

**The Generalizability of Personality Effects in Politics**

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Data syntax can be retrieved from <https://osf.io/s9mvj/>

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**Abstract**

A burgeoning line of research examining the relation between personality traits and political variables relies extensively on convenience samples. However, our understanding of the extent to which using convenience samples challenges the generalizability of these findings to target populations remains limited. We address this question by testing whether associations between personality and political characteristics observed in representative samples diverged from those observed in the sub-populations most commonly studied in convenience samples, namely students and internet users. We leverage ten high-quality representative datasets to compare the representative samples with the two sub-samples. We did not find any systematic differences in the relationship between personality traits and a broad range of political variables. Instead, results from the sub-samples generalized well to those observed in the broader and more diverse representative sample.

Keywords: Big 5, personality, generalizability, external validity, surveys, political psychology

### **The Generalizability of Personality Effects in Politics**

Personality matters for our understanding of contemporary politics (Duckitt & Sibley, 2016; Kandler, Bleidorn, & Riemann, 2012; Rentfrow, Jost, Gosling, & Potter, 2004; Roets, Cornelis, & Van Hiel, 2014; Vecchione & Caprara, 2009). Indeed, the relationship between personality traits and political variables is often larger than that of other commonly studied variables, including education and socioeconomic status (e.g., Gerber, Huber, Doherty, Dowling, & Ha, 2010). A burgeoning literature has observed important and meaningful connections between personality traits and political attitudes and behaviors. For example, a meta-analysis identified 73 studies involving more than 70,000 participants that investigated the association between personality traits and ideological self-placement (Sibley, Osborne, & Duckitt, 2012). Notably, however, most samples used in these analyses were convenience samples of one sort or another – primarily student samples (61%), but also samples of internet users (6%).

Although several prominent studies examining the linkages between personality traits and political phenomena have recruited representative samples (e.g., Gerber, Huber, Doherty, Dowling, Raso, & Ha, 2011), the use of various non-representative samples remains common in empirical studies of the political implications of personality traits. Because of the practical challenges in achieving representative samples, studies that utilize non-representative samples may come to represent an even larger share of future research. For instance, the need for expensive representative samples may wane if more effective statistical approaches to adjusting non-representative data for electoral predictions emerge (e.g., Wang, Rothschild, Goel, & Gelman, 2014). Additionally, the high cost of recruiting representative samples and the limited space and

time available in these surveys appears to inspire those collecting data from such samples to depend on abridged measures of personality traits. However, brief personality measures that are typically employed in representative studies have been criticized for producing unreliable and biased estimates (Bakker & Leles, 2018; see Ludeke & Larsen, 2017 for an analysis of a high-profile failure involving the use of such a personality measure). Cost-efficient methodologies, including the use of convenience and other kinds of non-representative samples, that allow for precise measurement of underlying psychological constructs and reliable estimates of its relationship to political variables may thus remain common to research in political psychology in the foreseeable future.

We evaluate the empirical evidence for a concern commonly raised about personality research in political psychology that makes use of convenience samples, namely, whether the reliance on common forms of non-representative samples is problematic for external validity. Specifically, do the results obtained from non-representative samples accurately and reliably approximate those obtained from more representative samples within the same population? Two types of populations commonly recruited for convenience samples in research on the relationship between personality traits and political variables give rise to concerns about generalizability, namely university students (Druckman & Kam, 2011; Hanel & Vione, 2016; Hooghe, Stolle, Mahéo, & Vissers, 2010; Krupnikov & Levine, 2014; Sears, 1986) and internet users (Best, Krueger, Hubbard, & Smith, 2001; Gosling, Vazire, Srivastava, & John, 2004; Mellon & Prosser, 2017). We address this question by assessing whether the relationship between personality traits

and political variables vary as a function of characteristics commonly used for the selection of convenience samples—i.e., student status and internet access.

In order to do this, we utilize large representative samples from several different countries, which enables us to evaluate the extent to which personality-politics correlations vary as a function of variables associated with convenience samples. This approach allows for direct and formal comparisons of different groups while taking survey mode, sampling methodology, and other sources of systematic error into account.

