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A poll too far? A study of the moderating effects of obesity and poor health on the distance to the ballot station and probability to vote relationship

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Abstract
This article explores the moderating effects of body obesity and subjective health status on the relationship between distance to the polling station and voter turnout in the Czech general election of 2017. Using insights from rational choice theory and the funnel model of turnout, multilevel logit models were used to examine whether the relationship between reported turnout and distance from home to the polling station was different for those who are obese and/or think they are in poor health. This study is based on analyses of the Czech Household Panel Survey data. The modelling results confirm that those who were obese and in poor health had a lower probability of voting as the distance to the polling station increased. Furthermore, this study found that being interested in the 2017 election outcome (instrumental motivation) did mitigate physiological limitations associated with getting to a polling station; however, thinking that voting is a civic duty (moral motivation) had no strong effect on the distance to the polls and turnout relationship.

Keywords
distance to polling station, health, obesity, voter turnout

Introduction

Most often, social scientists focus on the resource and motivational aspects of political participation. Here there has been a tendency to overlook the health or physiological aspects of voting. Consequently, voter characteristics such as being overweight or obese and subjective health evaluations have been ignored, on the assumption that nonvoting is primarily a personal choice. Such reasoning increases the methodological risk of invalid inferences due to the fundamental attribution error. This article questions this assumption by focusing on two key aspects of voters' health by exploring if being overweight/obese and feeling one is in poor health have direct and indirect effects on decisions to go to the polls on election day.

Obesity is a serious threat to public health and its increasing prevalence is of growing concern in many societies (Lean and Malkova, 2016). According to the most recent European Health Interview Survey (EHIS 2014), about half of all adults in the European Union (EU) are overweight and about one-in-six are obese. Czechs are above the EU-average for both characteristics. While the link between general health status and political participation has been examined by a number of scholars (e.g. Denny and Doyle, 2007; Haider-Markel and Joslyn, 2017; Mattila et al., 2017; Pacheco and Fletcher, 2015), the association between individual physiological characteristics, such as body mass index (BMI), and voter turnout remains understudied.

Within the literature on voter turnout, the issue of how far electors must travel to get to their assigned polling station is viewed as a nonnegligible cost of voting. The probability of voter turnout should be lower for those who live farthest from the polling station, that is, there is a negative relationship between turnout and distance to the polls because of the time and costs involved. From this perspective, individuals with physiological characteristics

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that limit their mobility should incur greater costs to getting to the polls on election day. To date, this specific aspect of voter turnout has been little considered or studied.

Using data from wave 3 of the Czech Household Panel Survey (CHPS) and a follow-up postelection survey (both conducted in the latter half of 2017), the aim of this article is to examine whether the "voter turnout and distance to polling station" relationship, evident during the Czech general election of October 2017, was moderated by being overweight or obese and subjective health status. The central research question of this article is whether longer distances to polling stations have a more negative influence on obese and less healthy people than all others ceteris paribus. Previous research confirms the expectation that those living further away from the polls are less likely to vote (e.g. Gibson et al., 2012; Niemi and Hanmer, 2010; Pawlowski and Coates, 2013).

One limitation of previous studies is that they did not take into account the possibility that the distance from polling station and turnout relationship may be moderated by individuals' physiological characteristics manifested in obesity and lower subjective health evaluations. One way in which the negative relationship between distance to polling station and probability of voting operates is through motivation mechanisms and their interaction with personal resources (or lack thereof resulting from health-based disabilities). This is the approach adopted in Wass and Blais's (2017) "funnel model of turnout" where the decision to go voting reflects a balance between the costs and benefits of going to the polls. Using Wass and Blais's (2017) general framework for studying turnout, this article will explore whether moral and instrumental motivations to vote indicated by (a) agreeing that voting is a civic duty and (b) being interested in the election outcome may attenuate the greater costs of getting to the polls for those who are overweight/obese and/or feel they are in poor health.

Obesity and poor health as costs of voting

According to the rational choice account of voter turnout, distance to the polling station is considered a cost for all voters. Of course, this particular cost of voting is not the same for each person. Although countries regulate the spatial distribution of polling station to optimize the convenience of voting, there are always differences in distances to polling stations among voters. Therefore, according to rational choice theorists, this particular cost of participation is higher for people living farthest from the ballot station. However, this perspective assumes that distance to the polling has the same cost-based meaning for all voters: this homogeneity assumption may be questioned.

For instance, voters differ in their health status, as indicated by physiological indicators such as BMI, and their ability to easily walk to a polling station. Since differences in health status among voting populations are universal, this systematic variation in mobility and associated costs and barriers to voting constitute the potential basis for political inequality through mechanisms such as differential turnout. In this article, the short-hand term "low physiological potential" will be used to refer collectively to the characteristics of (a) being overweight or obese and (b) feeling in poor health that might constitute the basis for political inequality.

Subjective health status and voter turnout

Scholars of electoral behavior know that poor health is associated with lower voter turnout (Arah, 2008; Blakely et al., 2001; Denny and Doyle, 2007; Pacheco and Fletcher, 2015). This empirical correlation has been typically explained using a rational choice type of argument that emphasizes individual perceptions of the costs and benefits of going to the polls. For a healthy citizen where walking is not a problem, the costs are small but for a person in poor health, the costs may not be negligible. More generally, rational choice theory predicts that those incurring greater costs in getting to the polls, such as those in poor health, will have a lower probability of voting.

The reasons for this negative distance–turnout relationship relate to (a) the time and effort of getting to the polling station and (b) the opportunities foregone in going voting rather than doing something else that is considered personally enjoyable or beneficial. For the subsection of the electorate who have restricted mobility due to obesity or feeling they are in poor health, for instance, the calculus of voting should be systematically different to that experienced by their fellow healthier citizens.

There is evidence that supports this rational choice account. Previous studies have reported a strong connection between walking (ability and speed) and reported subjective health (Guralnik et al., 2000; Jylha et al., 2001; Ostir et al., 2007; Rolland et al., 2006). Neufeld et al. (2013) indicate that walking ability is a key decision factor when people are asked to rate their health. Jylha et al. (2001: M609) note that "both walking difficulty and walking speed are independent determinants of self-rated health."

In short, ease of mobility is a very good summary measure of a person's overall health status, and hence propensity to undertake physical activities such as going to a polling station on election day. Combining this medical insight with a prediction from a rational choice account of turnout leads to the following hypothesis.

