Voting is a stronger determinant of mortality than education: a full-electorate survival analysis with 21-year follow-up

Hannu Lahtinen [1,2] Isa Yang,[1,2] Lasse Tarkiainen [1,2] Pekka Martikainen [1,2]

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[1]Helsinki Institute for Demography and Population Health, University of Helsinki, Helsinki, Finland
[2]Max Planck – University of Helsinki Center for Social Inequalities in Population Health, University of Helsinki, Helsinki, Finland

Correspondence to
Hannu Lahtinen;
hannu.lahtinen@helsinki.fi

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ABSTRACT

Background Although voting is recognised as a social determinant of health, the association between electoral participation and subsequent mortality at an individual level has not been established.

Objective To assess whether voters and non-voters differ in mortality risk.

Methods We used register-based information on electoral participation in the 1999 parliamentary elections from the full electorate of at least 30-year-old Finnish citizens living in mainland Finland linked to registers containing sociodemographic and mortality information by Statistics Finland. Mortality was assessed with Cox proportional hazards regression models, with follow-up until the end of 2020 (n=3 185 572 individuals; 58 133 493 person-years; 1 053 483 deaths).

Results The age-adjusted HR of non-voters compared with voters for all-cause mortality was 1.73 (95% CI 1.72 to 1.74) for men and 1.63 (95% CI 1.62 to 1.64) for women. These differences were strongest for external causes of death and for younger age groups. Among the older (age ≥75 years) population, voting men had lower mortality than non-voting women. The difference in mortality between non-voters and voters was stronger than between those with basic and higher education.

Conclusion Due to a strong relationship, information on voting contributes to a more comprehensive analysis of social differentials in mortality.

WHAT IS ALREADY KNOWN ON THIS TOPIC

⇒ Voters have better health profiles than non-voters.

WHAT THIS STUDY ADDS

⇒ We conducted an individual-level survival analysis assessing voting as a predictor of subsequent mortality.

HOW THIS STUDY MIGHT AFFECT RESEARCH, PRACTICE OR POLICY

⇒ Owing to a strong association between electoral participation and future mortality, information on voting may be valuable in clinical settings and in monitoring population well-being, health, and health disparities.

INTRODUCTION

During the 2020s, both academic journals[1–3] and policy programmes have highlighted the relevance of voting as a social determinant of health. For example, a policy initiative by the American Medical Association in 2022 stated that 'voting is a social determinant of health and significantly contributes to the analyses of other social determinants of health as a key metric',[4] followed by the American Psychiatric Association.[5] The US government's Healthy People 2030 initiative also declared that voting is a way for citizens to 'directly or indirectly impact their health and well-being' and adopted improvements of voter turnout among its core research objectives.[3 6]

Previous studies have established that voters have better health profiles than non-voters.[1 7] For example, cross-European and US-based studies have found approximately a 10 percentage point gap in turnout between those with good and poor self-rated health.[8 9] However, as a highly multifaceted phenomenon, measuring health is challenging, and incomprehensive measures possibly lead to an underestimation of the association between voting and health. Additionally, survey data on health and voting may be prone to bias due to the subjective experiences, social desirability and self-selection of respondents. Mortality is an objective indicator of population health that is free from these limitations in register-based samples.[10] However, previous studies on voting and mortality have mostly used aggregate-level data.[11–15] Although two previous political-science-oriented studies predicted an individual's voting propensity using information on future mortality risk,[10 16] to the best of our knowledge, a prospective individual-level survival analysis of voting as an independent predictor of mortality has not been conducted. Given the substantial interest that voting has recently received as a potential social determinant of health, empirical evaluation of the association between voting and mortality is warranted.

This study assessed (1) mortality differences between voters and non-voters; (2) the extent to which these differences are explained by education and (3) potential heterogeneous associations by gender, age and education, and between external and other causes of death. We use individual-level register-based data on voting in the 1999 Finnish parliamentary elections linked to sociodemographic information and followed up mortality for over 21 years. The design thus circumvents potential limitations related to inadequate power, self-reporting and self-selection biases, or limited inference from aggregate-level data.

