empirically in a more systematic way is to contribute to future advances that ensure that the quality of the travel experience is explicitly considered and better accounted for in transport planning and appraisal, and thus in future transport infrastructure investment decisions. Further theoretical work would be required to first establish whether existing planning and appraisal methods sufficiently consider the travel experience and if not, how a better empirical understanding of WTT could have implications for the appraisal process of transport policies. For instance, better knowledge on WTT can inform future VTTS studies for use in appraisal (see e.g. Wardman and Lyons, 2016). Likewise, further refinement and empirical evidence on WTT concepts would be a welcome step forward to continue bridging the gap that this paper began to address. If WTT significantly influences transport appraisal, we can hypothesise that greener modes of transport may benefit, as the travel experience appears to be relatively more appreciated on these modes.

## CRediT authorship contribution statement

**Veronique Van Acker:** Writing – original draft, Validation, Methodology, Formal analysis, Data curation, Conceptualization. **Yannick Cornet:** Writing – review & editing, Writing – original draft, Investigation, Formal analysis, Conceptualization. **Dimitris Milakis:** Writing – review & editing, Writing – original draft, Formal analysis, Conceptualization. **Eva Malichová:** Writing – original draft, Visualization, Validation, Methodology, Investigation, Formal analysis, Data curation. **Manuel Ojeda-Cabral:** Writing – original draft, Formal analysis.

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## Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

## Appendix A. The Woorti mobile app questionnaire

| Connection to: | Question | Answers |
|---|---|---|
| Onboarding | Where do you live? | Belgium, Finland, France, Italy, Norway, Portugal, Slovakia, Spain, Other |
| | What is your age? | 16–19, 20–24, 25–29, 30–39, 40–49, 50–64, 65–74, 75+ |
| | What is your gender? | Male, Female, Other |
| Trip | Confirm the modes of your trip: Did you go by___? | Yes/No, List of transport modes (Cornet et al., 2019) |
| | Overall, how did you feel about this trip? | 5-star scale: 1 – Lousy, 5 – Great |
| | What was the purpose of your trip? | Home, Work/School, Everyday shopping, Business trip, Leisure/Hobby, Personal tasks and other errands, Pick of or drop off somebody, Other |
| | Did you have to arrive at a fixed time? | Yes, No, Not sure |
| | How often do you make this trip? | Regularly, Occasionally, First time, Not sure |
| Trip leg | Was your travel time wasted or worthwhile? | 5-star scale: 1 – All time was wasted, 5 – All time was worthwhile |
| | What value did you take from your time on this part of the trip? | Enjoyment, Fitness, Productivity (Personal task), Productivity (Paid work) at 3-point scale: 1 – None, 2 – Some, 3 – High |
| | What exactly did you value doing? | List of activities (Cornet et al., 2019) |
| | Select the most important factors for the quality of your travel time. | List of experience factors (Cornet et al., 2019) |