### **Representativeness and Generalizability**

The use of non-representative samples has a long history in psychological research, and in the social sciences more generally, and the limitations of such samples have been examined closely (e.g., Landers & Behrend, 2015; Peterson, 2001; Sears, 1986). However, these criticisms, while important, do not necessarily generalize across all research domains and topics, but may also depend on the nature of the research questions and study design. Whether results from non-representative samples generalize to target populations has not attracted close consideration within political psychology. Several studies demonstrate that non-representative samples yield *experimental effects* that are comparable to those produced by representative samples or across different types of samples recruited from the same population (e.g., Berinsky, Huber, & Lenz, 2012; Coppock, 2018; Coppock & Green, 2015; Coppock, Leeper, & Mullinix 2018; Druckman & Kam, 2011; Krupnikov & Levine, 2014; Mullinix, Leeper, Druckman, & Freese, 2015). However, these results do not provide a strong evidentiary base for determining if or how naturally-

occurring psychological constructs, such as personality traits, covary with political variables in representative compared to non-representative samples.

Importantly, similar findings have been reported for observed correlations between other constructs in survey research (Berrens, Bohara, Jenkins-Smith, Silva, & Weimer, 2003). For example, correlations between personality and demographic characteristics (such as age and gender) in internet samples have been found to be comparable with other kinds of non-representative samples from the same population (e.g., those used in all publications from 2002 in a leading psychology journal; Gosling et al., 2004). In the political realm, Best and colleagues (2001) tested the relationship between 14 variables and vote choice and Presidential approval ratings, and found similar results between an internet-based convenience sample and a representative sample of the same population. Additional research has explored how personality connects to sociopolitical attitudes and left-right ideology. While one study at this intersection found similar results between students and non-student employees at the same university (i.e., Cooper, McCord, & Socha, 2011), another (i.e., Van Hiel, Cornelis, & Roets, 2007) observed different relationships, though a subsequent meta-analysis indicated no reliable differences across studies (Sibley & Duckitt, 2008).<sup>1</sup> Concerning internet users, a study of political left-right ideology (Clifford, Jewell, & Waggoner, 2015) reported that it exhibited comparable correlations with

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<sup>1</sup> An additional meta-analysis focusing specifically on ideological self-placement also considered how sample characteristics might moderate the relationship between ideology and personality (Sibley et al., 2012), but because the moderation analyses coded what we consider three distinct groupings (undergraduates, mixed/internet samples, and community/adult samples) as a single, three-level variable, interpreting the moderation results is problematic.

personality traits in American National Election Studies (ANES) and two web-based convenience samples of American citizens.

These studies represent a promising start, but because the political domain is much broader than vote choice and left-right ideology, additional work remains to be done. That there are noteworthy differences between students (vs. non-students) and people with (vs. without) access to the internet within a target population points to the need for further study. For example, students and internet users are more politically knowledgeable (Delli Carpini & Keeter, 1996), more ideologically left-leaning than the general population (Pew Research Center, 2016), and appear to differ from the general population in levels of several Big Five personality traits (Clifford, Jewell, & Waggoner, 2015; Lüdtke, Roberts, Trautwein, & Nagy, 2011). However, average differences in levels of a given trait do not necessarily imply differences in the estimated relationship between those traits and behavior (e.g., Schalm & Kelloway, 2001). For that reason we do not consider these mean-level differences to provide particularly strong grounds for hypothesizing about differences in the correlations between personality and political characteristics for representative and non-representative samples.

### **Current Study**

Previous research has not systematically investigated whether the observed relationships between personality and political variables in non-representative samples differ from representative samples of the same population. However, existing examinations of the external validity of observations derived from non-representative samples suggest that differences between these samples and the target population are unlikely. This possibility is noteworthy, as



representative samples are often treated as the gold standard in fields such as political science and sociology. But, if reliable and externally valid observations of the relationship between personality and political variables can be derived from non-representative convenience samples, representative samples may not be as necessary nor worth the additional costs and resources for some research questions. If, however, the relationships between personality traits and political variables exhibit meaningful, systematic differences depending on whether they are obtained using convenience samples or representative samples from the same population, then reliance on the former may result in systematically flawed conclusions in the literature. In this case, representative samples are necessary for a robust, replicable, and externally valid scientific understanding of political psychology. The purpose of the current study is to provide a direct and reliable test of this.

