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Does easy mean happy? Exploring the impact of ease of travel on travel satisfaction

Jonas De Vos[1] · **Daniel Oviedo**[2] · **Alireza Ermagun**[3] · **Ahmed El-Geneidy**[4]

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Abstract
Many studies have examined the determinants of travel satisfaction. However, how the perceived ability to travel, i.e., ease of travel (EoT), influences travel satisfaction has not been analysed in a comprehensive way. In this study, we will analyse how EoT, which is comprised of travel motivation, travel skills, travel options and travel quality, impacts satisfaction with travel to campus of 2593 students and staff members of University College London (UCL). One-way ANOVAs show that respondents with high levels of EoT are more satisfied with their trips to campus compared to those with lower EoT levels. Based on linear regressions (per mode and all modes combined), we found that all EoT elements seem to positively affect travel satisfaction, even after controlling for socio-demographics and trip characteristics. This indicates that EoT may be regarded as an important predictor of travel satisfaction. Apart from EoT, also age, mode choice, weather conditions and levels of crowding and congestion were found to significantly impact travel satisfaction. Somewhat surprisingly, effects of travelling alone, trip duration, and travel disabilities on travel satisfaction – which were often found in existing studies – were weak, suggesting that these effects may be partly explained/moderated by variations in EoT elements. In order to make public transport and active travel trips more satisfying, we recommend policy makers to focus on (1) improving the quality of public transport services and active travel infrastructure, and (2) helping people to improve their skills required to easily walk, cycle or use public transport.

Keywords Ease of travel · Travel behaviour · Travel satisfaction

✉ Jonas De Vos
jonas.devos@ucl.ac.uk

[1] Bartlett School of Planning, University College London, London, UK

[2] Development Planning Unit, University College London, London, UK

[3] Department of Geography and Geoinformation Science, George Mason University, Fairfax, US

[4] School of Urban Planning, McGill University, Montreal, Canada

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Introduction

In the past 15 years, many studies have analysed which emotions people experience when travelling and how they evaluate trips. Some of these studies found that travel duration has a strong and negative effect on this travel satisfaction. The longer a trip takes, the more stressful and tiring people usually get (e.g., Morris and Guerra 2015a; Zhu and Fan 2018). Especially when the actual travel duration is longer than the ideal travel duration, satisfaction levels are low (Ye et al. 2020). Many studies also found strong effects of the chosen travel mode on travel satisfaction. In general, public transport users are least satisfied with their trips, while active travellers are most satisfied (e.g., De Vos et al. 2016; Morris and Guerra 2015b; Olsson et al. 2013; Singleton 2019; St-Louis et al. 2014; Zhu and Fan 2018; Ye and Titheridge 2017). The potential crowdedness and congestion involved in public transport use, and physical activity while walking and cycling may partly explain these differences, although that these variances may also be explained by short active trips and long trips by public transport (e.g., De Vos et al. 2022; Smith 2017). Attitudes have also been found to influence travel satisfaction. A positive stance towards a certain mode positively influences satisfaction when using that mode (e.g., De Vos et al. 2016; St-Louis et al. 2014), while the inability to travel with (one of the) preferred mode(s) (travel mode dissonance) can negatively impact travel satisfaction (De Vos 2018; Ye and Titheridge 2019). Some studies have analysed the effects of the built environment on travel satisfaction, but did not find significant effects, or only indirect effects through trip duration and mode choice (Mouratidis et al. 2019; Ye and Titheridge 2017).

Travel satisfaction can also be affected by trip characteristics. The experience of travel can, for instance, be affected by travel companionship. Overall, travelling together with someone else has a positive influence on the experience of trips (De Vos 2019; Lancée et al. 2017; Zhu and Fan 2018). Also the activities that people – mainly public transport users – perform during travel can play a role. These activities (window gazing, listening to music, reading a book, etc.) can positively influence satisfaction levels, but may also be attempts to abate boredom (Ettema et al. 2012). Finally, weather conditions may affect travel satisfaction. Dry, calm, sunny and warm (but not too hot) weather positively impact travel experiences, especially of active travellers (Böcker et al. 2016), while rain and snow seem to have negative impacts (Abenoza et al. 2019; St-Louis et al. 2014). Since travel occupies a considerable share of our daily time, travel satisfaction can influence satisfaction with activities at the destination of the trip, satisfaction with life domains (e.g., job and leisure time satisfaction), and satisfaction with life in general (e.g., Bergstad et al. 2011; Clark et al. 2020; De Vos 2019). As a result, travel satisfaction can have an important impact on people's quality of life and subjective well-being.

The potential effect of ease of travel on travel satisfaction

Ease of Travel (EoT) refers to how easy it is for people to travel and is composed of four elements. *Travel motivation* refers to people's incentives to travel. People can have an internal motivation to travel, e.g., when they value certain aspects of travel, or may have more external travel motivations, when the trip is solely performed to reach an activity. Travel motivation may be mode specific, as some people may only desire to use a certain travel

