INVESTIGATING CIVIC ENGAGEMENT ACROSS 34 COUNTRIES

ENGAGING IN THE WORLD: INVESTIGATING THE FACTORS THAT PROMOTE CIVIC ENGAGEMENT ACROSS 34 COUNTRIES

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Lay Abstract

This thesis investigates the factors that affect how involved someone is in their community or society. This involvement is known as civic engagement, which we define as a combination of levels of volunteering and political efficacy (the belief that one can affect politics). A wide variety of potential influencing factors are considered, including literacy and numeracy level, education, health level, and immigration and language background. We use data from an international survey to investigate the effects of these variables on levels of civic engagement in 34 countries. We use a statistical method that highlights how our variables of interest influence civic engagement as a whole, and how the variables specifically influence levels of volunteering or political efficacy. By analyzing the effects of the variables across diverse countries and measures of civic engagement, we shed new light on the factors that promote civic engagement around the world.

Abstract

This thesis investigates the effect that a variety of demographic, educational, cognitive, and health-related variables have on civic engagement. Civic engagement is defined as a combination of frequency of volunteering and feelings of political efficacy. International survey data from 34 countries are used to provide a cross-national view of the predictors of civic engagement. We use canonical correlation analysis to investigate the widespread effects of predictor variables on both facets of civic engagement (volunteering and political efficacy) and the effects that are linked to only one facet. Furthermore, we use country-level socio-demographic data to link patterns of civic engagement of potentially marginalised groups to the representation those groups have at the community level and the political level. Our results highlight the importance of cognitive skills and skill-building resources in supporting engaged citizens: literacy skill, numeracy skill, educational attainment, and number of books in the home are found to be strong predictors of civic engagement across all countries. The present thesis contributes to knowledge by employing a common measure of civic engagement across all countries, using an analysis method that allows and accounts for variance shared by multiple facets of civic engagement, and by investigating civic engagement across a wide variety of countries.

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Declaration of Academic Achievement

The conceptualization of this thesis was conducted by myself, in collaboration with Dr. Kuperman. Chapter 2 was prepared by myself and Dr. Kuperman as a research article for journal submission. The statistical analysis was completed by myself and Dr. Kuperman. Chapters 1 and 3 of this thesis were written by myself.

1 Introduction

This thesis aims to deepen our understanding of the factors that contribute to civic engagement across countries. Here, civic engagement is defined as a combination of volunteering frequency and political efficacy (the belief that one can affect local politics). We investigate the effect that a variety of demographic, educational, cognitive, and health-related variables have on levels of civic engagement across 34 countries. The structure of the thesis is as follows: this introductory chapter provides an overview of the concepts and issues addressed in the thesis. Chapter 2 contains the article central to the thesis. Chapter 3 summarizes the conclusions and contributions made by the thesis and discusses avenues of further investigation.

The healthy functioning of a democratic society requires that citizens demonstrate civic engagement. Civic engagement involves developing and applying civic knowledge and skills to effect positive change in one's community or society (Ehrlich, 2000). It may be expressed through a multitude of social and political activities such as membership in community organizations, voting, discussing political issues, and problem solving with others in the community (Barrett & Brunton-Smith, 2014; OECD, 2007). Working for the betterment of society has numerous benefits, at both the personal and societal levels. Participating in community activities and volunteering in local organizations strengthens the bonds between community members and provides opportunities for individuals to apply and develop their interpersonal, technical, and cognitive skills. Volunteering has also been shown to provide direct physical and mental health benefits to those who volunteer, in the form of higher self-esteem, life satisfaction, and happiness, as well as a

reduction in mortality and high blood pressure (Gottlieb & Gillespie, 2008; Sneed & Cohen, 2013; Thoits & Hewitt, 2001). Moreover, contributing one's time and energy to community organizations supports the functioning of these institutions within the economy. For instance, in 2017 alone, it was estimated that Canadians volunteered for a combined 2 billion hours which contributed $55.9 billion to the country's economy, or 2.6% of its GDP (Conference Board of Canada, 2018). Thus, understanding the factors that promote civic engagement is of key interest for both the well-being of citizens and the countries they inhabit.

Past research investigating the predictors of civic engagement has shown a wide variety of predictors to be important. Education is one such factor. The promotion and development of civic engagement begins at a young age through schooling and is affected by the style of civic education provided to students, the openness of students' classrooms to civic and political discussions, opportunities at the school for involvement in student groups, and the amount of educational materials in the home (Torney-Purta, 2002). The completion of later steps in the educational pathway, such as attending college or university, has also been linked to higher levels of civic engagement (Flanagan & Levine, 2010; Jacobsen & Long, 2018; Rose et al., 2019). Education provides an avenue for students to learn about opportunities and methods to engage in society, and to gain the necessary skills to participate in such opportunities. Currently being a student also boosts civic engagement: those who are in school, regardless of their level of schooling, are more likely to vote (Highton & Wolfinger, 2001; Wolfinger & Rosenstone, 1980). Various demographic features have also been shown to affect levels of civic engagement.

Those who are older tend to be more engaged (de Mello, 2021; Highton & Wolfinger, 2001; Wolfinger & Rosenstone, 1980). This increase is often attributed to the achievement of stable life circumstances in adulthood that facilitate engagement with the community, however, it has also been shown to stem from the accumulation of general life experience, over and above any specific transitions (Highton & Wolfinger, 2001; Wolfinger & Rosenstone, 1980). Higher socioeconomic status or social class also promotes civic engagement, with members of these groups often being given more and earlier opportunities to become involved in the community (Barrett & Brunton-Smith, 2014; Flanagan & Levine, 2010; Torney-Purta, 2002).

Recently, there has also been an increased focus on cognitive skills as predictors of civic engagement. Skills such as literacy and numeracy have been identified as critical skills for participating fully in modern educational, economic, social, and civic activities (Jacobsen & Long, 2018; OECD, 2013a). Literacy is a complex skill that involves evaluating and using written texts to achieve goals and gain knowledge (OECD, 2013a). Being able to evaluate the trustworthiness of a source, extract key details from a text, or consolidate information from many documents are all processes that draw on literacy skills and that contribute to being an informed, participating citizen. Numeracy is also key to being fully engaged. Numeracy is more than mathematical knowledge acquired in the classroom: it involves activities such as applying mathematical concepts to real-world situations, using math as a tool to think critically about the world, and communicating numeric information to others (Geiger et al., 2015). Modern definitions of numeracy place a particular focus on the importance of being able to interpret and address real-

world problems mathematically and being able to extract numeric information represented in diverse formats (Tout, 2020), which are also skills that support being fully involved in society. Indeed, literacy and numeracy skills have been shown to predict civic, social, and economic outcomes. Those with higher literacy and numeracy skill levels are more likely to report having volunteered within the last year, feeling that they can affect local politics, trusting others, being employed, earning a higher wage, and having a positive health status (Grotlüschen, 2018; Jacobsen & Long, 2018; OECD, 2013a). For instance, in Canada, those at the highest literacy proficiency levels are over twice as likely to report high political efficacy and over three times as likely to report volunteering within the last year than those at the lowest literacy levels (Jacobsen & Long, 2018). However, while both literacy and numeracy skills predict civic engagement, they may do so to different extents. Literacy skill is more strongly supportive than numeracy of trust in others, political efficacy, and volunteering (common metrics of civic engagement), while numeracy skill is more strongly supportive than literacy of health level, being employed, and making a higher wage (OECD, 2013a). Thus, it is important for the present analyses to consider the unique relationships that each of these cognitive skills have with civic engagement. The link between cognitive skills and participation in society also highlights that having lower proficiency in literacy or numeracy may act as a barrier to full civic engagement, where those with lower levels of these cognitive skills may face exclusion from political and social institutions.

Another group potentially being excluded from these areas are those who are not native speakers of the majority language of a country. Language minorities (native

speakers of an official language of a country that is not the majority language, e.g., speakers of Arabic in Israel or speakers of French in Canada) report lower feelings of political efficacy and rates of volunteering than those who speak the majority language in the same country (Grotlüschen et al., 2021). These lower rates of civic engagement may be due to linguistic barriers faced along the pathway to full engagement. For instance, positive civic attitudes and trust in others are key pre-cursors to civic engagement (OECD, 2007). However, lower proficiency in the majority language is associated with more negative civic attitudes, such as the feeling that one is not able to make difference in the community (Makki Alamdari, 2020). As well, those who are less proficient in the majority language may opt not to join community organizations because of their proficiency level, or because they do not trust the organizations to effectively solve community issues (Gele & Harsløf, 2012). Thus, low proficiency in the majority language can act as a barrier to accessing full opportunities to participate in society and developing the building blocks of civic engagement.

Despite these insights on the predictors of civic engagement, there remain gaps in the literature. Civic engagement can be expressed in many ways, including joining community organizations, volunteering, voting, attending protests, having knowledge about civic issues, and working with other community members to solve problems (Barrett & Brunton-Smith, 2014; OECD, 2007). Due to this variety, civic engagement can thus be measured in research using many different metrics. While each of the above metrics of civic engagement highlight different facets of this complex concept, the inconsistency of definitions and measures makes comparisons across studies more

difficult. For instance, age has been shown to promote civic engagement when voter turnout is used to measure engagement (de Mello, 2021; Highton & Wolfinger, 2001; Wolfinger & Rosenstone, 1980), but has a negative effect on civic engagement as measured by frequency of volunteering (Jacobsen & Long, 2018). Furthermore, past research has largely investigated the various facets of civic engagement through separate analyses, which are only able to describe the effects of individual predictor variables on individual outcome variables (e.g., Alexander & Jalalzai, 2020; Highton & Wolfinger, 2001; Jacobsen & Long, 2018; Thoits & Hewitt, 2001). It is yet unknown which personal characteristics may have more widespread effects on how engaged one is in their community or society (contributing to the shared variance between multiple facets of civic engagement, i.e., both volunteering and political efficacy), and which have effects that are concentrated to a single facet.

A further question raised by the literature concerns how the predictors of civic engagement vary across national contexts. For instance, Grotlüschen et al. (2021) investigated civic engagement in five countries: Austria, Canada, Germany, Israel, and the United States. They found that women volunteered more than men and felt more able to affect politics than men in Canada and the United States, while in Austria they found an opposing trend, with men volunteering more than women. There were no gender differences for either outcome in Germany or Israel. However, this study only included countries with high levels of immigration, and thus cannot account for how the relationships between demographic predictors and civic engagement may differ in countries with varying immigration rates. The strength of the relationship between

cognitive skills and civic engagement also varies between countries. Literacy skill strongly promotes volunteering in Canada, Australia, and the United Kingdom, but has a much weaker effect in countries such as Poland, Japan, and Austria (OECD, 2013a). There is similar variation in the strength of literacy's effect on political efficacy. Depending on the country considered, those at the highest levels of literacy range from over four times as likely to report feeling that they can influence their local government (Germany) to no more likely than those at the lowest literacy levels (Spain) (OECD, 2013a). Thus, investigations of the predictors of civic engagement must consider many different national contexts to provide a full picture of civic engagement around the world.

The present thesis builds on the current literature by providing a common measure of civic engagement across all countries, using an analysis method that allows and accounts for variance shared by multiple outcome variables, and by investigating civic engagement across a wide variety of countries. We use frequency of volunteering and feelings of political efficacy as our measure of civic engagement in all country contexts. This facilitates the comparison of findings between countries and allows us to consider international averages, providing a global snapshot of a variable's effect on civic engagement. We employ canonical correlation analysis (CCA) to examine the effect of each variable on levels of civic engagement. CCA is a multivariate statistical technique that is used to examine the relationship between two sets of variables. CCA allows us to consider how our set of predictor variables are linked to both the individual variance in outcome variables (i.e., volunteering and political efficacy) and to the shared variance between the two variables (i.e., civic engagement). CCA is appropriate for this task

because it accounts for the complexity inherent in much human behaviour research, where variables are likely to have multiple causes and multiple effects (Sherry & Henson, 2005). A detailed description of CCA is given in Chapter 2.

Finally, we provide a comprehensive view of the factors that contribute to civic engagement by investigating these factors in 34 countries around the world. To do this, we use publicly available survey data from the Programme for the International Assessment of Adult Competencies (PIAAC). PIAAC follows in the footsteps of prior international surveys of adult skills such as the International Adult Literacy Survey (IALS: 1994-1998) and the Adult Literacy and Life Skills Survey (ALL: 2003-2007). Such surveys aim to describe the distribution of information-processing skills in various countries, how these skills are used and developed, and how proficiency in these skills is linked to economic and social outcomes (OECD, 2013b). The first cycle of PIAAC was completed from 2011 to 2017, providing a recent survey of skill levels around the world as well as updated measures of life outcomes. PIAAC includes a direct assessment of cognitive skills that are key to our analyses – namely, literacy and numeracy. The assessments of literacy and numeracy are consistent with modern applications of the skills, that is, applications that are prevalent in today's increasingly information-rich and digital societies (OECD, 2013b; Tout, 2020). For instance, PIAAC uses a broader conception of literacy than its predecessors that includes the reading of digital texts. PIAAC's extensive background questionnaire provides us with other key variables such as respondent demographic characteristics, health outcomes, language and immigration background, education, frequency of voluntary work, and feelings of political efficacy.

PIAAC was implemented in over 30 different countries during its first cycle. This allows us to investigate the factors that contribute to civic engagement in a wide variety of political, social, and linguistic contexts.

In sum, the current thesis employs CCA to explore the factors that support or inhibit levels of civic engagement across 34 different countries. Civic engagement is defined as a combination of volunteering and political efficacy, and we make novel contributions to the field by investigating how a wide variety of predictor variables affect both the shared variance between these two facets, and their individual variance, across diverse national contexts.

2 A bird's eye view of civic engagement and its facets: Canonical Correlation Analysis across 34 countries

2.1 Introduction

Civic engagement is a core element of a thriving democratic society. It is a complex construct that involves developing and applying civic knowledge and skills in order to effect positive change in one's community or society (Ehrlich, 2000). Participation in civic society can take on diverse forms, including voluntary work for or membership in community organizations; political activities such as voting, attending a protest, or engaging with politics through social media; and general problem solving alongside other citizens to work towards community improvement (Barrett & Brunton-Smith, 2014; OECD, 2007). Broadly, civic engagement is a measure of how involved one is in their community or society. When citizens are more engaged with their local institutions and fellow community members, this provides opportunities for individual social network development and contributes to the functioning of society by promoting a cohesive social landscape. In addition to supporting a prosperous society, having closer ties to one's community provides strong benefits to personal well-being and health. Longitudinal studies have shown that volunteering can increase self-esteem, life satisfaction, happiness, and lead to lower rates of mortality, depression, and health issues such as high blood pressure (Gottlieb & Gillespie, 2008; Sneed & Cohen, 2013; Thoits & Hewitt, 2001). Participation in civic activities and political activism are also important avenues by which disenfranchised individuals and groups can advocate for their rights, make their voices heard, and effect change in their society.

Not everyone has equal access to the institutions and pathways that enable one to actively participate in their community or society in a given country, and factors that affect observed levels of civic engagement vary around the world. This study aims to identify key factors that influence levels of civic engagement in two major domains – volunteering and political efficacy – in over 30 countries. Below we review known pathways and barriers to civic engagement and formulate the goals and methods of the present study.

Pathways A common pathway to fostering civic knowledge and attitudes begins at a young age through education. Factors such as the specific focus of the civic education curriculum, the openness of classrooms to discussions and debates about civic and political topics, and the opportunities for developing a sense of political efficacy while at school (e.g., through membership in a student council) all influence the effectiveness of this education and resulting levels of civic engagement (Torney-Purta, 2002). Early opportunities for engagement provide an avenue for students to gain knowledge pertaining to the relevant civic and political systems in their area, how these systems work, and how they might become involved. Moreover, membership in school groups that support a political cause or that connect students with their surrounding community facilitates the development of social bonds between community members. These connections, while having intrinsic value themselves, also provide young adults with further civic and economic opportunities that are an important pathway for education's positive effect on civic engagement (Flanagan & Levine, 2010).

Following these early exposures to the workings of a democratic society, civic engagement tends to increase across the lifespan (de Mello, 2021; Wolfinger & Rosenstone, 1980). The adult-roles theory attributes this effect to the attainment of stable life circumstances such as marriage, entering the workforce, or owning a house, however, participation has also been shown to increase with age independently of these transitions (Highton & Wolfinger, 2001; Wolfinger & Rosenstone, 1980). At the level of an individual, other factors often linked to civic engagement are socioeconomic status, gender, and health status, with those that are healthier, wealthier, or male showing more civic engagement (Barrett & Brunton-Smith, 2014; Fraile & Gomez, 2017; Gottlieb & Gillespie, 2008; Kim et al., 2015; Torney-Purta, 2002). At the level of a country, factors such as the organisation of a country's government, its efficiency, and its accountability can affect both the level of participation of the nation's citizens, and the influence that demographic, social, and psychological factors have on participation in that country (Barrett & Brunton-Smith, 2014). The enormous scope of the variables that can affect one's involvement in society, ranging from personal to national, contributes to the complexity of identifying and explaining patterns in civic engagement.

Barriers Research has pointed to multiple barriers at work that prevent certain groups from feeling that civic participation or knowledge is accessible to them. For instance, measures of civic engagement have been found to be lower among immigrants and those with low literacy (Grotlüschen, 2018; Rose et al., 2019). Proficiency in the majority language may be of particular concern for immigrant groups, where higher proficiency has been linked to more positive civic attitudes (Makki Alamdari, 2020) and

lower proficiency to exclusion from community organizations (Gele & Harsløf, 2012). As described above, education is also powerfully linked to levels of civic engagement: those who do not or cannot complete higher levels of education are not afforded the same opportunities for civic engagement, and as such are less involved in civic and political activities (Flanagan & Levine, 2010). Barriers to education can thus also operate as barriers to civic engagement. Likewise, low levels of health can prevent access to some forms of civic engagement (e.g., physically-intensive voluntary work, travelling large distances in order to vote, etc.). Indeed, health conditions such as diabetes, hypertension, and chronic pain have been cited as negatively affecting involvement in community activities and organizations (Gele & Harsløf, 2012). Less participation in volunteering among these groups means that they do not gain access to the resulting health benefits of such work, potentially leading to a negative cycle of worsening health.

However, investigations of potential barriers to civic engagement such as immigrant status tend to be limited to a single national context, often that of the United States (e.g., Lopez & Marcelo, 2008; Makki Alamdari, 2020; Stepick et al., 2008). This leads to a narrow view of how these factors operate as it does not provide insight into how their effects may vary between countries. Moreover, when barriers to civic engagement are studied in multiple contexts, some of these barriers show inconsistent effects across different countries (Grotlüschen et al., 2021; Rose et al., 2019). This highlights the importance of multinational studies that consider these factors across a range of contexts, to establish similarities and differences in the factors over and above the natural variability in country-level characteristics. The present study responds to this

need by investigating potential key factors linked to levels of civic engagement in 34 countries around the world. This allows comparisons to be made between differing sociopolitical contexts while using a consistent methodological setup.

Past studies also often focus on the relation of a thematic group of variables with individual facets of civic or political engagement – e.g., volunteering, participation in voting, or political party membership – without investigating effects common to all those multiple facets (e.g., Alexander & Jalalzai, 2020; Highton & Wolfinger, 2001; Thoits & Hewitt, 2001). This prevents the identification of which factors have widespread effects on what multiple facets of civic engagement share, and which are primarily linked to a single facet. The present study employs a wide variety of demographic, educational, health, and cognitive variables to provide a broad picture of potential influencing factors.

