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Public Expenditure and Sport Participation: An Examination of Direct, Spillover, and Substitution Effects

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Abstract

This study performs a comprehensive analysis of the relationship between various types of government spending and individual sport participation. By combining individual data from the German Socio-Economic Panel with expenditure data of the federal states for the period 2003–2011, direct (i.e., sport facilities, pools, general sport promotion), potential spillover (i.e., education, health, streets, public transport, environment), and substitution effects (i.e., culture) on regular sport participation are analyzed. The results of probit models reveal positive effects for direct sport-related public expenditure on sport facilities and swimming pools in the same year. While spillover effects could be observed for expenditure on streets and transport infrastructure, substitution effects were not identified. The results remain relatively robust when using three-year averages or relative measures of the expenditure variables. One implication for policy makers is that spillover effects from spending not directly targeted at sport can also facilitate regular sport participation.

Keywords: government spending, public finance, physical activity, sport promotion

Introduction

Previous research has shown that sport participation has positive effects on health (e.g., Humphreys, McLeod, & Ruseski, 2014; Warburton, Nicol, & Bredin, 2006), education (e.g., Pfeifer & Cornelißen, 2010; Rees & Sabia, 2010), social capital (e.g., Perks, 2007; Walseth, 2008), and labor market outcomes (e.g., Cabane & Clark, 2015; Lechner, 2009). Given this wide range of benefits, governments across countries promote sport

participation (e.g., Department of Culture Media and Sports [DCMS], 2002; German Parliament, 2014) by allocating financial resources to grassroots sports. However, the demand for active sport participation is of a complex nature (Gratton & Taylor, 2000); for example, people can engage in sport clubs, in commercial facilities, state-run programs, or informally (Hallmann, Feiler, & Breuer, 2015). Hence, supporting individual sport participation through public expenditure can be challenging given the various forms and opportunities of participation.

However, since the provision of public services such as healthcare, education, and public transport constitutes one of the primary tasks for governments, the largest share of the budget is usually allocated to these tasks. Moreover, governments are confronted with budget constraints and must, therefore, prioritize certain types of expenditure while ensuring a permanent supply of indispensable public services at the same time. As a consequence, for example, in times of financial distress, sport-related expenditure is often one of those areas in which budget cuts can be expected first (Ahlert & Stöver, 2008). Thus, a detailed understanding of how other types of public expenditure may affect sport participation patterns of the population could assist governments in promoting sport participation more effectively while fulfilling other purposes. However, according to Coalter (2007) there is currently "a lack of a strong cumulative body of research evidence from which to inform policy and practice" (p. 1).

The purpose of this study is to examine the relationship between various types of public expenditure and individual sport participation. The research context for this study is Germany, where the allocation of resources to many core public services (e.g., education, healthcare, transport) is at the discretion of the 16 federal states. Data on public expenditure of the federal states were made available from the German Federal Statistical Office (2015) and was linked with individual data from the German Socio-Economic Panel (GSOEP, 2014). The study contributes to the existing body of research by providing a comprehensive analysis of the effects various types of government spending can have on individual sport participation.

Research Context

In Germany, the federal structure shapes the distribution of powers and functions. All government bodies operate within a constitutional framework that specifies their competencies. Different from the federal system in the United States, the German system is not based on two separate pillars of federal and state power. In Germany, the legislative functions are mainly concentrated on a federal level, whereas the states have most of the administrative power. Although the federal government claims most of the legislative power for itself, the so-called "cultural and educational sovereignty of the federal states" provides the states with predominant responsibility for culture and education, which also includes the public administration of sport. As consequence, the federal states can relatively autonomously decide about their budget for these matters. Seitz (2008) found that only between 11% and 25% of the overall federal states' expenditure is dictated by the federal government. With respect to expenditure related to sport, it is noteworthy that in Germany there are no binding laws for government to support sport financially. Instead, sport promotion is a joint voluntary effort of the federal gov-

ernment—mainly focusing on elite sport—and the 16 federal states focusing on the promotion of amateur and grassroots sport.

Theoretical Framework and Literature Review

From a theoretical point of view, public expenditure can be divided into four categories in terms of their impact on individual sport participation: First, expenditure that is directly addressed at the promotion of sport; second, government spending that is indirectly related to sport potentially evoking positive spillover effects; third, types of public expenditure being counterproductive and potentially leading to substitution effects; and fourth, expenditure that is completely unrelated to sport. The first three types of public expenditure are examined in this study and discussed next.

Direct Effects

The promotion of sport participation with public expenditure specifically assigned to sport is considered direct spending and potential effects are defined as direct effects. In Germany, the federal states differentiate between three streams of sport-related expenditure: spending on sport facilities (excluding pools), spending on swimming pools, and spending on the general promotion of sport, which mainly comprises subsidies for sport clubs.