mode, but do not wish to use other modes (e.g., Anable 2005). *Travel skills* refer to the knowledge and skills required to travel in a safe and comfortable way. This relates to physical skills (such as the skills needed to ride a bicycle or drive a car), mental skills (identifying obstacles and anticipating the movements of other people or vehicles), and organizational skills (navigating to destinations, reading and interpreting traffic signs, public transport timetables and network maps). Travel skills are mainly obtained by repeatedly travelling in a similar way (Flamm and Kaufmann 2006), and – once acquired – will make it easier for people to reach destinations. *Travel options* mainly refer to having access to various travel modes. This can relate to car ownership, nearby public transport stops, and having car/bike sharing facilities within the residential neighbourhood. In general, people living in urban neighbourhoods have a wider variety of travel options available as they generally have easier access to public transport (due frequent and spatially widespread services), and more opportunities for walking and cycling (due to shorter average distances) compared to suburban residents (e.g., Ewing and Cervero 2010; Næss 2012). Finally, *travel quality* indicates to what extent a certain way of travelling is likely or stimulated. This can refer to fast-moving and free-flow traffic for drivers, high-frequency public transport services reaching multiple destinations without the need to transfer, and wide and protected sidewalks/bicycle lanes and safe (zebra) crossings for active travellers. In suburban areas, the car may be more convenient due to less congestion, while the quality of car alternatives is likely to be higher in urban areas due to better public transport services, active travel infrastructure, and shorter distances. EoT is closely related to perceived behavioural control. Perceived behavioural control refers to how easy people feel they can perform a certain behaviour and is, according to the theory of planned behaviour an important predictor of behaviour (through intention) (Ajzen 1991). In a previous study using the same data, De Vos et al. (2025) found that EoT significantly impacts travel mode choice, travel distance, and travel duration. They found that having ample travel options discourages train use and stimulates active travel, while those with a lot of travel options and good quality of travel have relatively low travel durations and distances. For more information on the EoT concept, see De Vos (2024).

EoT, or at least some of its elements, may have an impact on travel satisfaction. Studies have found that being motivated to travel and having a positive stance towards travel in general can positively influence satisfaction with travel (De Vos and Witlox 2016; De Vos et al. 2021). Some studies also found that physical health problems (e.g., disabilities hampering travel, being overweight) negatively impact travel satisfaction (Mokhtarian et al. 2015; Singleton 2019; Ye and Titheridge 2017). Having multiple travel options can also improve the travel experience as car/bicycle ownership, having a driving license or public transport pass, and short distances to public transport can improve satisfaction levels during travel (De Vos et al. 2016; Singleton 2019; Ye and Titheridge 2017). Travel quality may also impact satisfaction levels. The quality of public transport services (such as cleanliness, comfort, punctuality, etc.) can influence satisfaction with public transport trips (see, e.g., van Lierop et al. 2018), while the presence of congestion (and associated annoyance with other road users, and lack of freedom to choose speed and lane) can negatively impact satisfaction of drivers (Ettema et al. 2013; Morris and Hirsh 2016). Besides congestion, crowding also has a negative influence on satisfaction for public transport users (Börjesson and Rubensson 2019; Soza-Parra et al. 2019). Inadequate walking or cycling infrastructure, or the presence of slopes may worsen the experience of active travel (St-Louis et al. 2014; Susilo and Cats 2014; Willis et al. 2013). Although the above studies have explored how some elements of

people's travel ability impact travel satisfaction, a study analysing the impact of all EoT elements simultaneously is currently lacking.

The effect of EoT on travel satisfaction may, however, not be straightforward. According to the flow theory (Csikszentmihalyi 1990), an activity which is regarded as (too) difficult may result in feelings of stress and anxiety, while an activity which is considered as (too) easy may result in feelings of boredom. In terms of travel, this would mean that both trips which are regarded as too difficult (e.g., traveling with a disability or poor health status) or not challenging enough (e.g., long public transport trips) will not be satisfying. Positively experienced travel could be achieved when trips require certain skills, such as the ability to control movement in a demanding and skilful way when driving a car, or riding a bicycle. Te Brömmelstroet et al. (2022) applied this theory to travel and found that public transport trips are mostly not challenging and therefore often result in apathy and boredom, while the more challenging cycling and driving result in feelings of control, arousal (for cycling), and relaxation (for driving). Acker et al. (2021), focussing on the opposite of travel ease, i.e., travel effort, found expected negative effects of physical effort (walking, waiting, and carrying goods) on travel satisfaction.

It is also possible that travel satisfaction influences EoT. The flow theory, for instance, also suggests that the experience of an activity influences people's motivation; a satisfying activity may increase people's motivation to perform that activity in the future. Similarly, studies indicate that attitudes and motivations are influenced by how (un)pleasant activities were perceived (e.g., Eagly and Chaiken 1993; Perugini and Bagozzi 2001), an effect also found in a transport context by De Vos et al. (2019). The self-determination theory (Ryan and Deci 2000), on the other hand, indicates that experiencing feelings of autonomy, competence, and relatedness can make people's motivations more intrinsic (i.e., performing a behaviour because you like it). This would mean, for instance, that satisfying walking trips will strengthen the motivation to walk in the future. Furthermore, satisfying trips may stimulate people to further develop the skills needed to travel in that way, while they may try to improve options and quality of the desired travel (e.g., by relocating). Despite these potential effects of travel satisfaction on EoT, we will only focus on effects of EoT on satisfaction in this study.

