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# The impact of participation frequency and travel distances for different sport participation purposes on subjective wellbeing: the 'unhappy commuter' and the happy sport tourist? 

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#### Abstract

Research question: This study examines the impact of traveling for different sport participation purposes on subjective well-being. It extends previous research by distinguishing between different participation purposes and investigating travel distances for each purpose. Research methods: Survey data on the travel behavior of sport participants in 21 sports in Germany were collected ( $\mathrm{n}=7060$ ). Participation frequency and the number of kilometers traveled for different purposes, including training sessions, competitions or tournaments, league games, day trips, and sport vacations or training camps, were assessed for a one-year period. The empirical analysis takes endogeneity into account by using a set of instrumental variables for the five participation frequency and travel distance variables. Results and findings: Ordinary least squares regression results show a significant negative relationship between traveling to training sessions and subjective well-being, while the association of sport vacations/training camps is positive and significant. The instrumental variable models reveal significant positive effects for traveling to training sessions and day trips.


Implications:
The findings
support the importance of considering the causality of effects. The notion of the unhappy
commuter
found in existing travel research is not supported for traveling to regular training sessions.
Traveling for the purpose of competitive sports (tournaments, league games) does not yield significant wellbeing outcomes, suggesting that participation in various forms of sport
competitions generates stress for participants.
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Behavioral economics; happiness; life satisfaction; physical activity; sport tourism

## Introduction

People travel for a variety of purposes, including business, work, or study; shopping; escorting children; service infrastructure trips (e.g. doctor); and visits to public authorities (e.g. Best \& Lanzendorf, 2005). Another, more voluntary purpose for traveling is leisure-time sport participation. For example, people travel to sport facilities for regular sport par-ticipation (Pawlowski, Breuer, Wicker, \& Poupaux, 2009). Moreover, sport participants

[^0]travel to participate in competitions, enjoy day trips, or sport vacations and training camps (Wicker, in press). Hence, sport participants can travel for a variety of participation pur-poses in their leisure time. From a policy perspective, the well-being outcomes of sport participation are relevant because improving the well-being of the population is a policy goal in many countries, and sport participation is considered a way to achieve this goal (e.g. HM Government, 2015; World Health Organization [WHO], 2018).

While health and well-being outcomes of sport participation have been widely studied (e.g. Rasciute \& Downward, 2010), the question of the well-being derived from traveling for the purpose of sport participation has received less attention. Nevertheless, this ques-tion is particularly relevant to travel cost studies where the appropriate valuation of travel time has been discussed extensively and controversially (e.g. Chae, Wattage, \& Pascoe, 2012; Pascoe, Doshu, Dell, Tonks, \& Kenyon, 2014; Whitehead \& Wicker, 2018). For example, while some studies have argued that people derive neither utility nor disutility from traveling to a destination (Alberini, Zanatta, \& Rosato, 2007; Pascoe et al., 2014), others have assumed that traveling is not enjoyable and have, therefore, assigned an opportunity cost to travel time (e.g. Whitehead \& Wicker, 2018).

The well-being outcomes of traveling for the purpose of sport participation are not only relevant to tourism, but also to sport management. For example, the question of where sport facilities should be located to facilitate sport participation has been analyzed over the last years (e.g. Hallmann, Wicker, Breuer, \& Schönherr, 2012; O'Reilly, Berger, Her-nandez, Parent, \& Séguin, 2015). The location of sport facilities affects people's travel distance and time which are, in turn, associated with their well-being (e.g. Stutzer \& Frey, 2008). Moreover, sport governing bodies decide about the location of competitions, tour-naments, and league games, with the location affecting participants' travel distance and time. Furthermore, sport clubs might select public
sport facilities for regular training ses-sions and offer their members the opportunity to participate in training camps or sport holidays organized by the club. However, the well-being derived from traveling for different sport participation purposes has been largely neglected in existing research.
The purpose of this study is to examine the impact of traveling for different sport par-ticipation purposes on subjective well-being (SWB). Specifically, this study looks at the role of participation frequency and travel distance for five participation purposes, includ-ing regular training sessions, competitions or tournaments, league games, day trips, and sport vacations or training camps, over a one-year period. With regard to the understand-ing of sport participation, several aspects need clarification: This research includes com-petitive sports, but this does not mean professional sports, as the focus is on sport as a recreational activity. Also, this study is not about active commuting, such as walking or cycling to work; it is about traveling for the purpose of sport participation. Moreover, sport participation means that participants actively practice sport as opposed to passive sport consumption (spectating).

This study advances the following first research question: How are participation fre-quencies and travel distances for different sport participation purposes related to SWB? However, the direction of the relationship can be both ways, i.e. traveling for sport partici-pation purposes might add to SWB, but happier people might also be more likely to travel for these purposes. This issue of reverse causality is considered in the second research question: What is the causal effect of participation frequencies and travel distances for different sport participation purposes on SWB? By answering these research questions,
this study adds to the body of research examining well-being outcomes of sport partici-pation, the sport management literature discussing the location of sport facilities and com-petitions, and the tourism literature studying the enjoyment derived from traveling. اينجا

## Theoretical framework and literature review

## Subjective well-being

Individual health has a physical and a mental (or psychological) dimension (WHO, 2010). The latter does not only relate to the absence of mental disorders, such as anxiety and depression (WHO, 2010), but also to an individual's SWB which is regarded as an early indicator of potential mental health issues (KoivumaaHonkanen, Kaprio, Honkanen, Vii-namaki, \& Koskenvuo, 2004). Following Diener, Lucas, and Oishi (2002, p. 53), SWB is defined as 'a person's cognitive and affective evaluations of his or her life'. Consequently, existing research has captured SWB with selfreported measures of life satisfaction (e.g. Ruseski, Humphreys, Hallmann, Wicker, \& Breuer, 2014; Wicker \& Frick, 2015) or hap-piness (e.g. Downward \& Dawson, 2016).