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METHODS

We used information on whether an individual voted in the 1999 parliamentary elections, manually collected from official voting lists, covering the entire electorate residing in mainland Finland. These data were linked by Statistics Finland to administrative registers including demographic information and death certificates, until the end of 2020 based on unique personal identity codes before pseudonymised data were released to the research team (permission TK/3763/07.03.00/2021 by Statistics Finland). We included the electorate living in Finland and aged ≥30 years during the election month. We excluded younger individuals because of unestablished educational attainment or voting habits. Turnout in this age-restricted study sample was 71.5% for men and 72.5% for women. The dataset included 3 185 572 individuals (1 508 824 men; 1 676 748 women; 58 133 493 person-years).

We investigated all-cause mortality (1 053 483 deaths) and external (accidents, violent and alcohol-attributable causes (International Classification of Diseases 10th revision codes: F10, G312, G4051, G621, G721, I426, K292, K70, K852, K860, O354, P043, Q860, V01–Y89; 95 350 deaths), and other causes of death (other codes; 955 723 deaths) as the underlying cause of death. We excluded 2410 individuals with an unknown cause of death from the cause-specific analysis. Education was measured as (1) basic or unknown (International Standard Classification of Education (ISCED) 2011 codes 0–2), (2) secondary (ISCED 3–4) or (3) tertiary (ISCED 5–8). Age was measured in 5-year groups (30–34; 35–39; 40–44; …; ≥95 years).

We estimated Cox proportional hazards models following up individuals from 21 March 1999 (election day) to the day of death or the end of 2020, whichever came first. Model 1 adjusted for age and voting or education, and model 2 adjusted for age, voting and education. We also estimated Cox models separately for external and other causes of death. Finally, we assessed voting-age and voting–education interactions. P values for interactions were estimated with likelihood-ratio tests, comparing models with and without the respective interaction terms. We conducted all models separately for men and women, except the analysis including three-way voting–age–gender interactions. Additional sensitivity analyses were conducted using shorter follow-up periods and interactions for occupational social class and household income. We estimated statistical models with Stata 17 (StataCorp, College Station, Texas, USA).

RESULTS

Voting abstention was consistently associated with elevated all-cause mortality in age-adjusted model 1a in table 1 among men (HR=1.73; 95% CI 1.72 to 1.74) and women (HR=1.63, 95% CI 1.62 to 1.64). After adjusting for education in model 2, excess mortality was attenuated by 12% among men (HR=1.64, 95% CI 1.63 to 1.65) and 6% among women (HR=1.59, 95% CI 1.58 to 1.60). The association between voting participation and mortality was more pronounced for external causes of death rather than for other causes. Age-adjusted HR for external causes was 2.09 (95% CI 2.06 to 2.13) for men and 2.01 (95% CI 1.96 to 2.06) for women. We estimated supplementary models with 10- and 5-year follow-up periods (online supplemental tables 1 and 2). HRs of voting abstention, but not of education, were larger in shorter follow-up periods, possibly pointing towards a larger contribution of more acute health problems.

Panel A of figure 1 demonstrates that the disparity in relative mortality between voters and non-voters was most pronounced among those aged <50 years (for age–voting interaction, p<0.00001 among men, p<0.00001 among women; for three-way age–voting–gender interaction, p=0.15). In all age groups between 75 and 94 years, non-voting women had a higher HR than voting men, whereas in the younger age groups the converse pattern was observed. In panel B, the voting–mortality association was 6–7% weaker among men with

Table 1 Associations of voting in the Finnish parliamentary elections 1999 and education with all-cause mortality 1999–2020, and voting with external and other causes of death

	Men				Women			
	Models 1a and 1b		Model 2		Models 1a and 1b		Model 2	
	HR	95% CI	HR	95% CI	HR	95% CI	HR	95% CI
All causes of death								
Voted								
Yes	1		1		1		1	
No	1.73	1.72 to 1.74	1.64	1.63 to 1.65	1.63	1.62 to 1.64	1.59	1.58 to 1.60
Education								
Higher	1		1		1		1	
Secondary	1.41	1.39 to 1.42	1.34	1.33 to 1.35	1.24	1.23 to .25	1.18	1.17 to 1.19
Basic	1.65	1.64 to 1.67	1.51	1.50 to 1.53	1.45	1.44 to 1.47	1.33	1.31 to 1.34
External causes of death								
Voted								
Yes	1		1		1		1	
No	2.09	2.06 to 2.13	1.93	1.90 to 1.96	2.01	1.96 to 2.06	1.90	1.86 to 1.95
Other causes of death								
Voted								
Yes	1		1		1		1	
No	1.68	1.67 to 1.69	1.59	1.58 to 1.61	1.61	1.60 to 1.62	1.57	1.56 to 1.58

