Does government spending help to promote healthy behavior in the population?

Evidence from 27 European countries

Abstract

Background: The aim of this study is to examine if government spending is associated with an individual's decision to participate in physical activity and sport which is regarded as healthy behavior given the positive health effects documented in previous research.

Methods: Individual-level data (n = 25243) containing socio-demographic information are combined with national-level data on government spending (five-year average) in 27 European countries. Given the hierarchical data structure, i.e., individuals are nested within countries; multi-level analyses are applied.

Results: The multi-level models show that it is mainly education spending that has a significant positive association with participation in sport of various regularities. Health spending has some association with participation in other physical activity and sport of a lower regularity.

Conclusions: Whilst health spending can be considered a relevant policy tool for increasing sport participation rates, education spending is required more since the effects are larger and it affects both physical activity and sport. This suggests that health spending will have most effect combined with earlier influences from education spending.

Keywords: Physical activity; sport; multi-level analysis; hierarchical model; public health policy

Introduction

Research shows that participation in physical activity and sport has positive effects on various health parameters.[1,2] These positive health effects have also been acknowledged by governments. For example in the UK, it is stated in Game Plan[3] that "the health benefits from physical activity are the most strongly supported by the evidence that is currently available, and the most likely to achieve good outcomes for government" (p. 44). Consequently, it is advocated that public policies across countries should aim at increasing participation levels among the population to improve public health.[4] Such activity could have substantial health benefits. In the UK, for example it is argued that the total costs of physical inactivity amount to £2 billion per year.[3] This policy impetus raises the question of whether or not government spending is actually associated with increasing participation rates. This question has not been addressed in detail.

Previous studies typically examine individual participation in physical activity and sport focusing on individual characteristics including age, gender, education, income, occupation, marital status, working time, presence of children etc.[5-7] Typical conclusions are that males are more likely to participate than females, middle-aged people are less likely to participate than younger and older individuals, and educational level and income are positively associated with participation.[8-10]

Some studies, however, have analyzed the role of specific regional or national factors on participation. For example, two studies[11,12] show that individuals are more likely to participate when sport facilities are close to their homes, whilst another study[13] suggest that this is the case if the facilities are considered to be satisfactory, which is less likely to be the case for females. Research has also shown that regional factors like temperature and the degree of urbanization impact on the decision to participate.[14,15] Moreover, the positive impact of macroeconomic factors like gross domestic product (GDP) on sport participation was documented in international studies[16,17] and in Europe.[14,18] Other studies investigated the

impact of functional government spending on sport participation. Humphreys and Ruseski[19] examine the effect of government spending on parks and recreation and find that such expenditure may not be an effective policy tool for increasing physical activity. Van Tuyckom[14] shows that physical activity rates are significantly higher in European countries with higher public sector expenditure on health. It is clear, therefore, with the exception of Van Tuyckom's[14] analysis that the association between more general government spending and individual participation in sport and physical activity has been largely neglected in previous research.

The purpose of this study is to examine the association between government spending on health and education and individual participation in physical activity and sport across 27 European countries. It is important to be clear of the theoretical reasons why this study is undertaken. Implied in Game Plan[3] is a strong policy argument that sport and physical activity and education and health are integrally related. But this is through both direct and indirect effects – the latter of which, from an economics perspective, can be understood as externalities or *spillovers*. From the perspective of the methodological approach used in this study (i.e., multi-level analysis), they might be described as contextual effects. In this way whilst, say, health spending tends to prioritize primary care rather than health promotion,[20-22] and it is the latter that might intuitively have more direct effects, nonetheless health spending can indirectly release time and resources to individuals to facilitate their participation, for example having elderly parents looked after, or mitigate the need for private insurance cover against injury from taking part in sports that may lead to injury.