From a behavioral economics perspective, individuals are assumed to plan and under-take activities to satisfy their needs and to improve or maintain their level of SWB. Such well-being enhancing activities can include, for example, shopping; social and recreational activities; eating out; organizational, religious, or voluntary activities; and personal business (Abou-Zeid \& BenAkiva, 2012). Hence, participation in those activities yields utility which is considered the same as SWB. Importantly, the utility derived from the experience and evaluation of outcomes of participation in such activities (Ettema, Gärling, Olsson, \& Friman, 2010) is referred to as experienced utility (Kahneman, Wakker, \& Sarin, 1997; Stutzer \& Frey, 2008). The concept of experienced utility differs from the concept of decision utility used
by neoclassical economists, implying that choices and the weight of their outcomes yield utility (Kahneman et al., 1997).

Existing research has stressed that not only the frequency of participation in these activities is relevant to SWB, but also the travel to the activity (Abou-Zeid \& Ben-Akiva, 2012). Therefore, the present study is informed by studies examining the relationship between sport participation and SWB and by research studying well-being effects of commuting and traveling.

## Sport participation and subjective well-being

The relationship between sport participation and SWB has been widely studied. Theoreti-cally, sport participation can be related to SWB through different mechanisms (Lehnert, Sudeck, \& Conzelmann, 2012). An obvious mechanism is health, meaning that sport par-ticipation yields positive health outcomes (Humphreys, McLeod, \& Ruseski, 2014) which, in turn, positively affect SWB (Lera-Lopez, Ollo-Lopez, \& SanchezSantos, 2017). A second mechanism is social capital (Downward, Hallmann, \& Rasciute, 2018) because many sports are performed together with other people (Downward \& Riordan, 2007). Sport facilitates bonding with other people and establishing further links to other stake-holders (Darcy, Maxwell, Edwards, Onyx, \& Sherker, 2014). These social interactions facilitate the production of relational goods. These goods can only be produced through
joint interaction of people and include, for example, recognition, sense of belonging, soli-darity, social approval, and emotional support (Becchetti, Peloni, \& Rossetti, 2008). Further mechanisms include distraction from problems and stress, self-esteem, and self-efficacy (Lehnert et al., 2012).

Empirically, many studies have found a positive relationship between SWB and the likelihood of sport participation (e.g. Downward \& Rasciute, 2011). Also, positive associ-ations were evident between SWB and the frequency (Dolan, Kavetsos, \& Vlaev, 2014) and duration of participation (Downward et al., 2018). These positive associations can already be observed after a period as short as four weeks (Wicker, Coates, \& Breuer, 2015b) and hold several years, suggesting that well-being effects are longterm (Wang et al., 2012). Moreover, SWB was found to depend on the level of participation intensity, with light and moderate activity yielding the most beneficial well-being outcomes (e.g. Netz, Wu, Becker, \& Tenenbaum, 2005; Panza, Taylor, Thompson, White, \& Pescatello, in press), while vigorous activity even had a negative impact (Wicker \& Frick, 2015). Moreover, existing research was able to document a causal effect of the likelihood (Huang \& Humphreys, 2012; Ruseski et al., 2014) and frequency of sport participation (Pawlowski, Downward, \& Rasciute, 2011) as well as healthy participation levels on SWB (Downward \& Dawson, 2016).

While the study of sport participation, in general, has attracted a lot of attention, only a few studies distinguished between different participation purposes. For example, only cycling for utilitarian purposes, such as commuting to work, had a significant positive effect on SWB, while cycling for competitive and health purposes was insignificant. More-over, walking for recreation or health purposes was positively associated with SWB (Ras-ciute \& Downward, 2010). In another study, recreational athletes reported higher levels of SWB than competitive athletes (Chatzisarantis \& Hagger, 2007). Overall, these findings suggest that sport participation for competitive purposes does not add to SWB.

Commuting, travel, and subjective well-being
Given the scarcity of research on the effects of traveling for sport participation purposes on SWB, this study is also informed by existing economic and travel research. It reviews the literature on commuting because commuting also occurs with some regularity, like traveling to training sessions for the purpose of sport participation. Hence, this study attempts to compare the wellbeing effects of regular travel for sport participation pur-poses with existing research studying the well-being effects of commuting for work purposes.
From a theoretical perspective, travel in general and commuting to work can have both negative and positive effects on SWB. Starting with negative effects, people are confronted with various environmental stressors, such as crowd, congestion, noise, and pollution, during commuting and travel (Koslowsky, Kluger, \& Reich, 1995). For example, both per-ceived and actual air pollution levels had a negative association with individuals' SWB (MacKerron \& Mourato, 2009). Furthermore, commuting to work represents a physical and mental burden for many people because it can be associated with stress and out-of-pocket expenses, and it takes time away from other activities, like spending time with the family (Stutzer \& Frey, 2008). Specifically, stress can be caused by the perceived lack of control and predictability of commuting time and travel (Gottholmseder,

Nowotny, Pruckner, \& Theurl, 2009) which, in turn, negatively affects individuals' SWB (Ettema et al., 2010).