## Appendix B. The direct effects of the WTT components

### *Appendix B1. Walking*

| | Travel activities | | | | | | | | | Value domains | | | | Worthwhileness of travel time |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Accompanying someone | Browsing the Internet | Eating | Listening to audio | Personal care | Talking | Thinking | Walking itself | Enjoyment | Fitness | Productivity related to paid work | Productivity related to personal tasks | |
| | Unstan. effect p Stan. effect | Unstan. effect p Stan. effect | Unstan. effect p Stan. effect | Unstan. effect p Stan. effect | Unstan. effect p Stan. effect | Unstan. effect p Stan. effect | Unstan. effect p Stan. effect | Unstan. effect p Stan. effect | Unstan. effect p Stan. effect | Unstan. effect p Stan. effect | Unstan. effect p Stan. effect | Unstan. effect p Stan. effect | Unstan. effect p Stan. effect |
| **Value domains** | | | | | | | | | | | | | |
| Enjoyment | | | | | | | | | | | | | 0.452 ** 0.211 |
| Fitness | | | | | | | | | | | | | 0.215 ** 0.100 |
| Productivity related to paid work | | | | | | | | | | | | | 0.279 ** 0.081 |
| Productivity related to personal tasks | | | | | | | | | | | | | 0.336 ** 0.153 |
| **Travel activities** | | | | | | | | | | | | | |
| Accompanying someone | | | | | | | | | 0.170 ** 0.125 | -0.036 ** -0.026 | | -0.034 ** -0.025 | |
| Browsing the Internet | | | | | | | | | 0.070 * 0.020 | | | 0.155 ** 0.044 | |
| Eating | | | | | | | | | 0.076 ** 0.027 | -0.111 ** -0.040 | 0.039 * 0.023 | 0.149 ** 0.055 | |
| Listening to audio | | | | | | | | | 0.256 ** 0.115 | 0.095 ** 0.043 | | | |
| Personal care | | | | | | | | | | 0.175 ** 0.038 | | 0.202 ** 0.045 | |
| Talking | | | | | | | | | 0.136 ** 0.088 | | | 0.121 ** 0.080 | |
| Thinking | | | | | | | | | 0.038 ** 0.025 | 0.081 ** 0.054 | 0.047 ** 0.050 | 0.087 ** 0.059 | |
| Walking itself | | | | | | | | | | 0.165 ** 0.149 | | 0.025 * 0.023 | |
| **Experience factors, positive** | | | | | | | | | | | | | |
| Ability to do what I wanted to do | 0.035 ** 0.041 | 0.013 ** 0.040 | 0.022 ** 0.053 | 0.026 ** 0.049 | 0.015 ** 0.061 | 0.024 ** 0.031 | 0.105 ** 0.134 | 0.029 ** 0.027 | | | | | |
| Air quality, temperature | | | | | | | | | | | | | |
| Lighting, visibility | -0.052 ** -0.048 | | | | | | | -0.044 ** -0.033 | | | | | |
| Noise | | | | | 0.018 ** 0.049 | | | | | | | | |
| Predictability of travel time | -0.042 ** -0.037 | | | | | -0.034 ** -0.034 | -0.030 * -0.029 | | | | | | |
| Road path availability | 0.035 ** 0.041 | | | | -0.006 ** -0.025 | | | 0.041 ** 0.040 | | | | | |
| Road path directness | | | | | | | | -0.036 * -0.031 | | | | | |
| Road path quality | 0.049 ** 0.054 | | -0.016 ** -0.020 | | -0.008 * -0.018 | 0.024 * 0.030 | | -0.034 * -0.030 | | | | | |
| Scenery | | | -0.023 ** -0.048 | | | 0.035 ** 0.041 | 0.029 ** 0.032 | 0.098 ** 0.082 | | | | | |
| Simplicity/Difficulty of the route | | | 0.011 ** 0.029 | | | 0.036 ** 0.054 | | 0.094 ** 0.101 | | | | | |
| Today's weather | 0.071 ** 0.090 | | 0.021 ** 0.054 | 0.018 ** 0.038 | 0.005 * 0.022 | 0.051 ** 0.073 | 0.072 ** 0.099 | 0.078 ** 0.080 | | | | | |
| Traffic signals | -0.033 * -0.029 | | | | | | -0.046 ** -0.043 | -0.045 ** -0.031 | | | | | |
| **Experience factors, negative** | | | | | | | | | | | | | |
| Ability to carry bags | | | | 0.062 ** 0.042 | | -0.061 ** -0.029 | | | | | | | |
| Air quality, temperature | | | | | | 0.087 ** 0.070 | | 0.131 ** 0.075 | | | | | |
| Cars and other vehicles | | 0.015 ** 0.028 | | | | -0.034 * -0.026 | 0.051 ** 0.039 | | | | | | |
| Crowdedness, congestion | | | | -0.039 ** -0.038 | | | | | | | | | |
| Lighting, visibility | | | | | | | -0.042 * -0.022 | -0.153 ** -0.058 | | | | | |
| Noise | | | | 0.044 ** 0.052 | | | | | | | | | |
| Road path availability | 0.065 ** 0.033 | | | | | | | | | | | | |
| Road path directness | | | | -0.05 ** -0.034 | | 0.094 ** 0.046 | | | | | | | |
| Road path quality | | | | | -0.006 ** -0.018 | 0.043 * 0.030 | -0.030 * -0.020 | | | | | | |
| Scenery | -0.08 ** -0.04 | | | | | -0.077 ** -0.046 | | | | | | | |
| Today's weather | | | | 0.018 ** 0.038 | | | | | | | | | |
| Traffic signals | | | | | | | | | | | | | |
| **Traveller's characteristics** | | | | | | | | | | | | | |
| Gender, female | -0.048 ** -0.066 | -0.006 ** -0.023 | -0.013 ** -0.035 | | | -0.016 ** -0.025 | | -0.034 ** -0.038 | | 0.031 ** 0.031 | | | |
| Age, 16-24 (ref.: 25-49) | 0.017 ** 0.048 | | | | | 0.074 ** 0.092 | | 0.030 ** 0.026 | | | -0.06 ** -0.08 | 0.124 ** 0.102 | |
| Age, 50 and more (ref.: 25-49) | -0.011 ** -0.031 | -0.008 * -0.018 | -0.040 ** -0.071 | 0.009 ** 0.032 | -0.051 ** -0.064 | -0.029 ** -0.035 | | | -0.06 ** -0.048 | | -0.03 ** -0.04 | 0.041 ** 0.034 | |
| **Trip characteristics** | | | | | | | | | | | | | |
| Distance, 15km and more | | | | 0.051 ** 0.056 | | | | 0.048 ** 0.027 | | 0.038 * 0.019 | | | |
| Trip frequency, non-regularly | 0.043 ** 0.059 | -0.012 ** -0.043 | | -0.039 ** -0.085 | | | -0.030 ** -0.044 | -0.066 ** -0.073 | 0.048 ** 0.047 | -0.043 ** -0.042 | | 0.040 ** 0.041 | |
| Trip purpose, work related | | | | 0.013 ** 0.027 | | 0.015 * 0.021 | | | -0.054 ** -0.051 | | 0.07 ** 0.1 | 0.025 * 0.024 | |
| Trip purpose, maintenance related | 0.026 ** 0.033 | 0.012 ** 0.041 | | | | 0.026 ** 0.037 | 0.014 * 0.019 | | -0.054 ** -0.050 | | | 0.080 ** 0.077 | |
| Trip purpose, leisure | 0.053 ** 0.062 | | 0.011 ** 0.027 | | | 0.027 ** 0.035 | 0.025 ** 0.031 | -0.031 ** -0.029 | | -0.020 * -0.017 | 0.01 * 0.02 | 0.038 ** 0.033 | |
| Weekend | 0.055 ** 0.062 | | | -0.011 * -0.020 | | 0.023 ** 0.030 | | | 0.113 ** 0.094 | | -0.08 ** -0.11 | | |
| Time constraint, no | -0.044 ** -0.058 | -0.008 ** -0.026 | -0.012 ** -0.032 | -0.017 ** -0.036 | -0.009 ** -0.039 | -0.031 ** -0.046 | -0.025 ** -0.036 | -0.066 ** -0.071 | -0.050 ** -0.049 | | 0.07 ** 0.11 | | |
| Weather: rain | 0.033 ** 0.043 | | | 0.016 ** 0.035 | -0.007 ** -0.031 | | 0.036 ** 0.052 | 0.058 ** 0.062 | -0.035 ** -0.034 | | 0.04 ** 0.05 | 0.100 ** 0.100 | |
| Temperature, cool (ref.: comfortable) | -0.020 * -0.024 | 0.012 ** 0.037 | -0.013 ** -0.030 | -0.009 * -0.018 | 0.015 ** 0.059 | | | | -0.440 ** 0.038 | 0.084 ** 0.073 | 0.02 ** 0.03 | -0.050 ** -0.044 | |
| Temperature, warm to hot (ref.: comfortable) | -0.083 ** -0.088 | | -0.013 ** -0.028 | | | -0.057 ** -0.069 | -0.054 ** -0.063 | -0.186 ** -0.159 | | -0.041 ** -0.032 | -0.03 ** -0.04 | -0.075 ** -0.060 | |