Education spending moreover can have similar direct and indirect effects. In the former case obviously education is a site through which young people are exposed to the opportunity to participate in new activities and thereby helping to develop a taste for physical activity. Thus, education helps to form a desire for a physically active lifestyle, as well as reducing the costs of participation through, for example, developing the human capital, i.e.

skills, required to participate.[6,8] Also, it is likely that better educated individuals are more aware of the health benefits of physical activity and are, therefore, more likely to participate.[11] Indirectly moreover, it is well documented that these tastes can be transferred from adults to children.[23] Furthermore, often sports facilities are provided for communities through educational institutions.[3] The above reasons and the general lack of research on how government intervention might facilitate physical activity, through both direct and indirect effects, the latter by externalities, motivates the current research to inform policy discussion connected with resource allocation and potential welfare losses for society.[22]

Methods

Data sources

This study uses two datasets. First, individual-level data (Eurobarometer 72.3) containing information about participation in physical activity and sport as well as socio-demographic characteristics are used. The Eurobarometer is a regular survey of citizens in all countries of the European Union. It is authorized by the European Commission. Each survey has a different focus with this one focusing on physical activity and sport. Individuals are randomly selected for the interviews. For most countries approximately 1,000 individuals are surveyed, while only approximately 500 individuals are surveyed for smaller countries (Luxembourg, Malta, and Northern Ireland). The field work was conducted by TNS Opinion and Social in October 2009. The country samples are representative. The original dataset consists of n = 30292 individuals from 31 countries.

The present study focuses on the 28 countries of the European Union. For this purpose, national-level data containing information about government spending in these countries were also collected. The figures were retrieved from the Eurostat yearbook 2012.[24] Since health spending was not available for Croatia, this country was removed leaving 27 countries for the analysis. After also deleting observations with missing values on some of the variables of interest, n = 25243 observations are left for the analysis on the individual level.

Measures and variables

An overview of the variables used in this study is provided in Table 1. The variables measuring physical activity and sport result from the following two questions in the survey[25]: "How often do you exercise or play sport? […] And how often do you engage in a physical activity outside sport such as cycling or walking from a place to another, dancing, gardening…?" (p. 40). Possible answers to both questions were 5 times a week or more, 3 or 4 times a week, 1 to 2 times a week, 1 to 3 times a month, less often, never, and don't know. For our variables *any activity* and *any sport*, the first four categories were recoded into 1, while the categories *less often* and *never* were recoded into 0. Individuals replying *don't know* were given a missing value. Thus, *any activity* and *any sport* capture whether individuals participate at least once a month; that is infrequently.

Since regular activity is recommended and promoted by governments,[3] we also have two sets of variables capturing whether individuals participate in physical activity and sport regularly. Previous research argues that participation can be considered regular when it is performed at least once per week.[10] This is a measure that has been long adopted, for example for monitoring sport in the UK for policy.[26] Thus, *regular activity* and *regular sport* measure whether individuals participate at least once a week. Additional variables were also calculated to measure specific World Health Organization (WHO) recommendations for health enhancing activity (either sport or physical activity) of at least 5 times a week, i.e. *sport5+* and *activity5+*, or engagement in both at least 3 or 4 times a week to meet this threshold, *sportact5+*.[13] The former variables were calculated from the upper values of the sport and physical activity variables, and the latter from combinations of sport and physical activity of 3 or 4 times a week. Whilst the intensity of activity is not measured, these variables do identify the potential for health benefits.

The following socio-demographic characteristics of the respondents are included in this study based on the previous literature[7,8]: gender; age and its squared term; employment;

number of children in the household (as a proxy for time constraints); marital status; difficulty paying bills; and level in society.

On the national level, *health spending* captures government expenditure on health. Importantly, health spending does not only capture expenditures for hospitals, nursing, and health care, but also spending on prevention and public health services and programs.[27] Thus, as discussed above it is argued that this captures both direct *and* indirect influences of health expenditures relevant to physical activity. Since GDP and health spending are positively related,[28] a relative measure is preferred: *Health spending* is measured as a percent of GDP (both at purchasing power parity [PPP]) to ensure comparability of scale between countries and also the relative importance of spending in the countries. Health spending data across countries are comparable since the majority of European countries use the same framework, i.e., the definitions proposed in the System of Health Accounts manual.[29] The five-year average (from 2005-2009) is used to mitigate potential variations in spending and because it is to be expected that health expenditure may take time to yield impacts. *Education spending* is also measured as a percent of GDP and the five-year average is used. Importantly, the specific compositions of countries' expenditures will vary, and quite complexly, reflecting priorities and policies. The overall direct and indirect effects of these expenditures on sport will naturally *vary* across countries. To allow for this differential variance and to focus on the *typical* impact of these expenditures both directly and indirectly, therefore, means that the standard errors in the analysis are corrected for heteroskedasticity.