Despite many studies having analysed the determinants of travel satisfaction in the past years, people's ability to travel has only fragmentedly been included in travel satisfaction studies. To measure the effect of people's travel ability on the experience of travel in a clear and comprehensive way, we will analyse the impact of the four EoT elements on travel satisfaction by focusing on travel to UCL campus. One-way ANOVAs will be performed to see whether travel satisfaction is higher for those with higher levels of EoT, while linear regressions (for various travel modes and all modes combined) are performed to (simultaneously) examine the effects of EoT elements on travel satisfaction while controlling for socio-demographics and trip characteristics. By doing so, we can analyse whether EoT is an important determinant of travel satisfaction (and therefore well-being in general) which has largely been overlooked by previous studies. The remainder of this paper is organised as follows. In Sect. 3, the data collection and key variables are described, while the results are described in Sect. 4. In Sects. 4 and 5, a discussion and conclusion are provided.

Data and methods

Data collection

This study uses data from the 2023 University College London (UCL) travel survey (De Vos 2023). This survey collected information from UCL students and staff, in order to create insights into how UCL students and staff travel and how they experience it, with the main objective of making travel generated by UCL more sustainable and convenient. This study uses data from the first part of the survey, focusing on how respondents travel to campus, and how this travel is perceived.[1] Data was collected during the last four weeks of term 2, i.e. from February 27 until March 27, 2023. The survey was distributed via various UCL newsletters for staff and students, and UCL social media pages (Instagram, Facebook, and Twitter). As an incentive to complete the survey, respondents had a chance of winning one of eight £50 multi-store gift vouchers. In the end, 2,912 UCL staff members and students participated, of which 2,593 completely filled in the survey and were kept for further analysis. For more information on the sample recruitment, see De Vos et al. (2025).

Table 1 gives an overview of the respondents' socio-demographic characteristics, and their role at UCL. Due to the presence of students, more than half of the respondents are 35 years or younger; while those 46 or older only represent somewhat more than one in five of the respondents. This is in line with the general age distribution of staff members at UCL, where people in their fifties are underrepresented and those in their thirties overrepresented compared to the total UK higher education sector (UCL 2022). Women (64.7%) are overrepresented in the sample (as only 53% of staff and 61% of students at UCL are female (UCL 2022, 2024), while almost two out of three respondents live in Greater London. A small group of respondents indicates to have a disability that limits their ability to travel. The biggest group of respondents are administrative staff members, followed by research staff, undergraduate students, professors, postgraduate students, PhD students, and teaching staff. Staff and students from the faculties Medical Sciences, Engineering Sciences, and Population Health Sciences are best represented. The majority of respondents are fulltime staff or students.

Key variables

Ease of travel

Based on De Vos (2024), respondents were asked to indicate to what extent they agree on twelve statements (on a scale from 1 (totally disagree) to 5 (fully agree), three statements referring to travel motivation, travel skills, travel options, and travel quality each. Since the survey did not focus on one specific travel mode, the statements are rather general and not mode-specific. In order to identify underlying structures of EoT, and create a limited number of factors representing different aspects of EoT, principal axis factoring (with promax rotation) was chosen. This resulted in four factors, explaining 72.7% of the total variance (Table 2). Two variables were excluded as they did not have a high loading (i.e., above 0.4) on any of the factors (i.e., *I like to travel; Overall*, *I can travel in a desired way*). The

[1] The second part of the survey (for most UCL staff and PhD students) focused on (attitudes towards) academic travel.

Table 1 Sample characteristics

		%
Age	17–25	29.9
	26–35	29.3
	36–45	18.9
	46–55	12.4
	56+	9.5
Gender	Woman	64.7
	Man	32.3
	Non-binary/questioning/unsure	1.4
	Prefer not to say	1.6
Residential location	Inside Greater London	63.6
	Outside Greater London	36.4
A disability hampering the ability to travel	Yes	4.4
	No	95.6
Role at UCL	Undergraduate student	16.0
	Postgraduate student	11.6
	PhD student	9.8
	Administrative staff	21.6
	Research staff	19.7
	Teaching staff	4.3
	Professor	13.9
	Other	3.0
UCL faculty	Medical Sciences	13.4
	Engineering Sciences	11.9
	Population Health Sciences	11.5
	Social and Historical Sciences	10.2
	Mathematical and Physical Sciences	9.1
	Life Sciences	8.6
	Built Environment	7.0
	Other faculties	28.3
Employment/ student status	Fulltime	85.8
	Parttime	14.2

Bartlett's test of sphericity (0.81) and the Kaiser-Meyer-Olkin test ($p<0.001$) indicate that there is sufficient correlation among the variables to justify a factor analysis, while the number of factors is mainly based on the eigenvalues and interpretability. The first factor refers to the presence of travel options with the statement *My travel options are available to me whenever I want* (average score: 3.41) having the highest factor loading.[2] The second factor represents the possession of travel skills with the highest loading for *I easily find my way to out-of-home activities* (average score 3.80). The third and fourth factor refer to travel motivation and travel quality, with the highest (negative) loadings for *The only good thing about travelling is reaching the destination* (average score: 2.83) and *I have longer travel durations than desired* (avg. score: 3.45), respectively. A previous study using the same data as this study found that EoT elements are mainly influenced by the residential location, travel disabilities, and the proximity of public transport and shared (e-)bikes (De Vos et al. 2024).

[2] Factor loadings represent the degree of association between the statement and the factor.