On the positive side, individuals may value travel because traveling facilitates engage-ment in their daily activities which, in turn, might help them progress towards their goals in life or derive enjoyment from pursuing these activities (e.g. Ettema et al., 2010). This means that people value the instrumental character of travel. Furthermore, individuals might derive joy from commuting and traveling when they value the time for themselves or listening to music (Stopher, 2004). Moreover, commuting to work can be beneficial when people are compensated on the labor market by getting better-paid jobs or when they are able to find cheaper housing or a more pleasant living environment (Stutzer \& Frey, 2008). For sport participants, such a living environment could include, for example, proximity to sport facilities, implying that these people might self-select into more activity-friendly neighborhoods. Hence, the question is whether the negative experi-ences from commuting to work are also applicable to leisure-time commuting for sport participation purposes.

The empirical evidence with regard to the relationship between commuting, travel, and SWB is inconsistent. Many studies have indicated a negative relationship: for example, commuting to work was found to be the daily activity that causes the most unhappiness (Kahneman, Krueger, Schkade, Schwarz, \& Stone, 2004), with some research also pointing at delayed effects of commuting on individuals' health (e.g. Koslowsky et al., 1995). Overall, individuals with longer commuting distance and time to work were found to report significantly lower levels of SWB (Stutzer \& Frey, 2008), supporting the notion of the unhappy commuter. On the contrary, other studies reported no significant relation-ship between commuting time (Dickerson, Hole, \& Munford, 2014) or travel time and SWB (Sweet \& Kanaroglou, 2016).

Empirical research has also found a positive relationship between traveling in general and SWB. Differences were evident
depending on the travel mode (Morris \& Guerra, 2015), with active commuting in the form of walking and cycling having a positive associ-ation with SWB (Martin, Goryakin, \& Suhrcke, 2014; St-Louis, Manaugh, van Lierop, \& El-Geneidy, 2014). This positive relationship is driven by higher satisfaction with commuting when it involves physical exercise (Olsson, Gärling, Ettema, Friman, \& Fujii, 2013; Rissel, Crane, Wen, Greaves, \& Standen, 2016). The role of traveling for the purpose of sport participation has been touched in a German study which showed that traveling to the sport facility is negatively associated with individuals' satisfaction with their leisure time, while traveling home from the fitness center had a positive effect (Wicker, Coates, \& Breuer, 2015a).

## Shortcomings of existing research

While existing studies have provided valuable insights, some shortcomings can be noted. First, the heterogeneity of individual sport participation behavior has not yet been con-sidered and different participation purposes (e.g. training, competitions, day trips, training camps) were neglected. Many studies only assessed whether people participated or not, or the extent of participation in terms of frequency, duration, and/or intensity, whereas different participation purposes have not yet been considered in detail. In fact, many survey designs have not allowed analyzing different purposes because the sport
participation questions only referred to a short period prior to the survey, typically one week or one month. Second, existing research has examined either sport participation or (active) commuting and traveling, while traveling for the purpose of sport participation has received less attention. Hence, its effects on SWB have also not been studied. Third, many studies have only examined relationships rather than causal effects, meaning that reverse causality has not been considered in the empirical analysis. This study attempts to contribute to the existing literature by addressing these shortcomings.

## Method

## Data collection

Primary data were collected using online surveys in 21 different sports (Table 1). All 21 surveys were programmed using the online survey tool social science survey (www. soscisurvey.de). The surveys were targeted at active, adult sport participants with main residence in Germany. Data were collected separately for each sport. The sport-specific convenience samples were drawn by distributing the links to each online survey through several channels, such as social media websites (e.g. Facebook groups); contacts and official websites of sport clubs, federations, and associations; websites and newsletters of tourism destinations; sport-specific websites, blogs, and Internet fora; and sport magazines. It is possible that one individual answered several sportspecific questionnaires. However, this is only possible when an individual participates in several sports and spotted the different links to the sport-specific surveys because they were not distributed on the same websites. Given the anonymity of the surveys, it is not possible to identify how many individuals or which respondents have participated in more than one survey. Data were collected between 7 January and 5 June 2016.

> Table 1. Overview of sports included in this study (in alphabetical order).
Sport ..... (n)
American football ..... 406
Basketball ..... 108
Climbing/bouldering ..... 1191
Diving ..... 291
Field hockey ..... 187
Figure/roller skating ..... 218
Fitness (gym) ..... 551
rootball (soccer) ..... 253
Golt ..... 113
Handaball ..... 311
Headis ..... 205
Hiking/walking ..... 302
Skateboarding ..... 325
Skiing and snowboarding ..... 523
Surt sports (incl. windsurting, kitesurting, and wakeboarding) ..... 187
Swimming ..... 297
I able tennis ..... 261
lennis ..... 245
I rack and tield ..... 287
I riathlon ..... 413
Volleyball (Indoor) ..... 386
21 sports ..... 7060${ }^{\text {a }}$ Header with a soccer ball played on atable tennis table.

Altogether, 7634 respondents completed the survey. During the data cleaning, several observations were removed for a variety of reasons. For example, respondents who were not the target group of the survey were excluded, i.e. people who were inactive in 2015, younger than 18 years, or lived outside Germany. Responses were also checked for plausi-bility and internal validity and inconsistent responses on core questions were removed (e.g. respondents where activity years exceeded their age). After the data cleaning, $\mathrm{n}=7060$ observations were left for the empirical analysis.