Public expenditure on sport infrastructure is used to finance the construction, renovation, and maintenance of sport facilities or swimming pools (Ahlert & Stöver, 2008). Previous research has outlined the important role sport infrastructure plays for an individual's decision to participate in sport (e.g., Hallmann, Wicker, Breuer, & Schönherr, 2012; Navalpotro et al., 2012). Specifically, Wicker, Hallmann, and Breuer (2013) examined the role of a variety of sport facilities (e.g., fields, track and field arenas, park areas, gymnastics rooms, tennis courts, and swimming pools) and found a positive effect on sport participation in general for the supply of swimming pools and on club-based participation for the supply of sport fields. The results indicate that in the context of promoting sport participation, not every type of sport infrastructure can be considered equally effective and, hence, from a governmental perspective, a detailed understanding of the relationship between different types of sport-related spending and individual sport participation is needed. However, such an analysis has not yet been conducted in previous research.

By allocating subsidies to non-profit sport clubs, the government supports the most important sport provider in Germany financially. The more than 91,000 sport clubs can record approximately 27.3 million memberships—roughly one third of the German population (German Olympic Sports Confederation [DOSB], 2015). The provided subsidies may assist in offering affordable sport programs for the many population groups as well as for competitive athletes (Breuer & Feiler, 2015). Although there are numerous studies analyzing the financial situation of German sport clubs (e.g., Wicker, Breuer, & Hennigs, 2012), no research has specifically looked at the relationship of provided subsidies and its impact on sport participation.

Only few studies examined direct effects of public sport-related expenditure on sport participation; these studies have produced inconclusive findings. For example, Down-

ward, Lera-López, and Rasciute (2014) found a positive effect of per capita sport-related government expenditure at the national level on both male and female sport participation when analyzing the determinants of individual sport participation in all member states of the European Union. Kokolakakis, Lera-López, and Castellanos (2014) investigated regional differences between local authorities in England, but were not able to identify a significant effect of regional-level sport funding on regional sport participation rates. Both studies used a broad measure of public sport-related expenditure without specifying the exact purpose of the allocated money.

Spillover Effects

Generally speaking, spillover effects occur when in one context an effect occurs because of something else happening in a rather unrelated other context. From an economic perspective these effects can be regarded as positive externalities (Downward, Dawson, & Dejonghe, 2009). In this study, spillover effects can be described as the promotion of sport participation through public expenditure that is not directly related to sport, but positively influences sport participation through other channels. For example, sport participation is closely linked to the fields of health and education. Regarding health, it can be assumed that public health expenditure includes the promotion of healthy behavior such as being physically active (Lera-López, Wicker, & Downward, 2016). Also, healthy people are more likely to participate in sport (e.g., Dawson, & Downward, 2013) and research has shown that public health expenditure is positively associated with people's health (e.g., Brown, Martinez-Gutierrez, & Navab, 2014).

For education there are at least two possible channels. First, educated people have a better understanding of the benefits of sport participation, which is underpinned by research on the positive effect of the individual's educational-level on sport participation (e.g., Humphreys & Ruseski, 2015). Second, educational institutions (e.g., universities, schools) often provide sport facilities and programs to communities that can be used by the population at large (Haug, Torsheim, Sallis, & Samdal, 2010). Accordingly, previous research was able to identify significant positive effects for education and health expenditure on a national level on individual sport participation (Lera-López et al., 2016) and on national participation rates (Van Tuyckom, 2011), suggesting that spillovers exist between government spending on health and education and sport participation in the population.

Another type of spending that may be associated with sport participation is public expenditure on the environment. Research has shown that the natural environment such as green and park areas can be considered an uncommon sport facility compared to common sport facilities such as sport fields and swimming pools (Wicker et al., 2013). Moreover, environmental attributes such as aesthetics and safety were found to be positively related to participation in sport activities (e.g., Berke, Koepsell, Moudon, Hoskins, & Larson, 2007). When examining the influence of state-level public expenditure on parks and recreation on participation in various sport activities, Humphreys and Ruseski (2007) found a positive effect on participation in outdoor activities and individual sports, while no significant influence was found for group sports and walking.

Finally, spillover effects for expenditure on transport infrastructure have to be considered. A well-developed street infrastructure or public transport system can help people

reach a sport facility. For example, Alexandris and Carroll (1997) found that a lack of transport was perceived as a major constraint by sport participants, and Sallis et al. (2009) identified transit stops to be positively associated with sport participation. Similarly, studies have shown that proximity to sport facilities has a positive impact on sport participation (Huang & Humphreys, 2012; Reimers et al., 2014). Since in most of these studies proximity of a sport facility is defined by the time needed to approach a sport facility, not only the distance has to be considered, but also the transportation infrastructure assisting people in covering the distance to a sport facility. The relationship between expenditure on transport infrastructure and sport participation has been largely neglected in previous research. However, such an analysis would be valuable because data on transport expenditure bear additional information: while information about raw transport infrastructure only includes the number of bus lines or new constructed streets, expenditure data also include service staff and more frequently running bus lines.