> **H1:** There will be a lower probability of voting for adults with low subjective health status scores who reside a greater distance from the ballot station.

This first hypothesis directly captures the practical idea that the distance to the polls depends critically on a voter's subjective health status. The question of why a person feels

they are in poor health is not addressed in hypothesis 1. It is possible that for a nonnegligible number of voters, feelings of poor health are a consequence of being overweight or obese. Here it is important to see whether body size measured in terms of height and weight (BMI) may be an independent channel through which limited mobility may be linked with propensity to go to the ballot station on election day.

Obesity and voter turnout

From a physiological perspective, being overweight or obese is costly because such conditions lead in comparative term to greater energy consumption, higher metabolic costs, and more restricted mobility. Medical studies highlight that daily activities are more difficult for overweight and obese people due to a high level of body fat and biomechanical factors that restrict the ability of limbs to operate in a free, fluid, and efficient manner (Delextrat et al., 2011; Hemmingsson and Ekelund, 2007; Peyrot et al., 2009).

One method of examining the consequences of variations in body size, as indicated by BMI, is through a simple test involving experimental subjects attempting to walk as far as possible in 6 min. The results of two such studies show that endurance is progressively lower for people with a higher BMI (Hergenroeder et al., 2011; Pataky et al., 2014). BMI is calculated by dividing a person's body mass by the square of their height where BMI is expressed in kilograms per square meter (kg/m^2). BMI is a simple measure of body size.

The negative relationship between the distance walked and the body size has been explained in terms of three mechanisms. First, walking requires comparatively more energy for overweight and obese people (Delextrat et al., 2011; Foster and McGuckin, 2001; Lazzer et al., 2003; Pataky et al., 2014). This means that going voting is physiologically costlier for those with higher BMI scores. Second, being overweight or obese is less efficient as the biomechanical cost of supporting a larger body with lower powered limbs results in a comparatively higher and less efficient metabolic rate (Hulens et al., 2001). Consequently, for the obese, walking the same distance to the polls as a person with a normal BMI score is comparatively costlier in physiological exertion, thereby reducing the instrumental and potentially expressive benefits of voting. Third, overweight and obese people are more likely to suffer from secondary health problems that further impair physical movement such as walking. This suggests that additional consequences of walking to the polls further increase the physiological costs of voting. Each of these three mechanisms underpins the general expectation outlined in the following hypothesis.

H2: There will be a lower probability of voting among overweight and obese voters who live a greater distance from the polling station.

The second hypothesis complements the first by highlighting the general health-based costs of voting especially for those who are less mobile due to infirmity and/or being overweight or obese. It is important to stress that being obese does not automatically imply being unhealthy or having a low subjective health status score. In fact, physiologists highlight there can be an important interaction between low subjective health status and high BMI scores resulting in systematic differences in the amount of physical activities undertaken by the overweight and obese (Bell et al., 2015). The key implication here is that one should expect variation in the probability of voting among the overweight/obese depending on their subjective health status.

It is also important to note that besides physiological factors, there are also psychological reasons why the voting turnout may differ for obese people compared to normal-weight people. As previous research has shown, stigma and discrimination toward obese people are pervasive and influence their psychological and physical health (Puhl and Heuer, 2010). Obese people can decide not to vote to avoid showing up in public place. Classic study by Goffman (1963) suggest that one option how to respond to their stigmatized situation is using the obesity as an excuse and protection from social responsibility (Goffman, 1963: 20).

Distance to polling station

Countries differ in their average distance to polling stations. This is primarily due to law settings and different population density. Rational choice theory predicts that the probability of voting should decline as distance from the polling station increases because the costs of participation increase with distance. There is empirical support for this simple cost-based prediction of who goes to the polls (Gibson et al., 2012; Haspel and Knotts, 2005; Niemi and Hanmer, 2010; Pawlowski and Coates, 2013). Here some caution is warranted because a distance-based cost of going voting is sensitive to the mode of travel used: a 3-km trip by foot, bike, bus, or car to the ballot station is a qualitatively different experience.

There is some research on this topic. For example, Bhatti and Kasper's (2012) study found that car ownership reduces the inconvenience associated with travelling to the polling station. In line with rational choice theory, greater distance from a polling station is associated with lower probabilities of voting for all electors, but those who have access to a car are less sensitive to changes in distance to polling station (Haspel and Knotts, 2005). On balance, previous research suggests that longer distances to polling

stations reduce turnout regardless of how people travel to vote.

Election authorities are sensitive to this fact and have created a number of alternatives methods of voting that do not require travel to a ballot station on election day. In various countries, there are options such as "early" voting in public places like shopping malls, voting by mail or post, and e-voting. In the Czech Republic, voters with special needs may request that a mobile ballot box come to their home. The main goal of all voter facilitation policies is to maximize turnout.

Regulatory conflict and motivation

On voting day, voters are motivated to go to the polling station and yet for those who are overweight, obese, and/or have poor health there is "regulatory conflict." Regulatory conflict refers to motivated social action that is constrained by physical limitations where individuals must balance the "expenditure of energy against the bioenergetic resources available for action" (Cole et al., 2013). Medically speaking, voters who are overweight, obese, and/or in poor health are said to have a "low physiological potential" and will frequently experience regulatory conflict when matching desired goals with a constrained reality. Specifically, voters who have limited mobility may want to vote but decide reluctantly that they are unable travel to the polling station for fear of experiencing some medical difficulties (Cole et al., 2013; Trope and Fishbach, 2000).

To recap, the first and second hypotheses, outlined above, predict that people with a low physiological potential will be more likely to abstain from voting if the polling station is far away from their home. This is because the physical effort, or cost, involved is comparatively high. Here it is important to recognize that the distance from home to polling station may also have an important psychological aspect. Specifically, individuals with a low physiological potential are known to overestimate distances to be travelled and lengths to be traversed (see Cole et al., 2013; Lessard et al., 2009). Consequently, the moderating effect of low physiological potential on the relationship between the probability of voting and distance to the polling station may be further accentuated by the specific psychological characteristics of having a low physiological potential.

Previous research on voter turnout has frequently highlighted the importance of individual motivation for explaining variation in voting among individuals living in similar life circumstances. Consequently, it is essential to examine the possibility that the barriers to voting experienced by those with a low physiological potential may be offset by having a strong personal motivation to vote. In this article, two motivational factors that are known to have strong associations with probability to vote will be investigated. First, one of the strongest correlates of voter turnout is agreement that voting is a civic duty (Blais and Achen, 2018; Wass and Blais, 2017).