## Appendix B2. Cycling

| | Travel activities | | | | | | | | | | | | | | Value domains | | | | | | | | | | Worthwhileness of travel time | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Accompanying someone | | | Eating | | | Listening to audio | | | Personal care | | | Talking | | | Thinking | | | Cycling itself | | | Enjoyment | | | Fitness | | | Productivity related to paid work | | | Productivity related to personal tasks | | | | | |
| | Unstan. effect | p | Stan. effect | Unstan. effect | p | Stan. effect | Unstan. effect | p | Stan. effect | Unstan. effect | p | Stan. effect | Unstan. effect | p | Stan. effect | Unstan. effect | p | Stan. effect | Unstan. effect | p | Stan. effect | Unstan. effect | p | Stan. effect | Unstan. effect | p | Stan. effect | Unstan. effect | p | Stan. effect | Unstan. effect | p | Stan. effect | Unstan. effect | p | Stan. effect |
| **Value domains** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Enjoyment | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | 0.597 | ** | 0.274 |
| Fitness | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | 0.264 | ** | 0.105 |
| Productivity related to paid work | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | 0.395 | ** | 0.118 |
| Productivity related to personal tasks | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | 0.241 | ** | 0.105 |
| **Travel activities** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Accompanying someone | | | | | | | | | | | | | | | | | | | | | | 0.114 | ** | 0.066 | -0.066 | ** | -0.045 | | | | 0.083 | ** | 0.051 | | | |
| Eating | | | | | | | | | | | | | | | | | | | | | | 0.123 | ** | 0.025 | | | | | | | 0.238 | ** | 0.052 | | | |
| Listening to audio | | | | | | | | | | | | | | | | | | | | | | 0.142 | ** | 0.062 | | | | | | | 0.079 | ** | 0.037 | | | |
| Personal care | | | | | | | | | | | | | | | | | | | | | | 0.089 | * | 0.022 | | | | | | | 0.126 | ** | 0.033 | | | |
| Talking | | | | | | | | | | | | | | | | | | | | | | | | | 0.075 | ** | 0.039 | 0.051 | ** | 0.035 | | | | | | |
| Thinking | | | | | | | | | | | | | | | | | | | | | | 0.113 | ** | 0.083 | 0.045 | ** | 0.039 | | | | 0.088 | ** | 0.069 | | | |
| Cycling itself | | | | | | | | | | | | | | | | | | | | | | 0.07 | ** | 0.074 | 0.106 | ** | 0.130 | | | | | | | | | |
| **Experience factors, positive** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Ability to carry bags | | | | | | | | | | | | | | | | 0.084 | ** | 0.080 | | | | | | | | | | | | | | | | | |
| Ability to do what I wanted | | | | | | | 0.028 | ** | 0.044 | | | | | | | 0.089 | ** | 0.083 | 0.065 | ** | 0.042 | | | | | | | | | | | | | | | |
| Air quality, temperature | | | | | | | | | | 0.019 | ** | 0.055 | | | | | | | | | | | | | | | | | | | | | | | | |
| Lighting, visibility | | | | | | | | | | | | | | | | | | | -0.071 | ** | -0.047 | | | | | | | | | | | | | | |
| Predictability of travel time | | | | | | | -0.021 | ** | -0.043 | 0.013 | ** | 0.046 | | | | | | | | | | | | | | | | | | | | | | | | | |
| Road path availability and safety | 0.049 | ** | 0.082 | | | | | | | | | | 0.022 | ** | 0.047 | | | | 0.037 | * | 0.034 | | | | | | | | | | | | | | | |
| Road path directness | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Road path quality | | | | | | | | | | -0.012 | ** | -0.046 | | | | | | | | | | | | | | | | | | | | | | | | |
| Scenery | | | | | | | | | | | | | | | | 0.052 | ** | 0.061 | 0.066 | ** | 0.055 | | | | | | | | | | | | | | |
| Simplicity/Difficulty of the route | | | | | | | | | | 0.007 | * | 0.030 | | | | 0.054 | ** | 0.075 | 0.100 | ** | 0.098 | | | | | | | | | | | | | | |
| Today's weather | 0.041 | ** | 0.073 | | | | | | | | | | 0.035 | ** | 0.082 | 0.045 | ** | 0.064 | 0.153 | ** | 0.151 | | | | | | | | | | | | | | |
| Traffic signals | -0.052 | ** | -0.061 | | | | 0.024 | * | 0.037 | | | | | | | -0.056 | ** | -0.051 | -0.111 | ** | -0.070 | | | | | | | | | | | | | | |
| **Experience factors, negative** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Air quality, temperature | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Cars and other vehicles | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Crowdedness, congestion | | | | | | | | | | | | | | | | -0.035 | * | -0.033 | | | | | | | | | | | | | | | | | |
| Facilities | | | | | | | -0.032 | ** | -0.036 | | | | | | | -0.145 | ** | -0.097 | -0.084 | ** | -0.039 | | | | | | | | | | | | | | |
| Noise | | | | -0.007 | * | -0.025 | | | | | | | | | | 0.050 | ** | 0.051 | | | | | | | | | | | | | | | | | |
| Road path availability and safety | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Road path directness | | | | 0.021 | ** | 0.05 | | | | 0.022 | ** | 0.044 | | | | | | | 0.064 | ** | 0.029 | | | | | | | | | | | | | | |
| Road path quality | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Scenery | | | | 0.038 | ** | 0.093 | | | | | | | | | | -0.056 | * | -0.039 | | | | | | | | | | | | | | | | | |
| Simplicity/Difficulty of the route | | | | | | | | | | 0.020 | ** | 0.041 | | | | | | | 0.123 | ** | 0.059 | | | | | | | | | | | | | | |
| Today's weather | | | | -0.008 | ** | -0.024 | | | | -0.017 | ** | -0.041 | | | | | | | 0.048 | ** | 0.027 | | | | | | | | | | | | | | |
| Traffic signals | -0.03 | ** | -0.04 | -0.010 | ** | -0.032 | | | | | | | | | | | | | -0.126 | ** | -0.080 | | | | | | | | | | | | | | |
| **Traveller's characteristics** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Gender, female | -0.037 | ** | -0.062 | | | | 0.013 | ** | 0.030 | 0.011 | * | 0.044 | -0.020 | ** | -0.045 | 0.074 | ** | 0.099 | | | | -0.05 | ** | -0.05 | 0.084 | ** | 0.097 | 0.019 | ** | 0.028 | | | | | | |
| Age, 16-24 (ref.: 25-49) | 0.073 | ** | 0.058 | | | | | | | | | | | | | 0.054 | ** | 0.034 | | | | | | | | | | -0.045 | * | -0.032 | 0.225 | ** | 0.109 | | | |
| Age, 50 and more (ref.: 25-49) | -0.046 | ** | -0.078 | 0.009 | ** | 0.042 | | | | -0.007 | ** | -0.026 | -0.030 | ** | -0.067 | -0.039 | ** | -0.052 | -0.064 | ** | -0.059 | -0.15 | ** | -0.14 | -0.05 | ** | -0.05 | | | | 0.103 | ** | 0.107 | | | |
| **Trip characteristics** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Distance, 15km and more | | | | | | | | | | 0.009 | ** | 0.024 | | | | 0.05 | ** | 0.045 | 0.077 | ** | 0.049 | 0.096 | ** | 0.065 | 0.066 | ** | 0.051 | 0.028 | * | 0.029 | -0.11 | ** | -0.08 | | | |
| Trip frequency, non-regularly | | | | | | | -0.019 | ** | -0.044 | | | | | | | | | | -0.026 | * | -0.025 | | | | -0.136 | ** | -0.163 | 0.028 | ** | 0.045 | 0.057 | ** | 0.062 | | | |
| Trip purpose, work related | | | | | | | 0.029 | ** | 0.071 | | | | | | | 0.019 | * | 0.027 | 0.046 | ** | 0.046 | | | | | | | 0.178 | ** | 0.290 | -0.087 | ** | -0.097 | | | |
| Trip purpose, maintenance related | 0.085 | ** | 0.133 | 0.019 | ** | 0.086 | | | | | | | 0.040 | ** | 0.083 | 0.029 | * | 0.030 | | | | | | | -0.044 | ** | -0.046 | -0.044 | ** | -0.061 | 0.242 | ** | 0.232 | | | |
| Trip purpose, leisure | 0.092 | ** | 0.121 | 0.014 | ** | 0.053 | | | | 0.013 | ** | 0.04 | 0.047 | ** | 0.081 | | | | 0.040 | * | 0.029 | | | | -0.039 | ** | -0.034 | -0.042 | ** | -0.049 | | | | | | |
| Weekend | 0.038 | ** | 0.051 | | | | | | | | | | 0.031 | ** | 0.054 | -0.031 | ** | -0.032 | -0.043 | ** | -0.031 | 0.077 | ** | 0.060 | | | | | | | | | | | |
| Time constraint, no | | | | -0.007 | ** | -0.037 | -0.025 | ** | -0.060 | | | | -0.016 | ** | -0.039 | -0.026 | ** | -0.037 | -0.105 | ** | -0.105 | | | | | | | -0.015 | * | -0.025 | | | | | | |
| Weather: rain | -0.024 | ** | -0.036 | | | | 0.029 | ** | 0.059 | | | | | | | | | | 0.082 | ** | 0.068 | | | | | | | 0.098 | ** | 0.132 | 0.069 | ** | 0.064 | | | |
| Temperature, cool (ref.: comfortable) | 0.032 | ** | 0.052 | | | | | | | | | | 0.019 | ** | 0.041 | | | | | | | -0.029 | * | -0.027 | | | | | | | | | | | |
| Temperature,warm to hot (ref.: comfortable) | | | | -0.008 | ** | -0.025 | -0.06 | ** | -0.09 | | | | | | | | | | -0.245 | ** | -0.144 | -0.12 | * | -0.08 | | | | -0.106 | ** | -0.101 | | | | | | |