As full civic engagement entails that individuals are able to participate in and exert their influence on society without experiencing barriers to this involvement (Cooper, 2007), expanding our understanding of the barriers at work across national contexts is an important step in working to eliminate these barriers. The present study presents a macro view of a variety of potential factors affecting civic engagement in diverse contexts while using a methodologically consistent and multidimensional approach to civic engagement.

2.1.1 The present study

Rich, cross-national data sets such as the Programme for the International Assessment of Adult Competencies (PIAAC) make it possible to investigate the effects of

cognitive skills, education, language, and many other factors on civic engagement in a variety of national contexts. The PIAAC survey was carried out in over 30 countries, and includes an extensive background questionnaire as well as tests of literacy and numeracy (OECD, 2013b). The diverse spread of countries in which the survey was completed allows us to investigate the factors affecting civic engagement in countries with widely varying social systems, political institutions, immigration policies, and linguistic contexts.

We focus on two key variables related to civic engagement that were measured in the PIAAC background questionnaire: volunteering and political efficacy. A measure of the frequency of voluntary work (defined below) provides us with information about how involved citizens are with organisations in their community. A subjective measure of political efficacy taps into citizens' self-perception of the extent to which they feel they can effect change within their government. While the PIAAC survey does not contain a measure of actual political participation, such as frequency of voting or involvement in political demonstrations, higher perceived political efficacy has been linked to more frequent political participation (Barrett & Brunton-Smith, 2014; Valentino et al., 2009). Moreover, a measure of political efficacy is meaningful in itself, as it provides a metric of how competent a person feels in the political realm, and how likely they believe it is that their voice would be heard were they to engage (Iyengar, 1980).

Importantly, low levels of volunteering or feelings of political efficacy do not imply disinterest in the social or political life of the community, and should not be interpreted as such (Grotlüschen et al., 2021). Rather, those who report lower involvement in community groups or feelings of having a limited effect on politics may

be facing exclusion from the relevant institutions and activities. Our analyses are particularly concerned with groups that may be more vulnerable to this type of social exclusion, such as those with low literacy, immigrants, and language minorities.

This study provides a unique cross-national viewpoint on civic engagement by investigating the relation of a wide variety of demographic, health, and cognitive skills measures on two dimensions of theoretical interest. One dimension represents an overall, composite view of civic engagement: it taps into factors that underlie *both* facets of civic engagement considered here, i.e., volunteering and political efficacy. The second dimension concerns differences between these two facets and highlights factors that support one of the facets but not the other. The simultaneous consideration of the two dimensions is made possible through the relatively underused statistical technique of canonical correlation analysis, defined in the Methods section. By using these two dimensions, we pursue two related goals. One is to gain a more complete understanding of how potential factors of influence contribute to or impede political efficacy or volunteering as specific domains comprising civic engagement. The second goal is to establish how these factors affect the larger picture of community involvement and participation within and across countries. In exploring both goals, we pit our findings against independent cross-national socio-demographic data obtained from the World Bank database to identify patterns in the variability of civic engagement levels between countries.

2.2 Method

2.2.1 Participants

PIAAC data from 35 countries are openly available as Public Use Files at https://www.oecd.org/skills/piaac/data/. In all samples, participants were 16-65 year-old adults. To preserve privacy and confidentiality, these public data omit values from potentially identifying variables and report some numeric variables as ordinal bins (e.g., age is reported in 5- or 10-year bins). We have excluded one country, Russia, from our analyses as it does not make available a critical measure of civic engagement. Countries that carried out the PIAAC survey aimed to create nationally representative samples of 5,000 participants or more: the samples we use range in size from 4469 (Sweden) to 26683 (Canada). Several exclusion criteria were further applied to ensure a better fit to the present study of civic engagement. Specifically, we excluded participants in the age group of 16-19, as many of these individuals do not yet have voting rights or independent means of political and civic expression. Also, in some countries certain forms of volunteering are a mandatory part of the school curriculum and are not indicative of an individual choice. Because of the importance of immigration status and language background, we excluded individuals with missing or invalid data for this variable. Finally, we removed participants with missing or invalid responses to the critical variables of interest: political efficacy and volunteering. The resulting data pools constituted 71 to 95% of the original data across country samples. The size of the full samples and the samples after trimming are reported in Table 1.

Table 1: Full sample size and sample size after trimming by country.

	Country	Full	Trimmed
1	aut	5130	4578
2	bel	5463	4476
3	can	26683	24307
4	chl	5212	4725
5	cyp	5053	4086
6	cze	6102	5308
7	deu	5465	4848
8	dnk	7328	6720
9	ecu	5702	4926
10	esp	6055	5452
11	est	7632	7014
12	fin	5464	4913
13	fra	6993	6147
14	gbr	8892	8249
15	grc	4925	4671
16	hun	6149	5625
17	irl	5983	5606
18	isr	5538	4638
19	ita	4621	4354
20	jpn	5278	4803
21	kaz	6050	4315
22	kor	6667	6072
23	ltu	5093	4779
24	mex	6306	5573
25	nld	5170	4641
26	nor	5128	4424
27	nzl	6177	5434
28	per	7289	6504
29	pol	9366	8266
30	sgp	5468	4868
31	svk	5723	5178
32	svn	5331	4877
33	swe	4469	4011
34	usa	7921	6783

2.2.2 Materials

The design of the PIAAC survey is described in detail in OECD (2013b). The survey consists of two large blocks. First, an extensive background questionnaire collects information about demographic characteristics; education and training; social and linguistic background; as well as employment status and income. To tap into non-economic outcomes, PIAAC includes questions on health status, volunteering, political efficacy and social trust. The questionnaire also includes a skills use module that asks participants to self-assess how often they use job-related skills while at work, and how often they use literacy, numeracy, and technological skills at work and in everyday life. The final direct assessment component of the PIAAC survey is an adaptive test of the information-processing skills (literacy, numeracy, and problem solving) necessary for successful education, training, employment, and everyday life. Surveys are administered in the official language(s) of the country as well as languages of sizable linguistic minorities (e.g., English and French in Canada; Hebrew, Arabic, and Russian in Israel). All cognitive skill tests are psychometrically validated and their outcomes are directly comparable across languages and samples.

2.2.3 Variables

The present study is an exploratory overview of a large range of cognitive, demographic, educational, and health-related predictors of civic engagement. For this reason, we relied on the existing literature to cast a wide net and include numerous variables of potential relevance reported in different modules of PIAAC. For

interpretability, we rename most of the PIAAC variables. For reproducibility of results, we use the original values of variables as reported in PIAAC, with minor transformations. Table 2 reports both the original and new variable names, as well as the PIAAC definitions of the variables and values used in the study. In addition to variables from PIAAC, we make use of population statistics taken from The World Bank (2010a, 2010b) to link our findings to country-level demographic data.

Table 2: Variables and variable definitions.

Variable Group	Variable	PIAAC label	Definition	Values
Dependent				
	POLEF	I_Q06a	People like me don't have any say about what the government does.	Strongly agree (1), agree (2), neither agree nor disagree (3), disagree (4), and strongly disagree (5)
	VOLUN	I_Q05f	In the last 12 months, how often did you do voluntary work [...]?	Never (1), less than once a month (2), less than once a week but at least once a month (3), at least once a week but not every day (4), or every day (5)
Independent				
Demographic	AGE	AGEG5LFS	Age groups in 5-year intervals	2 (20-24) to 10 (60-65 y.o.)
	GENDER	GENDER_R	Gender	Male (1); Female (2)
	BORNLANG	BORNLANG	Interaction between place of birth and language status	Native-born and native-language (1), native-born and foreign-language (2), foreign-born and native-language (3), or foreign-born and foreign-language (4)
Education	EDU	EDCAT6	Highest level of formal education completed	Lower secondary or less (1), upper secondary (2), post-secondary – non-tertiary (3), tertiary – professional degree (4), tertiary – bachelor degree (5), or tertiary – master/research degree (6)
Cultural capital	NUMBOOKS	J_Q08	About how many books were there in your home when you were 16 years old?	10 books or less (1), 11 to 25 books (2), 26 to 100 books (3), 101 to 200 books (4), 201 to 500 books (5), or more than 500 books (6)
Cognitive Skills	LIT	PVLIT[1–10]	Average of 10 plausible literacy scores	0 to 500
	NUM	PVNUM[1–10]	Average of 10 plausible numeracy scores	0 to 500
Health	HEALTH	I_Q08[_T]	In general, would you say your health is excellent, very good, good, fair, or poor?	Excellent (1), very good (2), good (3), fair (4), or poor (5)

Dependent variables The critical variables of this study are measures of political efficacy (POLEF) and community engagement in the form of volunteering (VOLUN), see Table 2. POLEF is measured on a Likert scale as a degree of agreement with the statement that "*People like me don't have any say about what the government does,*" from 1 (strongly agree) to 5 (strongly disagree), where a higher value reflects greater perceived political efficacy. VOLUN is an ordinal variable measuring the frequency of unpaid voluntary work done in the last 12 months, from 1 (never) to 5 (every day).The PIAAC questionnaire includes measurements of another factor related to engagement in society, social trust, both of other members of the community and of local institutions (Grotlüschen, 2018; OECD, 2007). However, this facet of social cohesion is not the focus of the present study. In the PIAAC survey, social trust is evaluated by two items: "*There are only a few people you can trust completely*," and "*If you are not careful, other people will take advantage of you*". Measuring trust in this way is more strongly indicative of interpersonal feelings and relationships, rather than suggestive of active participation in the community (social trust may be characterized as a precursor to civic engagement, see OECD, 2007). Social trust measures also displayed high collinearity with our other dependent variables of interest. As such, the current analyses operationalize civic engagement as a combination of political efficacy and voluntary work.

Independent variables Eight independent variables are included in the present analyses based on the reviewed prior literature surrounding the factors related to civic engagement. These variables span demographic factors (age, gender, and a variable coding an interaction between language and place of birth), education level, cognitive

skills scores (literacy and numeracy), health status, and the number of books in the childhood home as a measure of cultural capital and scholarly culture (Sieben & Lechner, 2019; Sikora et al., 2019). The matrix sampling method of PIAAC determines that the sets of items that each participant encounters and responds to in the direct assessment of cognitive skills are not identical. To enable an accurate estimation of the measurement error, an individual score in each cognitive skill test is represented as 10 plausible estimates of what that person's performance would be on the full test (OECD, 2013c). For compatibility with the present statistical method, we use the mean of these ten plausible values to represent a respondent's literacy or numeracy level. Detailed descriptions of all variables are provided in Table 2.

2.2.4 Procedure

Sampling, administration, and other procedures related to PIAAC are reported in OECD (2013c). Data collection took place from 2011 to 2017.

2.2.5 Statistical considerations

Data imputation After trimming of participants (see above), data imputation was performed to handle the remaining missing or invalid responses to our variables of interest. The missing or invalid data for a given variable was replaced by a random sample of valid responses from that variable. The amount of imputed data per variable was small (M = 0.13%, maximum = 3%). Several variables of potential interest for our question – e.g., variables concerning the use of cognitive skills at work and at home –

showed high percentages of missing values. To avoid excessive data imputation, these variables were excluded from further analyses.

Canonical correlation analysis The main analytical challenge of this study is that it simultaneously operates with two sets of variables: two dependent variables (volunteering and political efficacy) and eight independent variables. Moreover, these variables may be correlated both within and across the respective sets. As well, we are interested in identifying factors contributing to both the variance shared by the two dependent variables and the variance that can be uniquely attributed to only one of them. The statistical technique that is recommended for analyzing a multivariate data structure of this kind is canonical correlation analysis (CCA). CCA takes its origin in educational research by Hotelling (1935, 1936) and has since been used in a wide variety of fields including sociology of civic engagement (see Frie & Janssen, 2009; O'Leary, 2014). In our brief presentation of CCA below, we follow an excellent primer to the use of CCA in social psychology by Sherry and Henson (2005). For details on the mathematical apparatus underlying CCA and its differences from related computational techniques including Principal Component Analysis, we refer the reader to Borga (2001), Hardoon et al. (2004), and Nimon et al. (2010).

CCA presents a method of estimating the simultaneous linear relationship between several predictors and outcomes. Specifically, CCA combines the observed variables in each set into one latent variable by means of linear regression. In other words, the resulting latent variable (one for the set of predictors and one for the set of outcomes) is a weighted sum of observed variables in the respective set, and the weights for each linear

regression are estimated from the data. A critical feature of CCA is that the linear regressions are estimated in a way that maximizes the correlation between the two latent variables. This means that variance in the set of predictor variables is estimated to maximally correlate with the combined variance in the set of outcome variables (see González et al., 2008 for details on algorithmic implementation). To rephrase, CCA finds two base vectors such that projections of the set of predictors and the set of outcomes onto those base vectors maximize a correlation between those projections (Hardoon et al., 2004). Furthermore, CCA estimates both the correlations of observed variables with the latent variables and the correlation between latent variables (Borga, 2001). Importantly, all correlations are familiar and interpretable Pearson's correlations with *r* in a standard -1 to 1 range. Since all effects are presented in the same range, CCA enables a very intuitive and easy-to-visualize grasp of the directions and relative magnitudes of effects, even when considering multiple variables or multiple countries simultaneously.

As mentioned above, the two base vectors form one dimension onto which all observed variables (from both the predictor and outcome sets) can be projected. Subsequent dimensions – all orthogonal to one another – can be estimated to account for the remaining variance in the data. The total number of dimensions cannot exceed the number of observed variables in the smaller variable set (two outcome variables, in our case), and the utility of resulting dimensions needs to be tested based on the amount of variance that they explain. In our analyses below, two dimensions are used for all national samples. A dimension reduction analysis using Wilks's lambda showed both the full model and the isolated second dimension to explain a significant amount of the variance

present in each country (all but five tests $p < .001$, remaining tests $p < .05$, full results of the hierarchical statistical significance tests for each of the 34 models are reported in Appendix A). The correlations of observed variables with each of these dimensions are reported.

Application of CCA to the present data required some simplification of the data. First, CCA estimates parametric Pearson's correlations. To comply with this feature, we treated all nominal and ordinal variables as interval variables, including both dependent variables. Thus, while the direction of correlation coefficients is interpretable, some caution is necessary when interpreting the numeric estimates of correlation coefficients. Second, while we presume and account for correlations between observed variables, we do not factor in any causal relationships that might exist in the data set. For instance, we gloss over the reciprocal relationship between literacy and education, where individuals with higher literacy gain easier access to educational resources, which in turn improves their literacy further (Reder, 1998). We relegate such analyses to future research and believe that the present exploratory study has high utility for understanding the landscape of factors promoting or hindering civic engagement. We used the implementation of canonical correlation analysis in package CCA v 1.2 (González et al., 2008) in the R statistical software platform v 4.03 (R Core Team, 2020).

2.3 Results

We applied CCA to each of the 34 national samples separately. The findings are presented below in two ways, one with a country as a unit of analysis and another with an individual independent variable as a unit of analysis. Thus, we begin with the analysis

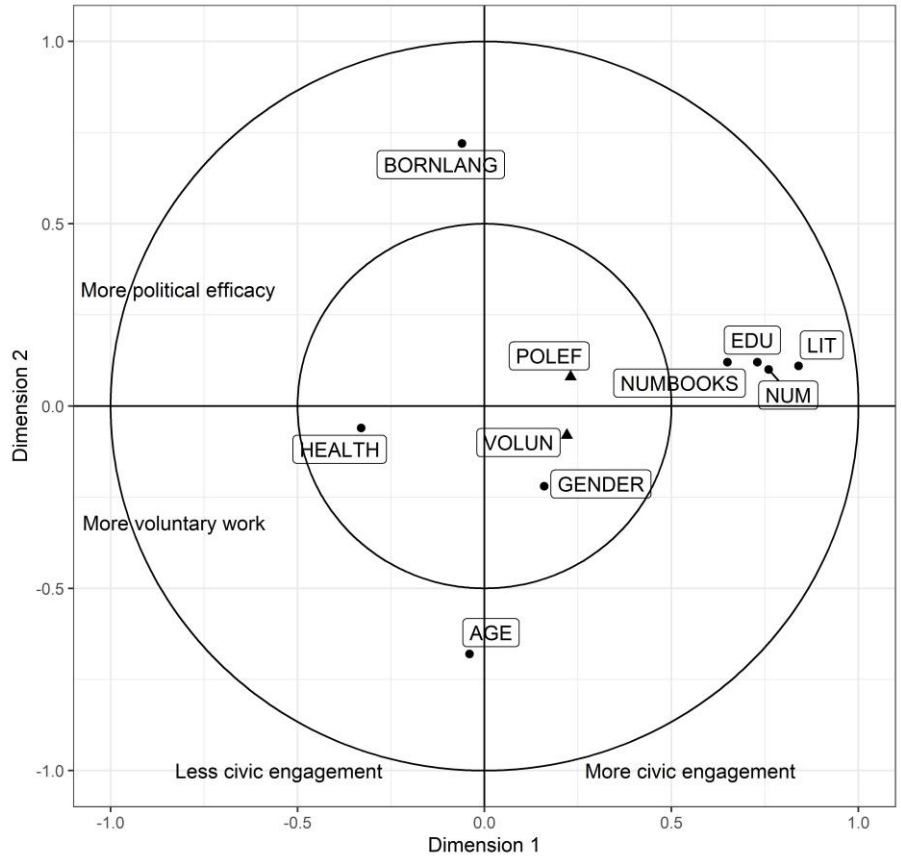
that enables a focus on trends characterizing civic engagement and its facets in a given country: it provides estimates for the effects of all variables as defined in a specific national sample. We illustrate this analysis using the example of Canada below. The next section is of a more direct interest to us: it reports how the effects of a given predictor are distributed over countries and enables identification of cross-national trends in patterns of civic engagement. We present predictors and their effects in groups as defined in Table 2.

2.3.1 Predictors of civic engagement within one country: The case of Canada

Figure 1 summarizes the results of the CCA for the Canadian sample. Each variable under consideration is projected onto two orthogonal dimensions where the *x* and *y* coordinates of a point representing a variable correspond to the Pearson's correlations between that variable and the two dimensions. Two circles in Figure 1 mark $|r| = 0.5$ and $|r| = 1$ along the two axes. Dimension 1 quantifies the overall propensity for civic engagement, which is conceptualised as the shared variance between one's perceived political efficacy and one's participation in voluntary work. Variables found in the right half of Figure 1 (with positive *x* values) are positively correlated with the latent variable that stands for the involvement of an individual in effecting communal or societal change; these variables support civic engagement. Variables with negative *x* values are estimated to hinder civic engagement. Dimension 2 highlights differences between the two facets of civic engagement – political efficacy and volunteering. Numeric estimates along this dimension reflect the specific role that a variable plays in supporting political efficacy rather than voluntary work or vice versa. Variables with positive *y* values show a specific support for political efficacy, while those with negative *y* values show support for

volunteering. Overall, Figure 1 visualizes the (often counter-directed) effects of major factors predicting the propensity of an individual citizen for both multiple forms of civic engagement and the specific forms.

Figure 1: Canonical correlation analysis of Canadian data. Dependent variables are marked with triangles, and independent with circles.



The two dimensions form a coordinate space in which a given predictor can occupy any position. For instance, NUMBOOKS, a measure of the number of books in the respondent's childhood home, has a large positive *x* value ($x = 0.65$) and a small *y* value ($y = 0.12$). A greater number of books in the individual's childhood's household (indicative of their cultural capital) predicts a greater involvement in communal and

societal activities, without a substantial specific bias towards either political efficacy or volunteering. A very similar effect was observed for the variables representing literacy level (LIT), numeracy level (NUM), and educational attainment (EDU), which cluster together with NUMBOOKS and provide strong support for overall civic engagement (i.e., large *x* values) largely unbiased towards either specific activity.