Here it is possible to envisage a voter with a low physiological potential who is experiencing regulatory conflict might nonetheless decide to travel to the ballot station on election day because they believe it is their moral duty as a good citizen to vote. This sense of civic duty operates independently of other motivations such as partisanship and concern about electoral outcomes and represents a key mechanism for lessening the moderating effect of low physiological potential on the relationship between probability of voting and distance to the polling box. This leads to the following hypothesis that proposes a three-way interaction (moderation) effect.

> **H3:** The moderating effect of low physiological potential on the relationship between distance to the ballot station and voter turnout will itself be moderated by support for the moral belief that voting is a civic duty.

This hypothesis says that the negative effect of greater distance from the polling station on probability to vote among voters with low physiological potential will be cancelled by these voters' belief that voting is a civic duty. In short, the health status of the voter should not matter for the turnout-distance-to-polls relationship if a sense of civic duty is present.

A second potentially important motivation for voting is being interested or concerned about the outcome of the election. In contrast to the moral basis for the civic duty motivation for electoral participation, being interested in which party or coalition wins an election is an instrumental motivation that forms a core element of the rational choice theory account of why people vote. With regard to voters who have a low physiological potential, they are more likely than all other voters to have a strong interest in the health and social welfare policies of the next government (Denny and Doyle, 2007; Mattila et al., 2017; Söderlund and Rapeli, 2015). This is because they are more dependent on public health services than all others. This dependency creates an instrumental motivation to vote for any candidate, party, or coalition option that has the most generous health and social welfare spending policies. The presence of this instrumental motivation is the basis for the following hypothesis.

> **H4:** The moderating effect of low physiological potential on the relationship between distance to the ballot station and voter turnout will itself be moderated by interest in the election outcome.

In a similar way to hypothesis 3, this fourth hypothesis predicts that the link between low physiological potential and probability to vote for those residing at greater distances from the ballot box will be mitigated by the presence of an instrumental motivation. To summarize, the potential

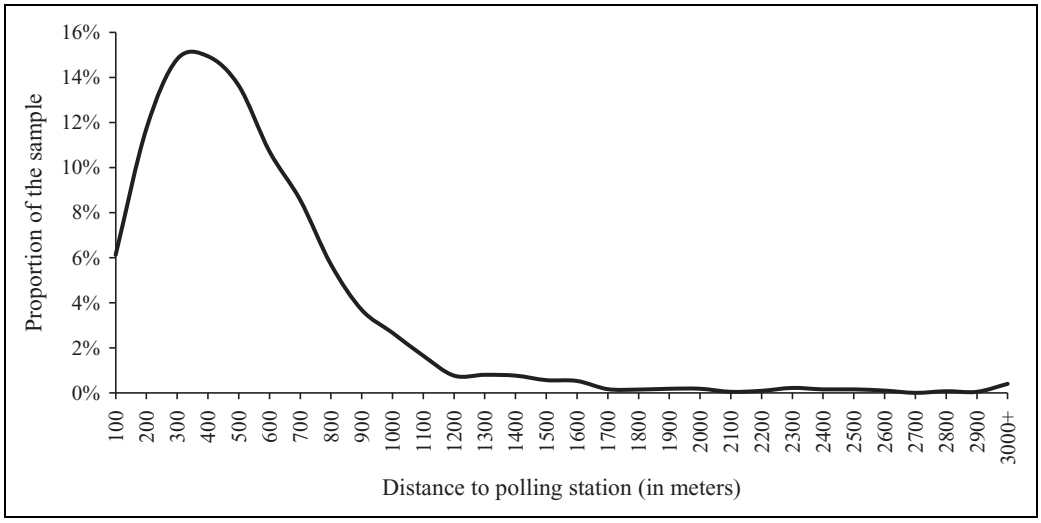

Figure 1. Distribution of distances from households to polling stations. *Source:* CHPS wave 1 (2015), $n = 10{,}990$. Note the area under the curve represents all voters (100%) at all distances ($\leq$100 m to $\geq$3000 m) from the ballot station.

costs of travelling some distance to vote for those with low physiological potential can be balanced by both moral and instrumental motivation. Having discussed a number of rational choice theory-based expectations regarding how the probability of voting and distance to the polling station relationship might differ for low physiological potential voters with contrasting motivations, it is now appropriate to describe the national context of the case study reported in this article.

Walking and voting in the Czech Republic

This article uses the Czech Republic as a case study. According to the second wave of the EHIS (2014), the Czech Republic has one of the highest overweight and obesity rates in the EU: 55% of Czechs are overweight and 19% are obese. To date, the focus has been on the public health consequences of obesity and poor health. Much less attention has been paid to the political or democratic consequences of having an increasingly immobile citizenry. The goal of this article is to provide a first step in exploring these consequences. With regard to the administration of elections, the Czech Republic does not allow early voting, postal/mail voting, or e-voting. However, there are at least four policies that are designed to make voting more convenient for Czechs who have limited mobility.

First, voting registration is automatic. Second, elections are always held over 2 days, typically Friday afternoon and evening and Saturday morning and early afternoon. Third, voters with mobility or health issues can request before or during polling days that a mobile ballot box visits their home. In this situation, the distance to the ballot box is zero. Fourth, the Czech Republic has a comparatively high number of polling stations ensuring that most of voters live within walking distance of their polling station; and therefore, the travel costs of voting are minimal.

Figure 1 shows the distribution of distances from respondents' home address to their assigned polling station. Based on data from wave 1 of CHPS (2015), a large majority of Czechs (93%) reside within 1 km of their polling station. In wave 3 of CHPS (2017), respondents were asked how usually they get to their polling station. A majority (82%) reported walking from home. The remainder went by car (13%), used public transport (2%), or went voting on their way from work, and so on (2%). Only one in a hundred voters requested having a mobile ballot box visit their home, which suggests that many older and infirm voters who would be eligible to avail of this service fail to take advantage of this option. The suspicion here is that this low uptake may reflect a social norm that places a high value on personal privacy even if the cost is loss of opportunity to vote.

Figure 2 combines walking distance from home to polling station with usual type of transport respondents used to go voting. This graph shows that the two main means of getting to the ballot box are walking and using a car. Moreover, this figure reveals that there is a relationship between the mode of transport and the distance to the polls: the farther respondents live from their polling station the more likely they are to use their car. This association fits with a rational choice cost-oriented view of voting where distance to the polls influences voters' choices on election day.