Table 1 gives an overview of the sports included in the study and the corresponding sub-sample sizes. Given that convenience sampling was applied, it is not possible to fore-cast the resulting sub-sample sizes. The overview reveals that some sport-specific surveys attracted more respondents than others. For example, the climbing/bouldering survey attracted more respondents than the football survey. These sub-sample sizes may not reflect the actual distribution of sports across sport participants in Germany because foot-ball tends to have more participants than climbing/bouldering. If information about the actual number of sport participants by sport was available for Germany, the representa-tiveness of the sample could be checked. In the case of structural differences between the sample and the total population of sport participants, the sample could be weighted by sport to make it more representative. Unfortunately, in Germany, statistics about par-ticipant numbers by sport are not available, only sportspecific membership numbers in non-profit sport clubs (DOSB, 2016). These numbers are, however, problematic, because they include passive members (i.e. people paying a membership fee, but not actively practicing the sport) and exclude informal participants and participants in other organizations (e.g. fitness centers, for-profit sport organizations). Therefore, these statistics cannot be used for representativeness checks and the calculation of weights. Another option would be to weight the sample in a
way that all sports are equally rep-resented in the sample. However, this weighting option does not make the sample more representative. In light of these issues, the sport-specific subsamples were combined into one dataset, providing results about a large number of sport participants.

## Questionnaire and variables

This study used a standardized questionnaire which was adapted to fit the specific charac-teristics of each sport. Each questionnaire started with an introduction that informed par-ticipants about the purpose of the research, the anonymity of data, and that the data will only be used for scientific purposes. The questions can be assigned to three main areas, including sport biography, travel behavior for sport participation purposes, and personal questions. Table 2 summarizes the resulting variables.

Each sport-specific survey started with questions related to participants' sport biography. Respondents were asked to report how many years they have practiced the sport already (Activity years) and whether they were a member of a sport club (Member). Then they were asked to state how often they practiced their sport on average per week in 2015, i.e. how many training sessions they had. ${ }^{1}$ For each training session, respondents should state how many kilometers they traveled to the sport facility (one-way distance) and how many weeks they were unable to participate because of sickness, injuries, vacation, business travel, etc. This information was used to calculate the number of sessions in 2015 (Training sessions) and the total distance traveled for these sessions (Training sessions distance).

Table 2. Overview of variables and summary statistics ( $\mathrm{n}=7060$ ).

| Variable | Description | Mean | S |
| :---: | :---: | :---: | :---: |
| Satisfaction | (0 |  |  |
|  | dissatisfied; $10=$ | 7.52 | 1.67 |
|  | completely satisfied) |  |  |
| drsi |  | 8.00 |  |
| sess | Number of training sessions in 2015 <br> Number of sport competitions/tournaments in |  |  |
| Competitions League games Day trips | 2015Number of league games in 2015 | $\begin{aligned} & 1.37 \\ & 3.96 \\ & 1.50 \end{aligned}$ | 2.97 <br> .66 <br> 4.46 |
|  |  |  |  |
|  | Number of day trips in 2015 <br> Number ot sport vacations/training camps in |  |  |
| Camps |  | $\begin{array}{r} 0.84 \\ 2582.0 \\ 6 \end{array}$ | $\begin{array}{r} 1.60 \\ 6899 . \\ 09 \end{array}$ |
| I raining | Iotal distance traveled to training sessions in 2015 (in km) |  |  |
| sessions |  |  |  |
| distance |  |  |  |
| Competition | I otal distance traveled to |  |  |
| distance | competitions/tournaments in 2015 (in km) |  | 811091. |
| League ga distance | lotal distance traveled to league games in 2015 (in km) | 373.0 |  |
| Day trips | Iotal distance traveled to day trips in 2015 (in | 389.4 | 195 |
| distance |  |  | 47 |
| Camps | I otal distance traveled to sport vacations/training | 884 | 413. |
| distance | camps in 2015 (in km) |  |  |
| Activity ye | Number ot years the sport has been practiced 11.6810 .06 |  |  |
| Member | Member ot a sport club ( 1 = yes) | 1.6810 .06 |  |
| Gender | Gender of participant ( $0=$ Individual's age (in years) | $\begin{aligned} & 0.696 \\ & 0.620 \end{aligned}$ |  |
| Age |  | $\begin{aligned} & 30.8511 .48 \\ & 083.7897 .1 \\ & 8 \end{aligned}$ |  |
| ge squar | Squared term of Age (=Age $\times$ Age) <br> Highest educational level is below university |  |  |
|  |  |  |  |  |  |  |  |
| ow educatio | entrance qualification (1 = yes) <br> Highest educational level is A-levels ( $1=$ yes) Hignest educational level is a university degree ( $1=$ yes ) | . 256 |  |
|  |  |  |  |
| evels |  | 0.313 |  |
| University |  | 0.431 |  |
|  |  | 1627.3 | 1212. |
| come | Personal monthly net income (in €) | 4 | 26 |

Respondents were also asked for their reasons to participate in sport using the five motivational dimensions suggested by Sebire, Standage, and Vansteenkiste (2008): health, improvement of physical abilities, meeting (new) people, social recognition, and improvement of appearance. The five motivational items were assessed on a five-point scale (from $1=$ totally disagree to $5=$ totally agree). These variables serve as instruments in the empirical analysis.