## Appendix B3. Public transport

| | Travel activities | | | | | | | | | | | | | | | | | | | | | | | | Value domains | | | | | | | | | | | | Worthwhileness of travel time | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Accompanying someone | | | Browsing the Internet | | | Listening to audio | | | Personal care | | | Relaxing | | | Talking | | | Thinking | | | Reading device | | | Reading paper | | | Watching, gaming | | | Enjoyment | | | Fitness | | | Productivity related to paid work | | | Productivity related to personal tasks | | | | | |
| | Unstan. effect | p | Stan. effect | Unstan. effect | p | Stan. effect | Unstan. effect | p | Stan. effect | Unstan. effect | p | Stan. effect | Unstan. effect | p | Stan. effect | Unstan. effect | p | Stan. effect | Unstan. effect | p | Stan. effect | Unstan. effect | p | Stan. effect | Unstan. effect | p | Stan. effect | Unstan. effect | p | Stan. effect | Unstan. effect | p | Stan. effect | Unstan. effect | p | Stan. effect | Unstan. effect | p | Stan. effect | Unstan. effect | p | Stan. effect | Unstan. effect | p | Stan. effect |
| **Value domains** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Enjoyment | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | 0.596 | ** | 0.238 |
| Fitness | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | 0.210 | ** | 0.048 |
| Productivity related to paid work | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | 0.509 | ** | 0.135 |
| Productivity related to personal tasks | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | 0.678 | ** | 0.272 |
| **Travel activities** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Accompanying someone | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | 0.146 | ** | 0.078 | | | | | | | | | | |
| Browsing the Internet | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | 0.055 | ** | 0.038 | | | | | | | 0.202 | ** | 0.139 | |
| Listening to audio | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | 0.200 | ** | 0.133 | | | | | | | | | | |
| Personal care | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | 0.422 | * | 0.075 | 0.332 | * | 0.050 | 0.274 | * | 0.027 | |
| Relaxing | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | 0.175 | ** | 0.098 | 0.075 | ** | 0.074 | | | | | | | |
| Talking | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | 0.073 | * | 0.040 | | | | | | | 0.162 | ** | 0.088 | |
| Thinking | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | 0.082 | ** | 0.054 | | | | | | | 0.196 | ** | 0.127 | |
| Reading device | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | -0.029 | * | -0.028 | 0.066 | ** | 0.053 | 0.154 | ** | 0.082 | |
| Reading paper | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | 0.054 | * | 0.025 | | | | | | | 0.139 | ** | 0.065 | |
| Watching, gaming | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | 0.22 | ** | 0.083 | | | | | | | -0.079 | * | -0.030 | |
| **Experience factors, positive** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Ability to do what I wanted | | | | | | | 0.033 | * | 0.045 | | | | 0.043 | ** | 0.070 | | | | 0.044 | ** | 0.061 | | | | 0.025 | ** | 0.048 | 0.045 | ** | 0.107 | | | | | | | | | | | | | | |
| Air quality, temperature | -0.036 | * | -0.049 | | | | | | | | | | | | | | | | | | | 0.055 | ** | 0.075 | | | | | | | | | | | | | | | | | | | |
| Cleanliness | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Crowdedness, seating | | | | 0.037 | * | 0.045 | 0.068 | ** | 0.087 | | | | 0.063 | ** | 0.097 | | | | 0.062 | ** | 0.081 | 0.042 | ** | 0.066 | 0.031 | ** | 0.057 | 0.023 | ** | 0.051 | | | | | | | | | | | | | | |
| Noise | -0.055 | ** | -0.074 | | | | | | | | | | | | | -0.056 | ** | -0.072 | | | | | | | | | | | | | | | | | | | | | | | | | |
| Other people, other passengers | 0.091 | ** | 0.121 | -0.052 | ** | -0.054 | -0.067 | ** | -0.071 | | | | | | | 0.071 | ** | 0.092 | | | | -0.044 | ** | -0.059 | | | | | | | | | | | | | | | | | | | |
| Payment and tickets | 0.023 | * | 0.036 | | | | | | | | | | -0.048 | ** | -0.074 | | | | -0.070 | ** | -0.091 | -0.047 | ** | -0.075 | | | | | | | | | | | | | | | | | | | |
| Predictability of travel time | | | | | | | -0.038 | ** | -0.056 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Scenery | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Security and safety | | | | | | | | | | | | | | | | 0.047 | ** | 0.076 | 0.063 | ** | 0.086 | 0.029 | * | 0.048 | | | | | | | | | | | | | | | | | | | |
| Simplicity/Difficulty of the route | | | | | | | | | | | | | 0.063 | ** | 0.112 | | | | | | | | | | | | | -0.032 | ** | -0.083 | | | | | | | | | | | | |
| Space for luggage | | | | | | | 0.048 | ** | 0.051 | | | | 0.062 | ** | 0.079 | | | | 0.093 | ** | 0.100 | | | | | | | | | | | | | | | | | | | | | | | |
| Today's weather | 0.031 | * | 0.046 | 0.080 | ** | 0.090 | | | | | | | | | | 0.084 | ** | 0.119 | | | | | | | | | | | | | | | | | | | | | | | | | |
| Toilets | 0.030 | ** | 0.055 | 0.059 | ** | 0.085 | 0.042 | ** | 0.063 | | | | | | | | | | 0.047 | ** | 0.072 | 0.054 | ** | 0.100 | | | | | | | | | | | | | | | | | | | |
| Vehicle ride smoothness | | | | | | | | | | 0.006 | ** | 0.05 | | | | | | | | | | | | | -0.027 | ** | -0.051 | | | | | | | | | | | | | | | | |
| **Experience factors, negative** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Air quality, temperature | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Charging opportunity | | | | | | | | | | | | | -0.045 | * | -0.048 | | | | -0.063 | ** | -0.057 | -0.085 | ** | -0.093 | | | | | | | | | | | | | | | | | | | |
| Cleanliness | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Crowdedness, seating | | | | | | | | | | | | | | | | | | | 0.058 | ** | 0.057 | 0.054 | ** | 0.064 | 0.037 | ** | 0.050 | | | | | | | | | | | | | | | | | |
| Internet connectivity | | | | | | | | | | -0.005 | ** | -0.026 | | | | | | | | | | 0.052 | * | 0.057 | | | | | | | | | | | | | | | | | | | |
| Noise | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Other people, other passengers | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Predictability of travel time | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Privacy | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Space for luggage | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Tables | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Today's weather | 0.049 | ** | 0.046 | | | | | | | | | | -0.041 | * | -0.038 | 0.080 | * | 0.074 | | | | -0.042 | * | -0.040 | | | | | | | | | | | | | | | | | | | |
| Toilets | | | | 0.049 | * | 0.038 | | | | | | | | | | | | | | | | | | | -0.037 | ** | -0.046 | | | | | | | | | | | | | | | | |
| Vehicle ride smoothness | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| **Traveller's characteristics** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Gender, female | | | | | | | -0.027 | ** | -0.042 | | | | -0.042 | ** | -0.077 | | | | | | | -0.044 | ** | -0.084 | | | | | | | -0.07 | ** | -0.07 | -0.02 | ** | -0.04 | 0.022 | ** | 0.034 | | | | |
| Age, 16-24 (ref.: 25-49) | | | | | | | | | | | | | 0.034 | ** | 0.051 | 0.030 | ** | 0.046 | 0.042 | ** | 0.055 | -0.032 | ** | -0.050 | | | | -0.023 | ** | -0.052 | | | | 0.086 | ** | 0.127 | -0.047 | ** | -0.060 | 0.066 | ** | 0.055 |
| Age, 50 and more (ref.: 25-49) | -0.027 | ** | -0.040 | | | | -0.039 | ** | -0.047 | | | | | | | | | | | | | -0.034 | ** | -0.051 | | | | -0.023 | ** | -0.050 | -0.11 | ** | -0.09 | | | | | | | | |
| **Trip characteristics** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Distance, 15km and more | | | | | | | 0.051 | ** | 0.072 | | | | 0.044 | ** | 0.074 | | | | | | | 0.041 | ** | 0.071 | 0.05 | ** | 0.1 | | | | 0.038 | * | 0.035 | | | | | | | 0.042 | ** | 0.039 | |
| Trip frequency, non-regularly | 0.027 | ** | 0.051 | -0.031 | ** | -0.045 | -0.037 | ** | -0.055 | | | | -0.015 | * | -0.028 | | | | | | | | | | -0.042 | ** | -0.091 | -0.036 | ** | -0.096 | -0.070 | ** | -0.070 | 0.036 | ** | 0.064 | 0.074 | ** | 0.111 | | | | |
| Trip purpose, work related | | | | 0.038 | ** | 0.056 | 0.043 | ** | 0.066 | | | | | | | | | | 0.023 | * | 0.037 | 0.027 | ** | 0.050 | | | | | | | | | | | | | 0.136 | ** | 0.207 | 0.053 | ** | 0.054 | |
| Trip purpose, maintenance related | 0.046 | ** | 0.067 | | | | | | | | | | | | | | | | | | | | | | | | | 0.030 | ** | 0.063 | 0.065 | ** | 0.051 | | | | | | | 0.045 | ** | 0.054 | 0.145 | ** | 0.114 | |
| Trip purpose, leisure | 0.060 | ** | 0.076 | | | | 0.050 | ** | 0.051 | -0.002 | ** | -0.015 | | | | | | | | | | | | | | | | | | | 0.143 | ** | 0.096 | | | | | | | 0.064 | ** | 0.064 | 0.071 | ** | 0.047 | |
| Weekend | 0.055 | ** | 0.068 | | | | 0.044 | ** | 0.045 | -0.002 | ** | -0.015 | | | | 0.067 | ** | 0.081 | | | | 0.028 | ** | 0.034 | | | | | | | 0.057 | ** | 0.038 | | | | | | | 0.026 | * | 0.027 | | | | |
| Time constraint, no | | | | 0.051 | ** | 0.075 | 0.022 | * | 0.034 | | | | | | | | | | | | | | | | 0.018 | ** | 0.039 | 0.019 | ** | 0.051 | 0.079 | ** | 0.080 | | | | | | | 0.035 | ** | 0.053 | | | | |
| Weather: rain | 0.047 | ** | 0.087 | | | | | | | | | | | | | 0.022 | * | 0.040 | 0.038 | ** | 0.058 | | | | | | | 0.036 | ** | 0.094 | 0.047 | ** | 0.046 | | | | | | | | | | |
| Temperature, cool (ref.: comfortable) | 0.028 | ** | 0.047 | | | | 0.027 | * | 0.037 | | | | 0.032 | ** | 0.051 | | | | 0.057 | ** | 0.080 | | | | | | | | | | | | | 0.045 | ** | 0.078 | 0.043 | ** | 0.064 | | | | |
| Temperature,warm to hot (ref.: comfortable) | 0.083 | ** | 0.120 | | | | 0.054 | ** | 0.062 | | | | 0.062 | ** | 0.086 | 0.054 | ** | 0.076 | 0.086 | ** | 0.102 | | | | | | | 0.035 | ** | 0.071 | | | | | | | 0.036 | * | 0.042 | | | | |