Turning now to Table 1, the survey data estimates reveal that there are small differences in how overweight, obese, and people with a "normal" body size travel to polling stations on election day. This evidence shows that a large majority (>80%) get to their assigned balloting point by walking regardless of their physiological potential. Use of cars and the mobile ballot box option is slightly higher

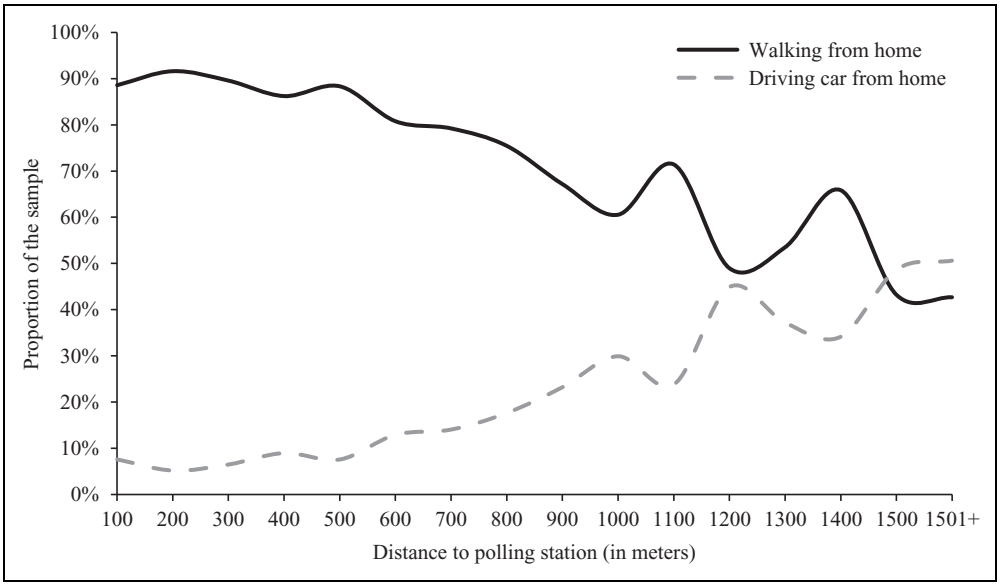

Figure 2. Mode of travel to polling stations by distance traversed. *Source:* CHPS wave 3 (2017), *n* (respondents) = 5404. Note that travel options with estimates of less than 5% (i.e. ballot box came to home, use public transport, and went to polling station from work) for all distances are not presented for reasons of clarity.

Table 1. Mode of travel to the polls by subjective health status and body size (%).

	Subjective health status					Body size (BMI)		
Means of getting to the polling station	Excellent health	Very good health	Good health	Average health	Poor health	Normal	Overweight	Obese
I walk from home	83	82	85	86	77	82	83	80
I use public transport	2	2	2	2	2	3	2	2
I drive a car from home	10	13	11	10	16	12	13	14
I stop to vote on my way from a place other than home	5	3	2	2	1	2	2	2
Ballot box comes to my home	0	0	0	1	4	1	1	1

Source: CHPS wave 3 (2017), $n = 5404$.
Note: BMI: body mass index; CHPS: Czech Household Panel Survey. Note that the columns sum to 100% subject to rounding errors.

among those who are classified as obese on the basis of their BMI. Table 1 suggests that those who report they are in poor health are less likely (−5 to 9 percentage points) to walk to the polling station than all others and are more likely to use a car (+6 points) and mobile ballot box (+4 points).

Data and methods

This article makes use of two CHPS data sets. The first data set contains information from wave 3 of CHPS (June to October 2017). The second data set is a postelection survey fielded in late October 2017 that contains mainly those who participated in wave 3 of CHPS during the previous 20 weeks. As both surveys formed part of a 4-year annual panel study, it is likely that those agreeing to be interviewed repeatedly may be different from the general population. One indication of a selection effect is a 24% overreporting of turnout where the actual rate was 61%. More will be said on this point below. Of course, this overreporting may also be due in part to well-known social desirability effect evident in most postelections surveys.

The five key explanatory variables used in this article are walking distance to the polls, BMI score (trichotomized: normal, overweight, obese), subjective health rating, sense of duty to vote, and interest in the election outcome. The walking distance from home address to assigned polling station has been calculated as shortest walking distance in meters using an algorithm used by Google Maps. BMI is calculated by using self-reported weight and height data. Overweight and obesity are operationalized as in previous studies such as Pataky et al. (2014): normal body size (BMI $\geq 18 < 25$ kg/m^2), overweight (BMI $\geq 25 < 30$ kg/m^2), and obese (BMI ≥ 30 kg/m^2).

The health data used in this article come from a standard subjective health question: "Would you say in general your

health is? (1) Excellent, (2) Very good, (3) Good, (4) Average, or (5) Poor." Mavaddat et al. (2011) report that answers to this subjective health question are strongly associated with physical health. Previous research also shows that subjective health ratings are strongly correlated with walking performance, that is, speed and distance. In sum, subjective health is a reasonable proxy indicator of ability to walk to a polling station. Turning now to the two types of voting motivation explored in this study, belief that voting is a civic duty was measured using a standard postelection item: "For some people voting is mostly a duty. For others, voting is an option. For you voting is? (1) A duty, (2) An option, (3) neither, or (4) don't know." Answers to this question were dichotomously recoded: 1 versus all other answers to create a measure of belief that voting is a civic duty. Having an instrumental motivation for voting was measuring with the following item: "How much do you personally care which parties will form the government coalition after the elections to the Chamber of Deputies?" (1) *A lot*, (2) *Quite a lot*, (3) *Not much*, (4) *Not at all*, and (5) *Don't know*.

The modelling strategy used in this article makes heuristic use of the funnel model of turnout formulated by Wass and Blais (2017). This model presents a broad explanatory framework for mapping out the many factors that are known from previous research to be correlated with voter turnout. Figure 3 shows that the broad range of factors identified are classified into five groups: resources, motivation, convenience, expression, and duty.

Of particular interest to this study is distance to the polling station, obesity, and health that fit into the "convenience" grouping of explanatory factors. Interest in the election outcome is viewed in the funnel model as an indicator of voter "expression." It is important to stress here that this article did not aim to test Wass and Blais's (2017) funnel model. Rather the goal was to use this model to outline a well-specified statistical models of turnout that minimize the possibility of omitted variable bias regarding the testing of the four hypotheses presented above.

