Introduction

An informal inquiry among a considerable number of friends and acquaintances reveals a clear picture. When asked which relationship between happiness and sport is relevant to them, almost all of them immediately answered: “Doing sport raises happiness.” They pointed out that engaging in sport is good for health because it strengthens the body; induces people to enjoy fresh air; has a welcome disciplining function; and most importantly sets into motion chemical processes in the body bolstering satisfaction with life, thus increasing happiness.

But is this really true? One could also argue that the causation goes into the opposite direction: Healthy – and therefore happier – people are able to engage in sport. Persons in ill health are unable, or unwilling, to do so. Hence, greater happiness leads people to do more sport, and not the other way round.

Both directions of causation make sense, and they may exist at the same time. But it may also hold that only one of them applies, while the other does not. In this chapter, we make an effort to empirically inquire whether doing sport makes people happy, or whether happy people do more sport. It must immediately be stressed that it is most difficult, and in many cases impossible, to empirically identify the two causal links, i.e., to clearly separate the two countervailing influences. Our results should therefore be taken cautiously. More extensive and better data are needed to reach a satisfactory answer. In particular, it would be good to have more precise data on what kind of sport activity people engage in.

The econometric estimates indicate that persons actively doing sport report higher happiness than those who do no sport. We find that this correlation between sport and reported subjective well-being is substantial. The more often people engage in sport, the higher the positive correlation with happiness. This result suggests that engagement in sport and happiness are directly related, and not only – as many people think – via the effect on physical health.

In the causal analysis, we find that both directions of influence matter: Sport influences happiness in a strongly positive manner, while happiness has a smaller positive impact on engaging in sport. The causal effect of sport...
participation on happiness is considerably larger than the reversed causal effect of happiness on sports participation.

**Previous empirical studies**

The study of happiness research is a prime example of an interdisciplinary agenda, undertaken by various scientific disciplines such as psychology (e.g., McMahon, 2006), philosophy (e.g., Diener et al., 1999), sociology (e.g., Veenhoven, 1993), and political science (e.g., Lane, 2000). Happiness research is now widely recognized as one of the most popular fields in current economic research. Surveys on the economics of happiness have appeared as articles (e.g., Dolan et al., 2008; Frey & Stutzer, 2002a), in books (e.g., Frey, 2008; Frey & Stutzer, 2002b; Layard, 2005), and in collections of articles (e.g., Bruni & Porta, 2005; Easterlin, 2002; Frey & Stutzer, 2013). These studies identify a large number of determinants of happiness: personality factors; economic factors such as income, work, and economic development; socio-demographic factors such as age, family status, children, social relationships, health, education, culture, and religion; and political conditions, in particular the extent of democracy.

A limited number of studies explore the relationship between sport and happiness. A positive correlation has been documented in several studies with different samples (e.g., Dolan et al., 2014; Downward & Rasciute, 2011; Kavetsos, 2011; Pawlowski et al., 2011; Wheatley & Bickerton, 2017). These studies do not claim to establish a causal link between happiness and sport.

The positive relationship between active sports participation and physical health is well founded (e.g., Blacklock et al., 2007; Brown et al., 2007; Stone, 2004). Good physical health raises happiness. As a consequence, sports participation and happiness are positively related. This indirect, positive relationship between sports participation and happiness through physical health has been found in several studies (e.g., Dolan et al., 2014; Pawlowski et al., 2011). However, these studies do not include a measure of physical health in their estimates; they therefore cannot distinguish between the direct relationship between sports participation and happiness and the indirect association through physical health.

There is also a direct link between physical activity and happiness, independent of health. Sports participation provides more opportunities for social contacts, serves as a distraction from unfavorable stimuli, improves self-confidence, and helps to develop communication and cooperation skills. All these factors are closely associated with higher levels of happiness (Huang & Humphreys, 2012; Wang et al., 2012). A number of studies have explored this direct, non-health relationship between physical activity and subjective well-being (e.g., Lee & Park, 2010). They generally find a positive correlation between sports participation and subjective well-being, while holding physical health constant. Some studies also consider the frequency of engaging in sport and find a positive association with happiness (e.g., Downward & Rasciute, 2011; Wheatley & Bickerton, 2017).
Various studies make an effort to establish the causation running from sports participation to happiness, using a cross-sectional 2-stage IV approach. Huang and Humphreys (2012) use the number of sport facilities and instructors per person in the individual’s country of residence; Dolan et al. (2014) make use of the respondent’s perceived benefit of sports participation. Both instruments are used by Ruseski et al. (2014). According to these studies, sports participation increases happiness. However, it is questionable whether these studies are able to clearly identify the causal effect of sports participation on subjective well-being.