## Appendix B4. Private motorised

| | Travel activities | | | | | | | | | | | | | | | | | | | | Value domains | | | | | | | | | | Worthwhileness of travel time | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Accompanying someone | | | Browsing the Internet | | | Eating | | | Listening to audio | | | Personal care | | | Talking | | | Thinking | | | Reading device | | | Driving itself | | | Enjoyment | | | Fitness | | | Productivity related to paid work | | | Productivity related to personal tasks | | | | | |
| | Unstan. effect | p | Stan. effect | Unstan. effect | p | Stan. effect | Unstan. effect | p | Stan. effect | Unstan. effect | p | Stan. effect | Unstan. effect | p | Stan. effect | Unstan. effect | p | Stan. effect | Unstan. effect | p | Stan. effect | Unstan. effect | p | Stan. effect | Unstan. effect | p | Stan. effect | Unstan. effect | p | Stan. effect | Unstan. effect | p | Stan. effect | Unstan. effect | p | Stan. effect | Unstan. effect | p | Stan. effect | Unstan. effect | p | Stan. effect |
| **Value domains** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Enjoyment | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | 0.720 | ** | 0.279 |
| Fitness | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | 0.309 | ** | 0.061 |
| Productivity related to paid work | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | 0.515 | ** | 0.137 |
| Productivity related to personal tasks | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | 0.786 | ** | 0.304 |
| **Travel activities** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Accompanying someone | | | | | | | | | | | | | | | | | | | | | | | | | 0.104 | ** | 0.082 | 0.022 | ** | 0.034 | | | | 0.094 | ** | 0.074 | | | |
| Browsing the Internet | | | | | | | | | | | | | | | | | | | | | | | | | 0.113 | ** | 0.035 | | | | | | | 0.086 | ** | 0.026 | | | |
| Eating | | | | | | | | | | | | | | | | | | | | | | | | | 0.178 | ** | 0.045 | 0.087 | ** | 0.043 | 0.071 | ** | 0.026 | | | | | | |
| Listening to audio | | | | | | | | | | | | | | | | | | | | | | | | | 0.103 | ** | 0.068 | | | | 0.027 | ** | 0.026 | | | | | | |
| Personal care | | | | | | | | | | | | | | | | | | | | | | | | | 0.183 | ** | 0.028 | 0.205 | ** | 0.062 | | | | 0.150 | ** | 0.023 | | | |
| Talking | | | | | | | | | | | | | | | | | | | | | | | | | 0.101 | ** | 0.069 | | | | 0.040 | ** | 0.040 | 0.053 | ** | 0.036 | | | |
| Thinking | | | | | | | | | | | | | | | | | | | | | | | | | 0.036 | * | 0.022 | 0.029 | ** | 0.034 | 0.037 | ** | 0.033 | 0.173 | ** | 0.106 | | | |
| Reading device | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | 0.161 | ** | 0.022 | | | |
| Driving itself | | | | | | | | | | | | | | | | | | | | | | | | | | | | 0.075 | * | 0.100 | 0.080 | ** | 0.079 | 0.157 | ** | 0.106 | | | |
| **Experience factors, positive** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Ability to do what I wanted | 0.085 | ** | 0.089 | | | | 0.016 | ** | 0.052 | 0.066 | ** | 0.082 | 0.012 | ** | 0.064 | 0.032 | ** | 0.039 | 0.157 | ** | 0.212 | | | | 0.052 | ** | 0.063 | | | | | | | | | | | | | |
| Other people, other passengers | 0.210 | ** | 0.224 | -0.011 | ** | -0.030 | 0.008 | * | 0.025 | -0.030 | ** | -0.037 | | | | 0.088 | ** | 0.109 | | | | | | | -0.087 | ** | -0.120 | | | | | | | | | | | | |
| Parking at the end | -0.047 | ** | -0.051 | | | | -0.006 | ** | -0.021 | | | | | | | | | | -0.044 | ** | -0.062 | | | | 0.021 | * | 0.026 | | | | | | | | | | | | |
| Predictability of travel time | -0.052 | ** | -0.050 | | | | | | | -0.021 | * | -0.025 | 0.005 | * | 0.023 | -0.076 | ** | -0.086 | -0.039 | ** | -0.049 | | | | -0.048 | ** | -0.054 | | | | | | | | | | | | |
| Privacy | -0.053 | ** | -0.053 | | | | | | | | | | 0.007 | ** | 0.036 | -0.042 | ** | -0.048 | | | | | | | | | | | | | | | | | | | | |
| Seat comfort | | | | 0.018 | ** | 0.049 | | | | | | | | | | 0.030 | * | 0.036 | | | | | | | 0.044 | ** | 0.055 | | | | | | | | | | | | |
| Security and safety | | | | | | | | | | | | | | | | 0.028 | * | 0.033 | 0.039 | ** | 0.051 | | | | 0.030 | ** | 0.036 | | | | | | | | | | | | |
| Simplicity/Difficulty of the route | | | | | | | | | | | | | | | | | | | | | | | | | 0.057 | ** | 0.081 | | | | | | | | | | | | |
| Today's weather | | | | | | | | | | | | | | | | 0.025 | ** | 0.032 | | | | | | | | | | | | | | | | | | | | |
| Traffic congestion | | | | | | | | | | | | | | | | 0.041 | ** | 0.046 | | | | | | | | | | | | | | | | | | | | |