Substitution Effects

Since peoples' leisure time is limited and many opportunities exist as to how they can spend their leisure time (e.g., sport, cultural activities, watching television), people have to make a decision about the activities in which they participate. These opportunities can represent substitutes for sport participation. Hence, by subsidizing other leisure activities and improving their supply, governments may encourage people to participate in other leisure activities instead of sport. For example, governments also support cultural institutions such as museums and theaters because they also expect social and economic benefits from promoting cultural participation (Mafrolla, & D'Amico, 2016). Hence, substitution effects may occur for government spending allocated to cultural activities. This competing relationship is further underpinned by Hallmann, Artime, Breuer, Dallmeyer, and Metz (2016), who found that participants of both cultural and sport activities share most of the socio-demographic determinants. However, Muñiz, Rodríguez, and Suárez (2011) suggest that a complementary relationship between both activities exists with considerable differences between men and women. In order to increase the knowledge on this relationship, considering public expenditure on both activities can provide valuable insights on how the allocation of financial resources to cultural institutions affects individual sport participation and if it negatively interferes with sport promotion.

Shortcomings of Previous Research and Contribution of this Study

When summarizing the existing research at least four shortcomings are revealed. First, regarding sport-related expenditure, previous research has only used broad measures without specifying concrete purposes of the spending. Second, a comprehensive analysis of all three possible effects and associated types of government spending simultaneously has not yet been conducted. Third, most studies compared different countries and used public expenditure data at the national level. When regional levels such as (federal) states within one country were investigated, regional participation rates were used rather than individual behavior. Finally, the majority of studies only used cross-sectional data, although public expenditure and sport participation vary over

time; hence, panel data could provide additional information. This study attempts to address these shortcomings by performing a detailed analysis of different types of public expenditure and combining public expenditure information of the federal states in Germany with individual sport participation data.

Methods

Data Sources

This study combines two datasets. Data about public expenditure of the 16 federal states is combined with individual data, including information about regular sport participation and socio-demographic characteristics. The state-level data are based on annual accounting reports of the 16 federal states. The German Federal Statistical Office (2015) has published this information only for the period 2002–2011; more recent data are not available. Information about individual characteristics, including sport participation, stems from the GSOEP, a panel survey conducted by the German Institute for Economic Research (DIW) with annual waves for the period 1984–2014. Since a sport participation question was not included in every wave, only some waves could be considered for the empirical analysis. Moreover, the availability of state-level data must be considered (until the year 2011). Consequently, the empirical analysis is based on the GSOEP waves in 2003, 2005, 2007, 2009, and 2011. The total sample amounts to n=85,401 observations. Because of different population sizes in the 16 states, the number of observations differs between 15,607 in North-Rhine Westphalia and 602 in Bremen to reflect these size differences and ensuring representativeness. Overall, the sample is an unbalanced panel consisting of n=34,914 individuals who participated on average in 2.4 waves with a range from 1 to 5.

Measures and Variables

The outcome variable is regular sport participation, which was assessed with a question in which the respondents were asked to state the frequency of their participation in sport activities. The four-point scale includes the following categories: at least once a week, at least once a month, less often, or never. The focus of this study is on sport participation leading to economic and societal benefits. According to previous research, a certain regularity of sport participation is needed to engender most of those benefits (Downward, & Rasciute, 2015; World Health Organization [WHO], 2010). Therefore, this study examines regular participation, which is defined as at least weekly participation—similar to previous research (Ruseski, & Maresova, 2014; Wicker et al., 2013). The participation measure was recoded into a dummy variable with 1 representing sport participation at least once per week and 0 for the other three categories.

The state-level variables of interest capture different types of annual public conceptualized earlier. Potential direct effects are captured with expenditure on sport facilities, pools, and general sport promotion. The expenditure addressed at general sport promotion measures general funding of sport, which mainly includes direct subsidies for sport clubs. All three variables represent aggregated measures from the municipality level. Potential spillover effects are measured with public expenditure on education, health, environmental protection, street infrastructure, and public transport. Expendi-

ture on education comprises spending on universities and schools (including facilities enabling sport participation) as well as funding of research and other educational areas (including sport science). Health expenditure reflects general health promotion such as prevention programs or campaigns. Subsidies of hospitals were subtracted since no effect on sport participation was expected. Expenditure on the environment consists of subsidies for environmental organizations and financing of concrete actions to improve or protect the environment. Transport infrastructure expenditure on streets and public transport captures spending to cover maintenance and constructions costs of railways and bicycle trails and public transport (i.e., bus, tram). Possible substitution effects are measured with expenditure on high culture, which includes spending on high culture institutions such as museums or theaters, and expenditure related to other cultural contexts such as churches or community programs.