Model estimates from Cox proportional hazards models. Model 1a: age + voted; model 1b: age + education; model 2: age + voted + education.
CI, confidence interval; HR, hazard ratio.

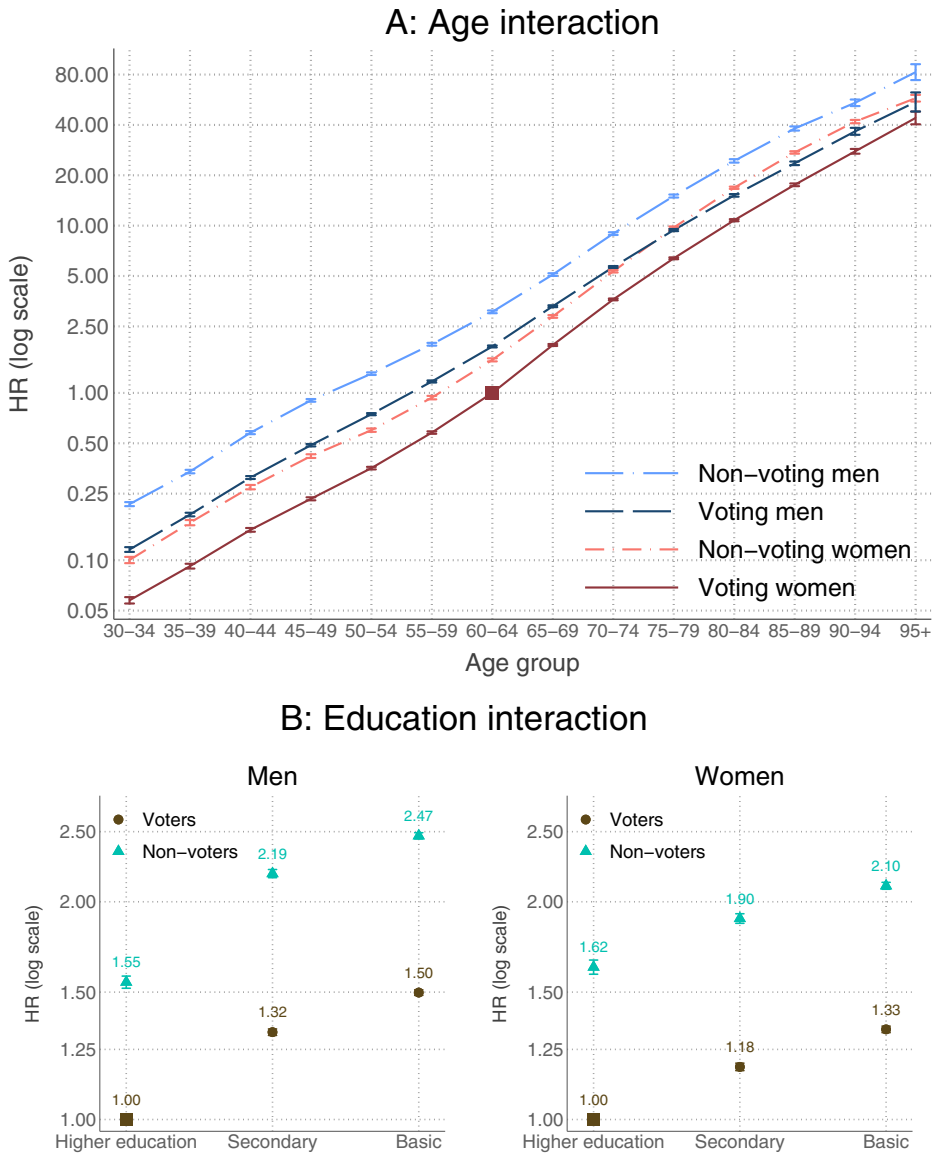

Figure 1 All-cause mortality 1999–2020 hazard ratios by interaction of voting in 1999 with age (panel A) and education (panel B). Notes: Cox proportional hazards models with all-cause mortality as the outcome. Capped bars represent 95% CIs (often indistinguishably narrow). The model in panel A was adjusted for voting, age, gender, education, voting*age, voting*gender, gender*age and voting*gender*age. Voting women aged 60–64 years is the reference group (indicated with a square symbol). The models in panel B were estimated separately for men and women and adjusted for voting, education, age and voting*education. Higher-educated voters is the reference group (indicated with square symbols). HR, hazard ratio.

higher education than men with secondary or basic education and was generally similar across educational groups among women. However, p values for interaction were low owing to the large sample size ($p<0.00001$ among men; $p=0.02$ among women). Corresponding voting–social class and voting–household income interactions are presented in online supplemental figure 1. Among men in the lowest income quartile, non-voters had a 9–12% larger HR relative to voters than in other income groups. Among upper-class non-manual women, non-voters had 7–11% larger HR relative to voters than in other social classes. Other interactions were small to negligible.

DISCUSSION

We explored the association between voter turnout in the 1999 Finnish parliamentary elections and subsequent mortality using full-electorate-wide register-based longitudinal data, with a follow-up of 21.8 years. The mortality difference between voters and non-voters was larger than between those with basic and tertiary education. Such an observation suggests a strong association between voting and mortality, given that a substantial education gradient in mortality is among the most robustly established sociodemographic mortality patterns.[17] Additionally, from the age groups of ≥75 years, voting men had lower mortality than non-voting women. The voting–mortality association was particularly strong among men and for external causes of death.

Although previous directly comparable, results are not available, we observed stronger associations than in previous studies with partly differing designs. This possibly stems from several sources. First, we used individual-level information on voting and mortality, rather than aggregate small-area statistics. Second, when comparing our results to individual-level analyses of voting and other health measures, our register-based measurement of