| Vehicle quality | 0.057 | ** | 0.064 | 0.014 | ** | 0.041 | | | | 0.055 | ** | 0.073 | | | | 0.041 | ** | 0.054 | 0.053 | ** | 0.076 | | | | 0.046 | ** | 0.061 | | | | | | | | | | | | |
| **Experience factors, negative** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Ability to do what I wanted | | | | -0.021 | ** | -0.032 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Cars and other vehicles | | | | -0.015 | * | -0.025 | | | | | | | | | | | | | | | | | | | -0.056 | ** | -0.042 | | | | | | | | | | | | |
| Charging opportunity | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Noise | | | | 0.021 | * | 0.025 | -0.012 | * | -0.018 | | | | -0.008 | ** | -0.018 | | | | | | | -0.005 | ** | -0.013 | | | | | | | | | | | | | | |
| Parking at the end | | | | | | | | | | | | | -0.007 | ** | -0.019 | 0.038 | * | 0.022 | | | | | | | | | | | | | | | | | | | | |
| Predictability of travel time | -0.066 | ** | -0.034 | -0.018 | * | -0.025 | | | | | | | | | | -0.044 | ** | -0.027 | | | | | | | -0.054 | ** | -0.033 | | | | | | | | | | | | |
| Scenery | | | | | | | | | | | | | | | | | | | -0.062 | ** | -0.040 | | | | | | | | | | | | | | | | | |
| Security and safety | | | | | | | | | | | | | | | | | | | 0.040 | * | 0.022 | | | | | | | | | | | | | | | | | |
| Simplicity/Difficulty of the route | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Today's weather | -0.103 | ** | -0.067 | | | | | | | -0.035 | ** | -0.027 | | | | -0.074 | ** | -0.055 | -0.030 | ** | -0.025 | | | | | | | | | | | | | | | | | | |
| Traffic congestion | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| **Traveller's characteristics** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Gender, female | | | | | | | -0.006 | ** | -0.023 | | | | | | | 0.026 | ** | 0.037 | | | | | | | -0.055 | ** | -0.080 | | | | -0.013 | * | -0.019 | | | | | | |
| Age, 16-24 (ref.: 25-49) | -0.032 | ** | -0.028 | 0.019 | ** | 0.043 | 0.009 | * | 0.026 | 0.053 | ** | 0.055 | | | | 0.057 | ** | 0.058 | | | | 0.012 | ** | 0.060 | 0.029 | ** | 0.030 | 0.109 | ** | 0.076 | 0.137 | ** | 0.188 | -0.023 | ** | -0.024 | 0.151 | ** | 0.106 | | |
| Age, 50 and more (ref.: 25-49) | -0.052 | ** | -0.056 | | | | -0.005 | * | -0.018 | -0.037 | ** | -0.047 | 0.010 | ** | 0.057 | -0.054 | ** | -0.068 | -0.036 | ** | -0.050 | | | | -0.029 | ** | -0.037 | | | | -0.02 | ** | -0.04 | | | | 0.046 | ** | 0.039 | | |
| **Trip characteristics** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Distance, 15km and more | 0.028 | ** | 0.035 | 0.016 | ** | 0.052 | 0.011 | ** | 0.043 | 0.051 | ** | 0.075 | | | | 0.043 | ** | 0.061 | 0.044 | ** | 0.069 | | | | 0.041 | ** | 0.059 | | | | | | | | | | | | |
| Trip frequency, non-regularly | | | | 0.008 | ** | 0.025 | | | | -0.051 | ** | -0.075 | | | | | | | -0.033 | ** | -0.052 | | | | -0.025 | ** | -0.036 | | | | | | | | | | | | |
| Trip purpose, work related | | | | | | | | | | 0.052 | ** | 0.071 | | | | | | | 0.014 | * | 0.021 | -0.003 | * | -0.020 | | | | | | | | | | | | | | |
| Trip purpose, maintenance related | 0.060 | ** | 0.075 | -0.015 | * | -0.048 | | | | 0.017 | * | 0.025 | 0.005 | ** | 0.034 | 0.025 | ** | 0.036 | | | | | | | 0.022 | ** | 0.032 | | | | | | | | | | | | |
| Trip purpose, leisure | 0.041 | ** | 0.042 | | | | 0.015 | ** | 0.047 | 0.060 | ** | 0.073 | | | | 0.031 | ** | 0.037 | | | | | | | -0.023 | ** | -0.027 | | | | | | | | | | | | |
| Weekend | 0.053 | ** | 0.061 | | | | | | | | | | | | | 0.021 | ** | 0.028 | | | | | | | -0.017 | * | -0.023 | | | | | | | | | | | | |
| Time constraint, no | -0.025 | ** | -0.032 | | | | -0.009 | ** | -0.035 | -0.050 | * | -0.075 | -0.004 | ** | -0.027 | -0.032 | ** | -0.047 | -0.031 | ** | -0.050 | | | | -0.018 | * | -0.026 | | | | | | | | | | | | |
| Weather: rain | 0.050 | ** | 0.059 | 0.013 | ** | 0.041 | | | | 0.024 | ** | 0.034 | -0.005 | ** | -0.029 | 0.027 | ** | 0.037 | -0.024 | ** | -0.037 | | | | 0.054 | ** | 0.075 | | | | | | | | | | | | |
| Temperature, cool (ref.: comfortable) | -0.040 | ** | -0.045 | | | | -0.005 | * | -0.018 | | | | 0.006 | ** | 0.032 | 0.026 | ** | 0.033 | | | | | | | | | | | | | | | | | | | | |
| Temperature,warm to hot (ref.: comfortable) | -0.131 | ** | -0.124 | -0.021 | ** | -0.050 | -0.010 | * | -0.030 | | | | | | | -0.074 | ** | -0.081 | | | | | | | -0.120 | ** | -0.132 | | | | | | | | | | | | |

## Appendix C. Sensitivity analysis

### *Appendix C1. Private motorised trips*

Note: 'private motorised trips' include car driver, car passenger, motorcycle, moped, taxi, car sharing.