As another example, AGE in Figure 1 is associated with a negligibly small *x* value ($x = -0.04$) and a large negative *y* value ($y = -0.68$). This suggests that chronological age does not directly support or hinder civic engagement in general, but it has a much stronger association with volunteering than political efficacy. Since this combination may appear counter-intuitive, we offer an informal analogy. If asked whether one likes pets or not, an individual can indicate no specific like or dislike. Yet when asked whether one prefers cats or dogs, that individual may indicate a stronger fondness for cats. What the effect of AGE reveals is that this variable does not directly tap into what is shared between individual feelings of political efficacy and the frequency of volunteering (i.e., Dimension 1) but instead is a strong contributor to the unique variance associated with only one of these metrics of civic engagement (i.e., volunteering).

The variable GENDER is located in the right half of the graph, with a small positive *x* value ($x = 0.16$). This variable codes males as 1 and females as 2, so a positive correlation with Dimension 1 indicates that female Canadians demonstrate higher levels of overall civic engagement. Likewise, GENDER has a negative *y* value ($y = -0.22$), indicating that females display somewhat higher levels of volunteering as compared to levels of political efficacy in this national context.

The HEALTH variable codes poorer self-reported health levels with high values (5), and better health levels with low values (1) in the PIAAC survey. In Canada, HEALTH has a negative *x* value ($x = -0.33$) and a negligibly small *y* value ($y = -0.06$). This indicates that while poorer health is associated with lower levels of general civic engagement, it does not hinder one aspect of civic engagement more than the other.

Finally, the predictor BORNLANG codes an interaction between immigration status and linguistic background: higher values of the nominal variable BORNLANG (3, 4) label immigrants, while the maximum value (4) is a label for immigrants whose first language is not the language of the test (i.e., not one of the majority languages of the country). We refer to those who fall into this language group as *minority language speakers*. In Canada, BORNLANG has a very small *x* value ($x = -0.06$), indicating that being an immigrant or a minority language speaker does not have a substantial effect on overall levels of civic engagement. However, this variable is associated with a very large positive *y* value ($y = 0.72$), indicating that being a part of these groups is associated with unique variance in feelings of political efficacy. This suggests that immigrants and minority language speakers in Canada feel that they are able to affect the government more than they tend to be involved in voluntary work.

These independent variables will be discussed in more detail in the following section on the cross-national effects of each variable, as well as in the General Discussion.

Unsurprisingly, the two dependent variables (POLEF and VOLUN), marked with triangles in Figure 1, are both associated with a relatively large x value (x = 0.23 and 0.22 respectively), indicating a positive correlation with the latent variable representing civic engagement and y values of the opposite polarity (y = 0.08 and −0.08 respectively), indicating support for respective specific facets of civic engagement.

In Appendix B, we provide visual summaries of the CCA for each of the 34 countries investigated, to allow for further by-country analyses.

2.3.2 Cross-national patterns of civic engagement

The focus of this study is a cross-national analysis of factors that predict both general patterns and specific facets of civic engagement. This section re-purposes the results of the CCA performed on each country and presents a cross-national distribution of effects for each specific predictor. Projections of a given variable's effect in each country are mapped onto the same coordinate system as above, with Dimensions 1 and 2 having the same definitions and interpretations. As a result, each variable is represented by a distribution of 34 points in a two-dimensional space. To summarize the cross-national trend in each variable, we fitted a data ellipse to the distribution of those effects, using the dataEllipse() function from library car v 3.0-10 (Fox & Weisberg, 2019) in R statistical software. The ellipse estimates a contour of constant probability within which 80% of the distribution lies. The $x - y$ coordinates of the ellipse centre quantify the central tendency of the distribution of each variable across 34 countries. Table 3 lists the cross-national central tendency of each variable, while the $x - y$ coordinates of each

variable per country are reported in Supplementary materials. Below we discuss the cross-national effect of each variable and correlate some of the variables' distributions with country-specific characteristics.

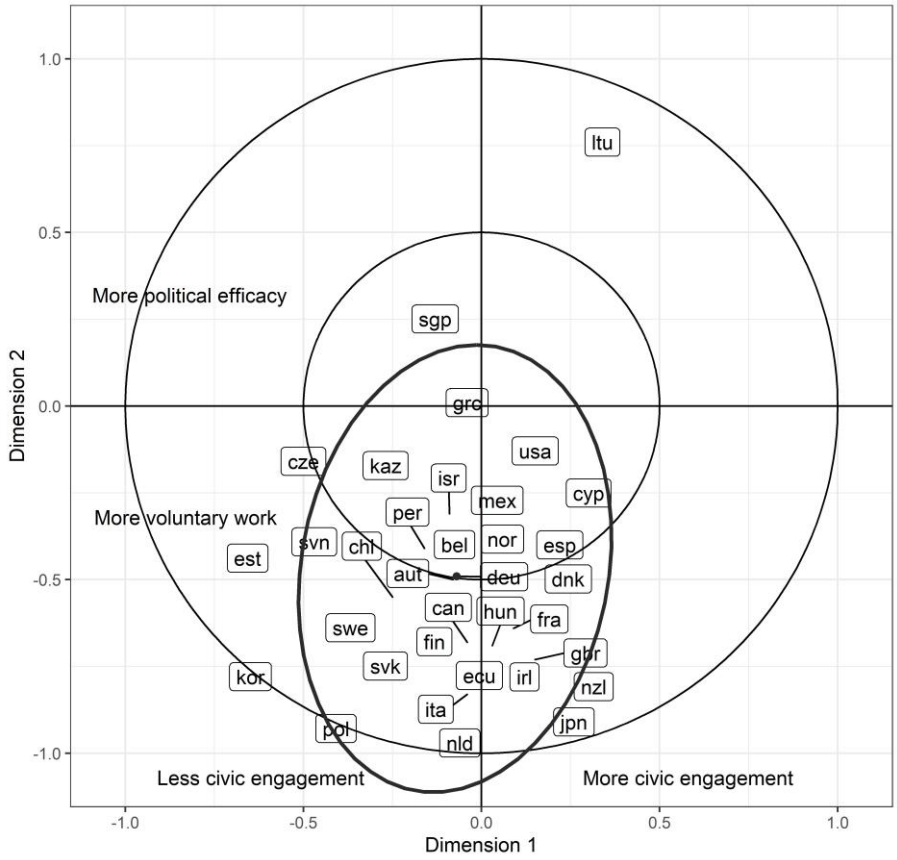
Table 3: Coordinates of ellipse centres for each predictor. Positive x values indicate support for overall civic engagement. Negative y values indicate more support for volunteering and positive y values indicate more support for political efficacy.

Predictor	Ellipse *x*	Ellipse *y*
POLEF	0.23	0.06
VOLUN	0.18	-0.09
AGE	-0.07	-0.49
GENDER	-0.02	0.10
EDU	0.70	0.09
LIT	0.74	0.14
NUM	0.73	0.01
NUMBOOKS	0.64	-0.14
HEALTH	-0.33	-0.15
BORNLANG	-0.16	0.16

Independent variables

Age The cross-national distribution of age effects estimated using CCA demonstrated the same trend we observed in the case of Canada, see Figure 2. While getting older (from 20 to 65 y.o.) did not change the overall propensity for civic engagement (negligibly small *x* value), with age individuals were much more likely to be active in voluntary work as compared to perceiving themselves to be politically efficacious (a large negative *y* value). The coordinates of the ellipse fitted to the distribution of effects for predictor AGE were $x = -0.07$ and $y = -0.49$, see Table 3.

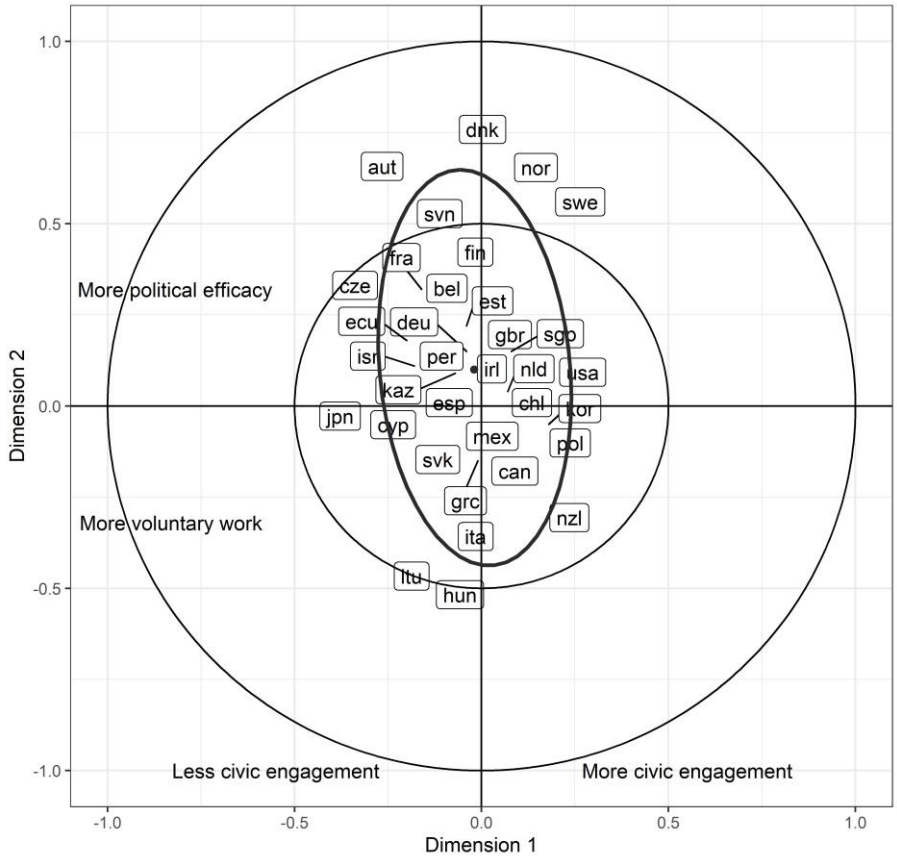
Figure 2: Composite of canonical correlation analyses for AGE.



Gender As Figure 3 indicates, gender does not appear to have a robust correlation with either Dimension 1 (the latent variable representing shared variance in two facets of civic engagement) or Dimension 2 (bias towards one of the facets). The centre of the ellipse is very near to the origin of the graph, with the coordinates $x = -0.02$ and $y = 0.10$. Yet visual inspection of Figure 3 suggests a possible systematic pattern in the distribution of values for predictor GENDER. With values 1 for male and 2 for female for the PIAAC variable GENDER, greater *y* values point to a higher level of political efficacy compared to volunteering in women. This level appears to be highest in countries that have recently

had a female leader (e.g., Denmark, Austria, Norway). To further investigate this possible trend, we linked a country's location along Dimension 2 with data on the percent of national parliamentary seats held by women in that country (The World Bank, 2010b). We found that as the proportion of seats held by women increased, so did the predominance of political efficacy over volunteering among women ($\rho = 0.48$, $p = .004$). That is, in contexts where women are explicitly acknowledged and included in high levels of politics, women in the general population are also more likely to report feeling that their voices are heard.

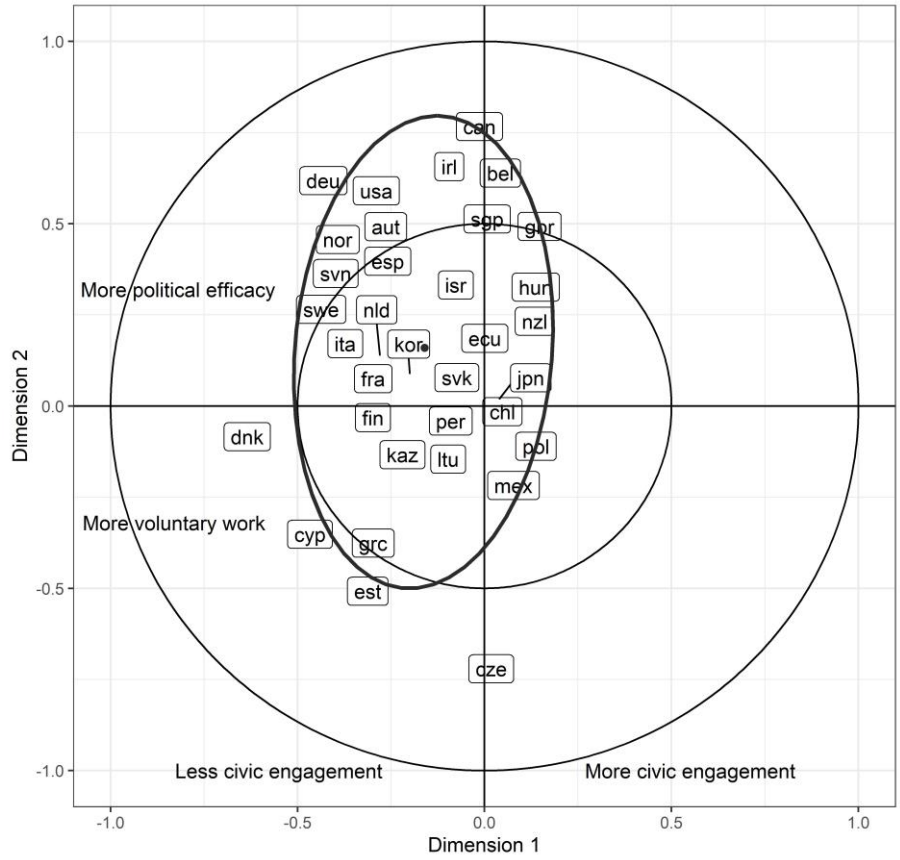
Figure 3: Composite of canonical correlation analyses for GENDER.



Immigration and language status BORNLANG codes an interaction between immigration and language status, where higher values of this variable label immigrants and minority language speakers with respect to a given country. Using the ellipse centre, BORNLANG appears to be only weakly correlated with Dimensions 1 and 2 across countries (Figure 4). A small negative *x* value ($x = -0.16$) on Dimension 1 suggests a weak trend for immigrants and minority language speakers to be generally disengaged from communal and societal involvement. Furthermore, BORNLANG appears to have a weak correlation with Dimension 2 ($y = 0.16$), indicating a slight bias towards political efficacy rather than volunteering. Taken together, the cross-national central tendency of this variable does not indicate a substantial link between this predictor and measures of civic engagement.

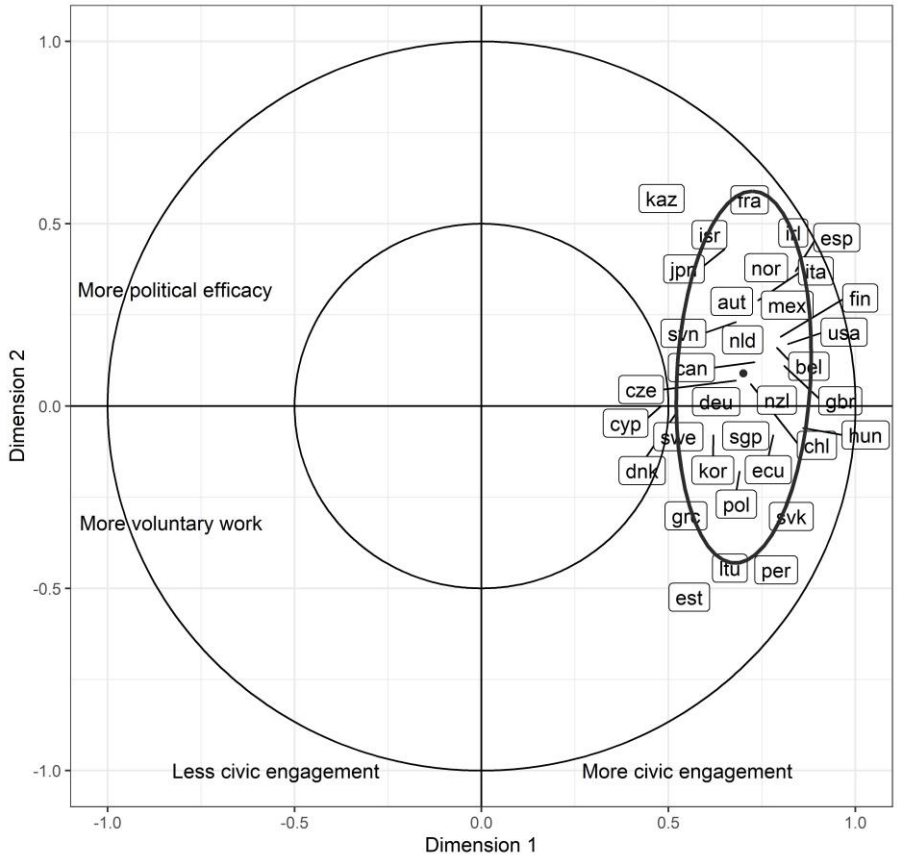
However, a more detailed exploration revealed a systematic pattern. The dispersion of countries along Dimension 2 varies according to national immigration levels, with countries showing a greater proportion of international migrants (The World Bank, 2010a) also displaying a larger *y* value ($\rho = 0.44$, $p = .009$). Countries with the highest levels of immigration (e.g., Canada, USA, Austria, Belgium, Israel) show the largest *y* values: these are the countries in which immigrants and minority language speakers feel that they have more of a say in the political life of the country. This may be a reflection of the greater weight that larger minorities – defined by their ethnicity, language, or country of origin – have in governance and activism. Smaller minorities in countries with lower immigration levels have a harder time being heard.

Figure 4: Composite of canonical correlation analyses for BORNLANG.



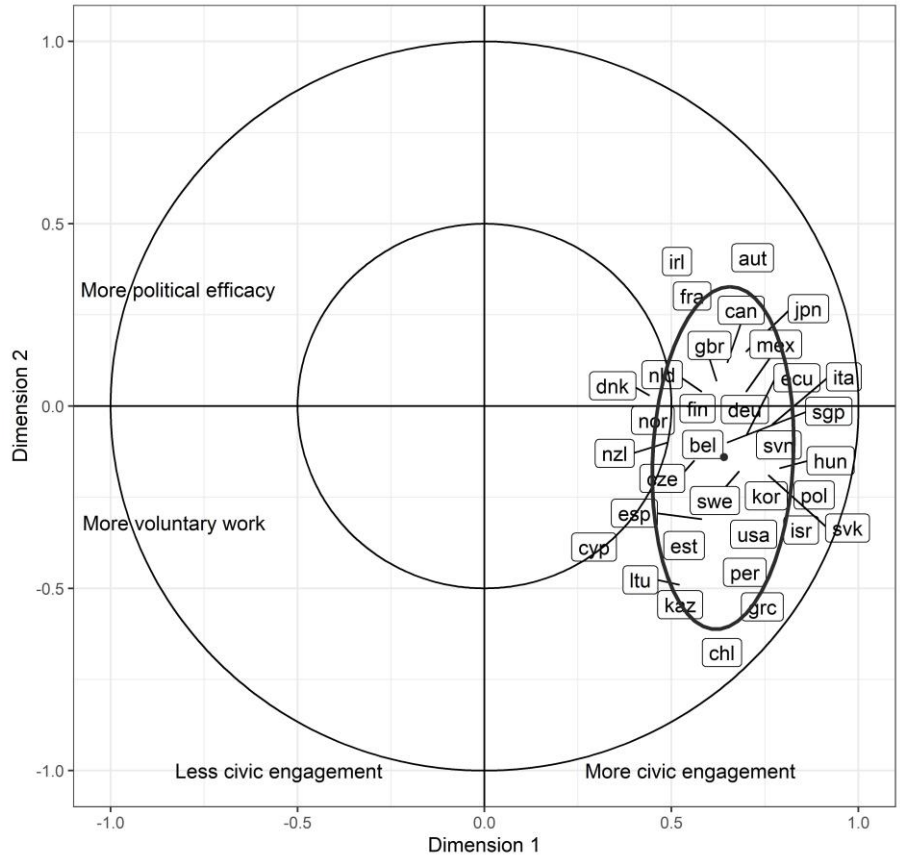
Education Figure 5 displays education's strong general support of civic engagement, similar to the case of Canada presented above. All countries are clustered around a large positive *x* value ($x = 0.70$), indicating that completion of higher levels of education (e.g., a bachelor's degree or a master's degree) strongly promotes overall civic engagement. Education does not appear to correlate with Dimension 2, however, as the ellipse centre has a small positive *y* value ($y = 0.09$). This suggests that higher education does not provide specific support for one of the facets of civic engagement (either political efficacy or voluntary work).

