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On undirected trips, satisfaction, and well-being: Evidence from Flanders (Belgium)

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ABSTRACT

Despite having the potential to improve subjective well-being, satisfaction with undirected travel, or travel for its own sake (e.g. taking a walk, bike ride, or joy ride), has not yet been empirically investigated. Using mean-comparison and generalized linear regression models, this study analyzes 1579 undirected trips made by 852 respondents to a survey in Flanders, Belgium during the COVID-19 pandemic lockdown (18 March – 4 May 2020). Undirected travel was found to be longer in duration and more satisfying than results from directed trips in previous literature, with an indication that higher levels of physical activity are important to satisfaction. Undirected travel satisfaction was found to have a clear positive relationship to well-being. As these trips are often active and were found to imply a positive utility of travel, understanding them can be important to policy goals regarding health, sustainability, and improving individual well-being.

1. Introduction

The travel behavior field has only fleetingly focused its attention on undirected travel, or travel without a destination wherein the trip is taken for the sole purpose of the trip itself. Undirected trip examples are as common as taking a walk, jog, or joy-ride, but also include recreational activities such as skiing, horseback riding, skydiving, or even airplane flights to nowhere. This category of daily travel fundamentally differs from directed travel (e.g. commute, shopping, or leisure trips) in that the purpose or goal of the trip is not to get from point A to point B, but instead to partake in the act of traveling. While one could argue that the destination of a walk is to get back home, a ski trip is the lodge or the lift (for another go), or a skydive is the ground, the important distinction is that the goal of these trips is to travel, not to reach a destination. Undirected trips have generally been defined as leisure trips, but this categorization overlooks that leisure trips are often destination-oriented (e.g. going to a museum, the seaside, a restaurant, or the home of friends/family) and therefore could vastly differ from undirected trips in terms of travel satisfaction, modal choice, or distance and duration.

As undirected travel is thus far under-researched, subsequently Undirected Travel Satisfaction (UTS) has not yet been investigated. Though there is extensive literature dedicated to the concept of travel satisfaction, directed trip satisfaction, the relationship to subjective well-being (SWB), and the positive utility of travel, UTS has not yet entered this conversation. For example, travel satisfaction is commonly linked to active mode use, short trip duration, and activities during travel (such as socializing or reading), though

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directed trips are (by definition) ancillary to the destination. UTS is important to understand because the concept of undirected travel thus far is recognized to be travel *for the purpose of* satisfaction, otherwise these trips would not be taken as there is no obligation to perform them. This implies that high travel satisfaction would automatically correspond to undirected travel, but this has not yet been empirically investigated. If undirected trips are indeed more satisfying, individuals might in turn undertake them for longer distances or durations, or with different modes, than they would directed trips.

Further, evidence of a positive utility of travel, or any benefits of travel discounting those related to the destination (Singleton, 2017), has been found in investigation of directed trips as there are aspects of commuting trips, for example, that might make them enjoyable such as viewing surroundings, relaxing, socializing, or preparing for activities ahead (Jain and Lyons, 2008). If this is the case for trips wherein the *destination* is the main goal, the positive utility of travel is also likely found in trips wherein the *trip itself* is the main goal. Therefore, the positive utility of travel could contribute to high UTS. Further, undirected trips provide an opportunity to improve well-being or remove negative feelings (Hook et al., 2021b), such as a teleworker getting out of the house for a walk to clear their head, and can have an effect on happiness, life satisfaction, and mood (Diener, 2009). Even disregarding travel experiences, activities during travel, and activity participation enabled by travel, De Vos et al. (2013) argue that undirected travel itself can positively affect well-being. Satisfaction with daily travel has often been considered a domain of SWB (e.g. Ettema et al., 2011; Ye and Titheridge, 2017), but studies exploring the relationship between UTS and SWB are non-existent. This investigation is specifically important during the COVID-19 lockdown when undirected travel might be used as a strategy for improving well-being when the closure of many out-of-home activities has left few other options, though it can also contribute to physical and mental well-being post-lockdown.

This study therefore aims to create theoretical insights that indicate how satisfied individuals are with undirected travel, and how this relates to well-being, by (i) analyzing the determinants of UTS and (ii) analyzing the link between UTS and SWB. Given that undirected trips are more often taken with active modes (Hook et al., 2021b), these concepts can be important to policy aiming to increase active travel behavior (i.e. for those concerned about public health or obesity) or to decrease motorized travel behavior (i.e. for those concerned about pollution or sedentary lifestyles). Alternatively, understanding UTS in all forms (including motorized) can help contribute to understanding the positive utility of travel as well as objective evaluations of well-being (for example, low levels of UTS might contribute to low levels of physical activity and therefore connect to obesity or depression) in addition to subjective evaluations of wellbeing examined in this study. Further, as the COVID-19 pandemic changes travel behavior in the short term (and potentially also in the long term (van Wee and Witlox, 2021)), information about undirected travel, satisfaction, and well-being could shape employer telework or flexible schedule policies to encourage compensatory behavior following a reduction in directed travel trips.