Table 2 Pattern matrix (factor loadings below 0.4 are not shown to improve readability)

Statement	Travel options	Travel skills	Travel motivation	Travel quality
My travel options are available to me whenever I want	0.84			
I have a lot of travel options available	0.75			
The travel options I have available enable me to reach my desired out-of-home activities	0.52			
I easily find my way to out-of-home activities		0.71		
I feel confident while travelling		0.69		
Travelling is physically challenging for me		−0.48		
The only good thing about travelling is reaching the destination			−0.84	
Travel time is wasted time			−0.81	
I have longer travel durations than desired				−0.88
I spend more money on travel than desired				−0.52

Characteristics and satisfaction of the most recent trip to campus

In this study we focus on the most recent, normal trip to the campus most frequently visited. Most respondents travel to UCL buildings located in London's city centre (within the inner ring road), generally to the Bloomsbury campus. These locations are all well connected by public transport (with multiple train, underground/overground, and bus stops nearby). A small share of respondents (1.4%) travel most frequently to the new UCL East campus (around 10 km east of Bloomsbury, but still well connected by public transport). Not surprisingly, most respondents travelled for their most recent trip by public transport, especially by underground/overground (London's metro/light rail system) or train (Table 3). Around one in five respondents either walked or cycled to campus, while only a small share drove (likely because of severe congestion and limited parking opportunities). Around four in ten trips were relatively short ($\leq$10 km), while almost one third can be considered as long distance ($>$25 km). As a result, the majority of respondents had a commute longer than 30 min, and almost one in three had a commute of more than 60 min. These long commute durations to London are not uncommon as almost four in ten workers in Central London have a commute of at least one hour (Department for Transport 2022). Most respondents travelled alone to campus, which is in line with other studies indicating that most commuters travel alone, while travelling with others is more common for other travel purposes (Lancée et al. 2017; Zhu and Fan 2018). Respondents often indicated that it was crowded, windy, and especially cold during their commute.

Table 3 Characteristics of most recent, normal trip to campus

		%
Travel mode	Bus/tram	6.8
	Underground/overground	39.3
	Train	29.1
	Car	1.9
	Walking	11.7
	Cycling	9.7
	Others	1.6
Travel distance	Short (≤10 km)	39.7
	Medium (10–25 km)	28.9
	Long (>25 km)	31.4
Travel duration	Short (≤30 min.)	25.6
	Medium (30–60 min.)	42.9
	Long (>60 min.)	31.5
Trip companionship	Alone	88.7
	With others	11.3
Trip conditions	It was raining	18.6
	It was windy	30.2
	It was cold	72.8
	It was sunny	13.2
	It was noisy	20.2
	It was crowded	37.6
	There was congestion	18.2
	It was dark	8.1

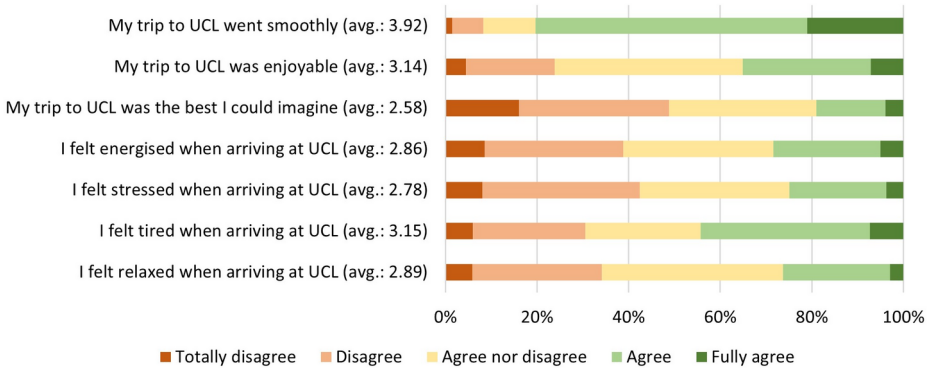

Fig. 1 Respondents' answers on the travel satisfaction statements

In order to measure travel satisfaction of the most recent trip to campus, respondents were asked to what extent they agree on seven statements, on a scale from 1 (totally disagree) to 5 (fully agree). Overall, the responses are rather neutral and evenly distributed, although we can see that most respondents indicate that their trip went smoothly, but also that many find the trip somewhat tiring and not the best imaginable (Fig. 1). Since the internal consistency of the scores on the seven statements (with reversing the scores on the statements referring to stress and tiredness) is good (Cronbach's alpha = 0.86), one variable representing travel satisfaction was created by averaging the scores on the seven statements. Doing so creates

a more reliable measure of travel satisfaction and enables a convenient way of analysing the relationship between travel satisfaction and its potential determinants (such as EoT).[3] The average score on this variable is 3.07, with a standard deviation of 0.72, indicating that many respondents have rather average travel satisfaction scores.

Results

The relationship between ease of travel and travel satisfaction

In order to explore the relationship between EoT and travel satisfaction, we analyse how respondents with various levels of EoT have varying travel satisfaction scores. In order of doing so, we have subdivided respondents in three categories based on their factor scores from the factor analysis: Low (factor scores < -0.5), Medium (factor scores between -0.5 and 0.5) and High (factors scores > 0.5).[4] Fig. 2 shows that those with high and medium levels of EoT have significantly higher travel satisfaction levels compared to those with medium/low and low levels of EoT, respectively (based on one-way ANOVAs with LSD