Figure 5: Composite of canonical correlation analyses for EDU.



Cultural capital The number of books in a respondent's childhood household (NUMBOOKS) is used as an index of their cultural capital. This variable is strongly supportive of overall civic engagement, as indicated by the large positive *x* value of the ellipse centre in Figure 6 ($x = 0.64$). This suggests that those who own more cultural goods valued by society are more involved with that society as well. There is a slight bias towards volunteering over political efficacy, as shown by the small negative *y* value of the ellipse centre ($y = -0.14$).

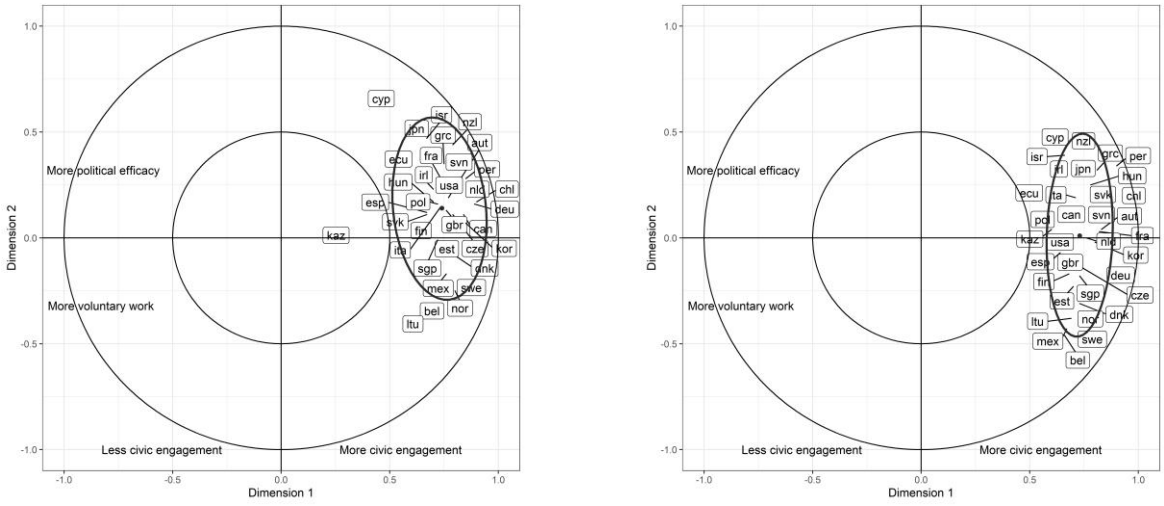
Figure 6: Composite of canonical correlation analyses for NUMBOOKS.



Cognitive Skills The variables LIT and NUM stand for individual scores in literacy and numeracy respectively. Both LIT (Figure 7a) and NUM (Figure 7b) are highly supportive of civic engagement (LIT: $x = 0.74$, NUM: $x = 0.73$), suggesting a link between proficiency in these skills and both a tendency to be involved in the community and a tendency to feel confident and listened to when operating in the political realm. Furthermore, while higher literacy scores provide some specific support for political efficacy over voluntary work ($y = 0.14$), numeracy's negligible y value ($y = 0.01$)

indicates that this cognitive skill does not support a particular underlying facet of civic engagement.

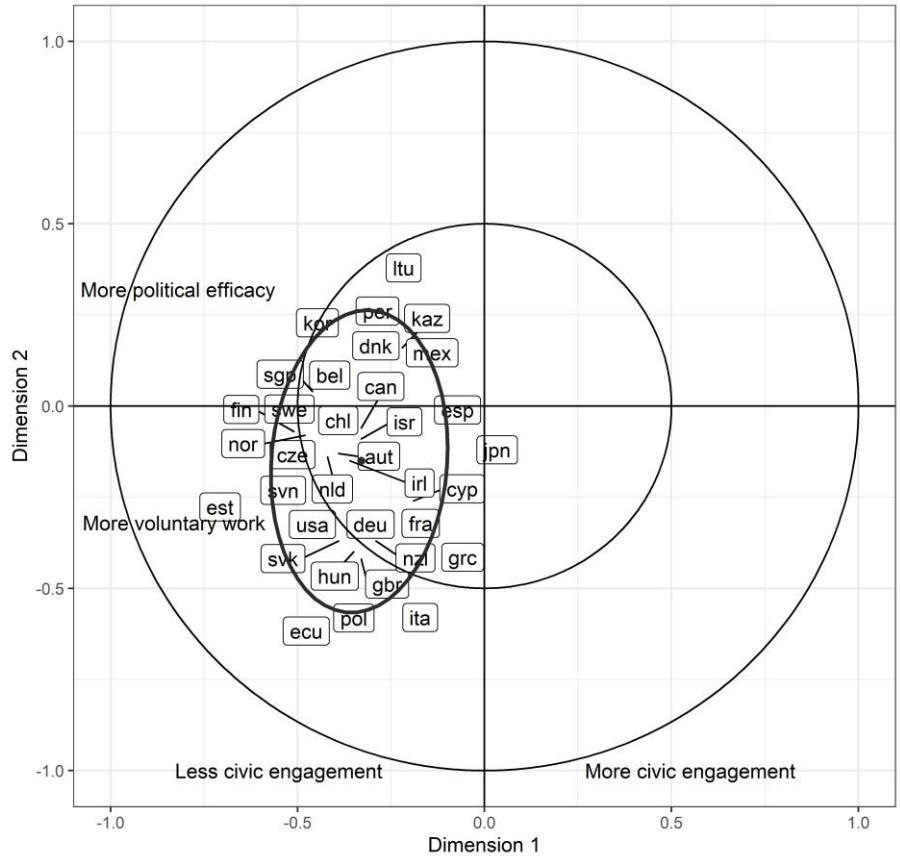
Figure 7: Composites of canonical correlation analyses for LIT (left panel) and NUM (right panel).



(a) (b)

Health Higher values of the HEALTH variable indicate poorer health status in the PIAAC coding. Thus, the interpretation of this predictor having a large negative value for Dimension 1 ($x = -0.33$) in Figure 8 is that better health is linked to higher levels of civic engagement. Likewise, better health status provides additional specific support for feelings of political efficacy, see Dimension 2 ($y = -0.14$).

Figure 8: Composite of canonical correlation analyses for HEALTH.

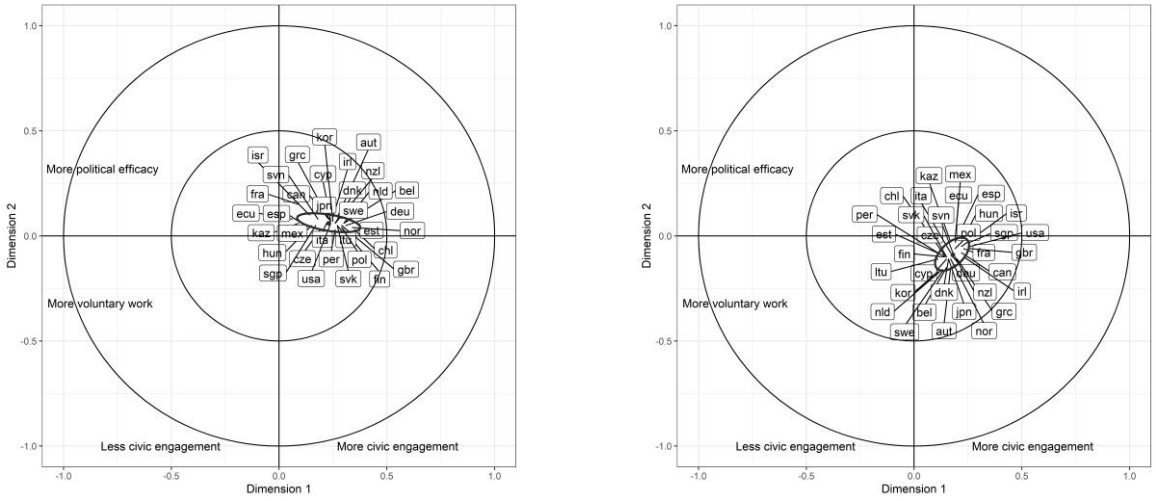


Dependent variables

Figures 9a and 9b demonstrate that across 34 countries, dependent variables (political efficacy and amount of voluntary work) occupy a very narrow range in their respective quadrants. This suggests an excellent convergence of the results obtained using the CCA statistical technique for each country independently. Positive *x* values for both of these variables indicate their support of the latent variable of civic engagement (POLEF: $x = 0.23$, VOLUN: $x = 0.18$). As expected, a positive *y* value for POLEF shows

the dependent variable's support for higher political efficacy over volunteering ($y = 0.06$), while a negative y value for VOLUN shows the opposite bias ($y = -0.09$).

Figure 9: Composites of canonical correlation analyses for POLEF (left panel) and VOLUN (right panel).



(a) (b)

2.4 General discussion

The findings presented here expand on prior research on the factors influencing civic engagement by providing a multidimensional analysis of a wide range of relevant predictors. To do so, we model the effects of a variety of demographic, health, social, and cognitive factors both on the individual facets of civic engagement (voluntary work and political efficacy), and on the shared variance between those facets (the latent variable of civic engagement). Analyzing the effect of the predictors on these two dimensions at the level of a single country (as in the first part of the results section) allows the conceptualization of how these factors behave in a particular nation's social, political, and linguistic contexts. Country-level representations also facilitate future comparisons of the

effect of each factor within and between specific countries. The intra-national and cross-national analyses are facilitated by the common and intuitive range (that of a Pearson's correlation) in which all effects are reported and visualized. Graphical representations of the CCA for each country are available in Appendix B. Analyzing the effect of a single predictor over all countries (as in the second part of the results section) provides an alternate view. This allows us to investigate the overall multidimensional effects of our factors of interest, while including a diverse range of national contexts.

The case study of Canada displayed that literacy, numeracy, education level, and number of books in the childhood home are all strongly supportive of civic engagement. These variables seem to behave in a similar way in this national context, clustering closely together in one sector of Figure 1. Considering these variables cross-nationally preserves their robust effect and further confirms similarities in their impact. Across all countries, they provided consistent and strong support for civic engagement overall and no substantial specific bias towards either of the two facets of volunteering or political efficacy.

The finding that educational attainment and cultural capital support civic engagement echoes and extends past research. Education and social capital (resources afforded by one's social ties and networks) are widely considered important factors related to participation and engagement with civic and political activities (e.g., Barrett & Brunton-Smith, 2014; Flanagan & Levine, 2010; Hoffman & Appiah, 2008; OECD, 2007). The present study adds to this body of research by displaying that cultural capital, a distinct form of capital relating to the acquisition and use of resources deemed valuable

by society, is also instrumental in promoting engagement with society. This suggests that being practiced at operating in the cultural sphere that is ascribed to higher social status may help individuals feel more comfortable taking part in community activities and political action.

Our findings also highlight the importance of cognitive skills in supporting civic engagement. Literacy skill displayed strong positive support for this latent variable across all countries. Higher literacy levels also tended to be indicative of somewhat higher feelings of political efficacy rather than volunteering, supporting the role of literacy proficiency as a key predictor of engagement with the political realm within one's country (Grotlüschen, 2018; Grotlüschen et al., 2021). Numeracy was also supportive of civic engagement across all countries and was unselective in its support for volunteering and political efficacy. This suggests that mathematical skills such as being able to interpret and relay numeric information are important in promoting participation across multiple forms of civic and political activities. The universal and substantial supportive effect of literacy and numeracy further characterizes the relationship between cognitive skills and involvement with society. Being able to effectively navigate, understand, and apply textual and numeric information are key skills that enable one's participation in many aspects of everyday life. This is the very premise of the PIAAC survey (OECD, 2013b). The findings presented here suggest that these skills are also instrumental in promoting engagement both locally, at the community level, and nationally, through engagement with the government and political bodies.

Considering how intertwined education, cultural capital, literacy, and numeracy are provides a practical explanation for their parallel effects in the present study. Literacy and numeracy skills both support one's participation in, and are developed by, education. Cultural capital is passed down from parents to children and provides educationally-relevant resources to children that enable them to achieve higher levels of success in school (Sieben & Lechner, 2019). As such, it is sensible that they display very similar effects on civic engagement and its underlying elements. Overall, these factors were found to have robust effects across 34 countries, and to provide rich support for one's involvement in society, as expressed through multiple channels of engagement. The persistence of the positive effect of this group of factors highlights their importance. Despite the wide variety of variables that can affect levels of civic engagement, including national-level factors such as government efficiency and accountability (Barrett & Brunton-Smith, 2014), these variables retained their supportive effect in all contexts.

The demographic variables of gender and age displayed varying effects on levels of civic engagement. Gender had no sizable association with either dimension, both in the single context of Canada and when its effect was viewed across all countries. However, when country-level characteristics were considered, a cross-national pattern emerged. In countries where a higher percentage of parliamentary seats were held by women, women also showed a greater skew towards feeling that they could affect politics when the individual facets of civic engagement were considered. This finding complements past research linking the presence of female parliamentarians and heads of government to increased interest in, access to, and participation in politics among women (Alexander &

Jalalzai, 2020; Wolbrecht & Campbell, 2007). Our findings likewise point to a relation between the inclusion of marginalized groups at high levels of government and feelings of empowerment and efficacy among those same groups in the community.

Like gender, age had no substantial effect on overall civic engagement. However, this variable did show a link with the second dimension, with older individuals reporting participating in more voluntary work rather than having feelings of political efficacy. Chronological age may have had little effect on feelings of political efficacy as this facet of civic engagement has been shown to be a relatively stable trait over time (Iyengar, 1980). Because the present data is cross-sectional with respect to individual countries, however, we cannot distinguish between age and cohort effects.

Health level was also shown to be related to both dimensions. Those with better self-reported health were more engaged overall, and healthier individuals reported particularly high levels of political efficacy as compared to involvement in voluntary work. These findings are partially in line with the widely investigated relationship between health and volunteering. Health level can affect one's involvement in volunteering, as those with better health possess more of the physical and mental resources required by many forms of volunteer service, and also tend to be more socially integrated with other community groups (Thoits & Hewitt, 2001). This creates pressures, likely in the form of both self-selection and selection by the volunteering organizations, that influence who takes part in this service. Likewise, volunteering has been shown to exert its own effect on health levels across time, leading to increases in life satisfaction, self-esteem, general health, and psychological well-being, even after controlling for initial

health level (Sneed & Cohen, 2013; Thoits & Hewitt, 2001). The potential benefits of volunteering are particularly salient for older individuals, who can foster social relationships, and maintain a sense of agency, purpose, and identity in later life when they may have fewer alternative avenues for this development (Gottlieb & Gillespie, 2008). Our results are consistent with the reported link between health level and volunteering, as individuals with better health showed more overall engagement, which includes the measure of volunteering. However, our findings point to the fact that the benefits of better health are not limited to increased participatory behaviour, but also extend to feelings of being effective in the political realm. That is, levels of voluntary work are not specifically privileged by better health over other forms of civic engagement (as indicated by health's relation to Dimension 2), rather the multiple forms of engagement are boosted synchronously.

We found a weak overall tendency for immigrants and minority language speakers to be less engaged in the civic life of their community or nation. This is in line with prior research showing that immigrants and minority language speakers report lower levels of individual civic engagement indicators than native citizens or speakers of the majority language (Grotlüschen et al., 2021; Rose et al., 2019; but see, e.g., Stepick et al., 2008). Some past research has attributed this effect in part to literacy level. For instance, Grotlüschen et al. (2021) showed that the negative effect of immigrant status on political efficacy disappeared after controlling for literacy level, while its association with volunteering remained robust. Our results highlight that literacy level cannot fully explain the link between immigrant or language status and civic engagement, as there remained a

negative effect of this variable even after the effects of literacy, numeracy, and education were accounted for. Thus, immigrants and speakers of minority languages experience barriers to civic engagement over and above those related to proficiency in the majority language (as measured by literacy level). Another possible explanation stems from socioeconomic status. Research surrounding the link between immigration status and civic engagement has shown that while immigrants tend to report lower participation in civic and political activities than non-immigrants, these differences are reduced or eliminated once demographic factors including socioeconomic status are controlled for (Lopez & Marcelo, 2008). This suggests that social standing and economic resources may be key determiners of immigrants' access to avenues through which to affect public policy and other governmental affairs.

Immigration status and status as a minority language speaker (the BORNLANG variable) was also shown to systematically vary across countries in its selective support for the underlying facets of civic engagement. The percentage of a country's population who are immigrants was a highly relevant factor of influence. In countries with higher levels of immigration, being an immigrant or a minority language speaker was linked to increased support for political efficacy over voluntary work. This correlation could be a product of immigrants moving to countries where they feel they are acknowledged and included in the political realm, and can thus have an effect on the government. Likewise, this link could indicate that having a larger immigrant community in a country makes it more likely that governmental practices and policies will be inclusive and responsive to a given ethnic or language minority, and that these groups will have formal representation

in the political and social sphere through institutions or political parties. An in-depth consideration of factors such as an individual country's population characteristics, immigration history, and political practices is necessary to characterize the specifics of this relation.

The BORNLANG variable also displays one of the strengths of the current analytical technique. If one were to only consider the effect of this variable within a single country, as in the case of the Canada-specific visualization (Figure 1), the only takeaway may be that immigration and language status is strongly supportive of political efficacy over volunteering. However, when viewed in the greater context of all 34 countries, it becomes clear that the selectivity of this variable is context dependent, with many countries showing little if any selectivity, and some showing more selectivity for voluntary work, see Figure 4. Linking such dispersion to country-specific characteristics, as we have done here through a comparison with the World Bank's data on immigration rates, provides a method by which to both visualize cross-national patterns in civic engagement, and identify potential factors linked to deviation from these patterns. Prior research that investigates civic engagement in only a subset of countries, for instance those with very high immigration levels (Grotlüschen et al., 2021), may not be sufficiently sensitive to trends such as these. By considering a broader range of sociopolitical contexts, we are able to investigate and identify patterns in civic engagement along a spectrum of national backdrops.

2.5 Limitations and future directions

One important limitation of the current study is the relatively narrow operationalization of civic engagement. As described above, civic engagement comprises a wide variety of activities and attitudes relating to participation in one's community or society. Here, only one's level of volunteering and feelings of political efficacy were used as indicators of this complex construct. Measures of participation in civic and political activities that may be considered less conventional, such as signing petitions, helping neighbours, or engaging in consumer activism, are not included. Moreover, the measure of voluntary work used here does not explicitly include activities such as translation or helping others to read or write in the majority language. As these are activities that immigrants and speakers of minority languages engage in to a high degree, often more than non-immigrants (Stepick et al., 2008), this may lead to an underestimation of levels of civic engagement in such groups. Additionally, possible interactions between variables are not evaluated. Such interactions are outside the scope of the present analyses and are thus left to future studies. Finally, we report here the average cross-national effect of each variable. While this allows us to characterize wide-spread patterns in the variables' effects on civic engagement, it leaves out patterns within a single country that may not be visible at a macro level. For instance, while the average effect of age is neither supportive nor unsupportive of civic engagement, certain countries on the outskirts of the ellipse show other patterns. We make all CCA results and visualizations available, both by-variable and by-country, to facilitate such future investigations (see Appendix B).