The overall research objectives of this study are twofold: creating theoretical insights that indicate (i) how satisfied individuals are with undirected travel and (ii) how this relates to well-being. First, characteristics and motivations of undirected travel that are related to satisfaction will be investigated, and second the association between UTS and SWB will be explored. This will be accomplished using data from a survey of 852 residents of Flanders, Belgium and their collective 1579 undirected travel trips during the COVID-19 pandemic lockdown (18 March – 4 May 2020). A literature review will first discuss what is known about undirected travel, the positive utility of travel, travel satisfaction, and SWB. Following, the relationship between UTS and trip characteristics, motivations, and respondent characteristics are explored through mean-comparisons and generalized linear regression models. Finally, the relationship between UTS and SWB is explored by analyzing correlations and crosstabs. This research can contribute to the travel satisfaction and SWB disciplines by offering baseline empirical information regarding UTS and the value of travel.

2. Literature review

2.1. Undirected travel

Undirected travel includes trips that have no destination (or with a destination ancillary to the travel) for which the trip itself is the purpose of the travel (Mokhtarian and Salomon, 2001). Though undirected trips are most often undertaken with active modes (Hook et al., 2021b), such as taking a walk, cycle, or jog, physical activity is certainly not a criterion as undirected trips also include, for example, joyriding by car, motorcycle, or motorboat. The distinction between undirected trips and directed trips, e.g. taking a walk to the supermarket or cycling to work, is the absence of a destination, indicating benefits of or motivations for travel other than simply arriving at the destination, or even an inherent demand for travel itself (Mokhtarian et al., 2010). These motivations have been found to include improving well-being, removing negative feelings, enjoying scenery, and out-of-home socializing (Hook et al., 2021b), though empirical analysis of undirected trips is not extensive. It is important to investigate undirected travel separately from directed travel because this fundamental difference could create completely different implications regarding modal choice, distance, duration, satisfaction, and well-being.

Thus far, no research has specifically analyzed *satisfaction* with undirected trips. Undirected trips were a topic of investigation at the beginning of this century (i.e. 2000–2010), but further undirected travel studies have become rare in the last decade, thereby missing the link with recent travel satisfaction studies. Mokhtarian and Salomon (2001) found evidence for a positive utility of travel, evidence for a travel time budget (i.e. a desired optimal travel time in which individuals will seek to participate), and argued that the share of undirected trips to total travel is underestimated. Cao et al. (2009) found that both having a positive attitude toward travel and living in areas where the built environment is conducive to travel encourages undirected trips. Mokhtarian et al. (2010) argued that there is a fundamental human need for mobility based on evidence that travel demand is not only dependent on demographic-based needs but also highly influenced by travel attitudes. Hook et al. (2021a) found that individuals compensated for a reduction in directed car use

with undirected trips, further suggesting evidence of a travel time budget and the positive utility of travel. Undirected travel may have had a specifically important role during COVID-19 lockdowns as compensation for the closure of many out-of-home activities, but it might also remain important to physical and mental well-being going forward as lasting travel behavior effects of the pandemic can be expected (van Wee and Witlox, 2021).

2.2. Positive utility of travel

There is ample evidence for a positive utility of travel in investigations of directed trips, given that some individuals consider travel time to be a 'gift' instead of a burden (Jain and Lyons, 2008) and many would choose a non-zero commute time instead of arriving instantaneously at their workplace (Humagain and Singleton, 2020; Redmond and Mokhtarian, 2001; Ye et al., 2020). After disregarding the destination and its benefits, there is an undeniable residual value of travel seen in travel behavior literature such as activities during travel and travel experiences (Singleton, 2017). The value of travel has been found to be higher in trips wherein individuals participate in activities (e.g. socializing, reading, or listening to music), active trips, and leisure trips (Le et al., 2020). Car use can also have residual value as it can be seen as a representation of prestige or can affect self-presentation, emotions such as freedom or adventure, and car-positive attitudes (Jakobsson, 2007; Steg, 2005). Further residual value can be found in the effect of travel on mood, satisfaction with the transport system, and SWB (particularly, the affective/emotional component) (Ettema et al., 2010). Though these themes have thus far only been identified in investigation of directed trips, they might be intensified in undirected trips which are (likely) undertaken for positive utility itself. By identifying the specific residual value provided by undirected trips, cost-benefit analysis outcomes can be better estimated for urban planners (Ettema et al., 2010). For example, if planners have a better understanding of the true value of a new bike path, they may allocate resources here instead of to a new highway lane.

2.3. Satisfaction with travel

Travel behavior, travel attitudes, and the built environment are interconnected as well as connected to travel satisfaction. Travel behavior, especially mode choice but also distance and duration traveled, is affected by travel attitudes – for example, someone who is pro-car will more often travel by car assuming a car is available (Cao et al., 2009; Handy et al., 2005; Ye and Titheridge, 2017). The built environment affects the ability to execute this preference through urban design that can promote or inhibit mode choice, distance, and duration, as well as the ease or enjoyability of travel (Ewing and Cervero, 2010; Ye and Titheridge, 2017). These interconnected relationships can have a direct link to travel satisfaction as preferences and expectations are met (or not). If the pro-car individual lives in an area where the built environment inhibits car use, travel satisfaction could be reduced. On the other hand, if the urban design of the neighborhood makes walking enjoyable, attitudes toward and satisfaction with walking could improve. Additionally, these changes in travel satisfaction could influence changes in travel behavior if the pro-car individual starts to walk more and drive less. While the relationships between travel behavior, attitude toward travel, and the built environment (measured here by residential level of urbanization) have been well researched, information thus far only regards directed trips. Valuable theoretical insights about travel satisfaction can be gained by shifting the focus to undirected trips.