At the heart of the survey was a detailed assessment of individuals' travel behavior in 2015 for another four sport participation purposes, including competitions/tournaments, league games, day trips, and training camps/sport vacations. Each
sport-specific survey assessed the participation purposes relevant to the sport. For example, the climbing/boul-dering survey asked for competitions, day trips, and sport vacations, while the volleyball survey assessed tournaments, league games, and training camps. For each participation purpose, respondents were asked if they have participated in 2015 and if so, how many times. Then they were asked to report the destination and estimate the one-way travel dis-tance or flight hours. These answers were checked using Google maps and adjusted accordingly. These questions yielded another four participation frequency (Competitions, League games, Day trips, Camps) and travel distance variables (Competitions distance, League games distance, Day trips distance, Camps distance). The final distance variables reflect total distances and were obtained by multiplying the one-way distances assessed in the survey by two.

The survey finished with a set of personal questions, including respondents' gender (Gender), Age (Age), highest educational level (Low education, A-levels, University), and personal monthly net income (Income). Since existing research has documented a u-shaped relationship between age and SWB (e.g. Downward \& Dawson, 2016; Pawlowski et al., 2011), the squared term of age (Age squared) is also included.

SWB was measured with an individual's level of satisfaction with her/his life in general (Satisfaction). Life satisfaction has been used in previous research to capture SWB (e.g. Ruseski et al., 2014; Wicker \& Frick, 2015). The measurement of this variable is identical to the German Socio-Economic Panel (GSOEP) (Becchetti et al., 2008; Orlowski \& Wicker, 2018), which uses a scale from 0 to 10 . Using the same scale as in the GSOEP allows comparisons with the German resident population. This scale is similar to the one used in the Taking Part Survey in the UK which goes from 1 to 10 (Downward \& Dawson, 2016; Downward \& Rasciute, 2011). Other surveys have used shorter scales, including scales from 1 to 4 (Huang \& Humphreys, 2012; Pawlowski et al., 2011; Wicker \& Frick, 2015) or 1-5 (Ruseski et al., 2014). Even though single-item life satisfac-tion measures have been criticized (Organisation for Economic Co-operation and Devel-opment [OECD], 2013), they were found to be valid and yielded similar results when compared with multi-item measures (Cheung \& Lucas, 2014).

## Empirical analysis strategy

The effect of participation frequencies and travel distances for the five sport participation purposes on SWB was analyzed using a set of regression models. The dependent variable was Satisfaction in all models. The independent variables of interest were the two sets of variables capturing participation frequencies and travel distances. Since these two sets of variables were highly correlated with each other, separate regression analyses were esti-mated. The five participation frequency and the five travel distance variables were posi-tively skewed. Therefore, the natural logarithm was used to move their distribution closer to the normal distribution. The remaining variables from Table 1 were included as control variables as SWB is also affected by socio-economic characteristics (e.g. Dolan, Peasgood, \& White, 2008; Stutzer \& Frey, 2008), civic participation such as club membership (Dolan et al., 2008), and experience in sport, measured by activity years,
which may affect the utility derived from sport participation (Wicker, Prinz, \& Weimar, 2013).

All independent variables were checked for multicollinearity using correlation analyses. With the exception of age and its squared term, which are by construction highly corre-lated, all correlation coefficients were below 0.8 (Hair, Black, Babin, \& Anderson, 2010), suggesting that multicollinearity should not be an issue in the present estimations. All models were estimated with standard errors clustered by sport as participants of the same sport might share similarities in participation and travel behavior.

The empirical analysis strategy consists of two main steps. First, life satisfaction was regressed on the two sets of sport participation variables using ordinary least squares (OLS) regression. In the social sciences, ordinal variables which have at least five categories and are measured on scales with equal interval length (i.e. equal distances between cate-gories, such as in a Likert scale) are considered quasi- or pseudo-metric variables, imply-ing that these variables can be treated as metric variables in the empirical analysis (Völkl \& Korb, 2018). Hence, the life satisfaction measure is treated as cardinal rather than ordinal. In the case of the latter, another opportunity would be to run an ordered probit or logit model. However, previous research has documented that the cardinality versus ordinality assumption and the resulting choice of the estimator makes virtually no difference. Specifi-cally, Ferrer-i-Carbonell and Frijters (2004) compared different estimators using data from
the GSOEP (and the identical life satisfaction variable) and found that 'there seems to be little difference between running a simple OLS on the raw scores [...] or taking an ordered logit or probit model' (p. 650). The OLS estimations give an idea as to how participation frequency and traveling for different sport participation purposes are correlated with life satisfaction. However, they do not allow identifying causal effects, i.e. what the direction of causality is. Hence, in the case of positive coefficients, it is not clear whether happier people are more likely to travel for sport participation purposes or whether such travel improves life satisfaction.

Second, and to address this endogeneity issue, this study employed an instrumental variables approach which allows identifying causal effects. Instrumental variables should be correlated with the participation frequency and travel distance measures, but not with life satisfaction. Instruments were chosen in line with existing studies: Motivational dimensions and associated benefits of sport participation (Dolan et al., 2014), survey month (Downward \& Dawson, 2016), and a measure of sport supply (e.g. Huang \& Hum-phreys, 2012; Ruseski et al., 2014; Wicker \& Frick, 2015) were used as instruments. The sport supply measure is sport club density in the state the respondent lives in (Orlowski
\& Wicker, 2018); it was calculated by dividing the number of sport clubs in 2015 (DOSB, 2016) by the settlement and traffic area in square kilometers in each German state (Deutschland in Zahlen, 2017).