2.6 Conclusion

This study provides a new perspective on the factors affecting civic engagement around the world. The use of CCA allows us to deepen our understanding of which factors contribute to only a single facet of civic engagement, and which affect what is shared between the two. This clarifies which demographic, cognitive, and educational characteristics have far-reaching effects on how one addresses issues within and around their community. By using nationally representative and cross-nationally comparable data from the PIAAC survey, we provide a global view of these effects. Through the use of socio-demographic data from multiple countries, we draw links between patterns of civic engagement of potentially marginalised groups and the representation those groups have at the community level and the political level. We see that while factors like educational attainment, cognitive skills, health status, and cultural capital strongly support involvement in multiple forms of civic engagement, these factors could equally act as barriers to engagement for those with lower levels. Programs that support the social and political participation of groups that have been excluded from such activities or who have not followed conventional pathways to civic engagement can help individuals to overcome these barriers. However, an important further step is a focus on addressing the barriers themselves. Understanding the reasons why people do not or cannot engage fully with the civic life of their society will provide guidance on how to promote more equitable access to these communal activities and the benefits they confer. It is by undertaking efforts to open such activities to all people, regardless of linguistic abilities,

educational background, or other demographic factors, that everyone's voice can be heard.

3 Summary and Conclusions

This thesis provides an overview of the factors that contribute to or hinder civic engagement in 34 countries represented in the PIAAC survey. This work makes novel contributions to the field by identifying a group of variables that provide strong support to multiple facets of civic engagement across all investigated countries, by using CCA to highlight the effects of predictors that are common to multiple forms of engagement, and by investigating the effects of predictor variables in diverse national contexts.

Literacy skill, numeracy skill, educational attainment, and number of books in the home had the strongest effect on levels of civic engagement of all the investigated predictors and retained their positive effect in all 34 countries. These variables are thus key predictors of engagement in the community and society, and their effects on engagement are robust to the numerous factors that vary between countries such as their political landscape, official languages, and population characteristics. The effects of these variables are also pervasive across multiple forms of civic engagement: all four variables provided strong support for both volunteering and political efficacy. These variables thus play an important role in supporting diverse forms of civic engagement and influence how involved a person is in both their community and local politics. Cognitive skill levels, education, and number of books in the home are interconnected variables in that they bolster each other (e.g., cognitive skills facilitate access to, and are developed by, education) and in that they can be grouped together as skill-related predictors. The positive effect of education on civic engagement is thought to be due to the benefits of the skills and knowledge afforded to a person through education (an absolute model) rather

than because education improves one's location in the social hierarchy (a relative model) (OECD, 2007). The supportive effects of the other variables in this thematic group are consistent with this interpretation. Literacy and numeracy level measure the cognitive skills a person has that enable them to be fully engaged in society. The number of books in one's childhood home, while an indicator of cultural capital, also indicates the number of educational resources available to a person that support skill and knowledge development (Sikora et al., 2019). Thus, the strongest and most consistent predictors of civic engagement seem to be those related to skill level – whether direct measurements of proficiency in those skills (i.e., literacy, numeracy), or background characteristics that promote those skills (i.e., educational attainment, number of books in the home).

This thesis also adds to the existing body of literature on civic engagement by employing CCA to examine which predictors have widespread effects on multiple forms of civic engagement, and which have effects that are limited to a single form. This is a key consideration when investigating a concept such as civic engagement, which can be measured with multiple outcome variables that are likely to be correlated and predicted by a similar group of variables. It is a consideration that has been overlooked in most prior research. The present findings demonstrate the importance of undertaking such an analysis. Numeracy skill provides strong support for civic engagement, and this support is balanced between the two underlying forms of engagement: volunteering and political efficacy. Literacy is similar to numeracy in its support of overall engagement, however, the CCA technique highlights that literacy also provides some specific support to political efficacy, independently of its effect on volunteering. The use of CCA thus sheds new

light on the intricacies of how the investigated variables influence levels of civic engagement.

Finally, this thesis broadens the existing literature by carrying out CCA in 34 different national contexts. Past research has shown that the predictors of civic engagement vary across countries, such that some predictors may be highly significant in some countries and have no effect on civic engagement in others (see Chapter 1). Past studies that focus on a single country or a small set of countries do not capture this variation. The present investigation employed nationally representative data from 34 countries that participated in the PIAAC survey. PIAAC's cross-nationally comparable design allows a common scale to be used for all country analyses and the visualization of how the effects of predictors vary between countries. Our analyses highlight both the persistence and variation of effects across national contexts. Despite differences in countries' political, social, and linguistic landscapes, many variables (e.g., literacy skill, numeracy skill, education, number of books in the home) consistently supported civic engagement in all contexts. Others displayed more variation (e.g., gender, immigration and language status), often along the second dimension of analysis, that is, how much specific support a variable provides to only one facet of civic engagement. These findings are enriched with socio-demographic data to link this variation with country-level characteristics. For instance, status as an immigrant and as a minority language speaker provided more specific support for feelings of political efficacy in countries with higher rates of immigration. This suggests that national support for and inclusion of linguistic and ethnic minorities within a country helps those groups to feel that their voice will be

heard within the political realm. The presence of formal avenues through which immigrants can share their concerns, civic organizations that support ethnic minorities, and political intermediaries that operate in the native language of immigrant groups all facilitate the political participation of immigrants (Barret & Brunton-Smith, 2014; Bonotti & Willoughby, 2022). Larger immigrant communities may be more able to form and maintain such organizations and supports, reducing linguistic barriers to participation for these communities.

3.1 Future directions

Future work in this area may be enriched by using political participation, rather than political efficacy, as a measure of civic engagement. While political efficacy has been shown to be a key predictor of involvement in conventional political activities such as voting, discussing candidates, attending a campaign rally, or donating to a political party (Barrett & Brunton-Smith, 2014; Reichert, 2016; Valentino et al., 2009), some analyses indicate that it does not consistently predict involvement in unconventional political activities such as signing petitions, attending protests, or engaging with political issues through social media (Reichert, 2016). Young people and ethnic minorities are more likely to participate in non-conventional political activities than those who are older or part of a majority group (Barrett & Brunton-Smith, 2014), so using political efficacy as a measure of engagement may underestimate involvement in politics among these groups. Using measures of actual political participation would aid in overcoming this limitation. Such measures are not currently available in the PIAAC survey, and other international surveys that do include them (e.g., the World Values Survey,

https://www.worldvaluessurvey.org) do not contain other measures that are key to the present analyses, such as assessments of cognitive skill level. This thesis thus also calls for the inclusion of diverse measures of political participation, both conventional and non-conventional, in future rounds of international skills surveys such as PIAAC. An analysis focusing on the predictors of diverse forms of political participation could also make use of the benefits of CCA: the method could be applied to combine measures of conventional and non-conventional political activities into a latent variable representing overall political participation. This would facilitate an analysis of which variables predict participation in diverse political arenas, and which favour one type of participation over another. Such an analysis would help to ensure that the engagement of all groups, including those that may be subject to narratives of disengagement, is accurately depicted.

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Appendix A

Results of hierarchical statistical significance tests

Table A1

Results of the hierarchical statistical significance tests of CCA in each country using Wilks's lambda.

Country	Functions	lambda	F	df1	df2	p
aut	1 to 2	0.87	40.32	16	9136	0.000
aut	2 to 2	0.97	23.30	7	4569	0.000
bel	1 to 2	0.88	37.98	16	8932	0.000
bel	2 to 2	0.97	17.66	7	4467	0.000
can	1 to 2	0.89	174.84	16	48594	0.000
can	2 to 2	0.99	49.69	7	24298	0.000
chl	1 to 2	0.86	46.20	16	9430	0.000
chl	2 to 2	0.99	6.73	7	4716	0.000
cyp	1 to 2	0.91	24.87	16	8152	0.000
cyp	2 to 2	0.98	9.46	7	4077	0.000
cze	1 to 2	0.95	17.71	16	10596	0.000
cze	2 to 2	1.00	2.07	7	5299	0.043
deu	1 to 2	0.87	44.12	16	9676	0.000
deu	2 to 2	0.99	10.02	7	4839	0.000
dnk	1 to 2	0.90	46.52	16	13420	0.000
dnk	2 to 2	0.98	16.07	7	6711	0.000
ecu	1 to 2	0.96	14.13	16	9832	0.000
ecu	2 to 2	0.99	4.93	7	4917	0.000
esp	1 to 2	0.95	17.81	16	10884	0.000
esp	2 to 2	0.99	5.60	7	5443	0.000
est	1 to 2	0.85	73.02	16	14008	0.000
est	2 to 2	0.99	11.49	7	7005	0.000
fin	1 to 2	0.89	36.43	16	9806	0.000
fin	2 to 2	0.99	9.17	7	4904	0.000
fra	1 to 2	0.92	33.11	16	12274	0.000

Country	Functions	lambda	F	df1	df2	p
fra	2 to 2	0.98	21.70	7	6138	0.000
gbr	1 to 2	0.85	84.37	16	16478	0.000
gbr	2 to 2	0.99	7.56	7	8240	0.000
grc	1 to 2	0.89	35.04	16	9322	0.000
grc	2 to 2	0.98	16.05	7	4662	0.000
hun	1 to 2	0.93	26.25	16	11230	0.000
hun	2 to 2	1.00	3.20	7	5616	0.002
irl	1 to 2	0.88	47.88	16	11192	0.000
irl	2 to 2	0.98	16.74	7	5597	0.000
isr	1 to 2	0.92	23.19	16	9256	0.000
isr	2 to 2	0.99	9.72	7	4629	0.000
ita	1 to 2	0.92	23.27	16	8688	0.000
ita	2 to 2	0.99	7.17	7	4345	0.000
jpn	1 to 2	0.91	30.35	16	9586	0.000
jpn	2 to 2	0.98	12.37	7	4794	0.000
kaz	1 to 2	0.96	10.42	16	8610	0.000
kaz	2 to 2	1.00	3.06	7	4306	0.003
kor	1 to 2	0.90	42.82	16	12124	0.000
kor	2 to 2	0.97	30.79	7	6063	0.000
ltu	1 to 2	0.90	30.91	16	9538	0.000
ltu	2 to 2	0.99	10.33	7	4770	0.000
mex	1 to 2	0.95	16.72	16	11126	0.000
mex	2 to 2	1.00	2.98	7	5564	0.004
nld	1 to 2	0.87	42.13	16	9262	0.000
nld	2 to 2	0.97	22.44	7	4632	0.000
nor	1 to 2	0.86	44.88	16	8828	0.000
nor	2 to 2	0.98	9.64	7	4415	0.000
nzl	1 to 2	0.89	40.65	16	10848	0.000
nzl	2 to 2	0.99	11.16	7	5425	0.000
per	1 to 2	0.91	37.37	16	12988	0.000
per	2 to 2	0.99	7.61	7	6495	0.000
pol	1 to 2	0.89	64.01	16	16512	0.000
pol	2 to 2	0.99	7.00	7	8257	0.000
sgp	1 to 2	0.91	30.61	16	9716	0.000

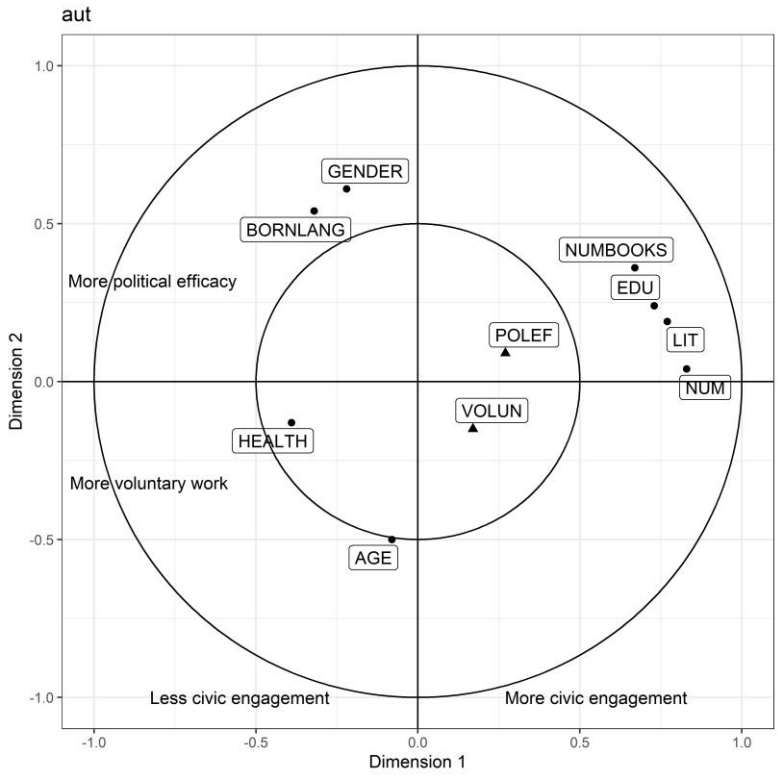
Country	Functions	lambda	F	df1	df2	p
sgp	2 to 2	1.00	2.30	7	4859	0.024
svk	1 to 2	0.90	35.84	16	10336	0.000
svk	2 to 2	0.99	10.72	7	5169	0.000
svn	1 to 2	0.92	24.26	16	9734	0.000
svn	2 to 2	0.98	10.62	7	4868	0.000
swe	1 to 2	0.88	32.23	16	8002	0.000
swe	2 to 2	0.97	20.19	7	4002	0.000
usa	1 to 2	0.88	54.22	16	13546	0.000
usa	2 to 2	0.99	7.13	7	6774	0.000

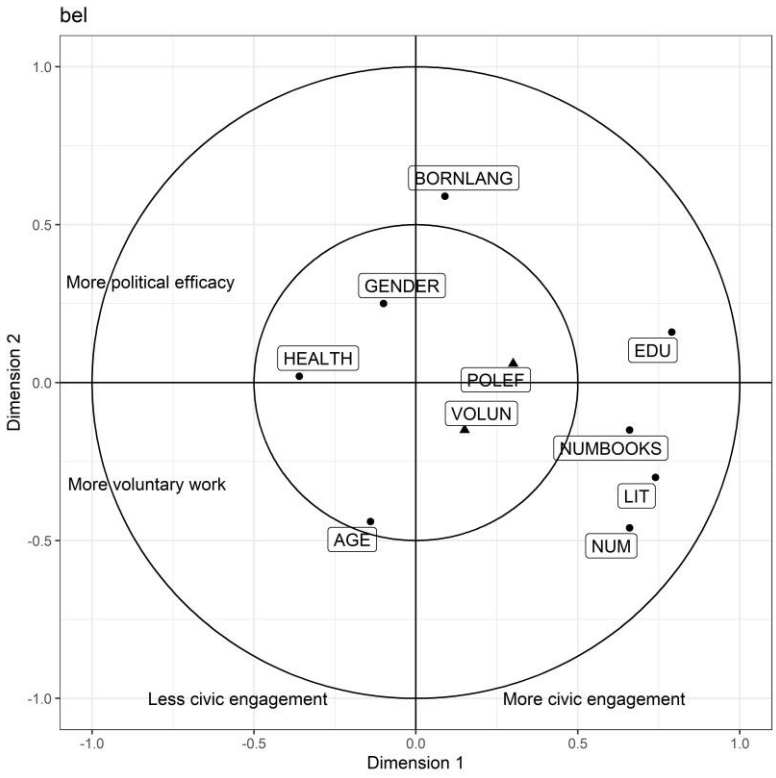
Note: Functions 1 to 2 refers to significance tests of the complete CCA models (including both dimensions), while functions 2 to 2 refers to significance tests of the second dimension only.

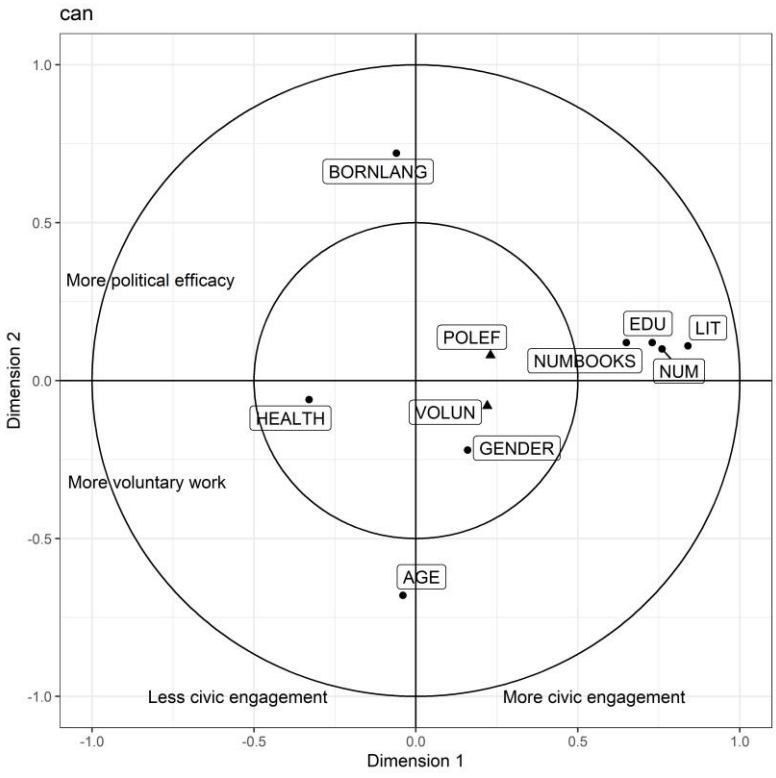
Appendix B

Visual summaries of CCA

The following are visualizations of CCA by country. Dependent variables are marked with triangles, and independent with circles. Country labels are located above each figure.