This is equally true regarding the relationship between travel satisfaction and SWB, or life satisfaction. Though this relationship is recognized as bidirectional through investigation of directed trips, travel satisfaction has been generally considered a domain of SWB (e.g. Ettema et al., 2011; Ye and Titheridge, 2017). The concept of travel satisfaction refers to aspects such as emotion and cognitive judgement (Ye and Titheridge, 2017). There are at least five ways in which the former can affect the latter (De Vos et al., 2013): positive or negative feelings when traveling to a destination, activity participation at the destination, activities performed during travel, undirected travel (travel as the activity), and motility (the capacity to become mobile). Studies exploring the link with life satisfaction have mostly found positive correlations or an effect of travel satisfaction on life satisfaction. Bergstad et al. (2011) found that daily travel satisfaction both directly and indirectly (through [satisfaction with] activity-participation) affects SWB, and De Vos (2019) also found a top-down relationship wherein life satisfaction might affect travel satisfaction. Friman et al. (2017) found similar results, as well as direct effects of daily travel satisfaction on emotional well-being. Focusing on UTS (as opposed to directed travel satisfaction) could present a greatly different relationship to SWB because undirected travel trips are taken *for the purpose of* satisfaction.

Ettema et al. (2011) developed the Satisfaction with Travel Scale (STS), consisting of emotion and evaluation components, to measure travel-related SWB, successfully standardizing measurements of travel satisfaction. Studies using the STS (concerning directed trips) have found that active travelers have the highest satisfaction and public transport users have the lowest (e.g. De Vos et al., 2016; St-Louis et al., 2014; Ye and Titheridge, 2017), that trip duration has a negative relationship with satisfaction (e.g. Higgins et al., 2018; Morris and Guerra, 2015), that the relationship between satisfaction and trip distance depends on trip purpose (e.g. Higgins et al., 2018; De Vos et al., 2016), that trips taken alone are less satisfying than those taken with company (De Vos et al., 2016; Mokhtarian et al., 2015), and that public transit users' evaluations of their trips can be affected by activities during transport (e.g. Ettema et al., 2012; Tan et al., 2018).

Regarding travel attitudes, studies using the STS have found positive attitudes toward travel, or travel-liking, in general have a positive relationship with travel satisfaction (De Vos and Witlox, 2016; Ye and Titheridge, 2017). Similarly, positive attitudes toward a certain mode are related to positive travel satisfaction for those using that mode (e.g. Abou-Zeid and Ben-Akiva, 2012; De Vos, 2019; Ye and Titheridge, 2017). Additionally, it has been found that attitudes toward physical activity and the environment can, via mode choice, affect travel satisfaction (Managh and El-Geneidy, 2013). Regarding the built environment, it has been found that access to varied travel modes and access to public transit increases travel satisfaction, that access to physical activity options (i.e. parks or

cycling paths) is positively associated with travel satisfaction, and that business density is negatively associated with travel satisfaction (Cao and Ettema, 2014; McCarthy and Habib, 2018). One study analyzing travel satisfaction during the COVID-19 pandemic (in Canada) indicated that active travel and discretionary trips positively affect satisfaction of (directed) travel (Khaddar and Fatmi, 2021).

2.4. Subjective well-being

SWB includes the components of cognitive evaluations/judgements and positive or negative affective/emotion reactions, and evaluates how and why individuals experience their lives positively through measures of momentary happiness, life satisfaction, and domain satisfaction (Diener, 2009). Various psychometric scales have been developed to measure different forms of SWB, such as the Positive and Negative Affect Scale (PANAS; Watson et al., 1988), the Satisfaction with Life Scale (SLS; Diener et al., 1985), the Swedish Core Affect Scale (SCAS; Västfjäll et al., 2002), the Flourishing Scale (Diener et al., 2010), or the Scale of Positive and Negative Experience (SPANE; Diener et al., 2010). These scales are increasingly being used to evaluate success of government policy, development, and social progress and have therefore gained attention in academic research (e.g. Frey, 2018).

SWB has further connections to travel, and specifically commute (see Chatterjee et al., 2020 for overview). The majority of literature suggests that individuals' satisfaction is lower during their commute than during other daily activities, though SWB is higher for those who commute by active modes, shorter durations, or with company. This connection between SWB and travel has the potential to span into a number of life domains other than travel, such as work, financial, or leisure (e.g. Bowling et al., 2011; Howell and Howell, 2008; Kuykendall et al., 2015; Wiese et al., 2017), or differ among personality traits (e.g. DeNeve and Cooper, 1998) though this will not be investigated in detail in this paper. Some demographic and genetic traits have also been found to affect SWB, such as the interaction between age and gender, academic achievement, religious activity, and community-minded-ness (e.g. Bückner et al., 2018; Inglehart, 2002; McCarthy and Habib, 2018; Nes and Røysamb, 2015; Witter et al., 1985).