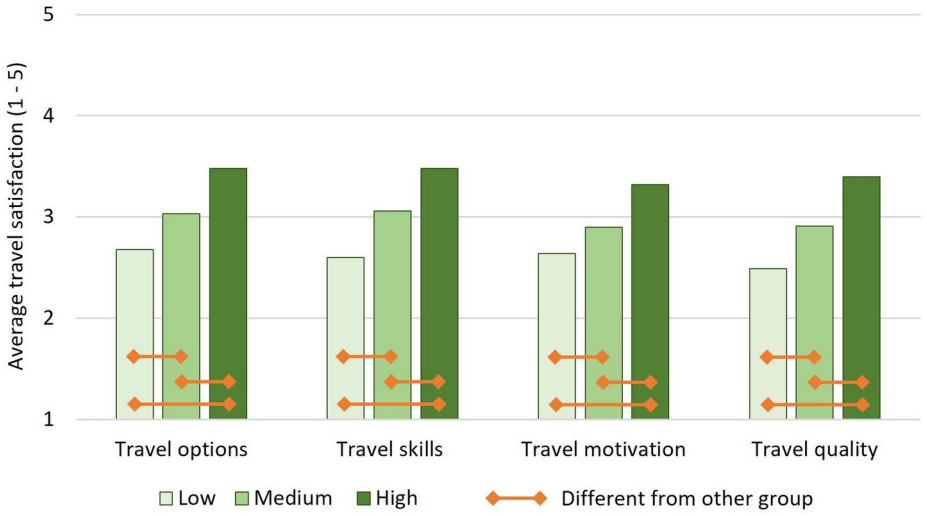

Fig. 2 Average travel satisfaction scores according to EoT levels

[3] We do acknowledge that the first three statements refer to overall trip satisfaction while the last four statements refer to experienced emotions upon arrival, suggesting two potential underlying dimensions. However, a factor analysis (principal axis factoring; promax rotation) only results in one factor (based on eigenvalues) representing all statements. In a two-factor solution (the second factor having an eigenvalue < 1), the two factors do not represent the two above-mentioned dimensions (trip satisfaction vs. emotions upon arrival), while two statements have relatively high cross loadings (factor loading > 0.3 on both factors). Hence, we feel that one variable originating from the average scores of the seven statements is the best option.

[4] For travel options, 28.5%, 43.4%, and 28.1% of the respondents have respectively low, medium and high values. For Travel motivation, 25.5%, 47.5%, and 27.0% of the respondents have respectively low, medium and high values. For Travel motivation, 28.6%, 40.0% and 31.4% of the respondents have respectively low, medium and high values, while for Travel quality, 28.6%, 40.0% and 31.4% of the respondents have respectively low, medium and high values.

post-hoc tests). Those with high levels on all elements of EoT have average satisfaction scores between 3.3 and 3.5, those with medium EoT levels have average satisfaction scores around 3, while those with low levels of EoT only have average satisfaction scores around 2.6. In sum, this suggests that EoT has a positive influence on travel satisfaction.

The effect of ease of travel on travel satisfaction

To measure the effect of personal characteristics, trip characteristics and (especially) EoT elements on satisfaction with the most recent, normal trip to campus, six linear regressions were performed, one for each travel mode and one for all modes combined (Table 4).[5] This allows us to measure whether the effects of EoT on travel satisfaction remain significant after controlling for other elements. For personal characteristics we included the following variables: Age (years), Gender (0 = man; 1 = woman), Residential location (0 = outside Greater London; 1 = within Greater London), Travel disability (0 = no disability hampering travel; 1 = disability hampering travel), and UCL status (student (ref. category), administration, teaching/research staff, professors). For trip characteristics, travel mode (for the model with all modes combined), travel duration, travel companionship (whether or not people travelled alone) and trip conditions (whether or not it was rainy, windy, cold, sunny, noisy, crowded, congested or dark) are used. Due to multicollinearity with travel duration (VIF values above 3), travel distance was removed from the models. For EoT, the factor scores from the factor analysis are used.

Results indicate that personal characteristics only have limited effects on travel satisfaction (Table 4). Only age seems to have a clear positive effect, mainly on train use, walking and cycling. Women are more satisfied with walking trips, while having a travel disability only has a negative effect for all modes combined. Compared to people using under/overground, respondents driving, walking and cycling are more satisfied. This is in line with existing studies finding low satisfaction levels of public transport users (e.g., Morris and Guerra 2015b; Singleton 2019). Somewhat surprisingly, travelling alone does not have a negative effect on travel satisfaction, although previous studies have often suggested such an effect (e.g., Lancée et al. 2017; Zhu and Fan 2018). This could be partly explained by the small share of respondents travelling with others (11.3%). On the other hand, also other studies found that the effect of companionship on travel satisfaction becomes modest after controlling for other elements (De Vos 2019; Mokhtarian et al. 2015), suggesting that the effect of companionship on travel satisfaction is partly explained by other elements included in the model. Also duration only has a weak effect on travel satisfaction, despite many studies indicating that long durations negatively impact satisfaction levels (e.g., Morris and Guerra 2015a; Zhu and Fan 2018). It may be possible that the effect of duration on satisfaction is partly explained by the effect of travel quality on travel satisfaction, since the statement with the highest loading on the travel quality factor is: *I have longer travel durations than desired*. On the other hand, the generally long trips to UCL campus may stimulate respondents to use their time productively (i.e., by performing activities during travel), thereby potentially reducing the negative impact of duration on travel satisfaction (e.g., Lyons et al. 2007; Singleton 2020). Windy and cold weather mainly have negative effects on satisfaction with walking and cycling, while sunny weather positively affects under/

[5] Since only 47 respondents travelled by car, hence a small subsample, no linear regression was performed for car users.

overground, train, and walking satisfaction. A positive effect of sunshine and temperature on travel satisfaction has also been found in previous studies, while a negative effect of wind has not always been identified (Abenoza et al. 2019; Böcker et al. 2016; Ettema et al. 2017). Noise negatively affects satisfaction with under/overground, crowdedness has a negative effect on satisfaction with under/overground and train use, while congestion negatively impacts satisfaction with the use of al modes, except train. The negative impacts of noise, congestion and crowding on travel satisfaction are in line with existing studies (e.g., Liu et al. 2024; Ma et al. 2021; Smith 2017).