bel
BORNLANG
GENDER
HEALTH
POLEF
VOLUN
EDU
NUMBOOKS
LIT
NUM
AGE
More political efficacy
More voluntary work
Less civic engagement
More civic engagement
Dimension 1
Dimension 2
1.0
0.5
0.0
-0.5
-1.0


can
BORNLANG
POLEF
EDU
LIT
NUMBOOKS
NUM
HEALTH
VOLUN
GENDER
AGE
More political efficacy
More voluntary work
Less civic engagement
More civic engagement
Dimension 1
Dimension 2
1.0
0.5
0.0
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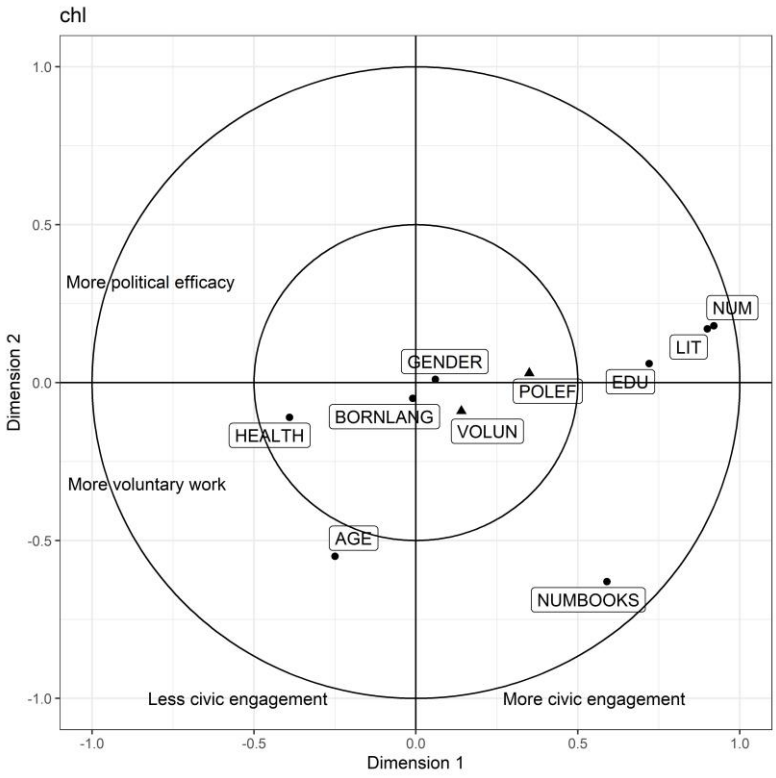
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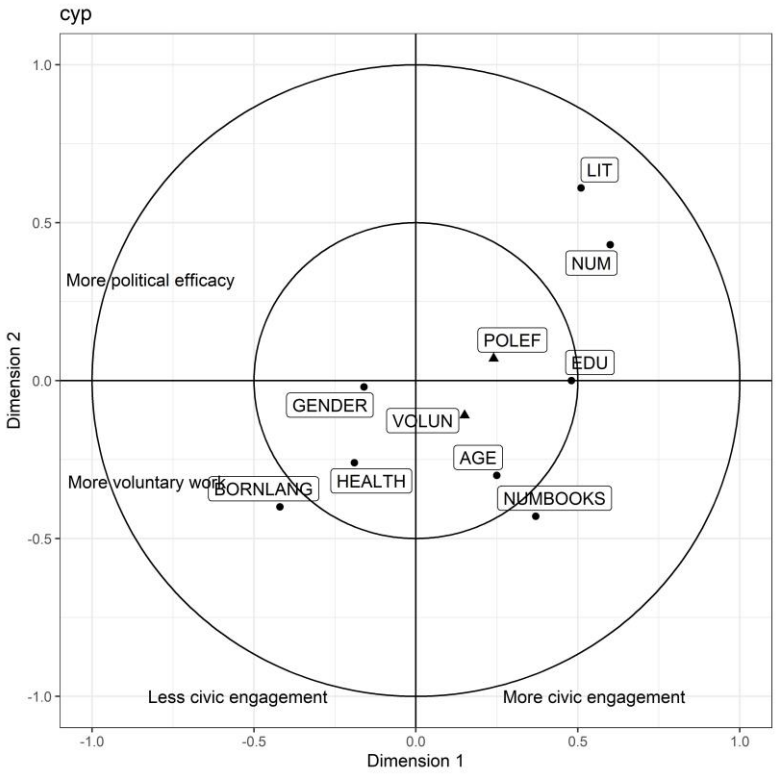
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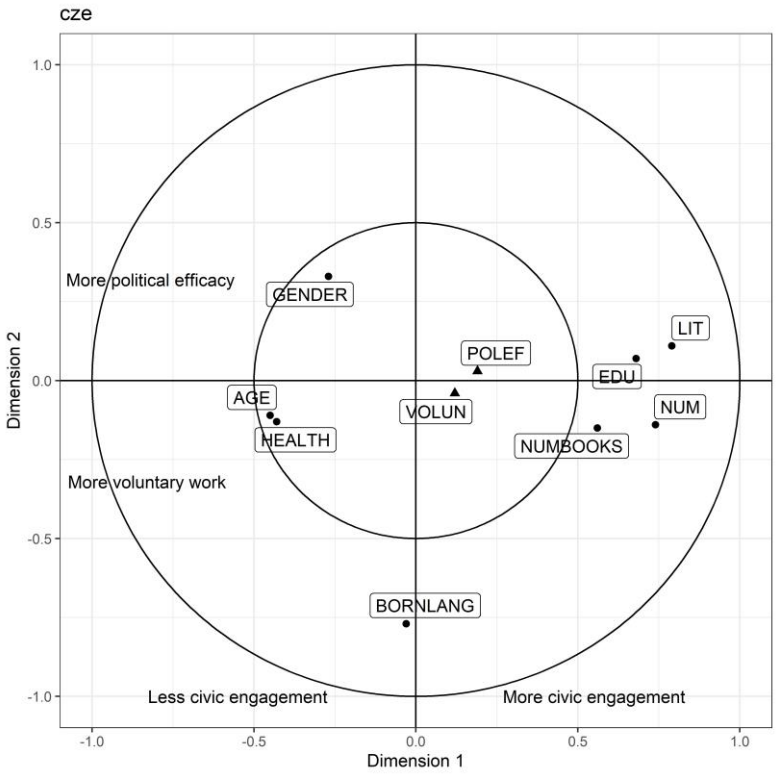
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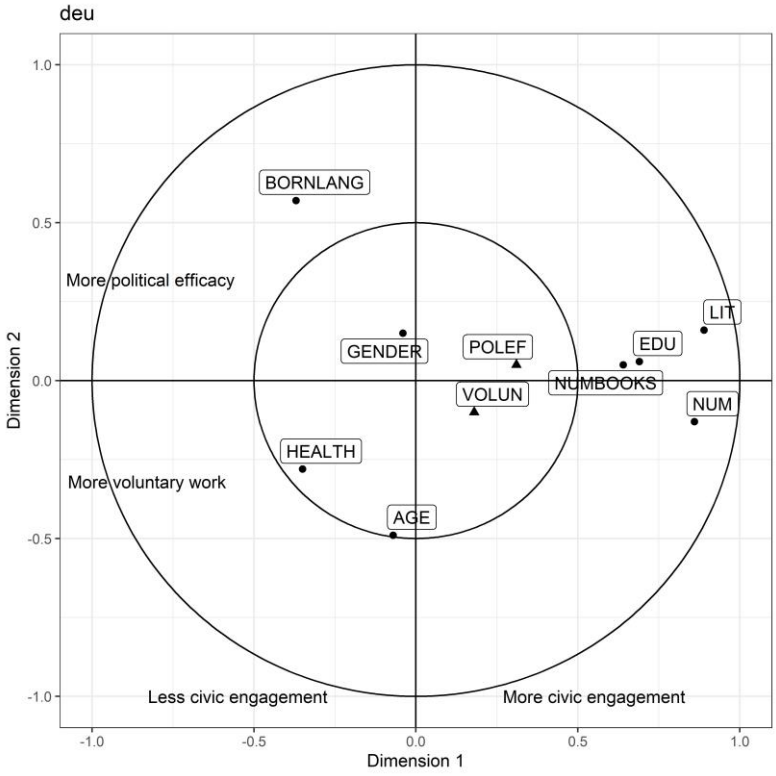
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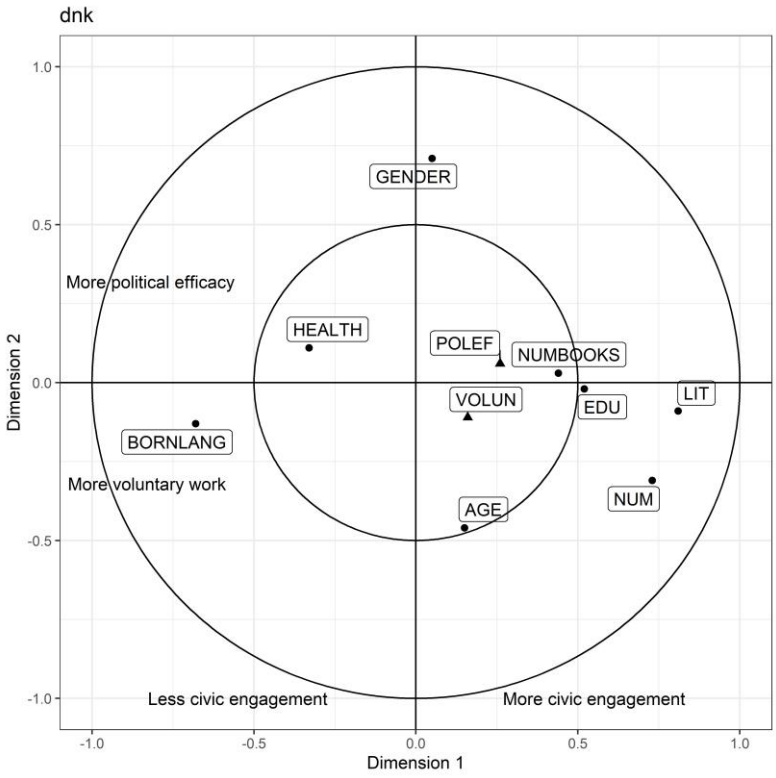
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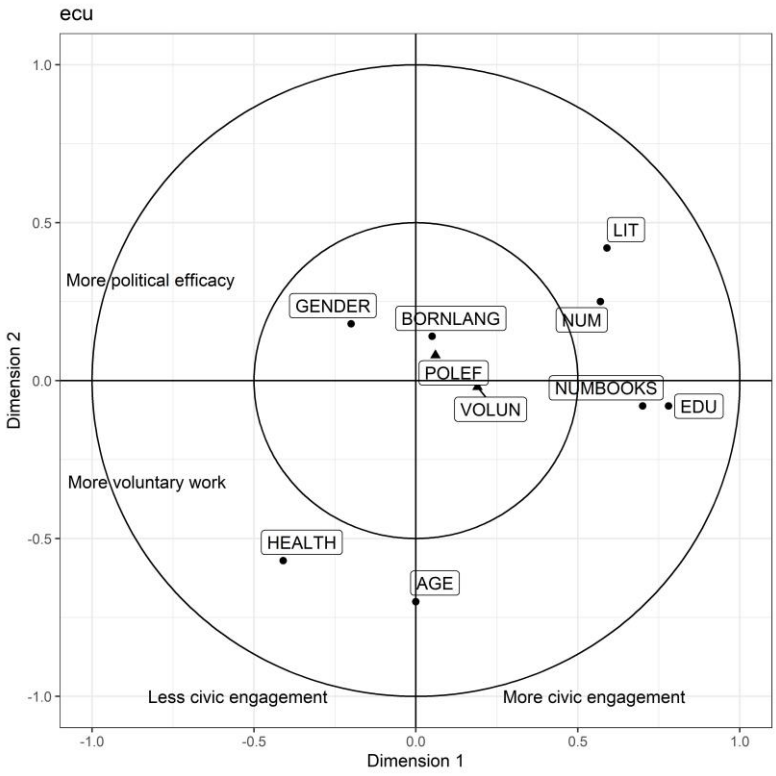
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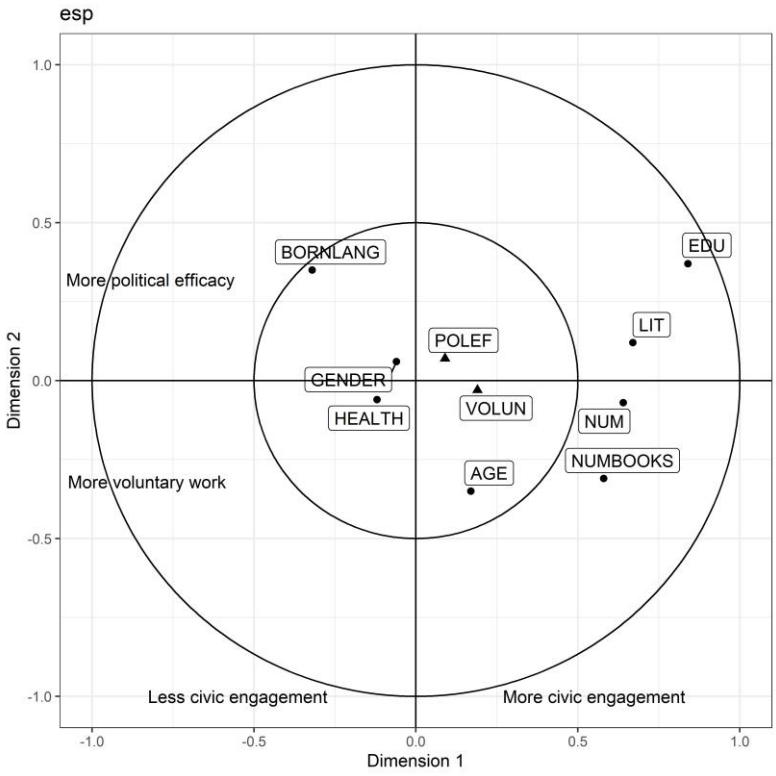
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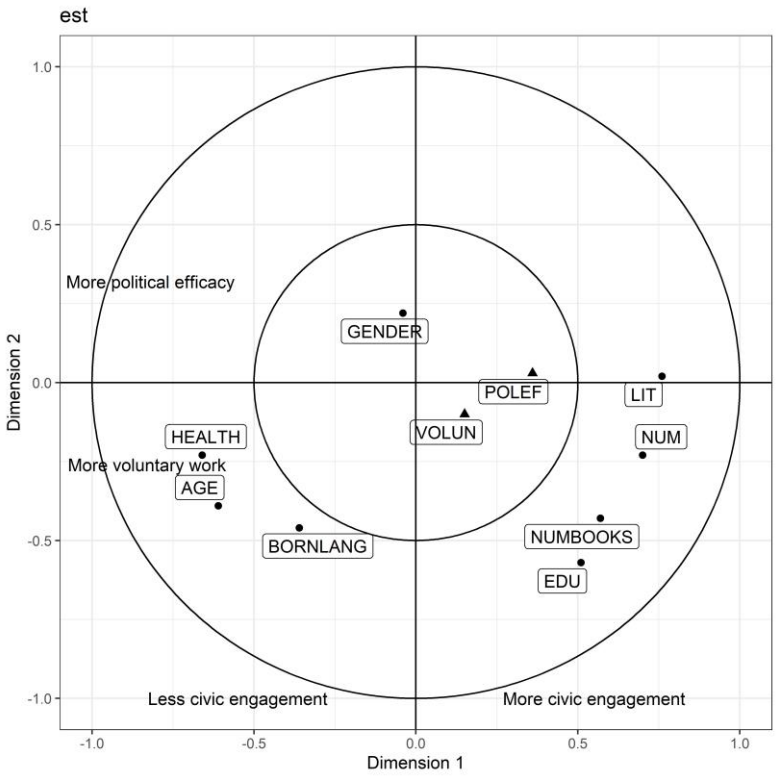