A two-step generalized method of moments (GMM) estimator was employed. This esti-mator is assumed to be more efficient than other instrumental variable estimators for large scale crosssectional data (Wooldridge, 2010) and has been applied in previous research (e.g. Downward \& Dawson, 2016; Pawlowski et al., 2011; Wicker \& Frick, 2015). The rel-evance and validity of instruments were assessed using F-tests and Hansen J tests, respect-ively. The F-tests for all 10 endogenous variables are
statistically significant, suggesting that the null hypothesis that the instrumental variables do not affect the participation fre-quency and travel distance variables can be rejected for all measures. The Hansen J tests which test for overidentification of all instruments were insignificant (Model 2a: $\mathrm{p}=0.713$; Model 2b: $\mathrm{p}=0.788$ ), indicating that the null hypothesis that the instrumental variables are unrelated to the error term of the life satisfaction equation cannot be rejected. Conse-quently, the instrumental variables can be considered relevant and valid, and the empirical analysis can provide some causal insights.

## Results and discussion

Table 2 reports the descriptive statistics. Altogether, $62.0 \%$ of respondents were male and the average age was 30.85 years. Regarding education, $25.6 \%$ of respondents have an edu-cational level below A-levels, $31.3 \%$ have a university entrance degree (i.e. A-levels), and $43.1 \%$ a university degree. On average, respondents reported a monthly net income of $€ 1627$. Respondents' sport biography indicates that they have practiced their sport for 11.68 years on average and $69.6 \%$ were a member of a sport club.

Regarding SWB, respondents scored 7.52 on the life satisfaction scale. Figure 1 visu-alizes the distribution of Satisfaction and compares it with the German resident population using data from the 2015 wave of the GSOEP (i.e. the survey year of this study). The comparison indicates that the distribution of life satisfaction in the sample is similar to the German population, with only few people reporting low satisfaction


Figure 1. Distribution of life satisfaction in the sport participants sample ( $\mathrm{n}=7060$ ) and the German resident population in 2015 (GSOEP; $\mathrm{n}=26,950$ ).
levels and the majority of respondents scoring between 7 and 9 on the scale from 0 to 10 . The mean value in the sample is slightly higher than the German population mean of 7.38 ( $\mathrm{SD}=1.73$ ), potentially reflecting empirical studies that document higher SWB levels for sport participants (e.g. Orlowski \& Wicker, 2018). The Taking Part Survey in the UK using a 10-point scale has yielded a similar mean value of 7.75 (Downward
\& Dawson, 2016), suggesting that the distribution of the present SWB measure is similar to previous studies.

Turning to sport participation, respondents have accumulated on average 109.07 train-ing sessions over a one-year period, resulting in a total of 2582 km that were traveled to these sessions. On average, respondents have participated in 1.37 competitions to which they traveled 472 km and in 3.96 league games involving 373 km of travel. Moreover, respondents conducted 1.5-day trips which were associated with 389 km of travel and 0.84 sport vacations or training camps yielding a travel distance of 1885 km . The high standard deviation for the participation frequency and travel distance variables supports the heterogeneity of individuals' sport participation behavior.

Table 3 summarizes the results of the regression analyses for life satisfaction. Models 1a and 1b are OLS regressions, while the second set of models includes the instrumental vari-ables estimates (GMM). The effect of gender is insignificant, like in some previous studies (Pawlowski et al., 2011), while other studies have identified a significant gender effect in favor of females (e.g. Downward \& Dawson, 2016; Huang \& Humphreys, 2012). This difference might be explained by the type of sample: while existing studies used population samples, this study relies on a sample consisting only of sport participants. Given that sport participation adds to SWB (e.g. Downward \& Dawson, 2016; Huang \& Humphreys, 2012), gender differences in SWB might be less pronounced among sport participants. The u-shaped age effect and the positive effects of higher educational levels and income are in line with existing research (e.g. Downward \& Dawson, 2016; Downward \& Rasciute, 2011; Huang \& Humphreys, 2012). Since the effects of control variables are similar to previous

Table 3. Summary of regression analyses for life satisfaction ( $\mathrm{n}=$ 7060).