It may be argued that regressions using cross-sectional data only capture statistical correlations but not causality (e.g., Frey & Stutzer, 2002b; Staubli et al., 2014; Stutzer & Frey, 2006; Wang et al., 2012). The identification of causal relationships is best undertaken by using panel data. Only a few longitudinal studies identify a causal effect of sports participation on happiness (e.g., Becchetti et al., 2008). Lechner (2009) applies a matching estimator such that sports participation for individuals is initially the same. Subsequent changes over time are then analyzed. The results suggest significant positive effects of sports participation on the subjective well-being of males, and positive but statistically insignificant effects for females.

To the authors’ knowledge, empirical evidence on the reverse causality running from happiness to sports participation is limited. There are some experimental studies (e.g., Bryan et al., 2007; Kiviniemi et al., 2007) seeking to capture this relationship. They find that positive affect of participants leads to higher intentions to do sport. Similarly, Ajzen and Driver (1992) find that positive moods can lead to more favorable attitudes about exercise and result in higher intentions to engage in sport. In contrast, negative moods tend to discourage individuals from participating in sport (Allen Catellier & Yang, 2013; Kwan & Bryan, 2010). These studies consider positive and negative affects to reflect people’s short-run, momentary emotions, while the happiness literature typically focuses on life satisfaction, a more cognitive form of happiness (Diener et al., 1999; Frey, 2018). Becker et al. (2006) and Schneider and Becker (2005) find life satisfaction to be positively associated with active sports participation. However, since cross-sectional data are used, their findings can hardly be interpreted in a causal way.

To the authors’ knowledge, (so far) there are no studies using panel data to identify the effect of happiness on the decision to participate in sport, nor are there combined analyses of both causal directions, from sport activities to happiness and from happiness to sport activities.

**Theoretical approach and data**

Our study deals with the relationship between happiness and sport in two steps:

The empirical connection between subjective reported life satisfaction and engagement in sport is empirically analyzed descriptively and econometrically
by using the German Socio-Economic Panel (GSOEP). The GSOEP is arguably the best data, as it measures individuals’ sports participation more extensively and over a longer time period than other panel datasets.

- Employing the panel structure of GSOEP, we seek to identify the two causal links: from sport to happiness and from happiness to sport.
- As already pointed out, the respective estimation results must be interpreted with caution because the identification of two simultaneous countervailing causal relationships is a major challenge (for a more extensive analysis, including various robustness tests, see Frey & Gullo, 2021).

Following the literature, individual happiness is captured by subjectively reported life satisfaction. The terms “life satisfaction” and “happiness” are used here interchangeably, again in line with the literature. The data on life satisfaction are based on responses to the question “How satisfied are you with your life, all things considered?” Responses range from 0 (“completely dissatisfied”) to 10 (“completely satisfied”). We use the data of the GSOEP as it is a representative survey of private households and persons in Germany across a time period of 35 years. The latest wave (2018) consists of more than 33’000 individuals in close to 20’000 households. The GSOEP asks a wide range of questions with regard to individual’s socioeconomic status, demographic characteristics, time use, personal attitudes, and self-assessed well-being. GSOEP is a most valuable dataset because it not only captures individual happiness in a longitudinal framework but also reveals the individual’s sport activity for an extended time period (Stutzer & Frey, 2004).

Sport activity is captured by a dummy variable (following, e.g., Schneider & Becker, 2005): People who do sport or exercise at least once a week are assigned the category of active (Sport active = 1). People who do sport or exercise less than once a week are assigned as inactive (Sport active = 0).

Twelve waves of the GSOEP are used in our analysis: 1992, 1994, 1996, 1997, 1999, 2001, 2005, 2007, 2009, 2011, 2015, and 2017. The omission of some intermediary years is due to the fact that some questions, in particular on sports participation, were not included. The panel is unbalanced, as the number of periods observed varies across individuals. The final dataset includes 58’368 individuals and 213’563 observations.