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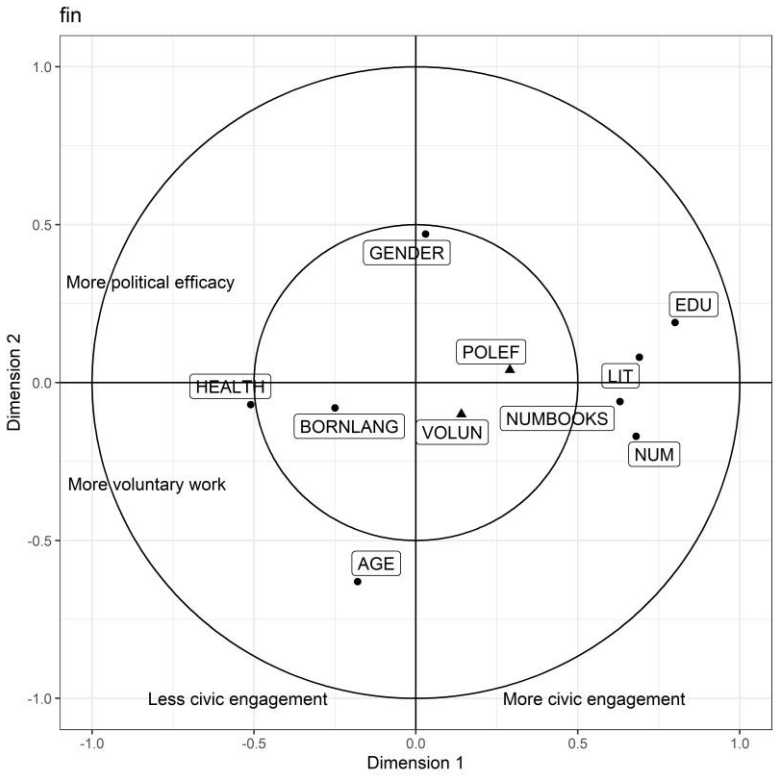
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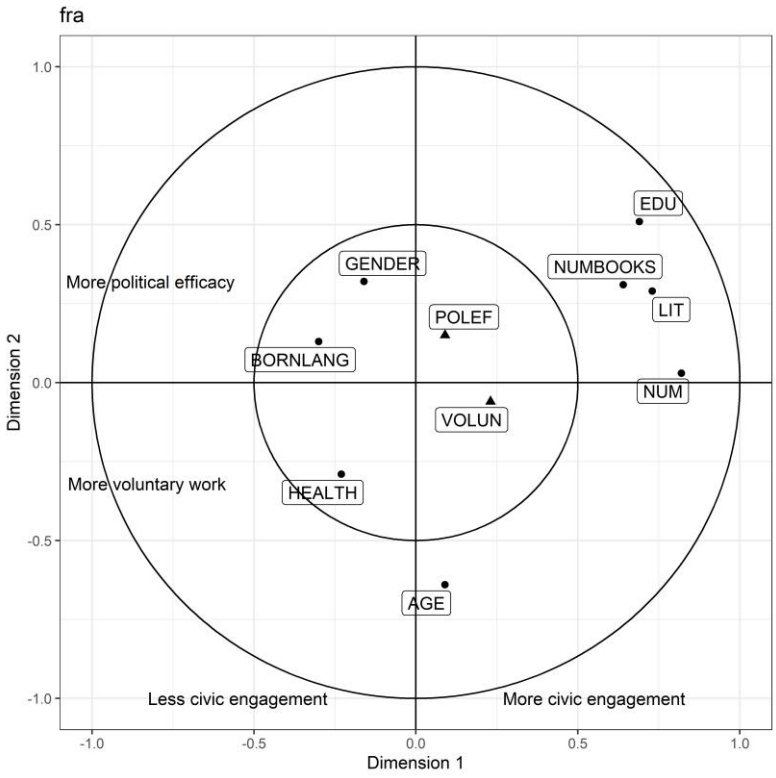
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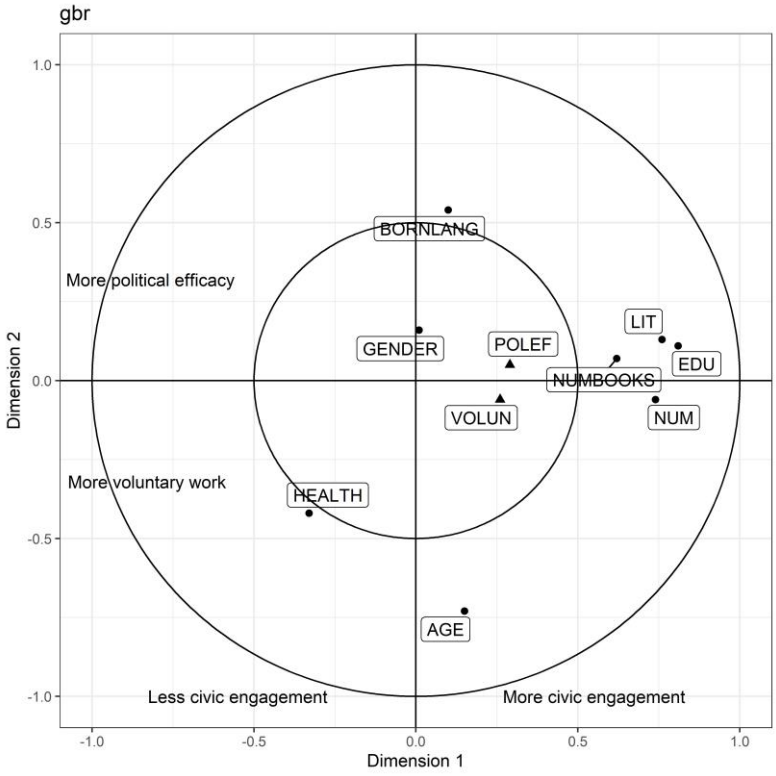
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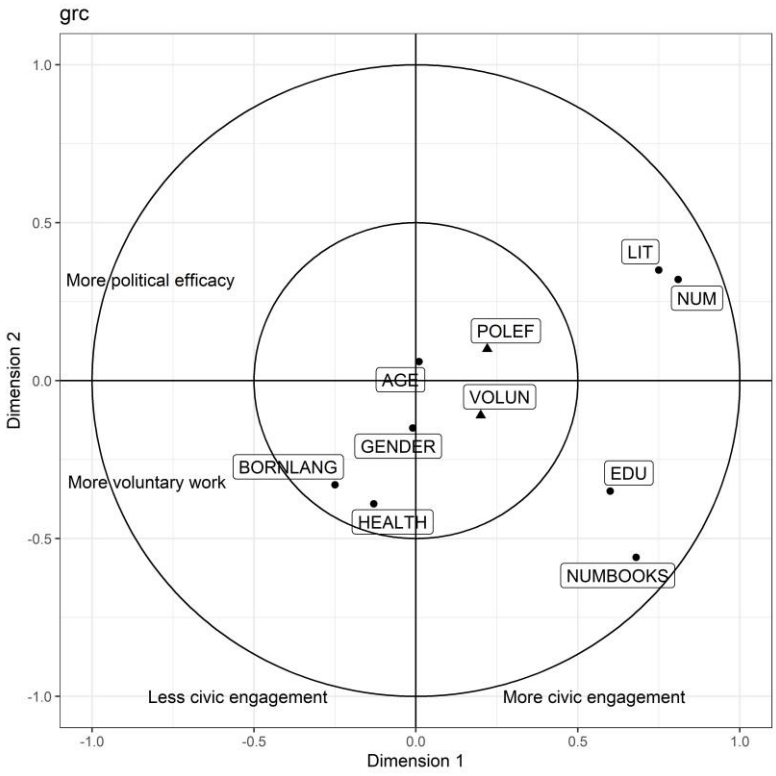
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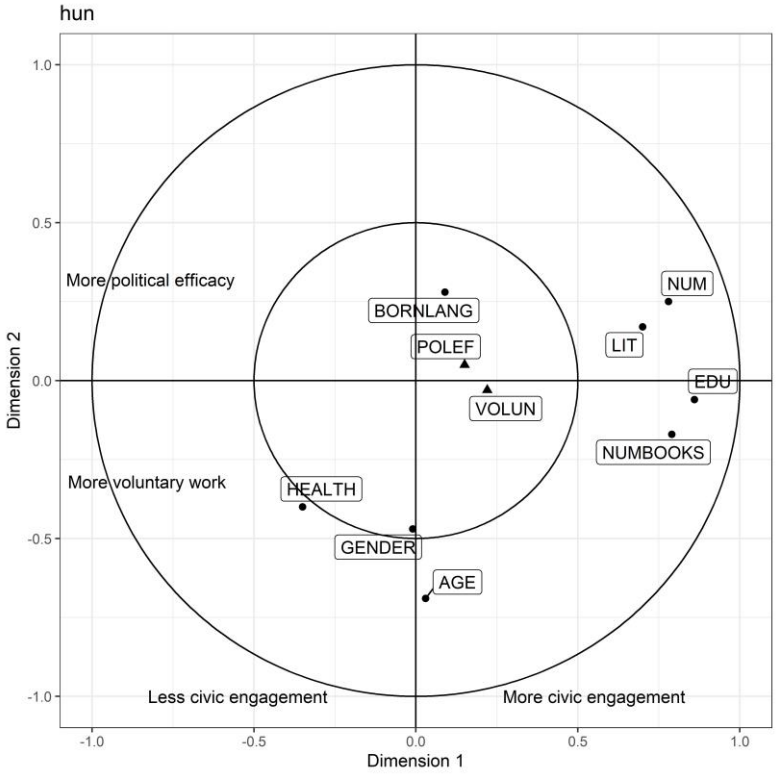
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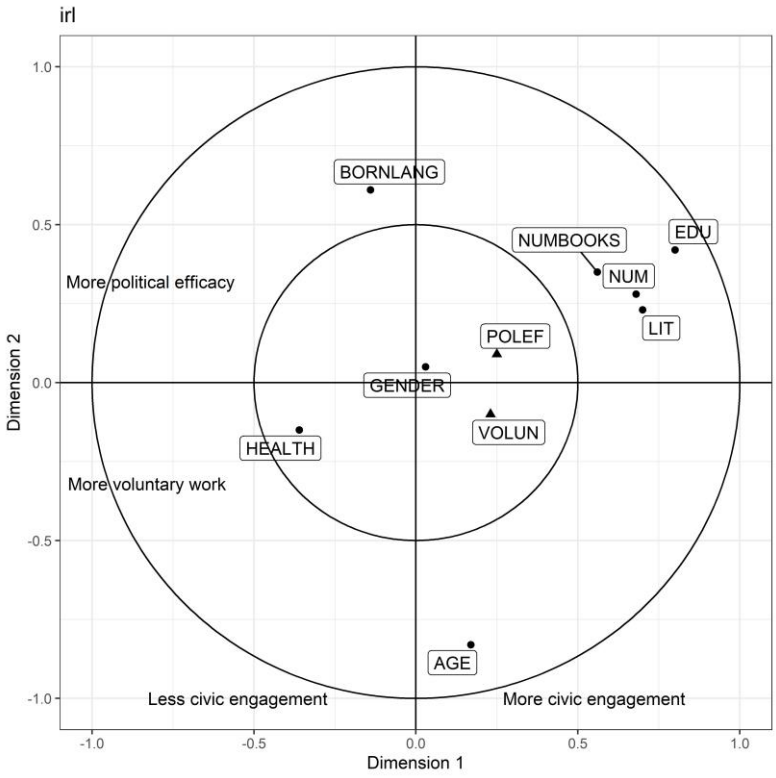
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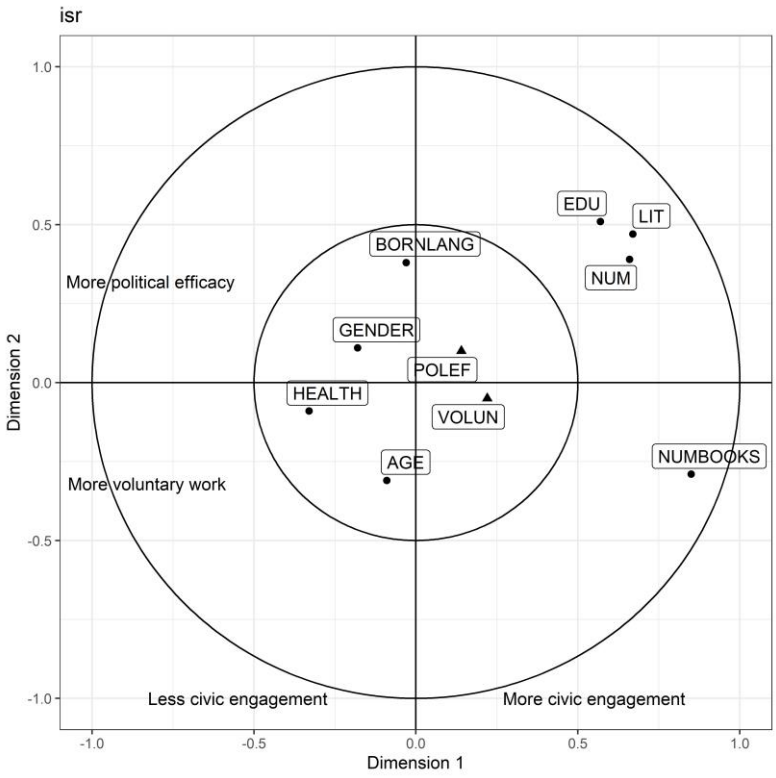
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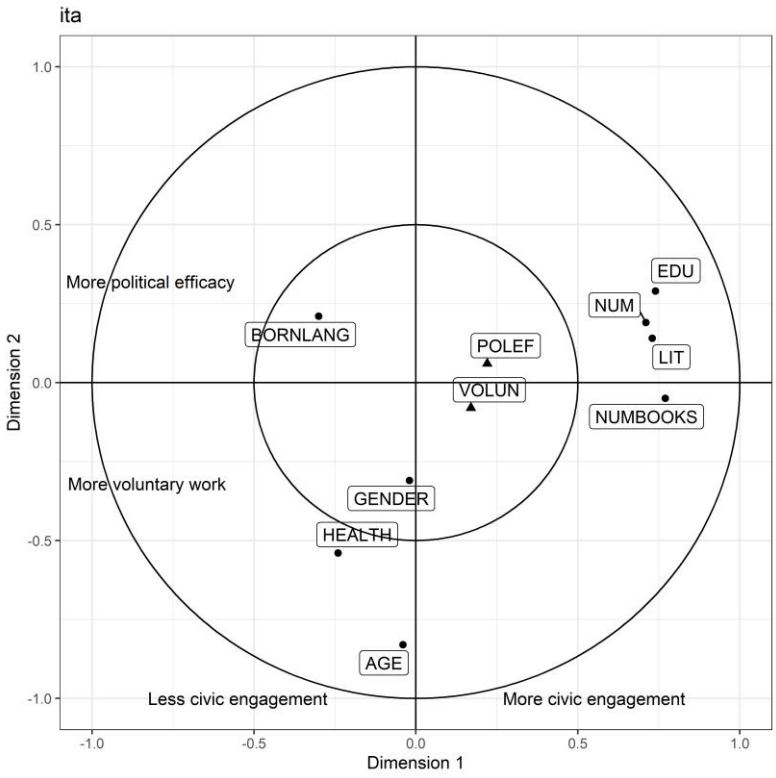
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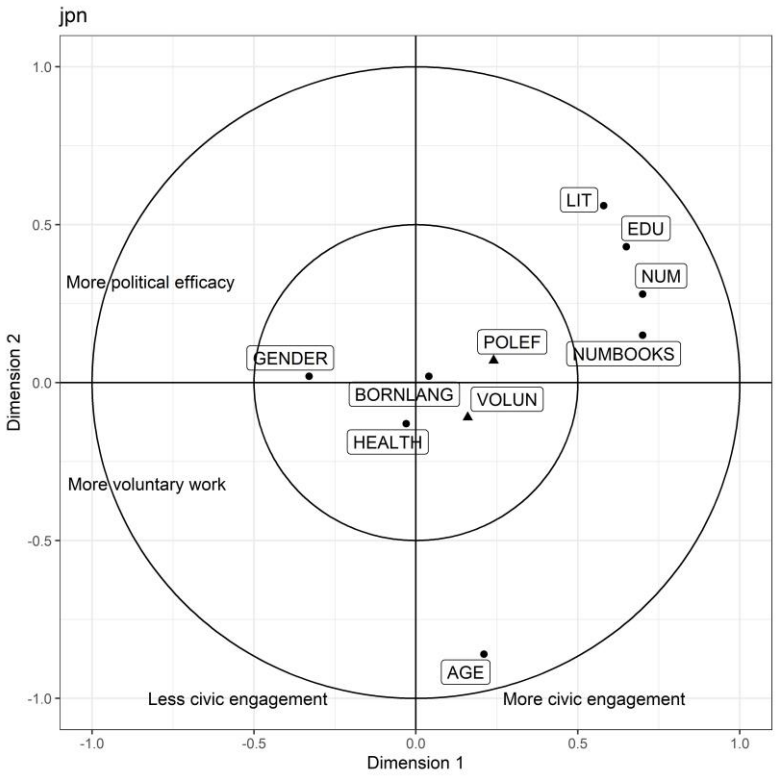
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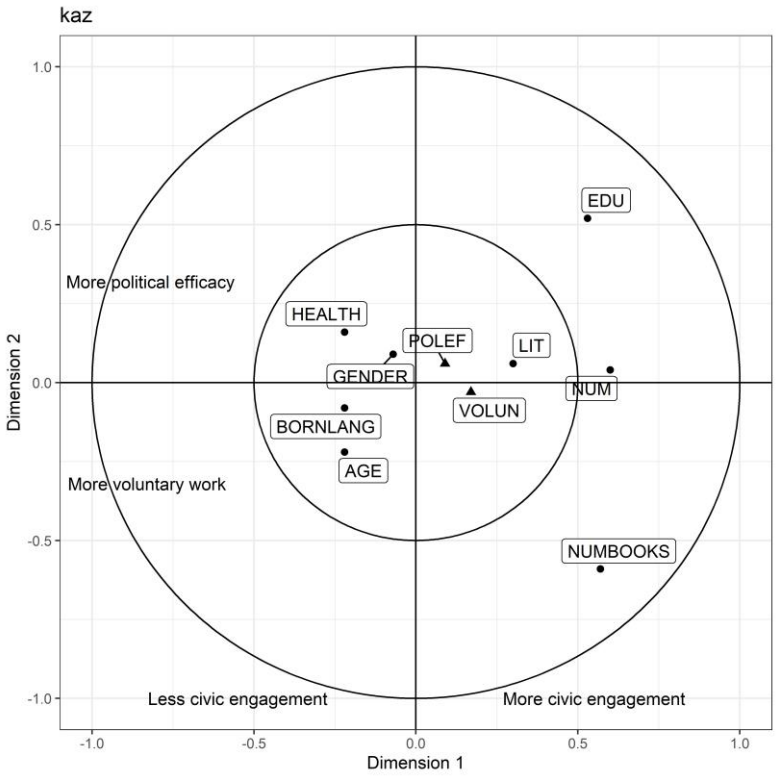
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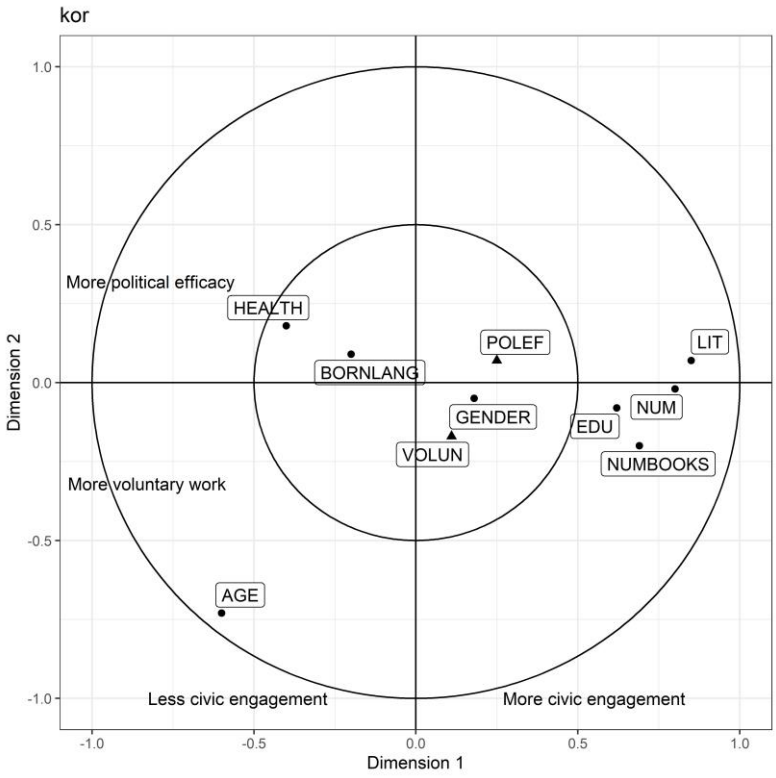
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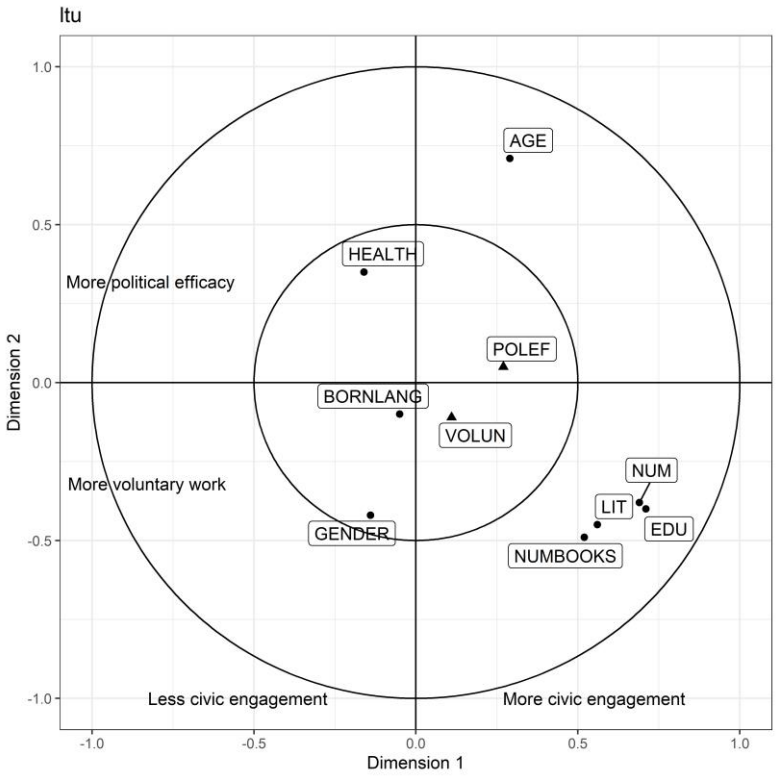