The public expenditure variables take three different forms (see Table 1). First, in order to take the different population sizes of the federal states into account, per capita values were used (denoted by *pc*). The second type of expenditure variable considers that it may take some time until an effect occurs for certain expenditure categories. For example, it is likely that the period between allocating public expenditure to a swimming pool and the construction process of a new swimming pool may exceed one year. Therefore, we computed three-year averages (Z_{t-2} to Z_t; denoted by *M3*) of the per capita variables to consider such lagged effects and variations in spending during this period. The three-year average was chosen as most of the expenditure effects likely occur during this period. Moreover, larger periods would have resulted in losing more observations because the state-level data were only available for the period 2003–2011, allowing the estimation of three-year averages only for the years 2005–2011. The third type of expenditure variable takes into account that governments have to operate under budget constraints, meaning that an increase in one expenditure category likely leads to a decrease in another. Therefore, the share of total public expenditure was calculated for all expenditure categories (denoted by %).

Additionally, control variables on the state and individual level were included. On the state level, information about total public expenditure, gross domestic product (GDP), and the size of recreational area was made available from the German Federal Statistical Office (2015). Using total expenditure takes into account that governmental budgets are limited, which may also affect the different expenditure categories. GDP is included since previous studies identified a positive relationship between GDP and sport participation on the national level (Ruseski & Maresova, 2014). The size of the area used for recreational activities, including area for sport facilities and swimming pools, can be considered a proxy for sport supply. On the individual level, a set of socio-economic determinants, including age, age^2, gender, marital status, income, education, and working hours, was used as control variables because they were found to also affect sport participation in previous research (e.g., Dawson & Downward, 2013; Downward, & Riordan, 2007; Humphreys, & Ruseski, 2015).

Table 1. Overview of Variables

Variable	Description	Scale
Regular_sport	Regular participation in sports and exercise (i.e., at least once a week; 1=yes)	Dummy
Spending variables		
(1) per capita values (in 1,000€): Public expenditure on …		
Facility_pc	Sport facilities	Metric
Pool_pc	Swimming pools	Metric
Sport_prom_pc	Sport promotion	Metric
Education_pc	Education	Metric
Health_pc	Health	Metric
Environment_pc	Environment protection and improvement	Metric
Street_pc	Streets	Metric
Pubtra_pc	Public transport	Metric
High_culture_pc	High culture	Metric
Culture_oth_pc	Other culture	Metric
(2) 3-year-average of per capita values (in 1,000€): Public expenditure on …		
Facility_M3	Sport facilities	Metric
…	…	Metric
Culture_oth_M3	Other culture	Metric
(3) Share of total public expenditure (in %): Public expenditure on …		
Facility_%	Sport facilities	Metric
…	…	Metric
Culture_oth_%	Other culture	Metric
Control variables		
GDP_state	Gross domestic product (in 1,000 €; per capita)	Metric
Recreational_area	Area used for recreational activities (in m^2; per capita)	Metric
Male	Gender (0=female; 1=male)	Dummy
Married	Marital status (0=other; 1=married)	Dummy
Income	Personal monthly net income (in 1,000 €)	Metric
Education_years	Education (in years)	Metric
Age	Age (in years)	Metric
Age^2	Age squared	Metric
Working_hours	Number of working hours per week	Metric

Data Analysis

In order to specify the model, three characteristics of the data have to be taken into account. First, the dependent variable *Regular_sport* is binary. Hence, a probit model using the cumulative normal distribution function to model the probability of regular sport participation is estimated. Since, for example, unlike in a linear probability model, the probit model restricts the probabilities between 0 and 1, this model can be considered most appropriate (Farrell & Shields, 2002). Second, the decision to regularly participate in sport does not only depend on individual determinants and observed public spending at the state level, but also on unobserved federal state-specific characteristics. For example, states have different needs for certain expenditures. Also, regional local costs of labor and capital vary and may influence how public expenditure affects individual sport participation. Therefore, federal state fixed effects are used to control for unobserved heterogeneity between states.

Third, individuals are nested in federal states and, therefore, all individuals living in the same state share the respective federal state's characteristics. Hence, it can be assumed that the standard errors for individuals in the same federal state are correlated. Since this would violate the assumption of independent and identically distributed standard errors, the standard errors were clustered by federal states. An alternative way of estimating the model represents multi-level modeling, which has been applied in previous research (e.g., Hallmann et al., 2012; Lerá-Lopez et al., 2016; Wicker et al., 2013). Multi-level models would have partitioned the residuals into a between-state component and within-state component. In this study, models with clustered standard errors are preferred over multi-level models (Ruseski & Maresova, 2014) as the former require fewer assumptions about the distribution of the residuals, and a violation of those assumptions could lead to biased estimations and statistical inference (Primo, Jacobsmeier, & Milyo, 2007). The model can be described as follows:

$$\text{Prob}(Y_{ist}=1 \mid X_{it}, Z_{st}, \alpha_j) = \Phi(X_{it}\,\beta + Z_{st}\gamma + \alpha_j) \qquad (1)$$

where Y_{ist} captures regular sport participation of individual i in year t living in state s; X_{it} is a vector of all explanatory variables varying by individual *i* and by time *t*; Z_{st} a vector including all the federal state expenditure variables varying by state *s* and time *t*; and α_j represents state fixed effects.