EoT seems to have strong positive effects on travel satisfaction. The effects are least strong for bus/tram use, although still significant for travel motivation and travel quality. For other modes (and all modes combined), all four EoT components have significant positive effects on satisfaction levels. The strongest effects are mainly found for travel skills, travel motivation and travel quality, and for under/overground use, train use, and cycling. The R^2s and adjusted R^2s are relatively high (R^2s ranging from 0.43 to 0.48) indicating that a substantial share of the variance in (mode-specific) travel satisfaction is explained by the included independent variables. The R^2s significantly drop when excluding the EoT elements to 0.35, 0.29, 0.32, 0.33, 0.27, and 0.33 for the models on bus/tram, overground/underground, train, walking, cycling and all modes, respectively (models not presented in the paper). This indicates that a large share of the variance in (mode-specific) travel satisfaction is explained by EoT elements.

Discussion of main results

Results from this study indicate that EoT can have important impacts on travel satisfaction, even after controlling for socio-demographics and trip characteristics. A substantial share of the variance in travel satisfaction is explained by EoT elements. Figure 3 illustrates the relative importance of each EoT element on travel satisfaction for the five modes. The magnitudes are derived from the standardised coefficient values in Table 4, with a value of 0.3 taken as the maximum, based on the strongest effect of an EoT element on mode-specific travel satisfaction (i.e., the effect of travel skills on cycling satisfaction (standardised coefficient: 0.29)). The figure shows that travel options – despite significant effects on all modes except bus/tram – have the weakest effect on satisfaction, as it only seems to play an important role for walking satisfaction. Hence, being able to choose how to travel, and which mode to use has a moderate positive effect on travel satisfaction. Travel skills play an important role in the satisfaction with active travel, underground/overground use, and train use. Travel motivation has a strong impact on satisfaction with all modes, but least for walking, i.e., those who like to travel will mostly be more satisfied with it. The figure also shows that travel quality has strong effects on the satisfaction with all public transport modes and cycling.

To improve people's travel satisfaction and overall quality of life, it is important to enhance certain EoT elements. Due to the overall strong impacts of travel quality and travel skills, and the malleability of these elements, a focus on quality and skills seems most appropriate. In order to increase satisfaction levels of public transport users, it therefore seems important to improve public transport services. This could potentially be done by increasing punctuality, frequency, and average speed so travel times would decrease, or by

Table 4 Linear regression models for travel satisfaction

		Bus/tram		Underground		Train		Walking		Cycling		Total	
		Coef.	S.C.	Coef.	S.C.	Coef.	S.C.	Coef.	S.C.	Coef.	S.C.	Coef.	S.C.
Personal characteristics	Age	0.00	0.03	0.00	0.07	**0.01**	**0.12**	**0.01**	**0.23**	**0.02**	**0.33**	**0.01**	**0.13**
	Gender (woman)	−0.11	−0.07	−0.03	−0.02	−0.08	−0.05	*0.19*	*0.12*	0.02	0.02	−0.03	−0.02
	Residential location (London)	−0.07	−0.02	−0.06	−0.04	−0.10	−0.05	0.44	0.08	−0.01	−0.00	−0.07	−0.04
	Travel disability	−0.29	−0.12	−0.09	−0.02	−0.19	−0.06	−0.31	−0.07	−0.17	−0.05	*−0.13*	*−0.04*
	UCL status (ref: student)												
	Administration	−0.13	−0.07	0.05	0.03	*−0.18*	*−0.12*	0.08	0.03	−0.16	−0.09	−0.05	−0.03
	Teaching/research staff	0.02	0.01	0.04	0.02	**−0.23**	**−0.15**	0.07	0.04	*−0.20*	*−0.15*	−0.04	−0.03
	Professor	0.02	0.01	0.08	0.04	*−0.24*	*−0.14*	−0.12	−0.04	−0.26	−0.18	−0.07	−0.03
Trip characteristics	*Travel mode* (ref: under/overground)												
	Bus/tram											0.08	0.03
	Train											0.04	0.02
	Car											**0.29**	**0.06**
	Walking											**0.16**	**0.08**
	Cycling											**0.26**	**0.11**
	Duration (min.)	−0.00	−0.06	−0.00	−0.05	−0.00	−0.04	−0.00	−0.06	0.00	0.00	*−0.00*	*−0.06*
	Travelling alone	−0.31	−0.14	−0.17	−0.05	0.05	0.01	−0.08	−0.04	0.31	0.08	−0.09	−0.03
	Trip conditions												
	Raining	−0.05	−0.03	−0.08	−0.05	−0.02	−0.01	−0.17	−0.09	−0.13	−0.07	*−0.08*	*−0.05*
	Windy	0.04	0.03	0.04	0.03	*−0.14*	*−0.09*	*−0.18*	*−0.13*	*−0.16*	*−0.12*	*−0.06*	*−0.04*
	Cold	−0.22	−0.15	−0.03	−0.02	−0.06	−0.03	*−0.22*	*−0.12*	*−0.02*	*−0.01*	*−0.07*	*−0.04*
	Sunny	0.27	0.14	*0.14*	*0.06*	**0.24**	**0.12**	*0.18*	*0.10*	−0.09	−0.06	**0.17**	**0.08**
	Noisy	−0.22	−0.12	*−0.11*	*−0.07*	−0.03	−0.02	−0.00	−0.00	−0.04	−0.03	**−0.09**	**−0.05**
	Crowded	−0.10	−0.07	**−0.23**	**−0.17**	**−0.25**	**−0.18**	−0.04	−0.03	−0.04	−0.02	**−0.19**	**−0.13**
	Congested	*−0.30*	*−0.21*	**−0.26**	**−0.15**	−0.13	−0.06	**−0.44**	**−0.23**	**−0.28**	**−0.22**	**−0.24**	**−0.13**
	Dark	0.38	0.10	−0.04	−0.02	−0.16	−0.07	−0.05	−0.02	0.27	0.12	−0.02	−0.01