|  | Model 1a OLS: Participation frequencies | Model 1b OLS: Iravel distances | Model 2a GMM: Participation frequencies | Model 2b GMM: Iravel distance |
| :---: | :---: | :---: | :---: | :---: |
| LN Training |  |  |  |  |
| sessions | $-0.050(-2.52)^{* *}$ | - | 0.672 (1.95)* | - |
| LN |  |  |  |  |
| Competitions LN League games | 0.062 (1.45) | - | -1.483(-1.34) | - |
|  | 0.069 (1.21) | - | 0.240 (0.43) | - |
| LN Day trips | 0.033 (0.95) | - | 1.505 (1.72)* | - |
| LN Camps | $0.161(3.06)^{* * *}$ |  | 2.118(1.52) |  |
| LN Training |  | -0.01 (-1.64 |  |  |
| sessions distance LN | - |  | - | 0.508 (2.18)** |
|  |  |  |  | -0.25(-1.3 |
| Competitions distance | - | $0.017{ }^{\text {j }}$ | - | 08) |
| games | - | $0.025{ }^{(1.15}$ | - | 0.056 (0.24) |
|  |  |  |  |  |
| distance trips | - | $0.013{ }^{(3.92))^{* x}}$ | - | $0.363(1.87) *$ $-0.04-0.2$ |
| distance | - | $0.028{ }^{(3.5)}$ | - |  |
| Activity years | -0.007 (-1.16) |  | 0.007(0.35) | $0.013(0.63)$ |
| Member Gender | $\begin{aligned} & 0.010(0.13)^{x} \\ & 0.124(2.01)^{x} \end{aligned}$ | $\begin{gathered} -0.01(-0.18 \\ 0.122(1.93)^{\star} \end{gathered}$ | $\begin{aligned} & -0.312(-0.64) \\ & -0.049(-0.21) \end{aligned}$ | $\begin{aligned} & -0.58\left(-1.0^{\prime}\right. \\ & 0.002(0.01) \end{aligned}$ |
|  |  | $-0.06(-6.81)^{*}$ |  | -0.078 |
| Age | $-0.068(-6.68){ }^{* * *}$ | 8 ** | $-0.087(-2.50)^{* *}$ | $(-2.45)^{* *}$ |
| Age squared Low | $0.001(6.14)^{* * *}$ | $0.001{ }^{(6.28)}{ }^{\text {x }}$ | 0.001 (2.16)** | $0.001(2.54)^{* *}$ |
| education | REF |  | REF | REF |
| A-levels | $0.181(3.78)^{* * *}$ | 0.182 | $0.525(2.84)^{* * *}$ | $0.614(3.21)^{* * *}$ |
| University | $0.394(6.07)^{* * *}$ | $\left.0.386{ }^{(5.7}{ }_{*}^{*}\right)^{* *}$ | 0.751 (3.75)*** | 0.850 (3.18)*** |
| LN Income | 0.218 (5.42)*** | 0.221 | 0.243 (3.13)*** | 0.167 (1.92)* |
| Constant | 7.004 (24.97)*** | (24.72)*** | 3.993 (1.97)** | 6.004 (4.32)*** |
| $\mathrm{F}_{\mathrm{R}}$ | $37.68{ }^{* * *}$ | 49.78*** | $25.23{ }^{* * *}$ | $20.50{ }^{* * *}$ |
|  | U.U31 | U.UЗ'2 |  |  |

Notes: LN = natural logarithm; REF = reference category; displayed are the non-standardized coefficients; t -values (OLS) or z -values (GMM) in parentheses; all models estimated with standard errors clustered by sport; reported F-values refer to the models.
${ }^{*} p<0.1$.
${ }^{* *} p<0.05$.
${ }^{* * *} p<0.01$.
studies, the present findings for participation frequency and travel distances can be con-sidered credible.
The results of OLS regression analysis show a significant negative relationship between the number of training sessions and SWB (Model 1a). The relationship is almost signifi-cant in Model 1 b for the corresponding travel distances ( $\mathrm{p}=0.116$ ). These findings provide some support for the notion of the unhappy commuter (e.g. Kahneman et al., 2004; Stutzer \& Frey, 2008), assuming that traveling to training sessions occurs with similar regularity as commuting to work. This finding, however, does not hold when looking at the instrumental variables estimates (Models 2 a and 2 b ): In the GMM esti-mations, the causal effect of participation frequency in training sessions (Model 2a) and travel distances to training sessions (Model 2b) is positive and statistically significant. This means that when taking endogeneity into account, the causal effect is in the opposite direction and the notion of the unhappy commuter, meaning the unhappy traveler to training sessions, cannot be supported anymore. In fact, the findings suggest that partici-pants derive some enjoyment from traveling to the location of training sessions. This conclusion is in line with existing research on fitness participants (Wicker et al., 2015a).
Turning to competitive sport purposes, the associations between the number of com-petitions/tournaments and SWB as well as between the number of league games and SWB are insignificant in the OLS regression analyses (Models 1a and 1b). This insignificance also holds for the travel distances for these two competitive participation purposes.

The instrumental variable estimates (Models 2a and 2b) provide a similar picture in the sense that neither the frequency of participation in competitions, tournaments, or league games nor the corresponding travel distances have a significant impact on SWB. This insignificance of participation for competitive purposes is in line with previous research (Rasciute \& Downward, 2010). The present findings also support the notion that not only the frequency of sport participation is relevant, but also the goals and values of sport participation (Chatzisarantis \& Hagger, 2007), which might be reflected in the different participation purposes to some extent. Another explanation is the presence of other underlying factors of trips to various forms of sport competitions, such as con-frontation with travel-related stressors (Koslowsky et al., 1995), moving away from the family, and disrupting the usual routine, which may be responsible for the finding that participation in and traveling to various forms of sport competitions does not significantly improve SWB.

It is also possible that the extent to which individuals can directly choose travel desti-nations and distances plays a role. In the case of league games, participants can choose neither the number of games they have to play nor the distances they have to travel in order to compete in these games. In fact, the choice is more indirect in nature, as partici-pants self-select into teams and clubs that play in specific leagues, meaning that they are aware of resulting travel distances. In competitive sports, travel distances increase with increasing performance level because higher-level sports leagues include teams from a larger geographical area. For example, when a player joins a team which plays in the regional league (i.e. third or fourth division, depending on the sport), he/she knows that travel distances are longer than in lower leagues, such as the district league. The same applies to competitions and tournaments, with some participants being able to directly choose the competitions and tournaments they participate in, while others choose them in a more indirect manner
by self-selecting into specific clubs and teams, again resulting in participation in specific competitions or tournaments.