voting and mortality may capture the association more comprehensively and avoid potential self-reporting or self-selection biases.

Voting, as a form of participation, is a type of social capital, which is linked to health benefits.[18] In addition, voting may increase other forms of civic participation (however, for mostly null results, see Holbein *et al*.[19]). Mortality-decreasing mechanisms of voting participation may thus include strengthening of social contacts, networks, and integration, and psychological benefits of increasing self-efficacy.[18] Health problems and related difficulties in functioning may also negatively affect many important prerequisites of participation, including enhancing resources, motivation to vote and political mobilisation.[20] A limitation of this study is that it cannot adequately distinguish the direction of causation, health and the risk of death. Additionally, individuals may encounter obstacles preventing voting or choose not to vote in any one election. Thus, future longitudinal studies with repeated measurement of participation in multiple elections and of health could better establish causal associations and reduce noise in detecting stable voting habits.

However, regardless of the exact causal pathways, the strong association between voting and mortality that acts independently of education supports the claim that voting is a valuable complementing factor in the social determinants of health research.[4] Information on voting may be useful in clinical settings – for example, abandonment of voting habits may be an early signal of significant health decline – and in monitoring population well-being, health and health disparities. Additionally, a strong association between voting and mortality raises concerns about equal political representation. Population groups with higher mortality may cast fewer votes, partly due to a lower likelihood of voting in the first place, and as one needs to be alive to vote, partly due to having a reduced number of eligible voters (see also Smith and Dorling[11] and Rodriguez[16]). As a corollary, narrowing inequalities in length of life can increase the equality of democratic representation.

Contributors HL and PM conceptualised the study. HL, LT and PM acquired the data infrastructure. HL and LT conducted the initial data processing for analysis sample. IY and HL conducted the data analysis and figure design. IY and HL wrote the draft of the manuscript. LT and PM revised the manuscript with critical input.

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ORCID iDs
Hannu Lahtinen https://orcid.org/0000-0003-0910-823X
Lasse Tarkiainen https://orcid.org/0000-0002-2003-2531
Pekka Martikainen https://orcid.org/0000-0001-9374-1438

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