Insert Table 1 here

Empirical model

As the present data are hierarchical in nature, meaning that all individuals living in the same country share the same country characteristics, integrating national level data into the individual level dataset can lead to interpretational and statistical errors if the variables are not just used as controls with clustered variances. Specifically, on higher-level variable

coefficients, the Type I error would be inflated because of too many degrees of freedom and bias in the standard errors. There is also an *ecological fallacy* meaning that higher-level results (here: national level) are ascribed to those of the lower level (here: individual level).[30] Multi-level analysis is, therefore, an appropriate statistical procedure to be used when seeking to identify the associations between country-level government spending and individual behavior.[31]

Within multi-level analyses separate regression models are estimated for each level. The two datasets (national and individual level) are linked through a key variable (country), which is present in both datasets. Multi-level models require large samples, particularly on the higher level. This study meets the criterion of having at least 20 cases on the higher level.[30] As the dependent variables are binary a logit model is estimated and odds ratios are reported, for ease of reporting the direction and scale of effects. The odds ratios of individual variables on individual participation can be interpreted as usual. The odds ratios of the aggregate government expenditure variables effectively capture the effect of the changes in expenditure on the country level effect on individual participation. In other words, whilst many unmeasured reasons might imply that individual participation varies more across countries than within them, for example due to culture, government spending might explain some of this variation.

Altogether, seven multi-level models are estimated in this study with *any activity, regular activity, any sport, regular sport, sport5+, activity5+,* and *sportact5+* serving as the dependent variables. All national-level and individual-level variables from Table 1 are included as independent variables. Fixed-effects models are preferred because they provide the effect that is constant for all groups (countries); robust standard errors are estimated to control for heteroskedasticity that could be influenced by compositional differences in country expenditures.[32] The models are estimated with HLM 7.1.[33]

Results

Summary statistics

The summary statistics (Table 2) show that 44% of the respondents are male. The average age is 48.7 years. Altogether, 41% of the respondents report being employed, 51% are currently not working, and 7% are self-employed. On average, there are 0.28 children below 10 years and 0.16 children between 10 and 14 years in the surveyed households. Most respondents are married (54%) and never have difficulty paying bills (64%).

Concerning participation, 87% of the respondents participate in any physical activity outside sport at least once per month, while only 30% do this more regularly, i.e., at least once a week. Altogether, 61% of the respondents play any sport at least once a month and 39% participate regularly in sport. Ten percent of the respondents play sport 5 times a week or more, 30% participate in physical activity 5 times a week or more, and 16% participate at least 3 or 4 times a week in both physical activity and sport. On average, the governments of the 27 countries under investigation spent 6.03% of GDP on health and 5.37% on education.

Insert Table 2 here

Multi-level models

The results of the multi-level models are presented in Table 3. Since the individual determinants on participation in physical activity and sport have already been investigated intensively,[5,7-9] and consistent with the focus of the paper, the presentation of results concentrates on the national-level effects. Recall that odds ratios > 1 imply positive effects, while odds ratios < 1 capture negative effects. The value greater than or less than one implies the percentage change in the odds of the behavior being analyzed in response to a one unit change in the relevant independent variable (or switch to the characteristic scored *1* rather than *0* in a dummy variable). In Model 1, neither health spending nor education spending have a significant impact on an individual's odds of participating in any activity outside sport. In Model 2, education spending has a significant positive effect, while the effect of health spending is insignificant. The odds ratio reveals that spending on average one percent of GDP

more on education (i.e., one unit change in this variable) is associated with an increase in the odds of participating in regular physical activity by 20.1%.

Turning to the models estimating the determinants of sport participation, it can be seen that spending on both health and education have a significant positive impact on an individual's probability to play sport at least once per month (*any sport;* Model 3) and at least once a week (*regular sport;* Model 4). In contrast, for participation in sport of at least five times a week (*sport5+*; Model 5) only education spending has a significant effect. The same is the case when considering any physical activity at least five times a week (*activity5+;* Model 6) and the combined variable of sport and physical activity (*sportact5+;* Model 7).