Finally, it is prudent to take account of a potential confounding variable: urban versus rural location. It is well-known that those living in rural areas reside in places that are served by fewer polling stations. Consequently, those living in the Czech countryside travel on average farther to vote. In addition, there is a persistent difference in actual voter turnout between urban and rural areas. Therefore, a dichotomous variable indicating urban and rural areas is included in the models estimated to control for any confounding effects.

All models presented later in Table 2 were estimated using multilevel logit. This is because the household data have a hierarchical structure where respondents were nested in collective dwellings such as family homes. As hypotheses 3 and 4 involve moderation effects the most appropriate approach is to represent these complex relationships graphically. This is because single parameter estimates of moderation effects, as given in statistical software output, is known in some situations to be misleading.

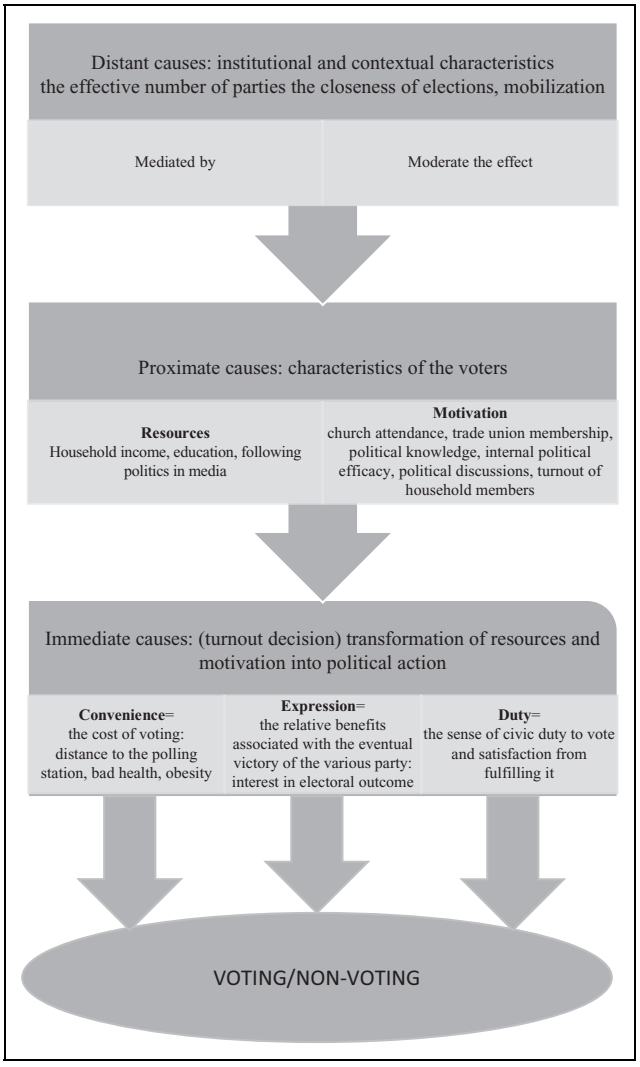

Figure 3. A general explanatory framework for voter turnout. *Source:* Derived from Blais and Wass's (2017: 461–464) funnel model of turnout. Note that the indicators for the five groupings (resources, motivation, convenience, expression, and duty) refer to indicators available in CHPS. CHPS: Czech Household Panel Survey.

Results

Model 1 (M1), presented on the left of Table 2, shows the results for the general framework for studying turnout as shown earlier in Figure 3. In M1, the voter turnout model excludes political knowledge, sense of internal political efficacy, and interest in the election outcome for methodological reasons. This initial model, when compared to subsequent more elaborate models such as M2, explores the potential impact of posttreatment bias. This is because

Table 2. Multilevel logit models of the probability of voting.

Funnel model of turnout explanatory variables and associated groupings	Direct effects models		Direct and moderation effects models			
	M1	M2	M3	M4	M5	M6
Control variables						
Age (years)	0.03	0.03	0.03	0.02	0.03	0.03
Age squared	<−0.01	<−0.01	<−0.01	<−0.01	<−0.01	<−0.01
Sex (woman)	−0.05	−0.13	−0.13	−0.15	−0.14	−0.13
Rural area	−0.08	−0.15	−0.16	−0.18	−0.16	−0.16
Resources						
Household income	0.01	0.02	0.02	0.02	0.02	0.02
Vocational school	0.10	0.23	0.19	0.17	0.17	0.19
High school (completed)	0.42	0.38	0.34	0.35	0.32	0.34
University degree	0.82**	0.54	0.51	0.56	0.50	0.52
Motivation						
Church attendance	0.57***	0.55**	0.56**	0.57**	0.58**	0.57**
Trade union membership	0.09	0.22	0.23	0.25	0.21	0.23
Political knowledge	NA	0.29**	0.29**	0.29**	0.29**	0.29**
Internal political efficacy	NA	0.04	0.04	0.03	0.04	0.04
Following politics in media	0.06*	0.04	0.04	0.04	0.05^{+}	0.04
Frequency discuss politics	0.15***	0.06	0.06	0.06	0.06	0.06
Turnout in household:						
At least one person voted	0.59**	0.53*	0.53*	0.55*	0.53*	0.52*
No other person voted	−1.11***	−0.98***	−0.99***	−1.00***	−0.98***	−1.00***
Convenience						
Distance to polling station	<−0.01	<−0.01	<−0.01	<0.01	<0.01	<0.01^{+}
Health (subjective)	−0.18*	−0.19^{+}	<0.01	0.09	0.10	0.71
Overweight	−0.17	−0.11	−0.12	−0.79	−0.11	−0.12
Obese	−0.32^{+}	−0.33	−0.16	−0.46	−0.32	−0.32
Duty						
Duty to vote	0.88***	0.90***	0.90***	0.91***	0.71	0.91***
Expression						
Interest in election outcome	NA	1.31***	1.30***	1.33***	1.32***	2.15***
Interactions						
Health × Distance	NA	NA	<−0.01^{+}	<0.01	<0.01	<−0.01^{+}
Obesity × Distance	NA	NA	<−0.01	<−0.01	NA	NA
Obesity × Health	NA	NA	NA	−0.07	NA	NA
Obesity × Distance × Health	NA	NA	NA	<−0.01^{+}	NA	NA
Duty to Vote × Health	NA	NA	NA	NA	0.58	NA
Duty × Distance	NA	NA	NA	NA	<0.01	NA
Duty × Distance × Health	NA	NA	NA	NA	<0.01	NA
Health × Care About Results	NA	NA	NA	NA	NA	−0.26^{+}
Distance × Care About Results	NA	NA	NA	NA	NA	<−0.01
Distance × Health × Care About Results	NA	NA	NA	NA	NA	<0.01
Intercept	1.04	−3.52**	−4.14***	−4.40***	−3.91***	−6.44 ***
Log-likelihood	−841	−725	−720	−720	−724	−724