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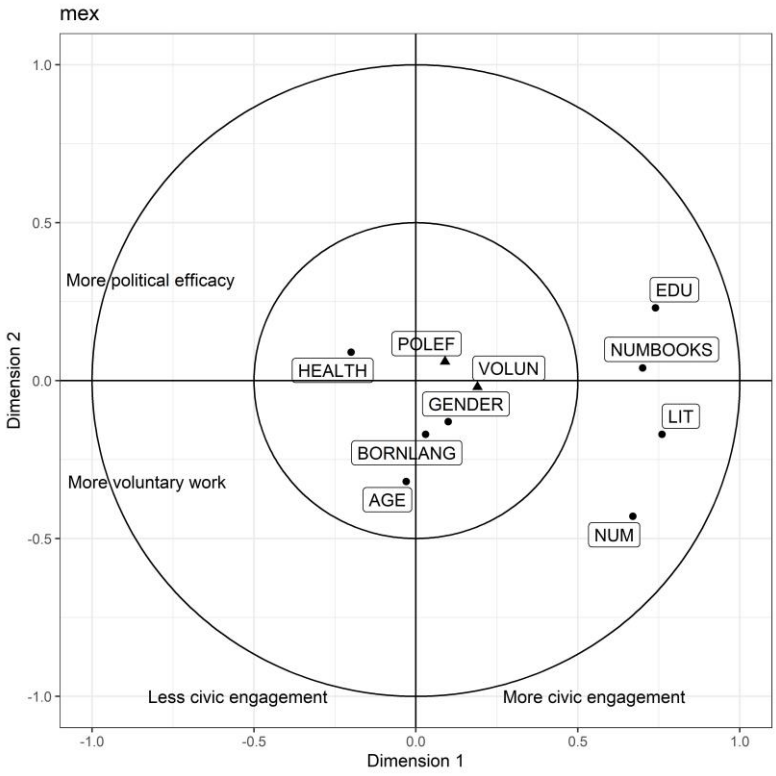
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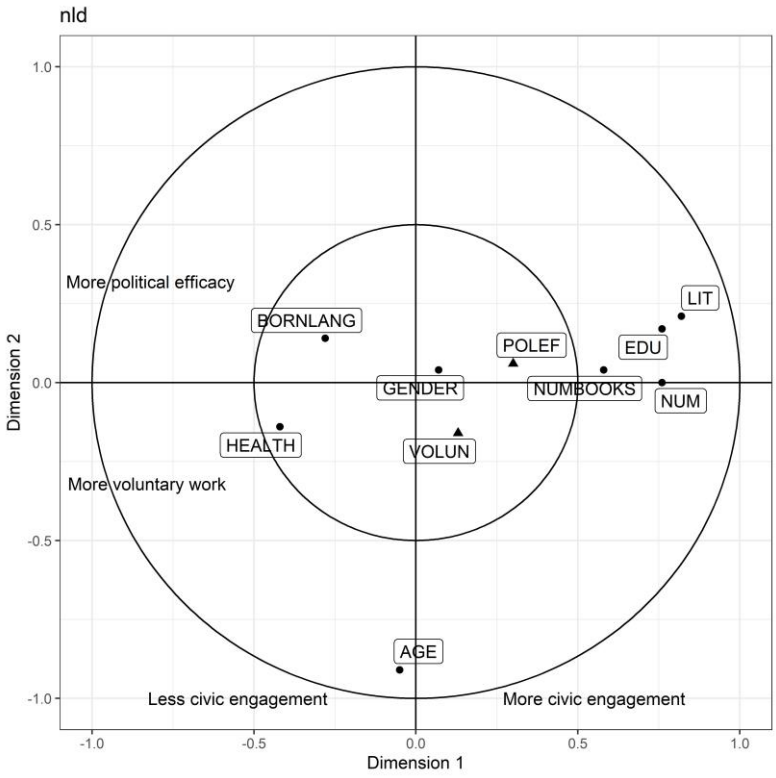
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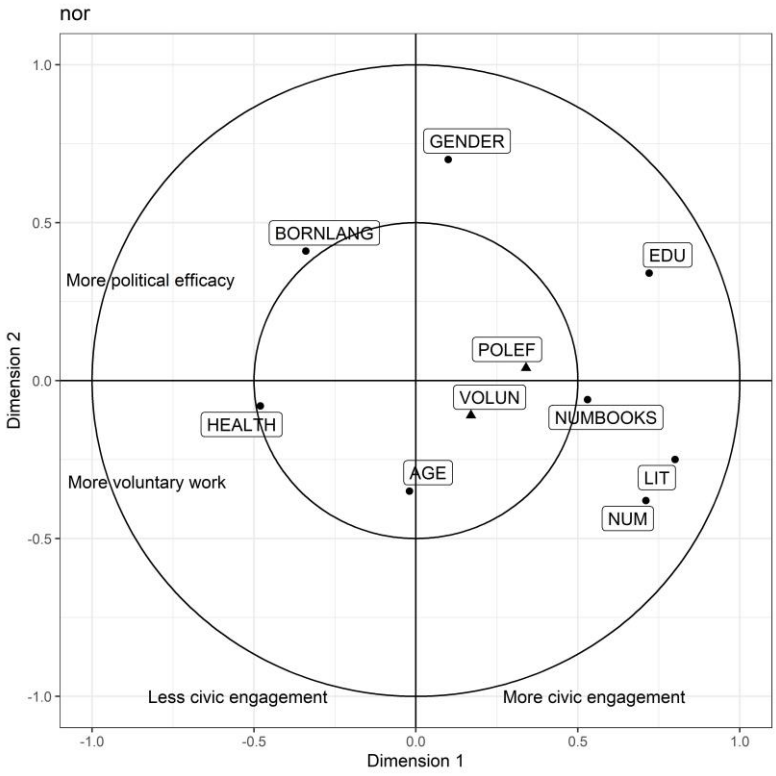
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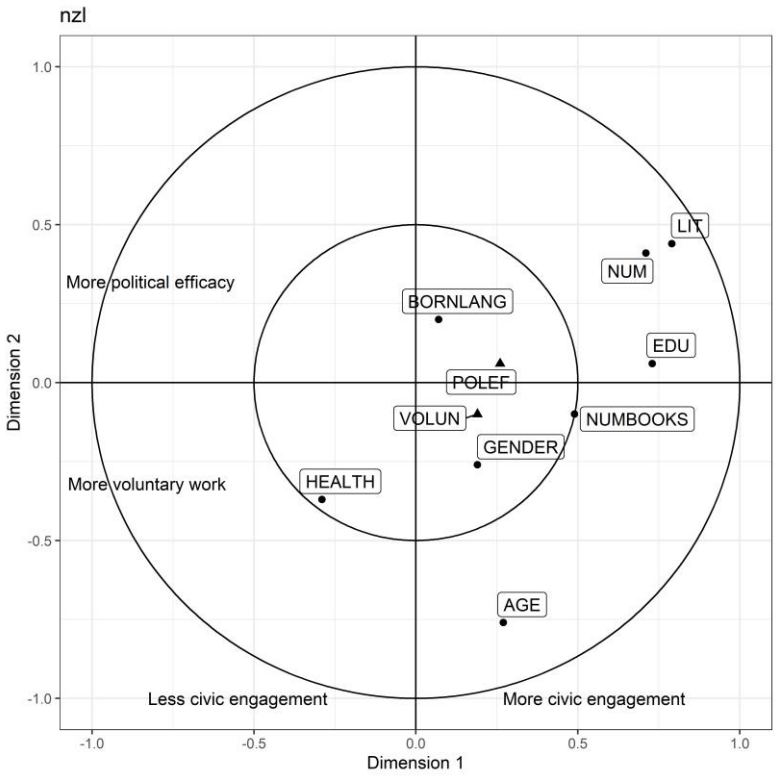
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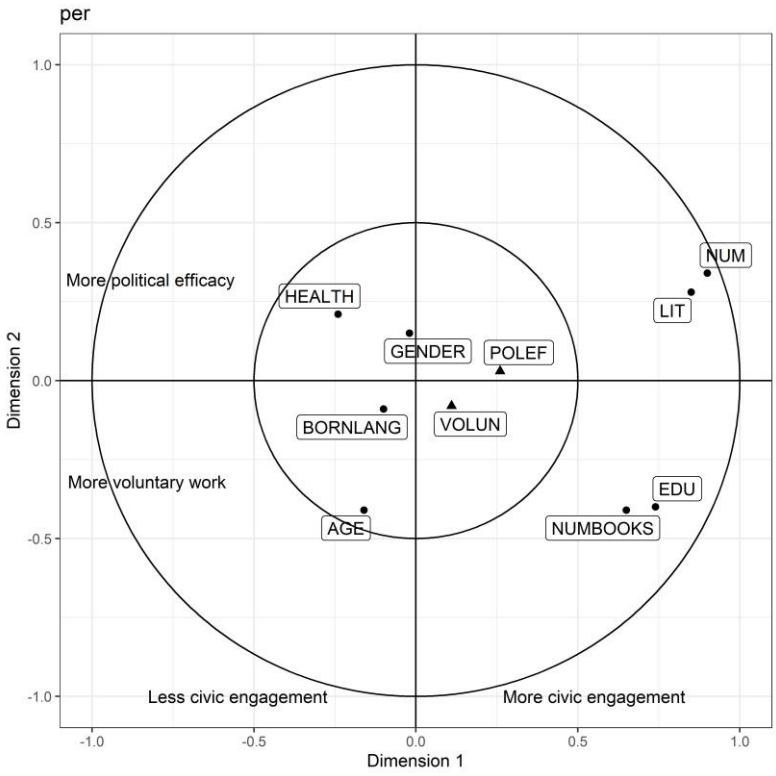
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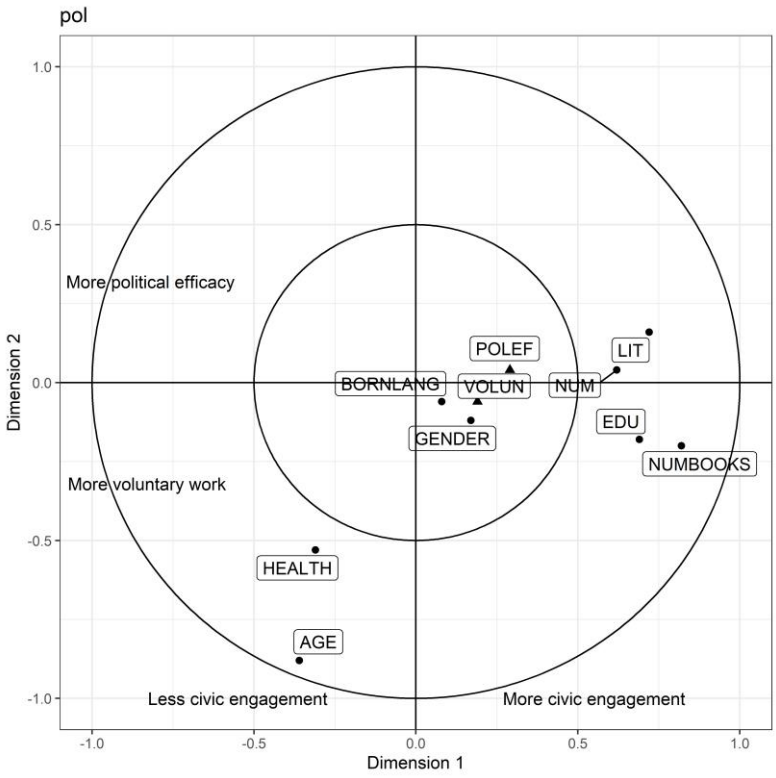
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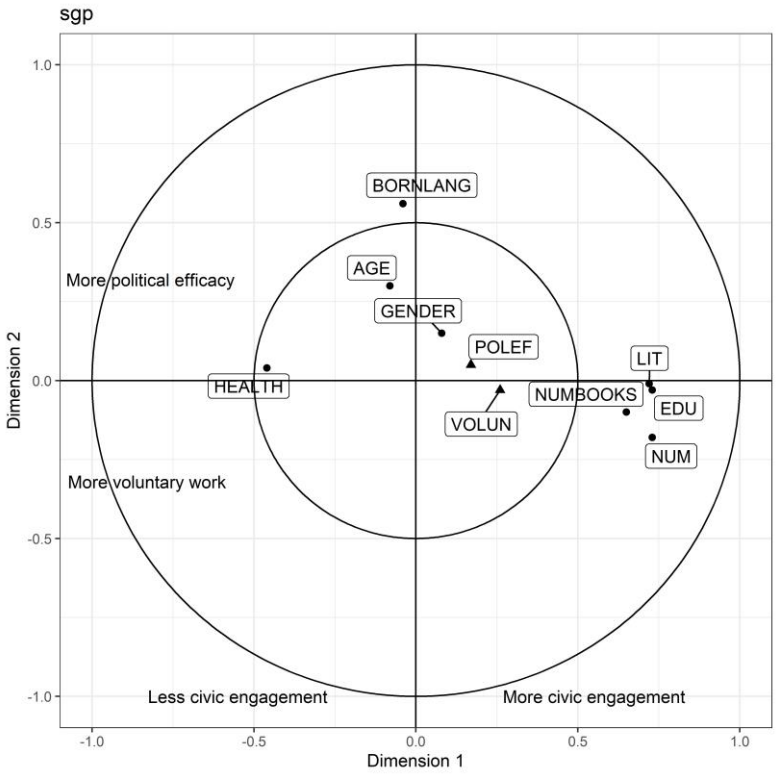
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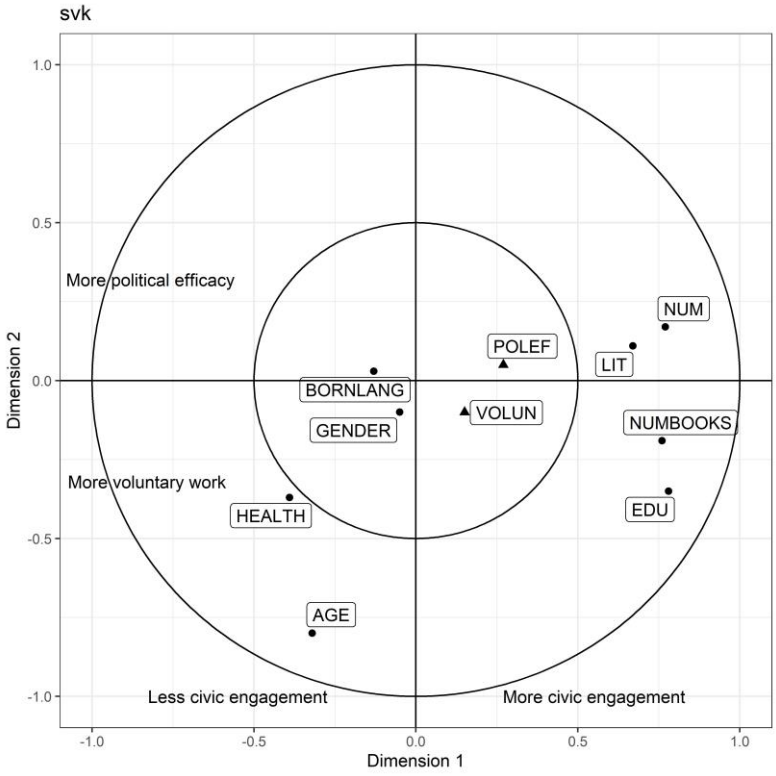
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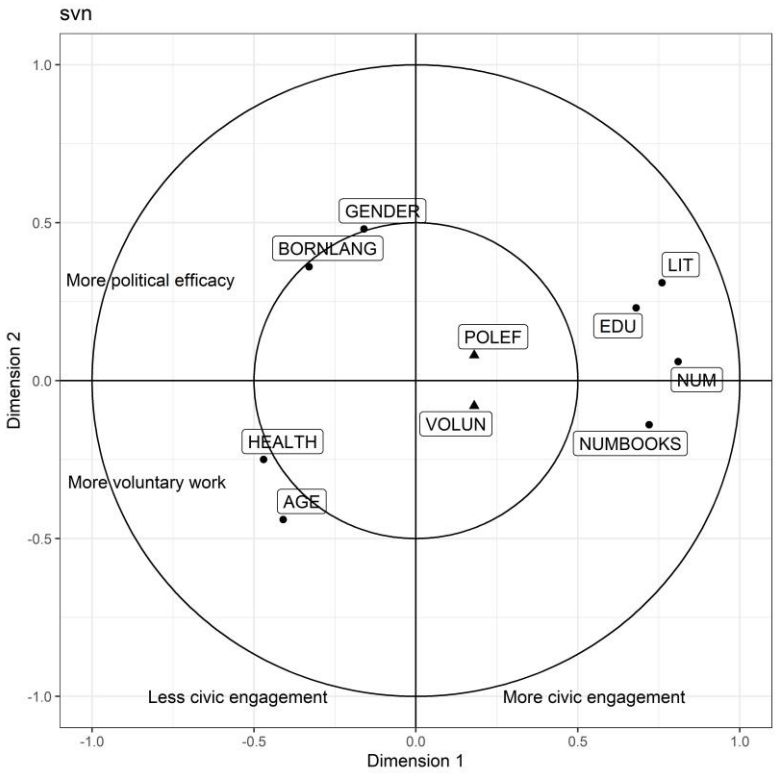
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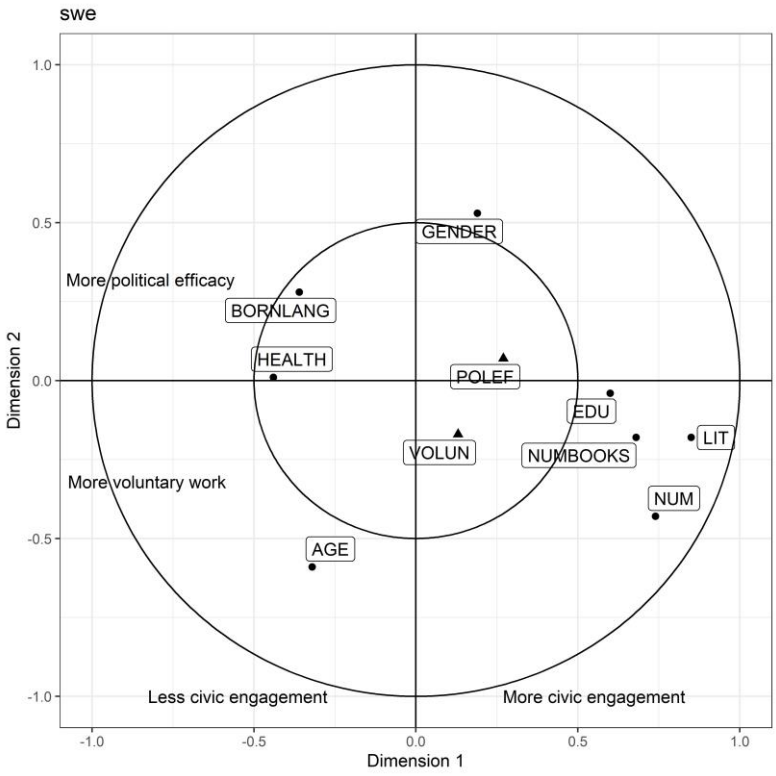
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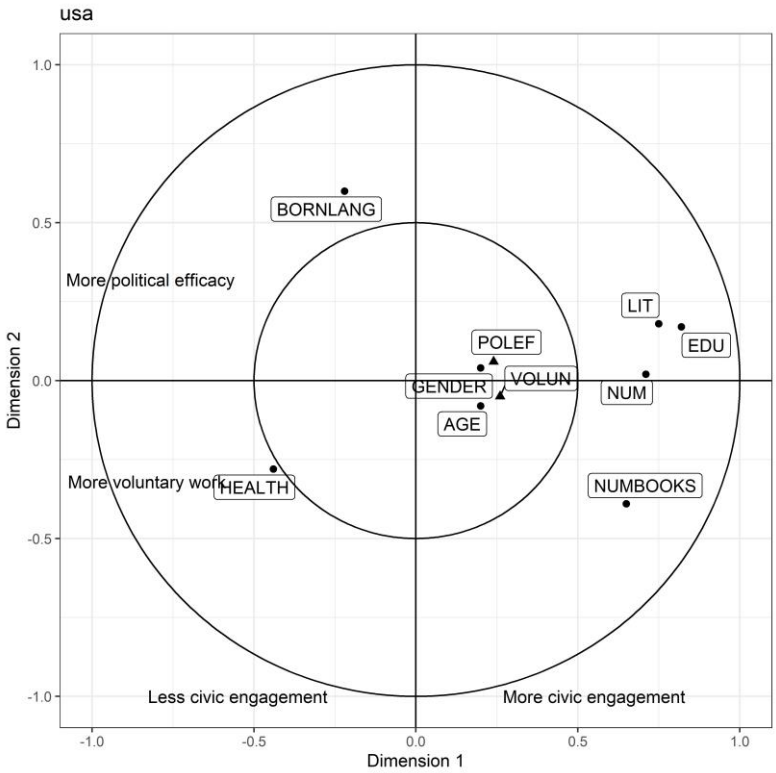
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