Table 4 (continued)

		Bus/tram		Underground		Train		Walking		Cycling		Total	
		Coef.	S.C.	Coef.	S.C.	Coef.	S.C.	Coef.	S.C.	Coef.	S.C.	Coef.	S.C.
Ease of travel	Travel options	0.04	0.04	**0.12**	**0.12**	**0.10**	**0.11**	**0.19**	**0.17**	*0.12*	*0.12*	**0.11**	**0.13**
	Travel skills	0.10	0.11	**0.22**	**0.25**	**0.24**	**0.27**	**0.24**	**0.24**	**0.24**	**0.29**	**0.23**	**0.25**
	Travel motivation	**0.17**	**0.22**	**0.15**	**0.20**	**0.14**	**0.18**	*0.08*	*0.11*	**0.21**	**0.26**	**0.14**	**0.18**
	Travel quality	**0.22**	**0.28**	**0.23**	**0.27**	**0.22**	**0.23**	**0.13**	**0.17**	**0.16**	**0.22**	**0.21**	**0.26**
	R^2	0.44		0.46		0.48		0.46		0.43		0.47	
	Adjusted R^2	0.35		0.45		0.46		0.41		0.37		0.47	

Coef. = Coefficient; S.C. = standardised coefficient; italic: Sig. At $p<0.05$; bold: Sig. At $p<0.01$