Source: CHPS wave 3 (June to October 2017) data set merged with a postelection survey conducted with the same respondents in late October 2017.
Note: CHPS: Czech Household Panel Survey; NA: models where the variables were "not applicable." Note that in all models there are 2565 respondents residing in 2078. The dependent variable is self-reported turnout and the models were estimated using a multilevel logistic procedure.
***$p \leq 0.001$; **$p \leq 0.01$; *$p \leq 0.05$; $^{+}p \leq 0.10$.

knowledge, efficacy, and interest in outcome may themselves be determined by a voter's body shape and subjective health status.

Model 2 (M2) incorporates all variables from the funnel model of turnout summarized earlier in Figure 3. Education, political media consumption, and political discussions all lost statistical significance ($p \geq 0.05$) in M2 in comparison to M1. The parameter estimates for body size (overweight, obesity) and subjective health are almost the same in both models. This suggests that posttreatment bias is not a serious problem in the models reported in Table 2. Moreover, there is little association between distance to the polling station and reported turnout evident in M2. As expected, poor subjective health status has a negative relationship with turnout ($p \leq 0.10$); however, obesity does not due to the strength of duty to vote and interest in political

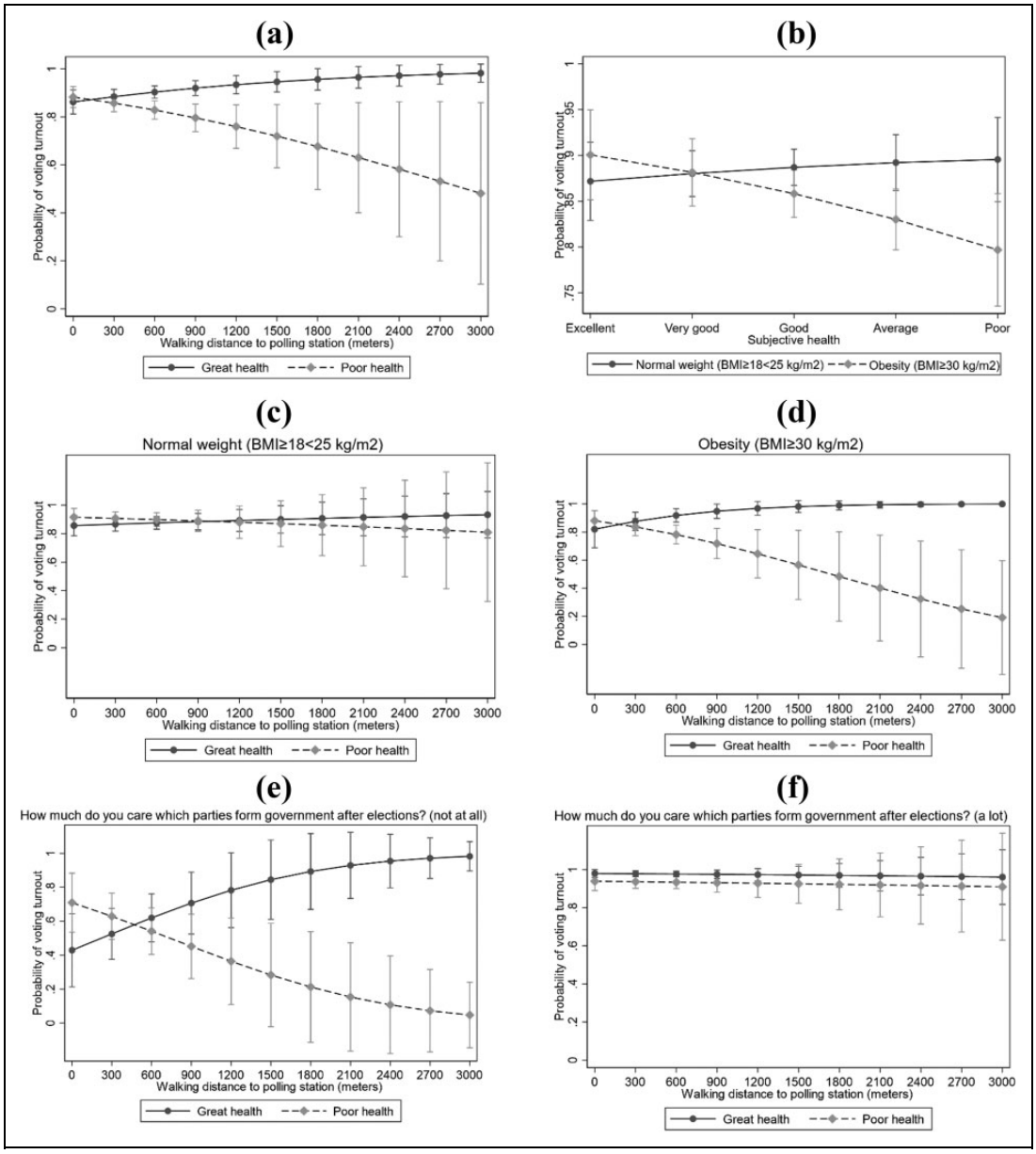

Figure 4. Predicted probabilities of turnout for various moderated relationship. (a) Moderation of health and distance (model 3) (H1). (b) Moderation of health and obesity (model 3) (H1). (c) Moderation of health, distance, and obesity for normal body size (model 4) (H2). (d) Moderation of health, distance, and obesity for the obese (model 4) (H2). (e) Moderation of health, distance, and no interest in the election outcome (model 6) (H4). (f) Moderation of health, distance, and high interest in the election outcome (model 6) (H4). *Sources*: CHPS wave 3 (June to October 2017) data set merged with a postelection survey conducted with the same respondents in late October 2017. Note estimates derived from models reported in Table 2.

outcome variables. If these latter two variables were dropped, obesity has a statistically significant negative relationship as expected. In sum, with regard to M2, duty to vote and interest in political outcome are with voter turnout in household the strongest predictors of voter turnout.