**Table A**
Standardized effects on WTT of private motorised trips – sensitivity analysis.

| | Car driver only | Car passenger | Car driver + car passenger | Private motorised |
|---|---|---|---|---|
| | N = 9,269 | N = 2,189 | N = 11,458 | N = 11,859 |
| *Direct effect of value domains on WTT* | | | | |
| Enjoyment | 0.286** | 0.174** | 0.277** | 0.279** |
| Fitness | 0.076** | 0.009** | 0.064** | 0.061** |
| Productivity related to paid work | 0.139** | 0.086** | 0.131** | 0.137** |
| Productivity related to personal tasks | 0.317** | 0.202** | 0.300** | 0.304** |
| *Indirect effect of travel activities on WTT via value domains* | | | | |
| Accompanying someone | 0.052** | 0.020** | 0.047** | 0.047** |
| Browsing the internet | 0.021** | 0.014* | 0.018** | 0.018** |
| Eating | 0.023** | 0.006 | 0.019** | 0.019** |
| Listening to audio | 0.032** | −0.006 | 0.022** | 0.023** |
| Personal care | 0.020** | 0.007* | 0.018** | 0.019** |
| Reading device | −0.006** | 0.012** | 0.007** | 0.007** |
| Reading paper | | | | n.s. |
| Relaxing or sleeping | | | | n.s. |
| Talking | 0.020** | 0.039** | 0.035** | 0.036** |
| Thinking | 0.051** | 0.025** | 0.045** | 0.045** |
| Walking/Cycling/Driving itself | 0.060** | −0.004 | 0.049** | 0.049** |
| Watching video, gaming | | | | n.s. |
| *Indirect effects of positive experience factors on WTT via travel activities and value domains* | | | | |
| Ability to carry bags | n.a. | n.a. | n.a. | n.a. |
| Ability to do what I wanted to do | 0.030** | 0.001 | 0.023** | 0.022** |
| Air quality, temperature | | | | b.m. |
| Crowdedness, seating | n.a. | n.a. | n.a. | n.a. |
| Lighting, visibility | n.a. | n.a. | n.a. | n.a. |
| Noise | | | | b.m. |
| Other people, other passengers | 0.006** | 0.004** | 0.008** | 0.008** |
| Parking at the end | −0.007** | −0.001 | −0.005** | −0.004** |
| Payment and tickets | n.a. | n.a. | n.a. | n.a. |
| Predictability of travel time | −0.013** | −0.002 | −0.010** | −0.010** |
| Privacy | −0.003** | −0.000 | −0.003** | −0.004** |
| Road path availability | n.a. | n.a. | n.a. | n.a. |
| Road path directness | n.a. | n.a. | n.a. | n.a. |
| Road path quality | n.a. | n.a. | n.a. | n.a. |
| Scenery | | | | b.m. |
| Seat comfort | 0.006** | 0.001 | 0.005** | 0.005** |
| Security and safety | 0.006** | 0.000 | 0.005** | 0.005** |
| Simplicity/Difficulty of the route | 0.007** | 0.000 | 0.004** | 0.004** |
| Space for luggage | | | | b.m. |
| Today's weather | +0.000 | 0.003** | 0.001** | 0.001** |
| Toilets | n.a. | n.a. | n.a. | n.a. |
| Traffic congestion | 0.001* | 0.003** | 0.002** | 0.002** |
| Traffic signals | n.a. | n.a. | n.a. | n.a. |
| Vehicle quality | 0.016** | 0.005* | 0.014** | 0.014** |
| *Indirect effects of negative experience factors on WTT via travel activities and value domains* | | | | |
| Ability to carry bags | n.a. | n.a. | n.a. | n.a. |
| Ability to do what I wanted to do | −0.001** | −0.000 | −0.001** | −0.001** |
| Air quality, temperature | | | | b.m. |
| Cars and other vehicles | −0.004** | 0.000 | −0.003** | −0.002** |
| Charging opportunity | | | | n.s. |
| Crowdedness, seating | n.a. | n.a. | n.a. | n.a. |
| Facilities | n.a. | n.a. | n.a. | n.a. |
| Internet connectivity | n.a. | n.a. | n.a. | n.a. |
| Lighting, visibility | n.a. | n.a. | n.a. | n.a. |
| Noise | −0.000 | +0.000 | −0.000 | −0.000 |
| Parking at the end | −0.000 | 0.002* | +0.000 | +0.000 |
| Predictability of travel time | −0.006** | +0.000 | −0.004** | −0.005** |
| Road path availability | n.a. | n.a. | n.a. | n.a. |
| Road path directness | n.a. | n.a. | n.a. | n.a. |
| Road path quality | n.a. | n.a. | n.a. | n.a. |

(*continued on next page*)

**Table A** (*continued*)

| | Car driver only | Car passenger | Car driver + car passenger | Private motorised |
|---|---|---|---|---|
| Scenery | −0.002** | −0.000 | −0.002** | −0.002** |
| Security and safety | 0.001 | 0.001 | 0.001 | 0.001* |
| Space for luggage | | | | b.m. |
| Simplicity/Difficulty of the route | 0.000** | 0.000* | −0.000** | −0.000** |
| Today's weather | −0.006** | −0.005** | −0.007** | −0.007** |
| Toilets | n.a. | n.a. | n.a. | n.a. |
| Traffic congestion | | | | n.s. |
| Traffic signals | n.a. | n.a. | n.a. | n.a. |
| *Indirect effects of traveller's characteristics on WTT via travel activities and value domains* | | | | |
| Gender, female | −0.008** | −0.002 | −0.006** | −0.006** |
| Age, 16–24 (ref.: 25–49) | 0.072** | 0.023** | 0.067** | 0.067** |
| Age, 50 and more (ref.: 25–49) | 0.003 | −0.005 | 0.001 | +0.000 |
| *Indirect effects of trip characteristics on WTT via travel activities and value domains* | | | | |
| Distance, 15 km and more | 0.037** | 0.023** | 0.036** | 0.036** |
| Trip frequency, non-regularly | 0.002 | 0.004* | 0.003 | 0.003 |
| Trip purpose, work related | −0.016** | −0.008 | −0.017** | −0.016** |
| Trip purpose, maintenance related | 0.023** | 0.026** | 0.022** | 0.023** |
| Trip purpose, leisure | −0.010* | −0.012* | −0.009** | −0.010** |
| Weekend | 0.025** | 0.006 | 0.023** | 0.023** |
| Time constraint, yes | −0.027** | −0.011** | −0.025** | −0.026** |
| Weather: rain | 0.037** | −0.020** | 0.024** | 0.024** |
| Temperature, cool (ref.: comfortable) | 0.009 | 0.014* | 0.010** | 0.010** |
| Temperature, warm to hot (ref.: comfortable) | −0.032** | 0.021** | −0.019** | −0.024** |
| *Model fit* | | | | |
| $Chi^2$ (df) p | 7196.795 (368) 0.000 | 2488.874 (368) 0.000 | 8811.599 (368) 0.000 | 9048.229 (368) 0.000 |
| $Chi^2$ / df | 19.557 | 6.763 | 23.945 | 24.588 |
| RMSEA | 0.045 | 0.051 | 0.045 | 0.045 |
| CFI; TLI | 0.927; 0.786 | 0.898; 0.700 | 0.925; 0.779 | 0.926; 0.783 |
| PNFI | 0.315 | 0.302 | 0.314 | 0.314 |
| $R^2$ | 20.4 % | 7.3 % | 18.8 % | 18.8 % |

* $p \leq 0.05$; ** $p \leq 0.01$.
b.m. = experience factor below median and therefore not considered in the path model.
n.a. = travel activity or experience factor is not applicable for this transport mode and therefore not considered in the path model.
n.s. = direct effect of travel activity on value domains (or experience factor on travel activities) tested but found insignificant at 95 % and therefore deleted from the path model.