Since the investigated relationship can be described as a situation of demand (sport participation) and supply (provision of infrastructure, etc. through government spending), reverse causality as a form of endogeneity has to be discussed. It could be argued that participation levels will be affected by the budget a government has allocated to promote sport, while at the same time authorities may decide upon the budget for sport promotion partly because of existing participation levels. For example, increased health spending (e.g., on health promotion) may affect individual sport participation, while increased participation levels could lead to higher health expenditure due to sport injuries. However, the decision to allocate financial resources to sport is rarely based on an actual demand analysis of sport and, in fact, is often not evidence-based (Coalter, 2007). Moreover, the complex process starting with the approval of budgets and ending with the implementation of actual interventions by governments can often cause a lagged reaction by governments to changes in sport demand. Hence, a direct

relationship between changes in sport participation levels and the allocation of financial resources to sport cannot be expected.

Three sets of regression models were estimated, with the first two sets of models including per capita values of public expenditure and the third set using public expenditure as a percent of total government expenditure. Since sport participation behavior was found to differ between men and women (e.g., Downward et al., 2014), each set of models includes separate estimations for males and females in addition to one model for the full sample.

The first set of models includes public expenditure variables of the same year. Two robustness checks were conducted. First, rather than using government spending in the same year, expenditure variables with a one-year-lag were used. Second, the models were estimated exploiting the variation in the dependent variable by using its ordinal character. For both robustness checks, the models yielded similar results (results are available upon request). The second set of models includes three-year averages of the spending variables. Hence, it considers expenditures from years prior to the observed sport participation level, which reduces the possibility of reverse causality. The third set of models uses the relative measures of the expenditure variables.

Given a possible dependency among the different expenditure categories and also between public expenditure and GDP (e.g., McLean & McMillan, 2003), all independent variables were checked for multicollinearity using bivariate correlations. The correlation coefficients of all three types of expenditure categories were all below 0.5 and, thus, showed no indication for multicollinearity in all three sets of models. However, in addition to age and age^2, which are closely related by construction, total public expenditure and GDP were highly correlated both with each other and with some of the per capita and three-year average expenditure variables ($r>0.8$). Also, recreational area had a correlation higher than $r>0.7$ with both per capita expenditure on sport facilities and the corresponding three-year average. As a consequence, the variables for total public expenditure, GDP, and recreational area could not be included in the first two sets of models using per capita values and three-year averages. In the third set of models, total public spending could only be indirectly included because the expenditure variables were expressed in relation to total spending. However, the models with relative spending measures allow including recreational area and GDP—in line with existing research (Lera-López et al., 2016).

Results and Discussion

The descriptive results are presented in Table 2. They show that the average age of the sample is 49.36 years with a range from 17 to 101 years. Altogether, 47.3% of respondents are male and 63.5% are married. On average, respondents had 12.2 years of education, work 26 hours a week, and have a monthly net income of 1,142€. The summary statistics reveal that 34.1% of respondents regularly participate in sport. When differentiating by federal state (see Table 3), the highest participation rate can be observed in Hamburg with 41.3% and the lowest in Thuringia with 23.0%.

Turning to public expenditure, the per capita expenditure of federal states is highest for education (291.77€; 7.40% of total expenditure), followed by street infrastruc-

ture (133.04€; 3.41% of total expenditure) and expenditure on other cultural matters (59.15€; 1.54% of total expenditure). The highest amount of sport-related expenditure is allocated to the financial support of sport facilities (24.09€; 0.06% of total expenditure).

Table 2. Summary Statistics (2003–2011)

Variables	Mean	SD	Min	Max
Individual level (2003–2011; *n*=85,401)				
Regular_sport	0.342	---	0	1
Male	0.472	---	0	1
Married	0.635	---	0	1
Income	1.143	0.82	0	42.00
Education_years	12.20	2.71	7	18
Age	49.36	16.59	17	101
Age²	2,710.93	1,719.59	289	10,201
Working_hours	26.43	24.62	0	144
State level, per capita (2003–2011; *n*=85,401)				
Facility_pc	0.024	0.009	0.006	0.046
Pool_pc	0.011	0.005	0.000	0.024
Sport_prom_pc	0.011	0.003	0.005	0.018
Education_pc	0.292	0.064	0.144	0.528
Health_pc	0.021	0.008	0.011	0.051
Environment_pc	0.022	0.011	0.009	0.078
Street_pc	0.133	0.038	0.027	0.273
Pubtra_pc	0.025	0.025	0	0.153
High_culture_pc	0.044	0.015	0.005	0.119
Culture_oth_pc	0.059	0.019	0.032	0.108
GDP_state	0.029	0.007	0.017	0.054
Recreational_area	47.169	37.076	20.694	225.96
State level, 3-year average (2005–2011; *n*=71,484)				
Facility_M3	0.024	0.009	0.008	0.045
Pool_M3	0.011	0.005	0	0.023
Sport_prom_M3	0.011	0.002	0.005	0.018
Education_M3	0.290	0.061	0.145	0.512
Health_M3	0.021	0.008	0.012	0.050
Environment_M3	0.022	0.009	0.014	0.070
Street_M3	0.133	0.036	0.028	0.249