Model 3 (M3) includes additional moderation effects linking distance to polling station with obesity and poor health. Table 2 shows a negative moderation effect for subjective health and distance to polling station thereby supporting the predictions outlined in hypothesis 1, that is, Czech voters who were in poor health in late 2017 and who live comparatively far from the ballot station had a lower probability of voting.

Figure 4(a) (based on M3) graphically presents the estimated probabilities for these two interaction terms in M3, keeping all other explanatory variables at their mean values. Figure 4(a) indicates that although there is a small

change in the probability to vote depending on the distance to polling station among healthy individuals, there is a drop in a probability to vote among those suffering from poor health. Those voters having poor health residing close to the polling station (≤300 m) had a high probability of voting (86%) in the Czech general election (2017). However, if a person in poor health lived quite far from the polling station (≥3 km), the probability of turning out to vote declined to 48%.

Figure 4(b) (based on M3) shows differences in probability to vote for obese participants and those with a normal body size in combination with their subjective health. The probability of voter turnout for those of normal body size is not as much influenced by their subjective health as it is for those defined by their BMI as being obese. Respondents with a normal body size and who reported being in excellent health had an 87% probability of voting: this estimate was largely the same (89%) for those in poor health. M3 reports a 13% difference in probability of voting for obese participants in excellent or poor health (90% vs. 77%). The interaction of health and obesity shown in Figure 4(b) supports the idea that obesity and subjective health have important moderating effects on voter turnout as proposed in hypotheses 1 and 2.

The results from M3 are extended in model 4 (M4) with the inclusion of a three-way moderation parameter for obesity, health, and distance to polling station. This parameter tests the expectation that there was a lower probability of voting in the Czech general election of 2017 if there was a longer distance to polling station; and this relationship was moderated by both body size (obese) and self-reported (poor) health. Table 2 reveals this complex moderation effect is not strong ($b < -.01$, $p \leq 0.10$). However, a graphical representation of this relationship in Figure 4(c) and (d) shows that the probability of voting for those who are both obese and in poor health and who must also travel a relatively long distance to vote is considerably lower than for all others. In different words, the combination of long distance and poor health is crucial for voting. However, obesity also plays an important moderating role. Specifically, Czechs with bad health and normal body shape living 3 km from polling station had an estimated 88% probability of turnout in October 2017. In contrast, those who were obese and in poor health residing 3 km from the ballot box had a very much lower probability of turnout (17%) than all others.

A key element in the theory outlined earlier was the prediction that higher levels of motivation could attenuate the increased costs of getting to the polls on election day for those with a low physiological potential. Specifically, it was proposed in hypothesis 3 that civic duty, a moral motivation for voting, may change the calculus of voting for those Czechs who were obese and in poor health in late 2017. Therefore, hypothesis 3 was tested using a three-way interaction of duty to vote, distance to polling station, and subjective health. Neither the parameter reported in the M5 columns of Table 2 ($b \leq -0.01$, $p \geq 0.10$) nor the graphical representations of this moderation effect (not reported) indicate support for hypothesis 3.

Finally, in model 6 (M6), the instrumental motivation for voting (indicated by interest in the election outcome) was treated in a similar manner to M5 to test the expectation outlined earlier in hypothesis 4. The parameter estimate for this three-way moderation effect reported in Table 2 indicates weak or no effects ($b \leq .01$, $p \geq 0.10$). However, presenting this moderation effect graphically suggests that instrumental motivation has the relationship predicted in hypothesis 4. Specifically, Figure 4(e) shows that the probability to vote among individuals with self-reported excellent health marginally rises with distance; however, there is a steep decline in probability to vote among unhealthy individuals. Figure 4(f) demonstrates that the relationship between distance to the polling station and probability of voting was the same for Czech voters if they were interested in the 2017 election outcome regardless of subjective health status. In sum, there is evidence, supportive of hypothesis 4, that having an instrumental motivation for voting in the last Czech general election did attenuate the negative turnout–distance relationship for those who were obese and in poor health.

Discussion

This article extends knowledge of voter turnout in two ways. First, this is the first empirical study of the moderating effect of body size (overweight/obesity) on the relationship between distance to the polling station and probability of voting. Second, this article is the first to present evidence that distance to the polls does not always have a strong negative association with probability of voting contra predictions based on rational choice theory. This latter finding may be due to the comparatively short distances from voters' homes to the polls in the Czech Republic. As the vast majority of Czech voters (93%) are within a kilometer of the polling station, walking to vote is the majority choice. For this reason, the Czech Republic represents a good case study for analyzing the effects of body size and subjective health on walking to the polls. In this respect, this study has three main findings.

First, the expectation that obesity has a negative relationship with electoral turnout is not supported by the evidence because not all overweight or obese voters feel they have poor health. It is the combination of both obesity and poor health that mitigates voter turnout because such conditions make walking to the polls especially difficult. Second, motivation is important for voters with a low physiological potential in deciding to walk to their assigned polling station. In particular, this study has shown that instrumental motivation has a greater moderating effect than a moral impulse. Third, although the Czech Republic

is one of the few countries to have a mobile ballot box for ill and infirm voters, very few electors (1%) make use of this option. This suggests that there are psychological limits, associated with personal privacy, to reducing the physical costs of voting. In this respect, e-voting may be a preferred alternative for those with a low physiological potential as it minimizes uncomfortable social interactions.

Limitations of this study

Two limitations on the evidence used in this study must he highlighted. First, the national case study used may be considered atypical because the Czech electoral authorities have been effective in minimize distances to ballot stations. Consequently, the lessons from this case study may not generalize to countries where distances to the polls are greater. The data set contains lower number of respondents that live in distant places and therefore the statistical significance is usually on the edge of values traditionally used as a rule of thumb. Second, as noted above, the survey data used in this article may have a selection bias because it may contain more cooperative respondents, who also vote in higher numbers, than that present in the general population. Although these two limitations may lessen the general lessons that may be drawn from this article, these characteristics may also underscore the robustness of the findings. If the effect of body size, subjective health, and distance to polls is evident among participative respondents in a country that minimizes travel to the polls, then there is good reason to think this relationship will be stronger in (a) a less cooperative general population and (b) in other countries where travel distances to the ballot box are greater.