### *Appendix C2. Public transport*

Note: 'public transport' includes train, bus, tram, subway/metro.

**Table B**
Standardized effects on WTT of public transport trips – sensitivity analysis.

| | Train | BTM | Public transport |
|---|---|---|---|
| | N = 1,102 | N = 3,805 | N = 4,907 |
| *Direct effect of value domains on WTT* | | | |
| Enjoyment | 0.200** | 0.236** | 0.238** |
| Fitness | 0.032 | 0.057** | 0.048** |
| Productivity related to paid work | 0.148** | 0.125** | 0.135** |
| Productivity related to personal tasks | 0.291** | 0.263** | 0.272** |
| *Indirect effect of travel activities on WTT via value domains* | | | |
| Accompanying someone | 0.002 | 0.022** | 0.019** |
| Browsing the internet | 0.035** | 0.049** | 0.047** |
| Eating | | | n.s. |
| Listening to audio | 0.026** | 0.032** | 0.032** |
| Personal care | 0.014 | 0.019** | 0.018** |
| Reading device | 0.019* | 0.028** | 0.028** |
| Reading paper | 0.015 | 0.027** | 0.024** |
| Relaxing or sleeping | 0.010 | 0.032** | 0.027** |
| Talking | 0.012 | 0.040** | 0.034** |
| Thinking | 0.069** | 0.041** | 0.047** |
| Walking/Cycling/Driving itself | n.a. | n.a. | n.a. |
| Watching video, gaming | −0.007 | 0.015** | 0.012** |
| *Indirect effects of positive experience factors on WTT via travel activities and value domains* | | | |
| Ability to carry bags | n.a. | n.a. | n.a. |
| Ability to do what I wanted to do | 0.005 | 0.008** | 0.009** |

(*continued on next page*)

**Table B** (*continued*)

| | Train | BTM | Public transport |
|---|---|---|---|
| Air quality, temperature | 0.001 | −0.001 | 0.001 |
| Crowdedness, seating | 0.018** | 0.013** | 0.015** |
| Lighting, visibility | n.a. | n.a. | n.a. |
| Noise | −0.001 | −0.004** | −0.004** |
| Other people, other passengers | −0.002 | −0.001 | −0.001 |
| Parking at the end | n.a. | n.a. | n.a. |
| Payment and tickets | −0.015** | −0.001 | −0.008** |
| Predictability of travel time | −0.001 | −0.002** | −0.002** |
| Privacy | | | b.m. |
| Road path availability | n.a. | n.a. | n.a. |
| Road path directness | n.a. | n.a. | n.a. |
| Road path quality | n.a. | n.a. | n.a. |
| Scenery | | | n.s. |
| Seat comfort | n.a. | n.a. | n.a. |
| Security and safety | 0.009** | 0.006** | 0.008** |
| Simplicity/Difficulty of the route | 0.001 | 0.002* | 0.002** |
| Space for luggage | 0.018** | 0.002 | 0.008** |
| Today's weather | 0.006** | 0.009** | 0.009** |
| Toilets | 0.010** | 0.014** | 0.013** |
| Traffic congestion | n.a. | n.a. | n.a. |
| Traffic signals | n.a. | n.a. | n.a. |
| Vehicle quality | n.a. | n.a. | n.a. |
| Vehicle ride smooth | −0.002 | +0.000 | −0.000 |
| *Indirect effects of negative experience factors on WTT via travel activities and value domains* | | | |
| Ability to carry bags | n.a. | n.a. | n.a. |
| Ability to do what I wanted to do | | | b.m. |
| Air quality, temperature | | | n.s. |
| Cars and other vehicles | n.a. | n.a. | n.a. |
| Charging opportunity | −0.005 | −0.004** | −0.007** |
| Crowdedness, seating | 0.010** | 0.003* | 0.006** |
| Facilities | n.a. | n.a. | n.a. |
| Internet connectivity | 0.001 | 0.001 | 0.001 |
| Lighting, visibility | n.a. | n.a. | n.a. |
| Noise | | | n.s. |
| Parking at the end | n.a. | n.a. | n.a. |
| Predictability of travel time | | | n.s. |
| Road path availability | n.a. | n.a. | n.a. |
| Road path directness | n.a. | n.a. | n.a. |
| Road path quality | n.a. | n.a. | n.a. |
| Scenery | | | n.s. |
| Security and safety | | | b.m. |
| Space for luggage | +0.000 | 0.001** | 0.001** |
| Simplicity/Difficulty of the route | | | b.m. |
| Today's weather | −0.001 | 0.002 | 0.001 |
| Toilets | 0.001 | 0.001 | 0.001 |
| Traffic congestion | n.a. | n.a. | n.a. |
| Traffic signals | n.a. | n.a. | n.a. |
| *Indirect effects of traveller's characteristics on WTT via travel activities and value domains* | | | |
| Gender, female | −0.019* | −0.016** | −0.019** |
| Age, 16–24 (ref.: 25–49) | 0.032** | 0.017** | 0.016** |
| Age, 50 and more (ref.: 25–49) | −0.025** | −0.023** | −0.024** |
| *Indirect effects of trip characteristics on WTT via travel activities and value domains* | | | |
| Distance, 15 km and more | 0.053** | −0.001 | 0.028** |
| Trip frequency, non-regularly | −0.009 | −0.002 | −0.006 |
| Trip purpose, work related | 0.048** | 0.045** | 0.050** |
| Trip purpose, maintenance related | 0.018 | 0.042** | 0.038** |
| Trip purpose, leisure | 0.008 | 0.032** | 0.030** |
| Weekend | 0.006 | 0.008 | 0.007 |
| Time constraint, yes | −0.023** | −0.014 | −0.018** |
| Weather: rain | 0.025* | 0.033** | 0.030** |
| Temperature, cool (ref.: comfortable) | −0.005* | −0.008** | −0.007** |
| Temperature, warm to hot (ref.: comfortable) | −0.020* | −0.022** | −0.020** |
| *Model fit* | | | |
| $Chi^2$ (df) p | 1914.221 (420) 0.000 | 2963.456 (420) 0.000 | 4001.290 (420) 0.000 |
| $Chi^2$ / df | 4.558 | 7.056 | 9.527 |
| RMSEA | 0.057 | 0.040 | 0.042 |
| CFI; TLI | 0.902; 0.748 | 0.938; 0.841 | 0.935; 0.833 |
| PNFI | 0.343 | 0.361 | 0.361 |
| $R^2$ | 15.4 % | 14.7 % | 15.4 % |

* $p \leq 0.05$; ** $p \leq 0.01$.
b.m. = experience factor below median and therefore not considered in the path model.
n.a. = travel activity or experience factor is not applicable for this transport mode and therefore not considered in the path model.
n.s. = direct effect of travel activity on value domains (or experience factor on travel activities) tested but found insignificant at 95 % and therefore deleted from the path model.

## Data availability

The empirical investigation is based on a large, open and European-wide travel experience dataset available at https://doi.org/10.5281/zenodo.4027465

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