Table 2. (Cont.) Summary Statistics (2003–2011)

Variables	Mean	SD	Min	Max
Pubtra_M3	0.025	0.023	0	0.153
High_culture_M3	0.044	0.015	0.007	0.108
Culture_oth_M3	0.058	0.019	0.032	0.105
State level, % of total spending (2003–2011; *n*=85,401)				
Facility_%	0.006	0.002	0.001	0.011
Pool_%	0.003	0.001	0	0.007
Sport_prom_%	0.003	0.001	0.001	0.006
Education_%	0.074	0.019	0.041	0.157
Health_%	0.005	0.002	0.003	0.015
Environment_%	0.006	0.003	0.003	0.023
Street_%	0.034	0.011	0.005	0.065
Pubtra_%	0.006	0.008	0	0.051
High_culture_%	0.011	0.005	0.001	0.026
Culture_oth_%	0.015	0.007	0.008	0.036

Table 3. Regular Sport Participation by Federal State (2003–2011)

States	Observations	Mean
Baden-Wuerttemberg	10,318	0.372
Bavaria	12,930	0.377
Berlin	3,082	0.375
Brandenburg	3,708	0.259
Bremen	602	0.380
Hamburg	1,212	0.413
Hessen	6,194	0.393
Lower Saxony	8,043	0.377
Mecklenburg-Vorpommern	2,069	0.274
North-Rhine Westphalia	15,067	0.348
Rheinland-Pfalz	4,270	0.295
Saarland	1,028	0.394
Saxony	6,572	0.296
Saxony-Anhalt	3,736	0.234
Schleswig-Holstein	2,583	0.345
Thuringia	3,987	0.230

Table 4 shows the results of the first set of probit models, including expenditure variables of the same year. The results of the socio-demographic control variables are similar to previous research (Dawson & Downward, 2013; Humphreys & Ruseksi, 2015), indicating that the effects of the government spending variables can be considered credible.

Table 4. Results of the Probit Models for Regular Sport Participation (2003–2011; per capita public expenditure)

Variables	**Model 1a Total Sample**	**Model 1b Male**	**Model 1c Female**
Facility_pc	0.977*	1.865**	0.166
	(0.584)	(0.785)	(0.481)
Pool_pc	1.648**	1.832**	1.441*
	(0.665)	(0.854)	(0.755)
Sport_prom_pc	0.661	0.981	0.229
	(1.382)	(1.226)	(1.770)
Education_pc	-0.155	-0.206	-0.105
	(0.118)	(0.126)	(0.129)
Health_pc	-0.083	-0.348	-0.036
	(0.897)	(1.050)	(0.878)
Environment_pc	0.268	0.967*	-0.346
	(0.528)	(0.566)	(0.544)
Street_pc	0.492***	0.086	0.881***
	(0.125)	(0.152)	(0.162)
Pubtra_pc	0.250**	0.269*	0.251*
	(0.126)	(0.139)	(0.139)
High_culture_pc	0.095	0.165	0.026
	(0.624)	(0.782)	(0.545)
Culture_oth_pc	0.723	1.022	0.407
	(0.638)	(0.750)	(0.655)
Male	-0.016***	–	–
	(0.004)	–	–
Married	-0.009	0.004	-0.008
	(0.005)	(0.007)	(0.007)
Income	0.056***	0.046***	0.068***
	(0.004)	(0.003)	(0.006)
Education_years	0.035***	0.037***	0.035***
	(0.001)	(0.001)	(0.001)

Table 4. (Cont.) Results of the Probit Models for Regular Sport Participation (2003–2011; per capita public expenditure)

Variables	Model 1a Total Sample	Model 1b Male	Model 1c Female
Age	0.001	-0.009***	0.011***
	(0.002)	(0.002)	(0.002)
Age^2	-0.000***	0.000*	-0.000***
	(0.000)	(0.000)	(0.000)
Working_hours	-0.001***	-0.001***	-0.000*
	(0.000)	(0.000)	(0.000)
State fixed effects	Yes	Yes	Yes
n	85,401	40,349	45,052

Note: Displayed are the marginal effects; standard errors in parentheses;
***p<0.01, **p<0.05, *p<0.1.

Starting with direct effects, public expenditure on sport facilities and on swimming pools has a significant positive effect on sport participation in the first set of models, whereas general sport promotion is insignificant in all models. These findings emphasize the importance of sport infrastructure for regular sport participation, which is in line with previous research (Downward et al., 2014; Hallmann et al., 2012; Wicker et al., 2013). The insignificance of general sport promotion mostly reflecting subsidies for sport clubs is surprising at first glance given the important role of sport clubs for the provision of sport. However, these results may reflect the inability of governments to control how and when sport clubs actually use the financial resources allocated to them. Also, given the multi-faceted nature of sport participation, being active in a sport club represents just one possibility of sport participation. Moreover, especially younger people (under 18) who are largely excluded from the survey use the offerings of sport clubs (Hallmann et al., 2015). Furthermore, Breuer and Feiler (2015) found that 12.1% of all sport clubs in Germany have elite athletes, indicating that a certain share of the subsidies is allocated to the support of elite sport, which only affects sport participation of a small group of people.