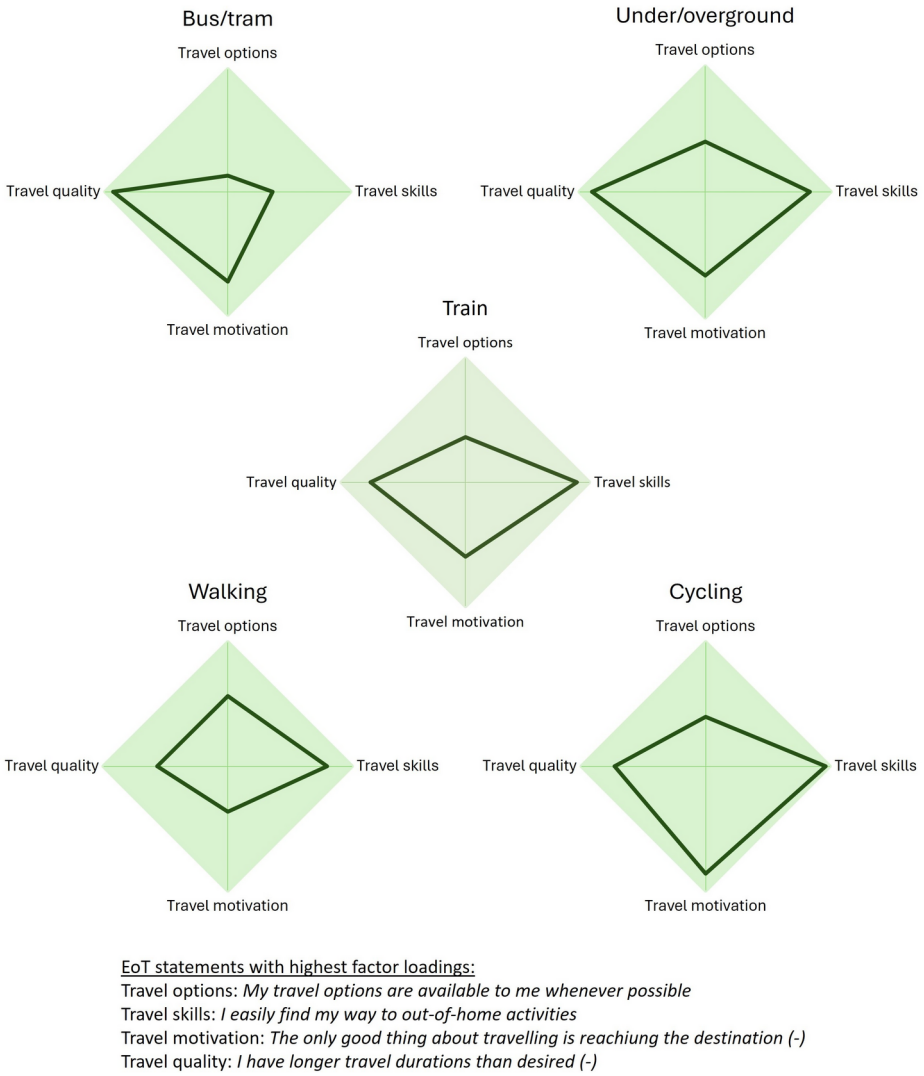

Fig. 3 Relative importance of EoT elements on travel satisfaction by mode

improving the on-board experience by increasing cleanliness, comfort and seating capacity. Since higher travel costs than desired (one of the statements used for travel quality) also reduce public transport satisfaction, more affordable public transport tickets (at least for some vulnerable population groups) would be beneficial for public transport satisfaction. For underground/overground and train users, travel skills are important determinants of satisfaction. This suggests that providing residents with more information on the public transport system, easier-to-read public transport networks, and easier access to public transport stations and vehicles could improve satisfaction with public transport. For active travel satisfaction, travel skills seem to be important. This could indicate that cycling training programmes – learning people to cycle comfortably and safely – such as cycling to school

projects could enhance cycling satisfaction. For pedestrians, better signposts to reach destinations on foot could result in more satisfying walking trips. Walking and cycling satisfaction could also be improved by increasing travel quality, e.g., by wide sidewalks, segregated bicycle lanes and safe (zebra) crossings. Policy makers and urban planners could also try to adjust the built environment and transport system. De Vos et al. (2024) – using the same data as this study – found, for instance, that all EoT elements were positively affected by living in urban areas, and having nearby public transport stops and available rental (e-)bikes in the neighbourhood. Hence, creating these compact, mixed-use neighbourhoods with multiple travel options nearby can stimulate travel satisfaction.

The effects of trip conditions on travel satisfaction are as expected and generally in line with previous studies (e.g., Böcker et al. 2016; Smith 2017); wind, cold, noise, crowdedness, and congestion all have negative effects, while the sun has a positive effect. However, this is – to the best of our knowledge – the first study to analyse the effects of all these trip conditions on travel satisfaction together. Negative effects of travel disabilities, trip duration and travelling alone on travel satisfaction were only found for all modes combined but not for the modes separately, despite previous studies mostly finding such effects (e.g., De Vos 2019; Mokhtarian et al. 2015; Singleton 2019). This could be partly explained by the fact that those with travel disabilities and long travel durations have lower levels of EoT (as found in De Vos et al. 2025), while those traveling alone have higher levels of travel options and skills (based on one-way ANOVA). Performing the regressions without the EoT elements as independent variables results in negative effects of traveling alone on travel satisfaction (except for all modes combined), negative effects of duration on travel satisfaction (except for cycling satisfaction), and negative effects of a travel disability on satisfaction for underground/overground use, train use, and all modes combined. Hence, the effects of travelling alone, trip duration, and travel disabilities on travel satisfaction may be partly explained/moderated by variations in EoT elements.

Conclusions and suggestions for further research

This study provides new insights into the determinants of travel satisfaction and how to create more enjoyable travel patterns. Based on the most recent trip to campus of 2,593 university students and staff members, we have found that EoT may be an important predictor of travel satisfaction, independent from other determinants. Overall, travel satisfaction seems to be positively affected by EoT. Additionally, we found that satisfaction with the use of various travel modes is influenced by varying EoT elements and hence suggest mode-specific policies to enhance overall travel satisfaction levels, and therefore general well-being levels. Since this is the first time that EoT has been measured, and hence this study can be regarded as exploratory, we recommend future studies to further test the EoT statements in different (geographical) contexts and suggest new or alternative statements to improve the reliability of the created constructs. Future research may also analyse the plausible reverse effects of travel satisfaction on EoT (and travel mode choice). Instrumental variables models or the use of longitudinal panel data could provide more insights into their causality. Additionally, the data used in this study originates from one university and only focuses on travel to campus which may make the results of this study not generalisable to other situations. Hence, future studies should ideally use a more representative sample

and focus on various travel purposes. Finally, a detailed focus on EoT of one specific travel mode, using mode-specific EoT statements, may provide more detailed insights into how to make that travel mode more satisfying.

Author contributions J.D.V. collected and analysed the data and wrote the main manuscript text. D.O., A.E., and A.E.-G. reviewed the manuscript.

Data availability No datasets were generated or analysed during the current study.

Declarations

Competing interests The authors declare no competing interests.

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Jonas De Vos is an Associate Professor of Transport Planning at the Bartlett School of Planning, University College London. His research mainly focuses on travel behaviour and transport planning. He is co-editor-in-chief of Transport Reviews, and chair of the World Society for Transport and Land Use Research (WSTLUR).

Daniel Oviedo is an Associate Professor of Transport and Urban Development Planning at the Development Planning Unit, University College London. His research mainly focuses on transport equity in developing countries. He is founder of the International network for Transport and Accessibility in Low-Income Communities (INTALInC) and the UCL Inclusive Mobility Innovations Platform.

Alireza Ermagun is an Assistant Professor of Transport Geography at the Department of Geography and Geoinformation Science, George Mason University. His research mainly focuses on human mobility and travel behaviour modelling. He is director of the Mobility Observatory and Data Analytics Lab (MODAL).

Ahmed El-Geneidy is a Professor of Transport Planning at the School of Urban Planning, McGill University. His research focuses on land use and transportation planning, public transport planning and operations, travel behaviour analysis, and measurements of accessibility and mobility in urban contexts. He is leading the Transportation Research at McGill (TRAM) research group and is co-editor-in-chief of Transport Reviews.