**Empirical analysis**

The average life satisfaction of the residents of Germany amounts to 7.1 (out of 10). This value is close to the value of 7.0 reported by the World Happiness Report of Helliwell et al. (2019). On average, Germans report a high life satisfaction. Thirty-two percent of the German sample population say that they regularly engage in sport (at least once per week). Sixty-two percent rarely do sport and 6% do so monthly.
The relationship of happiness and sport

Table 15.1 shows the average life satisfaction in Germany for different levels of sports participation.

On average, people who are active in sport report being happier than those who are not. The difference of 0.5 is statistically significant. Regularly doing sports is associated with greater happiness. The more often people engage in sport, the happier they are on average.

The first part of the econometric analysis deals with the question of how sport participation is related to happiness, applying a pooled ordinary least squares (OLS) estimate. The partial correlation between sports participation and happiness is estimated, keeping a large number of socio-demographic, economic and social factors constant (e.g., Alesina et al., 2004; Di Tella et al., 2003; Easterlin, 2006; Frey, 2008; Stutzer, 2004):

- Age and age-squared.
- Gender: The dummy variable “male” is assigned the value 1 if the respondent is male, and 0 if female.
- Marital status according to five categories: single, married, separated, divorced, and widowed.
- Number of children (up to 16 years) according to four groups: no children; one child; two children; and three or more children.
- Place of residence: This dummy variable assigns the value 1 to residents of former West Germany and the value 0 to those of former East Germany.
- Nationality: This dummy variable takes the value 1 if the respondent is German and 0 if he or she is a foreigner.
- Education in natural logarithm of the respondent’s years of education.
- Physical health according to bad health, average health, and good health.
- Household income (in natural logarithms).
- Household size (in square root): Income is shared among the household members; therefore, the square root of the household size is taken to capture a possible non-linear relationship.
- Employment status according to nine categories: full-time employed; unemployed; self-employed; some work; non-working; maternity leave; military service; in education; and retired.
- Annual working hours.

<table>
<thead>
<tr>
<th>Variables</th>
<th>Average life satisfaction</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sport active</td>
<td>7.4</td>
</tr>
<tr>
<td>Sport inactive</td>
<td>6.9</td>
</tr>
<tr>
<td>Rarely doing sport</td>
<td>6.8</td>
</tr>
<tr>
<td>Monthly doing sport</td>
<td>7.3</td>
</tr>
<tr>
<td>Weekly doing sport</td>
<td>7.4</td>
</tr>
</tbody>
</table>
• Weekend work: This dummy variable takes the value 1 if the respondent has to work at weekends at least one a month and takes the value 0 otherwise.
• Social relationships measured by the number of meetings with friends, relatives, or neighbors in their free time: weekly, monthly, rarely (i.e., less than once a month), and no social relationships.
• Religiosity: weekly; monthly; rare; or no religious activities.

**Correlational analysis**

Since the dependent variable is discrete qualitative, the ranking information contained in the scaled life satisfaction should in principle be estimated by ordered probit or logit techniques. However, as shown by various happiness studies (e.g., Ferrer-i-Carbonell & Frijters, 2004; Stutzer & Frey, 2006), estimation coefficients in the OLS estimations and the average marginal effects in ordered probit estimations are quite similar. As the coefficients are easier to interpret, we opt for the OLS technique.

Our estimation model employs a dummy variable taking the value 1 if the individual is active in sport (does sport or exercise at least once a week) and 0 if he or she is not. This model aims to identify how individuals’ decisions to participate in sport or not are related to happiness: Are individuals who do sport happier than those who do not? The additional interaction terms test whether the relationship between sports participation and happiness varies for different ages and health status.

Table 15.2 reports the pooled OLS estimation results. The results are only shown for the variables that are essential for the research question. In order to control for aggregate time trends, dummy variables for the 12 waves are included.

Table 15.2 illustrates the partial correlations. The coefficient of the variable “Sport active” indicates a sizeable, positive relationship between sport activity and life satisfaction: On average, people who actively engage in sport report a 0.4 points higher life satisfaction than those who do not.

The coefficients of “Age” and “Age-squared” indicate a U-shaped curve with higher levels of happiness at younger and older ages, and lower life satisfaction in middle ages for people who are inactive in sport. The positive association between sports participation and life satisfaction is stronger at younger and older ages compared to middle ages.