This study is the first to investigate UTS, and one of the few empirical investigations of undirected travel trips. The first research question addresses the effects of trip factors (mode, distance, duration, and company) and personal characteristics (motivations, travel attitudes, level of urbanization, socio-demographics) on UTS through mean comparisons and generalized linear regression models. The second research question addresses the relationship between UTS and SWB with the analysis of correlations and crosstabs. The lack of necessity to perform undirected trips suggests that these trips are more leisurely by nature, and therefore may result in higher levels of satisfaction as well as have a different relationship to mode, duration, and distance than directed trips. However, some similarities to other studies on travel satisfaction (e.g. elevated satisfaction for active trips, positive relationship with travel attitudes, or trips alone being less satisfying) can be expected. This research aims to create theoretical insights that indicate how satisfied individuals are with undirected travel and how this relates to well-being.

3. Data and methods

3.1. Sample recruitment

The COVID-19 pandemic and subsequent lockdown period was an opportunity to investigate undirected travel as there was, for many, an increase in undirected trips as compensation for a decrease in directed trips following reduced out-of-home activities. Therefore, an online survey was open and circulated for two weeks (20 April – 4 May 2020) during the lockdown period in Flanders, Belgium. Due to time constraints (the duration of lockdown could not be anticipated) and the interest of targeting a range of urbanization levels (instead of only city-center residents, for example), municipalities within the Ghent and Antwerp regions (17 and 30 municipalities, respectively) were targeted by convenience sampling. Facebook municipality community groups were contacted, and moderators of 41 groups (with collectively approximately 393,900 members) allowed an initial post advertising the survey, and one follow-up post. The survey was advertised to take approximately 15 min to complete, and five cash prizes of €100 were raffled for participants providing their contact email at the end of the survey. The survey posed questions regarding individuals' satisfaction with and characteristics of their most recent undirected walking, cycling, jogging, and car trip¹. Further questions were directed to their motivations to perform undirected travel trips, travel attitudes, and measurements of well-being during the lockdown period. There was an initial response of 1041 participants, but those not reporting taking at least one undirected trip were removed resulting in 852 (81.8%) respondents taking 1579 trips retained for further analysis – 65.8% of respondents took different trips with more than one mode (Table 1). Walking made up 48.3% of total trips, cycling made up 34.3%, jogging made up 13.2%, and the car was used for 4.2% of total trips. Regardless of mode, 79.6% of respondents took undirected trips at least weekly, and 20.4% took them less frequently than weekly.

3.2. Socio-demographics

Demographic characteristics (Table 2) included gender, age, employment, income, and residential urbanization score. This sample

¹ The option to report on 'other' undirected trips was provided, but the response rate was statistically negligible and therefore not included, e.g. 3 respondents took undirected motorcycle trips and 11 respondents took undirected roller skating trips. Zero respondents reported taking public transport (bus, train, or tram) undirected trips.

Table 1
Mode use for multiple trips taken.

	Single mode	With walking	With cycling	With jogging	With car use	With 2 + modes	Total Trips
Walk	225	/	296	37	23	181	762
Bike	52	296	/	15	2	177	542
Jog	11	37	15	/	0	144	209
Car	9	23	2	0	/	34	66

is overwhelmingly overrepresented by women (as recorded on 26 May 2020 (StatBel), the population of the Antwerp district was 50.4% female and the Ghent district was 50.2% female) and therefore a weighted regression was performed to account for this discrepancy. Age demographics were representative of population statistics in Flanders, though slightly under-representative of the 26–40 age group (≤ 25 : 15.8%, 26–40: 27.1%, 41–55: 28.9%, > 55 : 28.2%; StatBel, 2020). Employment (74.7%) and unemployment (2.8%) demographics were representative of population statistics in Flanders (StatBel, 2020). The sample was overrepresented by high-income households, with the average net monthly income for individuals being €1677 in Flanders (StatBel, 2020). Address-level data was geocoded and analyzed using built environment variables (population density, transit station density, street-network intersection density, and land use mix – shapefiles retrieved with open-source availability through the Geoportal of the Belgian Federal Institutions (2020)) to produce a standardized continuous urbanization score (range = -7.05 to 5.05; $M = 0.02$; $SD = 2.01$) relative to the sample following Adams et al.'s (2014) methodology². Negative values indicate lower levels of urbanization. Though age and income were placed into groups in Table 2, this was solely for reference purposes as they were used in their original continuous/categorical form for regression analyses. Meanwhile, binary variables were used for those who are female and employed/studying.

3.3. Key variables

3.3.1. Satisfaction with travel scale

Average responses to the 9-item Satisfaction with Travel Scale (STS; Ettema et al., 2011) can be seen in Table 3. These responses quantify emotional (positive deactivation-negative activation/positive activation-negative deactivation) and evaluation (cognitive) components of undirected travel trips. The average STS scores seen in this study regarding UTS are relatively high – much higher than studies using the STS for commute trips (Friman et al., 2013; Singleton, 2019), and somewhat higher than those using the STS for leisure trips (De Vos et al., 2015) – indicating that the nature of undirected trips (i.e. people performing these trips for the trip itself) results in high satisfaction levels. This study uses two variables calculated from these responses: STS Emotion and STS Evaluation. Respondents were asked to evaluate their satisfaction with their most recent undirected walk, cycle, jog, or car trip, and were therefore able to assess satisfaction for more than one trip/mode. Reliability was assessed for the six emotion and three evaluation components, with Cronbach's $\alpha = 0.909$ and 0.864 , respectively, which is higher than the 0.7 threshold of reliability (Taber, 2017).