The results for the two more touristic travel purposes - day trips and sport vacations or training camps - provide an interesting pattern. The number of day trips and the corre-sponding travel distances are not significantly related to SWB in the OLS regressions (Models 1a and 1b). However, the instrumental variable regressions reveal a significant positive impact for both the frequency of day trips (Model 2a) and the distance traveled (Model 2b). Hence, conducting some day trips throughout the year adds to individuals' SWB. It is possible that participants value the distraction from everyday life and problems (Lehnert et al., 2012) that may be associated with these trips.
The results for sport vacations or training camps show the opposite pattern: In the OLS regression models for both participation frequency (Model 1a) and travel distances (Model 1b), the relationship between vacations/camps and the SWB measure is positive and significant. However, this finding does not hold in the instrumental variable estimates where the effect is insignificant (Models 2 a and 2 b ). This finding suggests that happier people are more likely to travel to sport vacations or training camps, but traveling for these purposes does not significantly improve SWB. It might be explained by the increasing stress that can be associated with airports and flight schedules that do not add to SWB. Existing research has indicated that the extent to which individuals have control over travel activities and associated stress was found to affect SWB (Ettema et al., 2010; Got-tholmseder et al., 2009).

The findings of this study have implications for policy makers, sport managers, and travel cost researchers. Regarding the policy goal of population well-being through sport (e.g. WHO, 2018), the present research suggests which types of sport participation purposes are better suited to achieve increases in SWB. The findings indicate that competi-tive sport is less suited than noncompetitive sport: Frequent participation in and traveling to sport competitions does not significantly add to SWB, while participation in regular training sessions has a significant positive impact. This finding also has implications for sport managers at sport governing bodies concerned with scheduling and organizing sport competitions, tournaments, and league games. To the extent to which this is possible in each sport, one possibility is to reduce the travel distances to competitions, tourna-ments, and league games, for example by scheduling league games on subsequent days over the weekend when teams have to travel long distances to play against each other. In fact, the German Volleyball League has already implemented double game days so that a team from Eastern Germany plays against two teams in Western Germany over a weekend and vice versa. Another possibility is to choose locations for competitions or tournaments that are closer to where the majority of participants live, ultimately reducing emissions caused by sport-related travel. Such reductions would also be in line with the policy goal of reducing emissions and pollution caused by (car) travel (OECD, 2008).

The different effects of the travel distances for the five sport participation purposes have implications for travel cost researchers. Many existing studies have relied on an opportu-nity cost approach for assigning a monetary value to travel time (Chae et al., 2012; Pascoe et al., 2014; Whitehead \& Wicker, 2018). In doing so, the assumption was that the value of travel time mainly depends on the time and distance traveled as well as the foregone income during this period. The present research highlights that appropriate valuation of travel time should not only take the time
and distance traveled into account but also the travel purpose. Hence, resulting travel cost estimates should be adjusted accordingly.

## Conclusion

This study set out to examine the effect of participation frequency and travel distances for different sport participation purposes on SWB. The results of OLS regression analyses showed a negative relationship between traveling to regular training sessions and SWB, similar to the notion of the unhappy commuter. However, this finding did not hold in the instrumental variable estimates documenting a causal positive effect of traveling for the purpose of regular training sessions on SWB. The OLS results further reveal a signifi-cant positive association of sport vacations and training camps with SWB, suggesting that happier people are more likely to travel for this purpose. This effect does not hold in the instrumental variable models, where only traveling for the purpose of day trips signifi-cantly adds to SWB, supporting the notion of the happy sport tourist. The findings also reveal that traveling to various forms of sport competitions (league games, tournaments, etc.) does not add to SWB, suggesting that the travel component of competitive sports gen-erates stress which reduces the enjoyment from participation. In fact, participation in and traveling for the purpose of non-competitive sport (regular training, day trips) yields more utility and positively impacts SWB, respectively.
The present research contributes to the literature in at least four ways. The first contri-bution relates to a detailed assessment of different participation purposes, including not
only regular training sessions, but also competitions or tournaments, league games, day trips, and sport vacations or training camps. Hence, this study is able to capture the heterogeneity of individual participation behavior more fully than existing research. A second contribution is that it does not only assess participation frequency for the above purposes but also travel distances. This assessment makes it one of the first studies that examine the link between travel for sport participation purposes and SWB. A third contribution is the identification of causal effects rather than only relationships by addressing the endogeneity issue. Fourth, this study does not ask for sport participation and travel behavior over only a specific short period prior to the survey, such as one or four weeks/one month. It analyzes a one-year period, making it less prone to biases resulting from seasonal variations in sport participation (e.g. Hagströmer, Rizzo, \& Sjöström, 2014).

This research is not free of limitations which can guide future studies. The present study shares the limitations of all surveybased studies as it relies on self-reported measures for SWB, sport participation frequency, and travel distances (Krueger \& Schkade, 2008; Rzew-nicki, Auweele, \& De Bourdeaudhuij, 2003). The implementation of plausibility checks for reported travel distances was an attempt to mitigate this issue. Nevertheless, some respondents might have had difficulty recalling all trips. Also, respondents who have participated in many competitions, league games, tournaments, etc. may have dropped out of the survey because they were not motivated to report the destinations and travel distances for each trip. To the extent this is true, the reported participation frequencies and travel distances are underestimated. A fruitful avenue for future research is the use of tracking devices that record participation duration and intensity as well as travel distances and time, thus capturing sport participation and travel behavior more fully and objectively.

A second limitation is the convenience sampling strategy and the lack of information about the extent to which the sample is representative for sport participants in Germany. A third limitation is that the study only assessed travel distances, but not travel duration, which should be considered in future studies. Another limitation is that the present survey did not include commuting for work-related purposes. Examining the relationship between traveling for sport participation purposes and workrelated commuting rep-resents another fruitful avenue for future research.

## Note

1. This study uses the term 'training session' for all regular (weekly) activities, acknowledging that for some respondents or sports the sessions were not held with the purpose of improving performance.

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