The coefficients of the three health categories indicate a close relationship between physical health and life satisfaction. In line with previous literature, better physical health contributes to higher life satisfaction. Especially striking is the large size of this association: Among people who do not participate in sport, individuals in bad health report 1.1 points lower life satisfaction compared to those in an average state of health, while individuals in good health report 0.8 points higher life satisfaction compared to those in an average state of health.
The interaction terms of physical health and sport activity can be understood as differences in differences. The positive relationship between sport activity and life satisfaction turns out to be the same for people in good health compared to people in average health. However, having bad health, but still engaging in sport, is statistically significantly associated with higher life satisfaction.

The results for the socio-demographic and economic control variables (not explicitly shown in Table 15.2) are generally consistent with the empirical
results from the happiness literature, extensively cited above: Higher household income, fewer household members, more children, regular social relationships, and religious activities are positively correlated with life satisfaction. Moreover, males are less happy than females, singles are less happy than married individuals but happier than divorced and separated individuals, foreigners are less happy than nationals, residents of East Germany are less happy than residents of West Germany, and full-time-employed people are happier than part-time-employed, unemployed, and self-employed people, but less happy than women on maternity leave, individuals in education, and retired people.

A related estimate takes into account how the frequency of engaging in sport is related to happiness (see Frey & Gullo, 2021). It aims to identify whether the relationship between monthly sports participation and happiness differs from the connection between rarely engaging in sport and happiness. These estimates suggest that the more frequently sport is undertaken, the stronger is the positive relation to happiness. The relationship between sports participation and happiness is increasing at a decreasing rate.

Causal analysis

The correlational analysis undertaken so far does not address the underlying causal mechanism: Does sports participation impact an individual's happiness or are happier people more willing to participate in sport? Part B of the empirical analysis addresses this issue by testing both causal directions. We employ the fixed-effects model capturing causes of changes within an individual by controlling for all time-invariant unobserved differences between the individuals. Those within individual effects are averaged across individuals.

The econometric estimates are presented in Table 15.3. Results are only presented for the variables essential for our research question. Year dummies are included to account for underlying time patterns.

Effects of sports participation on happiness

The first column of Table 15.3 reports the causal determinants of happiness. The results mainly confirm the results obtained in the correlational analysis.

The coefficient of the variable “Sport active” in Model A indicates that the positive relationship between sports participation and life satisfaction found in the correlational analysis can be interpreted causally: Ceteris paribus, becoming active in sports increases life satisfaction by 0.2 points, on average.

Physical health contributes to life satisfaction. The positive effect of sports participation is larger for people whose health is worsening compared to people remaining in average health. Sports participation thus seems to be particularly beneficial to people experiencing problematic physical health.
Table 15.3 Causal Link between Sports Participation and Happiness

<table>
<thead>
<tr>
<th>Dependent variable: predictors (reference group)</th>
<th>(A) FE-OLS life satisfaction</th>
<th>(B) FE-OLS sport active</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Sport activity (reference: Sport inactive)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sport active</td>
<td>0.235***</td>
<td></td>
</tr>
<tr>
<td>Life satisfaction</td>
<td></td>
<td>0.005***</td>
</tr>
<tr>
<td>Age</td>
<td>−0.005</td>
<td></td>
</tr>
<tr>
<td>Age-squared</td>
<td>−8.03e−5**</td>
<td>−1.46e−4***</td>
</tr>
<tr>
<td>Sport active × age</td>
<td>−0.014***</td>
<td></td>
</tr>
<tr>
<td>Sport active × age-squared</td>
<td>1.92e−4***</td>
<td></td>
</tr>
<tr>
<td><strong>Health (reference: Average health)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Good health</td>
<td>0.429***</td>
<td>0.023***</td>
</tr>
<tr>
<td>Bad health</td>
<td>−0.760***</td>
<td>−0.027***</td>
</tr>
<tr>
<td>Sport active × good health</td>
<td>0.029*</td>
<td></td>
</tr>
<tr>
<td>Sport active × bad health</td>
<td>0.124***</td>
<td></td>
</tr>
<tr>
<td>Annual work hours</td>
<td>−1.06e−5***</td>
<td></td>
</tr>
<tr>
<td>Weekend work</td>
<td>−0.013**</td>
<td></td>
</tr>
<tr>
<td>Socio-demographic factors</td>
<td>Included</td>
<td>Included</td>
</tr>
<tr>
<td>Economic influences</td>
<td>Included</td>
<td>Included</td>
</tr>
<tr>
<td>Year effects</td>
<td>Included</td>
<td>Included</td>
</tr>
<tr>
<td>Constant</td>
<td>5.301***</td>
<td>−0.658***</td>
</tr>
<tr>
<td>Observations</td>
<td>213,563</td>
<td>125,477</td>
</tr>
<tr>
<td>Within R-squared</td>
<td>0.091</td>
<td>0.018</td>
</tr>
<tr>
<td>Overall R-squared</td>
<td>0.186</td>
<td>0.010</td>
</tr>
<tr>
<td>Number of individuals</td>
<td>58,368</td>
<td>45,808</td>
</tr>
</tbody>
</table>