3.3.2. Motivations for undirected travel

The survey also included questions about the motivations for participating in undirected travel. Respondents were asked to answer 24 motivation questions³ such as 'Undirected travel is healthy', 'Undirected trips give a sense of control', 'I appreciate the following aspects of undirected trips: enjoying the sun; emptying head', etc. A factor analysis of these items resulted in a four-factor solution: Improving Well-Being (highest factor loadings of 0.95 and 0.85 respectively on 'Undirected trips are good for me' and 'undirected trips improve well-being'); Removing Negative Feelings (highest factor loadings of 0.92 and 0.80 respectively on 'undirected trips remove feelings of anger and hostility' and 'undirected trips help to relieve tension and fears'); Enjoying Scenery (highest factor loadings of 0.79 and 0.63 respectively on 'admiring nature' and 'admiring landscape' as appreciated aspects of undirected trips); and Out-of-Home Socializing (highest factor loadings of 0.50 and 0.41 respectively on 'escaping the house' and 'seeing other people' as appreciated aspects of undirected trips). For more information about this factor analysis, see Hook et al. (2021b). These undirected travel motivation scores [-3.58 – 2.34] were used for regression analyses in this study.

3.3.3. Characteristics of undirected trips

Respondents were asked whether they had taken walking, cycling, jogging, or car undirected trips since the start of the pandemic, and if so were asked further details including open-ended questions about travel distance (km), duration (min), and company (i.e. alone or with partner/child[ren]/other family member/friend). Most (65.8%) respondents took more than one undirected trip with different modes, the average duration and distance across all modes were 71.4 ($SD = 54.2$) minutes and 12.1 ($SD = 16.1$) kilometers, respectively, and 39.3% of trips were taken alone. The duration of undirected trips is notably high compared to, for example, the average commute duration of 28 min for Belgians (Eurostat, 2019), suggesting that people do not want to minimize durations of undirected trips (contrary to commute trips). This could also be partially attributed to the lockdown situation, in that individuals with

² Using 1 km street network buffers from participant households, the aforementioned densities are calculated, z-scored, and summed.

³ The motivation questions were developed by the authors, but were inspired by earlier undirected travel literature (e.g., Mokhtarian and Salomon, 2001).

Table 2
Demographic characteristics.

Characteristic		% of Sample
Female		75.2
Age	≤25	12.7
	26–40	32.6
	41–55	29.2
	>55	25.5
Employment	Employed/Studying	67.9
	Searching	2.8
	Not searching/Retired	29.4
HH Income/ Month	< €2000	27.8
	€2000-4000	32.4
	€4000+	39.8

Table 3
Satisfaction with travel scale (STS) variables, average (M) responses, and standard deviation (SD).

	M	SD
Positive deactivation-negative activation		
Time-pressed (1) – Relaxed (7)	5.78	1.24
Worried I would not be in time (1) – Confident I would be in time (7)	5.28	1.39
Stressed (1) – Calm (7)	5.25	1.52
Positive activation-negative deactivation		
Tired (1) – Alert (7)	5.60	1.59
Bored (1) – Enthusiastic (7)	5.50	1.60
Fed up (1) – Engaged (7)	5.07	1.56
Cognitive evaluation		
Travel was worst (1) – best (7) I can think of	5.62	1.25
Travel was low (1) – high (7) standard	5.24	1.33
Travel worked poorly (1) – well (7)	5.63	1.38

a temporary lack of commute have more time for undirected trips, or that undirected trips could compensate for reduced normal recreational activities. Distance and duration were categorized (short, medium, long) by tercile splits *per trip mode* for ANOVA mean-comparison tests.

3.3.4. Attitude toward travel

In order to explore the relationship between UTS and travel-liking, exploratory variables included attitude toward travel in general (Mokhtarian and Salomon, 2001; Handy et al. 2005; Ory and Mokhtarian, 2005). Participant attitude toward travel was assessed by asking to what extent they agree with five travel-related statements (on a 5-point Likert scale from absolutely disagree to fully agree): 'I like to discover new, unknown places', 'Reaching my destination is the only good thing about getting around', 'I like to be on the road', 'I am reluctant to make trips', 'Travel time is lost time by definition'. The second, fourth, and fifth statement responses were reverse-coded to ensure all positive answers represent positive travel attitudes. The scores on the five statements were then summed with a possible range of scores from 5 to 25 ($M = 19.1$; Cronbach's $\alpha = 0.711$).