Spending on public transport has a significant positive effect in the model for the total sample and in the models for males and females. The results indicate that governments can influence sport participation by spending on transportation infrastructure, which may translate into better accessibility of sport facilities. Since previous research found that proximity of a sport facility is an important predictor of sport participation (e.g., Huang & Humphreys, 2012), not only the raw number of sport facilities may be important, but also how easily people can cover the distance to the respective infrastructure.

The effect of spending on street infrastructure is also positive and significant in the model for the total sample and in the model for females. Recall that the variable *Street_exp* also includes expenditure on bicycle trails, which can induce people to cycle more frequently. Thus, expenditure on bicycle trails may promote cycling participation on the one hand and also facilitate reaching sport facilities.

Regarding expenditure on environmental protection, a statistically significant effect could only be identified for males. This finding is in line with previous research from Humphreys and Ruseski (2007), who found that government spending on parks and recreation has a positive effect on outdoor activities and individual sports—activities that are generally preferred by males.

The positive effects of education and health expenditure found by Lera-López et al. (2016) could not be documented in this study. One possible explanation is that this research looks at state-level expenditure with smaller between-state variance compared to the national perspective taken in previous research (Lera-López et al., 2016) where the between-country variance in terms of expenditure is higher.

The two variables measuring expenditure on culture were insignificant across all three models, suggesting that substitution effects cannot be found. This means that spending on culture does not hinder sport participation. While being insignificant, the effects are positive, indicating that positive relationships and, thus, complementary effects are even more likely than substitution effects. These results confirm previous research indicating that cultural and sport participation can also be complements (Muñiz et al., 2011). Moreover, it is important to note that it remains unclear how expenditure on cultural institutions actually transfers to cultural participation.

The second and third sets of regression models (see Table 5 and 6) consider the three-year average and percentage of total expenditure of the public expenditure variables. The discussion of results focuses on differences between the three sets of models. Regarding direct effects, unlike in the first set of models, for three-year averages only expenditure on swimming pools is statistically significant, whereas in the models using relative measures only expenditure on sport facilities is significant. The observed change in significance for expenditure on sport facilities in the three-year average model may result from spending inconsistencies over the three-year period and indicates that for spending on sport facilities, short-term effects are more likely. The insignificance of expenditure on swimming pools in the third model may result from including recreational area as a control variable, which is insignificant, but may act as a mediating variable between spending on swimming pools and individual sport participation.

Turning to spillover and substitution effects, the results are similar to the first set of models in the sense that significant positive effects are found for expenditure on street infrastructure and public transport in nearly all models. The significant effects of the three-year average variables indicates that expenditure on infrastructure may take some time until it yields an impact due to, for example, construction processes or government inefficiencies.

Conclusion

This study examined the relationship between various types of public expenditure and regular sport participation. Using individual survey data combined with data on state-level government spending, it shows that individual sport participation is not only affected by direct sport-related spending (e.g., on sport facilities and pools), but also indirectly through public expenditure on streets and transport infrastructure. The contribution of this study lies in a comprehensive analysis of the relationship between

Table 5. Results of the Probit Models for Regular Sport Participation (2005–2011; three-year average of per capita expenditure)

Variables	Model 2a Total Sample	Model 2b Male	Model 2c Female
Facility_M3	-0.584	-0.271	-5.115
	(0.409)	(4.570)	(3.880)
Pool_M3	1.599***	9.493	8.278*
	(0.518)	(6.237)	(4.431)
Sport_prom_M3	0.821	29.136	-15.675
	(3.166)	(17.943)	(18.972)
Education_M3	-0.242	-1.551	-1.107
	(0.195)	(1.191)	(1.049)
Health_M3	-0.799	0.251	-8.012
	(0.879)	(5.565)	(5.771)
Environment_M3	-0.344	3.489	-6.133
	(0.938)	(5.677)	(5.279)
Street_M3	1.425***	6.978**	8.436***
	(0.428)	(2.692)	(2.200)
Pubtra_M3	0.197*	1.675**	0.653
	(0.112)	(0.731)	(0.656)
High_culture_M3	0.007	-3.022	2.861
	(0.575)	(4.076)	(3.395)
Culture_oth_M3	0.734	3.185	4.058
	(0.885)	(5.297)	(5.235)
Male	-0.022***	–	–
	(0.003)	–	–
Married	-0.005	0.011**	-0.005
	(0.006)	(0.006)	(0.008)
Income	0.056***	0.264***	0.000***
	(0.004)	(0.018)	(0.000)
Education_years	0.035***	0.035***	0.033***
	(0.001)	(0.001)	(0.001)
Age	0.002	-0.009***	0.011***
	(0.001)	(0.002)	(0.000)
Age^2	-0.000***	0.000**	-0.000***
	(0.000)	(0.000)	(0.000)

Table 5. (Cont.) Results of the Probit Models for Regular Sport Participation (2005–2011; three-year average of per capita expenditure)

Variables	Model 2a Total Sample	Model 2b Male	Model 2c Female
Working_hours	-0.000***	-0.001***	-0.000
	(0.000)	(0.000)	(0.000)
State fixed effects	Yes	Yes	Yes
n	71,484	33,638	37,846

Note: Displayed are the marginal effects; standard errors in parentheses; ***p<0.01, **p<0.05, *p<0.1.