Notes: Clustered standard errors in parentheses. 

** ***p < 0.01, ** ***p < 0.05, * p < 0.1.

Variables not indicated for the socio-demographic factors: marital status (four variables), children (three variables), ln (years of education), social relationships (three variables), religiosity (three variables), place of residence (West Germany or East Germany), and economic influences: ln (household income), household size^{1/2}, and working status (eight variables).

Source: GSOEP.
The influence of socio-demographic and economic control variables is similar to the pooled OLS results.

**Effects of happiness on sports participation**

Model B in Table 15.3 reports the causal determinants of sports participation. Two additional determinants of sports participation are included: annual working hours and weekend work in order to account for time limitations and the work–leisure conflict. The estimate reveals a significant, but very small effect of life satisfaction on sports participation. Even if life satisfaction increases by 10 units from “completely dissatisfied” to “completely satisfied,” the probability of sports participation increases by just 4.6%.

**Conclusion**

Our study presents new evidence on the *positive relationship* between sport and happiness: People actively participating in sport report a 0.4 points higher life satisfaction than those who do not engage in sport. This finding suggests that sports participation and happiness are not only related indirectly through its influence on physical health, but also directly.

The *causal analysis* suggests that both directions of influence matter: *Sport has a positive effect on happiness, and happiness has a positive impact on sports participation.*

On average, becoming active in sport raises life satisfaction by 0.2 points, ceteris paribus. Sports participation is particularly beneficial to people experiencing bad physical health.

Life satisfaction, in turn, has a positive effect on sport activity. However, the effect size is very small: An increase in life satisfaction by one unit increases the probability of sports participation by only 0.5%, on average.

The effect of sports participation on happiness thus dominates the reversed causality from happiness to sports participation.

The empirical results highlight the importance of sport in our societies. On the micro-level, each individual can decide to participate in sport or not, knowing that it tends to raise his or her happiness. On the macro-level, the dominant causal direction identified from sport to life satisfaction is relevant for policy interventions intending to increase happiness.

Our study is subject to various limitations, which could be accounted for in future research.

First, sport includes various aspects. For instance, it can be distinguished between team sport, sport done with others, and sport just for oneself (e.g., running, cycling). Another important difference is between active sports participation and sport spectatorship. Sports participation could be further divided into health, amateur, and professional sport. Sports spectatorship in turn includes live attendance and watching sport on TV.
Second, although fixed-effects models for panel data are widely recognized as powerful tools for causal analyses, these models also have some limitations. Fixed-effects models are not able to control for unobserved characteristics that vary over time. Fixed-effects models are also unable to capture the effect of time-invariant variables. For these reasons, difference-in-difference models (Diff in Diff) and regression discontinuity designs (RDD) have increasingly been used to identify causal effects. Both econometric methods consider the external effect a sudden, unexpected change in an explanatory variable on the dependent variable. In our case, this requires an external shock to sport, which until recently was rarely the case. However, the current global outbreak of COVID-19, producing a lockdown imposed by government of many amateur and professional sport activities, may produce such a “natural experiment.” Application of these estimation techniques requires a sufficient number of data that will only be available in the future.

While the present study is subject to limitations mostly due to missing data, it expands our knowledge. It provides detailed evidence on the positive relationship between sport and happiness. It helps to fill a research gap by identifying a positive causal impact of sport on happiness, which strongly dominates the positive effect of happiness on engaging in sport.

Notes

1 The empirical estimates are based on the more extensive analysis in Frey and Gullo (2021).

2 Annual work hours and weekend work are not available for the waves 1992, 1994, 1996, 1997, 1999, and 2001, thus reducing the sample size to 45,808 individuals and 125,477 observations.

References


Bruno S. Frey and Anthony Gullo