3.3.5. Subjective well-being measures

Other exploratory variables included three well-being scores. The Flourishing Scale (Diener et al., 2010) was adjusted to specifically capture well-being changes as a result of the lockdown. The extent to which the measures to combat the coronavirus negatively affect eight elements of respondents' lives, such as: the meaning of life, general health, the future, etc. was addressed. Responses were reverse-coded in order to represent the most negative answers with the lowest scores and summed for all eight items with a possible range of scores from 8 to 56 ($M = 32.0$; Cronbach's $\alpha = 0.889$), with an average above the midpoint of this range indicating that the lockdown did not considerably reduce well-being. Positive and negative affect scores retrieved from the Scale of Positive And Negative Experience (SPANE; Diener et al., 2010) further measured emotional well-being. Responses (5-point scale; *very rarely/never* to *very often/always*) indicated to what extent participants experienced six positive emotions (e.g., positive, good, pleasant) and six negative emotions (e.g., negative, bad, unpleasant) during lockdown. Positive feelings and negative feelings were respectively summed with a possible range of scores from 6 to 30 (positive: $M = 20.7$, Cronbach's $\alpha = 0.920$; negative: $M = 16.2$, Cronbach's $\alpha = 0.886$). Averages indicated that, despite the lockdown, positive feelings prevail negative feelings to some extent.

4. Results

4.1. Satisfaction with travel scale

First, ANOVA mean-comparison tests (Table 4) were performed to explore how undirected trip characteristics of mode, duration,

Table 4

Average (M) STS scores (emotion and evaluation) and standard deviation (SD) for mode, duration, distance, motivation, and company of Undirected trips.

Mode	N	Average STS			
		Emotion		Evaluation	
		M	SD	M	SD
1. Walk	762	5.22 ^{2,3}	1.23	5.35 ²	1.17
2. Cycle	542	5.68 ^{1,4}	1.17	5.76 ^{1,4}	1.09
3. Jog	209	5.55 ^{1,4}	1.25	5.52 ⁴	1.2
4. Car	66	5.02 ^{2,3}	1.18	4.95 ^{2,3}	1.26
Duration					
1. Short	448	5.08 ^{2,3}	1.22	5.03 ^{2,3}	1.22
2. Medium	568	5.36 ^{1,3}	1.24	5.48 ^{1,3}	1.17
3. Long	513	5.76 ^{1,2}	1.13	5.93 ^{1,2}	0.96
Distance					
1. Short	427	5.07 ^{2,3}	1.22	5.07 ^{2,3}	1.19
2. Medium	423	5.50 ¹	1.19	5.55 ^{1,3}	1.15
3. Long	679	5.57 ¹	1.22	5.74 ^{1,2}	1.10
Motivation					
1. Improving Health & Well-Being	305	5.58 ⁴	1.22	5.71 ⁴	1.14
2. Removing Negative Feelings	350	5.80 ^{3,4}	1.08	5.86 ⁴	1.02
3. Enjoying Scenery	426	5.44 ^{2,4}	1.21	5.50 ²	1.13
4. Out-of-home Socializing	258	5.20 ^{1,2,3}	1.23	5.30 ^{1,2}	1.17
Company					
Alone	620	5.44	1.22	5.47	1.18
With Others	959	5.40	1.24	5.51	1.17

Note: ^{1,2,3,4} indicates that the average group score significantly differs (at $p < 0.05$) from the average scores of groups 1,2,3,4 respectively, using one-way ANOVAs with post-hoc multiple comparison analysis using Tukey's method (if meeting the assumption of homogeneity of variance) or the Dunnett-C method (if not meeting the assumption of homogeneity of variance).

distance, and company, and undirected travel motivations relate to STS (emotion and evaluation). Respondent characteristics were not included in this initial mean-comparison analysis as the focus was specifically about undirected trip characteristics (though respondent characteristics are added in the secondary regression analysis as control variables). Tukey's post-hoc tests were performed for those with assumed homogeneity of variance from non-significant Levene's tests; Dunnett's C post-hoc tests were performed for those with assumed unequal variance from significant Levene's tests. Cycling, jogging, and longer trips (particularly for duration but also somewhat for distance) were found to be more satisfying than walking, car trips, and shorter trips (though within the STS evaluation measurement, jogging was not significantly more satisfying than walking). Trips taken by people motivated by improving well-being or removing negative feelings were found to be more satisfying than those motivated by enjoying scenery or out-of-home socialization. Trips taken alone were not significantly more or less satisfying than those taken with company. This suggests that mode, duration, and motivation are important to discussions of undirected trips, distance is somewhat important, and company is less important. Though motivations scores in their continuous form were retained for regression analyses (discussed below), respondents were assigned only the motivation for which they scored the highest in order to categorize trip motivation for ANOVA tests (and those with negative scores for all motivations – 15.2% – were removed).

Following, two generalized linear models with negative binomial regression explore the relationship of undirected trip characteristics, undirected travel motivations, and respondent characteristics to the two measures of STS (emotion and evaluation; Table 5). STS values were discrete non-negative dependent variables with a (relatively) large range and equal upper bounds for all observations (effectively mirroring count data), and failed to meet assumptions of linearity with independent variables. Therefore, generalized linear regression was chosen over an ordinary least squares regression model (Wooldridge, 2010). Due to overdispersion of the data, a negative binomial model was chosen over a Poisson model. Binomial models have been found to be acceptable for Likert-type personality measures (Allik, 2014), and this was similarly incorporated for STS variables.⁴

After controlling for respondents' characteristics, significant effects of mode and duration were still found on both measures of STS. Similarly to the mean-comparison tests, cycling, jogging, and longer (duration) trips were found to have more association with higher STS than walking and shorter trips. However, greater distance was not found to be associated with higher STS. This indicates that as duration, but not necessarily distance, and perhaps physicality of undirected trips increases, UTS slightly increases. All motivations had significant relationships with UTS with the exception of out-of-home socializing. This indicates that the more motivated by improving well-being, removing negative feelings, or enjoying scenery one is, the higher their UTS. The non-significant relationship to out-of-home socializing could be an outcome of the lockdown survey period where opportunities for socialization during undirected trips were smaller. Attitude toward travel did not have a significant relationship with UTS nor did level of urbanization. Age had a positive relationship with both components of STS, indicating that STS improves with age.