The coefficients for these models show that when governments spend one percent of GDP more on health on average, the odds of participation increase by 18.3% (*any sport*) and 20.6% (*regular sport*). The odds of participation increase even more when government spending on education increases by one percent of GDP on average: the increases are 34.6% (*any sport*) 45.4% (*regular sport*), 43.3% (*sport5+*), 20.1% (*activity5+*), and 37.8% (*sportact5+*).

Insert Table 3 here

Discussion

Main findings of this study

The results of this study indicate that government spending on health is not typically associated with the healthy behavior of the population in the sense that it does not affect individuals' probability to participate in physical activity, though it can mediate less frequent sport. In contrast, whilst government spending on education has no association with any physical activity, it has a significant positive association with regular physical activity and participation in physical activity (and sport) 5 times a week or more. This means that in countries where governments spend a higher percentage of GDP on education, the probability of citizens being more regularly physically active is significantly higher. The significant

association of education spending is particularly interesting because governments spend on average more on health than on education. The findings have implications for policy makers who aim at promoting public health. If the aim of health policies is to increase participation rates for physical activity, it can be recommended that education may be a more fertile ground to invest in. Health promotion expenditures might be better targeted at education, and that education spending should be recognized as having important spillovers for health promotion.

What is already known on this topic

The individual determinants (e.g., age, gender, income, time, education) of participation in physical activity and sport have already been well documented in previous research.[5-9] It was also shown that the proximity of sport infrastructure plays a role.[10,11] Moreover, some studies examined the effect of regional[14,15] and macroeconomic factors[16-18] on the likelihood to participate.

What this study adds

This study contributes to the literature by examining how government spending affects participation in physical activity and sport which is considered healthy behavior. This topic has been neglected in previous research with a few exceptions.[19] Yet, it is important to examine the effectiveness of public spending respectively which expenditures (health vs. education) are associated with higher participation rates. For policy makers it is important to know where to allocate money in order to achieve the desired outcomes stated in public health policies. This is particularly relevant given the tight public budgets across countries.

Limitations of this study

This study has some limitations that represent avenues for future research. It is only based on cross-sectional data and, thus, faces similar problems as other studies using official survey data where panel data are scarce because questions about physical activity are only randomly asked every few years. Therefore, those questions should be considered more often in official surveys so that developments over time can be tracked. Moreover, the present study

is limited to the survey variables. Only participation decisions modelling decision thresholds are presented and not the determinants of the frequency, duration, or intensity of physical activity and sport. Furthermore, future research should break down health and education spending into several spending categories, financing agents, and providers. Such data would allow more detailed recommendations for policy makers. Yet, at present these data are not available for all countries.

Conflict of interest

The authors declare that there is no conflict of interest.

Funding

This research received no specific grant from any funding agency in the public, commercial, or not-for-profit sectors.

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Table 1

Overview of variables

Variable	Description	Scale

Dependent variables		
Any activity	Participation in any physical activity outside sport including cycling or walking from a place to another, dancing, gardening etc. at least once a month (1=yes)	Dummy
Regular activity	Participation in any physical activity at least once a week (1=yes)	Dummy
Any sport	Participation in sport at least once a month (1=yes)	Dummy
Regular sport	Participation in sport at least once a week (1=yes)	Dummy
Sport5+	Participation in sport 5 times a week or more (1=yes)	Dummy
Activity5+	Participation in physical activity 5 times a week or more (1=yes)	Dummy
Sportact5+	Participation in sport and physical activity 3 or 4 times a week (1=yes)	Dummy
National level		
Health spending	Government expenditure on health (percent of national GDP; average of five years, 2005-2009)	Metric
Education spending	Government expenditure on education (percent of national GDP; average of five years, 2005-2009)	Metric
Individual level		
Male	Gender (0=female; 1=male)	Dummy
Age	Age	Metric
Age squared	Age squared (=Age*Age)	Metric
Employment		
No work	No work (1=yes)	Dummy
Self-employed	Self-employed (1=yes)	Dummy
Employed	Employed (1=yes)	Dummy
Children up to 10	Number of children under 10 years in the household	Metric
Children 10-14	Number of children between 10 and 14 years in the household	Metric
Marital status		
Single	Single (1=yes)	Dummy
Married	Married (1=yes)	Dummy
Couple	Couple (1=yes)	Dummy
Widowed	Widowed (1=yes)	Dummy
Separate	Separate (1=yes)	Dummy
Other status	Other marital status (1=yes)	Dummy
Difficulty paying bills	During the last twelve months, would you say you had difficulties to pay your bills at the end of the month…?	
Never	Almost never/never (1=yes)	Dummy
Sometimes	From time to time (1=yes)	Dummy
Often	Most of the time (1=yes)	Dummy
Level in society	Perceived level in society (from 1=lowest level to 10=highest level)	Ordinal