Table 6. Results of the Probit Models for Regular Sport Participation (2003–2011; expenditure categories as percent of total public expenditure)

Variables	Model 3a Total Sample	Model 3b Male	Model 3c Female
Facility_%	6.520***	9.551***	3.598
	(1.819)	(2.069)	(2.255)
Pool_%	1.883	2.420	1.073
	(6.365)	(4.091)	(9.113)
Sport_prom_%	3.749	4.455	2.917
	(2.910)	(3.035)	(3.745)
Education_%	-0.186	-0.465	0.117
	(0.600)	(0.655)	(0.600)
Health_%	-0.745	-2.277	0.028
	(3.545)	(4.015)	(3.591)
Environment_%	0.445	2.664	-1.532
	(1.747)	(1.768)	(1.933)
Street_%	1.064*	-0.630	2.717***
	(0.623)	(0.581)	(0.906)
Pubtra_%	0.593**	0.672**	0.592*
	(0.278)	(0.289)	(0.332)
High_culture_%	-0.712	-0.151	-1.011
	(2.617)	(2.583)	(3.072)
Culture_oth_%	1.123	2.434	-0.137
	(2.061)	(2.073)	(2.443)
GDP_state	-0.014	0.154	-0.207
	(0.901)	(1.178)	(0.872)
Recreational_area	0.000	0.000	0.000
	(0.000)	(0.000)	(0.000)

Table 6. (Cont.) Results of the Probit Models for Regular Sport Participation (2003–2011; expenditure categories as percent of total public expenditure)

Variables	Model 3a Total Sample	Model 3b Male	Model 3c Female
Male	-0.016***	–	–
	(0.004)	–	–
Married	-0.009*	0.004	-0.008
	(0.005)	(0.007)	(0.007)
Income	0.056***	0.046***	0.068***
	(0.004)	(0.003)	(0.006)
Education_years	0.035***	0.037***	0.035***
	(0.001)	(0.001)	(0.001)
Age	0.001	-0.009***	0.011***
	(0.002)	(0.002)	(0.002)
Age^2	-0.000***	0.000*	-0.000***
	(0.000)	(0.000)	(0.000)
Working_hours	-0.001***	-0.001***	-0.000*
	(0.000)	(0.000)	(0.000)
State fixed effects	Yes	Yes	Yes
n	85,401	40,349	45,052

Note: Displayed are the marginal effects; standard errors in parentheses; ***p<0.01, **p<0.05, *p<0.1.

various types of public expenditure and individual sport participation, as opposed to previous research only looking at select types of spending.

While having the difficulty of identifying causal relationships in mind, the findings have implications for policy makers and the allocation of public funds. If governments want to promote sport participation, which has the potential to generate wider social benefits (e.g., health, education, social inclusion), on a short-term basis, expenditure on sport infrastructure can be considered most promising. Even though, authorities should not only be aware of expenditure on construction and renovation of sport facilities and pools, but also how individuals can access them, as this study has revealed positive effects of expenditure on transport infrastructure and streets on sport participation. Furthermore, the results provide evidence that the financial support of cultural institutions does not negatively interfere with the objective of sport promotion. Thus, governments do not have to decide between the promotion of sport or cultural participation. Finally, governments should notice gender differences in sport participation patterns and effects of public expenditure on participation. Some expenditure types may work better for men than for women and vice versa. For example, expenditure on environment appears to be more influential on male participation, whereas spending on street infrastructure, which includes the construction of bicycle trails, affects female participation.

This study has some limitations that may be considered in future research. First, only broad measures were available for the sport participation and expenditure variables. The sport participation measure only considered participation frequency—information about the concrete type of sport activity or about participation duration and intensity was not available. However, such information would be valuable and allow considering the recommended physical activity guidelines of the WHO (2010). The expenditure variables, in particular the variables capturing spillover effects, are limited to the available level of detail provided by the German Federal Statistical Office. This limitation creates difficulties for drawing causal conclusions and, hence, future research would benefit from more detailed information. Second, since expenditure on sport tends to affect sport participation in an indirect way, including mediating variables (e.g., actual number of sport facilities), which may affect both the supply and the demand of sport, would be valuable. While these data are not available at a state level in Germany, they should be considered in future studies.

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Disclosure Statement

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