⁴ Potential alternative analysis methods could include ordinal regression or tobit regression for censored data, though after diagnosing residuals the regression assumptions of the negative binomial model remained.

Table 5

Beta values and Wald statistic (standardized coefficient) from generalized linear regression analyses investigating the effect of undirected trip characteristics, undirected travel motivation, and respondent characteristics on STS (emotion and evaluation).

			STS Score			
			Emotion		Evaluation	
			Chi ² = 142.3		Chi ² = 178.5	
			B	Wald	B	Wald
Trip Characteristics	Mode (ref: Walk)	Cycle	0.053	5.959	0.042	4.084
		Jog	0.062	4.019	0.051	2.972
		Car	0.007	0.016	-0.036	0.435
		Duration (min)	0.001	13.588	0.001	25.005
	Distance (km)	0.001	1.272	0.001	1.961	
	Alone	0.002	0.012	-0.017	0.792	
Motivation	Improving Health & Well-Being		0.034	4.435	0.034	4.759
	Removing Negative Feelings		0.053	10.797	0.048	9.135
	Enjoying Scenery		0.033	6.287	0.031	6.180
	Out-of-home Socializing		-0.010	0.448	-0.021	2.305
Respondent Characteristics	Attitude Toward Travel		0.000	0.000	0.002	0.832
	Urbanization Score		-0.005	0.991	-0.001	0.013
	Age		0.002	6.996	0.002	6.898
	Female		0.026	1.604	0.014	0.494
	Employed/Studying		0.009	0.157	0.010	0.227
	HH Income >€3,000/M		0.001	0.080	0.000	0.000

Note: bold and italicized Beta values significant at $p < 0.05$ level, bold Beta values significant at $p < 0.10$ level; mode reference category = walk.

4.2. Subjective well-being

Pearson correlation coefficients among STS scales (emotion and evaluation) and SWB scales (flourishing, SPANE positive, SPANE negative) can be seen in Table 6. Due to the convoluted relationship between travel satisfaction and SWB, measures that imply causality or direction were not ideal for this analysis (perhaps those feeling the negative effects of the COVID-19 lockdown on SWB might be more inclined to perform undirected trips, or vice versa). Instead, examining correlations provides insight into the relationship without direction. Positive significant correlations are seen between both STS scales and the Flourishing and SPANE positive SWB scales, with a negative correlation to the SPANE negative SWB scale. This indicates that higher travel satisfaction is associated with higher life satisfaction. A stronger correlation between SWB and the emotion scale of STS than the evaluation scale, indicating that perhaps emotion/affective aspects of undirected trips might be more important to explaining SWB than the evaluation aspect.

Six crosstabs concerning STS (emotion and evaluation) and the three measurements of SWB can be seen in Table 7. Categories (high, medium, and low) were created by equal groups of the scale ranges to display crosstabs. All six crosstabs indicate that most respondents are both (relatively) satisfied with their undirected travel and have medium to high well-being scores, while (a combination of) low UTS and low well-being scores are less common. This suggests that there exists a positive relation between UTS and SWB. The significant Chi² tests confirm this positive relationship as respondents are not randomly distributed according to travel satisfaction and well-being. Lower Chi² values are associated with the Flourishing scale, indicating that this test is a better fit.

5. Discussion and conclusions

Since individuals perform undirected trips for the purpose of satisfaction (as there is no obligation to perform them), the main goal of this study was to explore UTS and the links with SWB. In fact, this study is the first to empirically analyze the determinants of UTS, including trip and personal characteristics, as well as the relationship between UTS and SWB. Additionally, this is the first study to investigate travel satisfaction of jogging trips. The majority of undirected trips were walking trips, though 65.8% of respondents took undirected trips with more than one mode. Both average duration and satisfaction were found to be higher for undirected trips than levels found for directed trips in previous literature. Undirected cycle and jog trips had significantly higher average UTS than walking and car trips, suggesting not only that satisfaction with active trips (though perhaps not walking) is higher than with motorized trips, but also that the level of physical activity of undirected trips may be important to UTS. Contrary to previous findings exploring directed trips, longer duration of undirected trips was positively associated with UTS. This suggests that further research regarding duration and UTS may be interesting to explore, and that there is certainly a deviation between the determinants of UTS and directed trip satisfaction.

Undirected trip motivations of improving well-being, removing negative feelings, and enjoying scenery were all positively related to UTS, while out-of-home socializing was not significantly related to UTS. This, alongside the lack of relationship between UTS and trip company, could suggest that undirected trips are more useful to fulfilling personal goals or self-care than as an opportunity for socialization. This also deviates from research of directed trips finding that company during travel increases travel satisfaction. Those in more urban areas were likely to have lower UTS than those in rural areas, though this effect disappeared with more advanced statistical analysis. This could imply that there is more disruption to undirected trips in denser areas, especially considering that the survey was dispersed during lockdown while social distancing requirements might have had a stronger effect on those in denser areas.