Table 2

Summary statistics

Variable	Obs.	Mean	SD	Min	Max
Any activity	25243	0.87	0.34	0	1
Regular activity	25243	0.30	0.46	0	1
Any sport	25243	0.61	0.49	0	1
Regular sport	25243	0.39	0.49	0	1
Sport5+	25243	0.10	0.30	0	1
Activity5+	25243	0.30	0.46	0	1
Sportact5+	25243	0.16	0.37	0	1
Health spending	27	6.03	1.45	3.06	7.76
Education spending	27	5.37	0.98	3.88	7.18
Male	25243	0.44	0.50	0	1
Age	25243	48.74	18.25	15.00	98.00
Age squared	25243	2708.81	1833.03	225.00	9604.00
Employment					
No work	25243	0.51	0.50	0	1
Self-employed	25243	0.07	0.26	0	1
Employed	25243	0.41	0.49	0	1
Children up to 10	25243	0.28	0.65	0	9
Children 10-14	25243	0.16	0.48	0	14
Marital status					
Single	25243	0.18	0.38	0	1
Married	25243	0.54	0.50	0	1
Couple	25243	0.09	0.29	0	1
Widowed	25243	0.10	0.30	0	1
Separate	25243	0.07	0.26	0	1
Other status	25243	0.02	0.13	0	1
Difficulty paying bills					
Never	25243	0.64	0.48	0	1
Sometimes	25243	0.26	0.44	0	1
Often	25243	0.09	0.29	0	1
Level in society	25243	5.62	1.59	1	10

Table 3

Multi-level models for participation in physical activity and sport (fixed effects models with robust standard errors; displayed are the odds ratios)

	Model 1: Any activity	Model 2: Regular activity	Model 3: Any sport	Model 4: Regular sport	Model 5: Sport5+	Model 6: Activity5+	Model 7: Sportact5+
Intercept	1.694	0.234**	0.261*	0.049***	0.017***	0.234**	0.021***
Health spending	1.121	0.922	1.183***	1.206***	0.997	0.922	1.057
Education spending	1.058	1.201*	1.346**	1.454***	1.433***	1.201*	1.378***
Male	1.084*	0.971	1.204***	1.129***	1.109*	0.971	1.071
Age	1.007	1.014**	0.944***	0.951***	0.982*	1.014**	0.981**
Age squared	0.999***	0.999***	1.000**	1.000**	1.000	0.999**	1.000
Self-employed	0.890	0.822**	1.306***	0.989	0.928	0.821**	0.812**
Employed	1.052	0.731***	1.282***	0.948	0.695***	0.731***	0.719***
Children up to 10	0.916**	1.054*	0.855***	0.838***	0.846***	1.054*	0.870***
Children 10-14	0.999	1.019	0.989	1.016	1.019	1.020	1.024
Married	1.094	0.955	0.983	0.916*	0.946	0.956	0.907
Couple	1.167**	0.887**	0.977	0.862***	0.908	0.887**	0.883*
Widowed	0.878*	0.941	0.873*	0.831***	0.840*	0.941	0.825*
Separate	1.005	0.963	1.000	0.976	1.090	0.963	1.039
Other status	1.004	1.193	1.274	1.486	1.440*	1.193	1.172
Never	1.624***	1.141**	1.533***	1.757***	1.256**	1.141**	1.578***
Sometimes	1.376***	0.982	1.274***	1.287***	0.968	0.983	1.253**
Level in society	1.087***	0.992	1.194***	1.168***	1.094***	0.993	1.141***

Note: *p<0.1; **p<0.05; ***p<0.01. Reference categories are *no work* (employment), *single* (marital status), and *often* (difficulty paying bills).