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References

Arah O (2008) Effect of voting abstention and life course socioeconomic position on self-reported health. *Journal of Epidemiology and Community Health* 62(8): 759–760.

Bell J, Hamer M, van Hees V, et al. (2015) Healthy obesity and objective physical activity. *The American Journal of Clinical Nutrition* 102(2): 268–275.

Bhatti Y and Kasper MH (2012) Retiring from voting: turnout among senior voters. *Journal of Elections, Public Opinion and Parties* 22(4): 479–500.

Blais A and Achen CH (2018) Civic duty and voter turnout. *Political Behavior* 41(2): 473–497.

Blakely T, Kennedy PB and Kawachi I (2001) Socioeconomic inequality in voting participation and self-rated health. *American Journal of Public Health* 91(1): 99–104.

Cole S, Balcetis E and Zhang S (2013) Visual perception and regulatory conflict: motivation and physiology influence distance perception. *Journal of Experimental Psychology* 142(1): 18–22.

Delextrat A, Matthew D, Cohen D, et al. (2011) Effect of stride frequency on the energy cost of walking in obese teenagers. *Human Movement Science* 30(1): 115–124.

Denny K and Doyle O (2007) Take up thy bed, and vote: measuring the relationship between voting behavior and indicators of health. *European Journal of Public Health* 17(4): 400–411.

Foster DG and McGuckin BG (2001) Estimating resting energy expenditure in obesity. *Obesity Research* 9(Suppl 5): 367S–372S.

Gibson J, Kim B, Stillman S, et al. (2012) Time to vote? *Public Choice* 156(3/4): 517–536.

Goffman E (1963) *Behavior in Public Places: Notes on the Social Organization of Gatherings*. New York: The Free Press.

Guralnik MJ, Ferrucci L, Pieper FC, et al. (2000) Lower extremity function and subsequent disability: consistency across studies, predictive models, and value of gait speed alone compared with the short physical performance battery. *The Journals of Gerontology Series A: Biological Sciences and Medical Sciences* 55(4): 221–231.

Haider-Markel D and Joslyn M (2017) "Nanny state" politics: causal attributions about obesity and support for regulation. *American Politics Research* 46(2): 199–216.

Haspel M and Knotts G (2005) Location, location, location: precinct placement and the costs of voting. *The Journal of Politics* 67(2): 560–573.

Hemmingsson E and Ekelund U (2007) Is the association between physical activity and body mass index obesity dependent? *International Journal of Obesity* 31(4): 663–668.

Hergenroeder LA, Brach SJ, Otto DA, et al. (2011) The influence of body mass index on self-report and performance-based measures of physical function in adult women. *Cardiopulmonary Physical Therapy Journal* 22(3): 11–20. PMC3163413.

Hulens M, Vansant G, Lysens R, et al. (2001) Study of differences in peripheral muscle strength of lean versus obese women: an allometric approach. *International Journal of Obesity and Related Metabolic Disorders* 25(5): 676–681.

Jylha M, Guralnik J, Balfour J, et al. (2001) Walking difficulty, walking speed, and age as predictors of self-rated health: the women's health and aging study. *The Journals of Gerontology Series A: Biological Sciences and Medical Sciences* 56(10): M609–M617.

Lazzer S, Boirie Y and Bitar A (2003) Assessment of energy expenditure associated with physical activities in free-living

obese and nonobese adolescents. *The American Journal of Clinical Nutrition* 78(3): 471–479.

Lean M and Malkova D (2016) Altered gut and adipose tissue hormones in overweight and obese individuals: cause or consequence? *International Journal of Obesity* 40(4): 622–632.

Lessard D, Linkenauger S and Proffitt D (2009) Look before you leap: jumping ability affects distance perception. *Perception* 38(12): 1863–1866.

Mattila M, Rapeli L, Wass H, et al. (2017) *Health and Political Engagement*. Milton Park, Abingdon, Oxon: Routledge.

Mavaddat N, Kinmonth AL, Sanderson S, et al. (2011) What determines self-rated health (SRH)? A cross-sectional study of SF-36 health domains in the EPIC-Norfolk cohort. *Journal of Epidemiology and Community Health* 65(9): 800–806.

Neufeld S, Machacova K, Mossey J, et al. (2013) Walking ability and its relationship to self-rated health in later life. *Clinical Gerontologist* 36(1):17–32.

Niemi GR and Hanmer MJ (2010) Voter turnout among college students: new data and a rethinking of traditional theories. *Social Science Quarterly* 91(2): 301–323.

Ostir GV, Kuo YF, Berges MI, et al. (2007) Measures of lower body function and risk of mortality over 7 years of follow-up. *American Journal of Epidemiology* 166(5): 599–605.

Pacheco J and Fletcher J (2015) Incorporating health into studies of political behavior: evidence for turnout and partisanship. *Political Research Quarterly* 68(1): 104–116.

Pataky Z, Armand S, Müller-Pinget S, et al. (2014) Effects of obesity on functional capacity. *Obesity* 22(1): 56–62.

Pawlowski T and Coates D (2013) The habit for voting, "civic duty" and travel distance, economics department, university of Maryland Baltimore County, Working Paper 13-05. Available at: https://economics.umbc.edu/files/2014/09/wp_13_05.pdf (accessed 27 July 2019).

Peyrot N, Thivel D, Isacco L, et al. (2009) Do mechanical gait parameters explain the higher metabolic cost of walking in obese adolescents? *Journal of Applied Physiology* 106(6): 1763–1770.

Puhl RM and Heuer ACH (2010) Obesity stigma: important considerations for public health. *American Journal of Public Health* 100(6): 1019–1028.

Rolland Y, Lauwers-Cances V, Cesari M, et al. (2006) Physical performance measures as predictors of mortality in a cohort of community-dwelling older French women. *European Journal of Epidemiology* 21(2): 113–122.

Söderlund P and Rapeli L (2015) In sickness and in health: personal health and political participation in the Nordic countries. *Politics and the Life Sciences* 34(1): 28–43.

Trope Y and Fishbach A (2000) Counteractive self-control in overcoming temptation. *Journal of Personality and Social Psychology* 79(4): 493–506.

Wass H and Blais A (2017) Turnout. In: Arzhaimer K, Evans J and Lewis-Beck M (eds) *SAGE Handbook of Electoral Behaviour*. London: Sage, pp. 459–487.

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