Table 6

Pearson correlation coefficients among STS scales (emotion and evaluation) and SWB scales (Flourishing, SPANE positive, SPANE negative).

Scale (mean score)	1.	2.	3.	4.	5.
1. STS Emotion (1.39)	–	–	–	–	–
2. STS Evaluation (1.49)	0.715	–	–	–	–
3. Flourishing Scale (32.0)	0.113	0.062	–	–	–
4. SPANE Positive (20.7)	0.312	0.265	0.478	–	–
5. SPANE Negative (16.2)	-0.253	-0.214	-0.478	-0.579	–

Note: bold and italicized Pearson correlation coefficients are significant at $p < 0.05$ level.**Table 7**

Crosstabs among STS scales (emotion and evaluation) and SWB scales (Flourishing, SPANE positive, SPANE negative).

		STS Scale										
		Emotion					Evaluation					
		Low	Medium	High	Total	Pearson Chi ²	Low	Medium	High	Total	Pearson Chi ²	
SWB Scale	Flourishing	Low	19	117	161	297	36.781	7	109	180	296	33.176
		Medium	31	255	391	677		29	233	414	676	
		High	19	53	205	277		15	49	213	277	
		Total	69	425	757	1251		51	391	807	1249	
	SPANE Positive	Low	5	37	24	66	109.319	3	40	23	66	90.102
		Medium	51	284	334	669		37	252	380	669	
		High	13	104	398	515		11	99	405	515	
		Total	69	425	756	1250		51	391	808	1250	
	SPANE Negative	Low	11	86	289	386	64.433	11	71	305	387	64.794
		Medium	43	271	413	727		31	253	444	728	
		High	15	67	54	136		10	67	60	137	
		Total	69	424	756	1249		52	391	809	1252	

Note: All Pearson Chi² tests are significant at $p < 0.001$.

On the other hand, the urban score was linked to home location, but this study did not collect information about the location in which the undirected trips were taken. It is possible that urban respondents traveled away from the city to perform undirected trips, which could explain the discrepancy in satisfaction. Though causality or directionality cannot be assumed due to the convoluted nature of the relationship between satisfaction and SWB, this study found a clear positive relationship between UTS and SWB.

This study implies a positive utility and value of travel, and could be used by urban planners and policy makers to promote sustainable active transport and improve individuals' satisfaction with these trips. Improved infrastructure for active travel could not only stimulate active mode choices, but also undirected travel trips and therefore could positively influence SWB. Additionally, if there is a stronger connection to SWB for undirected trips than for directed trips, this distinction (and possible other differences) could have implications for planning regarding the facilitation of UTS (e.g. improving scenery, removing walkways from traffic for a more peaceful experience).

Another practical policy application regarding the positive utility of travel relates to teleworking. It is possible that habits of working from home will be retained post-COVID-19 as employers and organizations realize the benefits of flexible schedules. Therefore, employees could commute less frequently, and perhaps replace this time by working longer hours. In order to ensure that individuals remain physically and mentally healthy, policy makers should stimulate these undirected trips because they are mostly active and (according to this research) satisfying. This could be accomplished in the form of making pop-up bike lanes permanent, giving more space to pedestrians and joggers, organizing community undirected trip events, etc. Companies could also take this into account in their home-working policies and find creative ways to encourage undirected travel.

Shifting the investigation of travel satisfaction to recognize the distinction between undirected and directed trips can help to create valuable insights about the relationship between travel satisfaction and SWB. As undirected trips are taken *for the purpose of* satisfaction, it is unsurprising that results indicate higher satisfaction with these trips. The benefits of this paper include the opportunity provided by the lockdown period to investigate undirected travel (while other types of leisure and out-of-home activities were reduced or forbidden) and the high count of trips for evaluation. The limitations include the high ratio of women to men due to the convenience sampling method. This paper provides a first empirical analysis of UTS as a groundwork for future studies based on undirected travel and satisfaction, providing evidence for a positive relationship between UTS and SWB, a link between physical activity and high UTS, a negative relationship between residential urbanization level and UTS, and a motivation-dependent connection between undirected trips and travel satisfaction. The connection between travel satisfaction, SWB, other life domain satisfaction, and personality characteristics were not investigated in this research, but further exploration of the interconnected nature of these concepts would help shape what is known about UTS and its relationship to SWB. Though survey collection during lockdown was seen as a benefit, research during a more conventional time period would also be valuable.

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CRedit authorship contribution statement

Hannah Hook: Conceptualization, Methodology, Validation, Formal analysis, Investigation, Data curation, Writing – original draft, Visualization. **Jonas De Vos:** Conceptualization, Methodology, Writing – review & editing, Supervision, Project administration, Funding acquisition. **Veronique Van Acker:** Methodology, Data curation, Writing – review & editing, Supervision, Project administration, Funding acquisition. **Frank Witlox:** Resources, Writing – review & editing, Supervision, Project administration, Funding acquisition.

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.

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