Previous research provides some grounds for expecting that the relationship between personality traits and political variables might differ between convenience samples and the target population. For example, as student populations tend to have high levels of political sophistication (e.g., Delli Carpini & Keeter, 1996), they may be better able than non-student populations to organize their attitudes and preferences into a coherent left-right ideology, identify which political party best represents this worldview, and, consequently, effectively participate in and navigate a complex political environment in ways that are associated with their personality. It is therefore possible that the link between personality and political variables is stronger in student populations compared to non-student samples, as has been found in other research investigating the moderating role of political knowledge for the link between underlying psychological characteristics and political preferences (Federico & Schneider, 2007; Johnston, Lavine, & Federico, 2017). Similarly,

while internet samples may yield more demographically diverse participants than student samples (Berrens et al., 2003; Gosling et al., 2004), access to the internet may also covary with characteristics that could potentially complicate the relationship between personality traits and political variables. For example, a lack of access to the internet is associated with low levels of education and socio-economic status (Rainie, 2010; Van Deursen & van Dijk, 2015), which is associated with lower levels of political knowledge (e.g., Delli Carpini & Keeter, 1996). Thus, internet samples, just as for student samples, may over-estimate the relationship between personality and political variables, compared to the general population.

In our analysis, we first identified publicly available datasets that meet two major criteria: (1) The presence of measures on both personality traits and political variables; (2) The use of a large, representative sample of a target population (i.e., citizens of a given country) in which a substantial number indicated either status as student or access to the internet. Because correlational estimates obtained from small samples are unstable (Schönbrodt & Perugini, 2013), we did not include any sub-sample with fewer than 150 respondents in the group or use any imputation to increase the sample sizes. Accordingly, our smallest subgroup sample size is 175 (for students in Canadian Election Study). We also limit our analysis to dependent variables present across multiple datasets. In total, our analysis is based on ten data sources from multiple countries. By examining different datasets, we do not make conclusions based on a single finding (which could emerge due to chance, given the high number of tests). To the extent that the observed relationship between personality traits and political variables varies as a function of student status or access to internet in multiple datasets, the generalizability of research on personality and politics using

convenience samples might be considered impaired. This approach provides a useful framework to systematically examine how the size and direction of observed relationships between psychological and political variables might differ, with clear practical and theoretical relevance for the interpretation of published and future studies using convenience samples.

### **Methods**

#### **Empirical Strategy**

In order to examine our research questions, we use a series of high-quality data sources and test whether selection variables associated with commonly used convenience samples—students and internet users—moderate the relationship between personality traits and political measures. By using a series of different datasets of independent samples, we can examine the robustness of any deviation in the correlations between personality traits and political variables as a function of these selection variables. Specifically, given the number of statistical tests we undertake in the analysis below, a finding that the relationship between a given trait and a specific political variable is moderated by one of our two selection variables might be due to study-specific characteristics or chance. Hence, in this context, we are interested in patterns that are stable across different datasets (i.e., multiple significant interactions across the available tests), involving independent samples and varying operationalizations of relevant constructs, and thus more likely to indicate robust differences between convenience and representative samples.

Large datasets on representative samples typically employ highly abbreviated measures of personality, such that the Big Five measures used in this study (Big Five Inventory-10 (BFI-10), Rammstedt & John, 2007; Ten Item Personality Measure (TIPI), Gosling, Rentfrow, & Swann,

2003; International Personality Item Pool (IPIP), Goldberg et al., 2006) range in length from 10 to 50 items, with almost all studies at the lower end of this range. Fortunately, although some personality measures include items that are closely related to political orientations (which limits the interpretability of correlations between these constructs), none of the scales included in the samples analyzed here contained any such problematic items.

For political variables, we focus on political attitudes and behavior studied in previous work on personality effects, including left-right ideology, political efficacy, political trust and several measures of political engagement. Supplementary material A contains the question wording used to measure each construct for each dataset. For the non-English surveys, we provide the English translations. Descriptive statistics for each variable in each sample used in this analysis are available in supplementary material B.

For the analysis of whether observed relationships vary as a function of student status, we use seven different datasets: American National Election Study 2012 (ANES 2012), Longitudinal Internet Studies in the Social Sciences (LISS, from the Netherlands), British Election Study (BES), Swiss Household Panel (SHP), Latin American Public Opinion Project (LAPOP, 24 countries), Swiss Election Study (SELECTS), and Canadian Election Study (CES). For the analysis of whether observed relationships vary as a function of internet access, we use six different datasets: LISS, LAPOP, New Zealand Election Study (NZES), ANES 2012, ANES 2016, and American National Election Study 2010-2012 (ANES 2010-2012). In sum, we have samples from several geographical regions that allows us to examine the extent to which the political effects of personality vary across selection variables. We utilized all available observations for participants

who completed the Big Five measures in these samples. As noted above, we do not include any respondents with missing data on any of the Big Five items. The material required to produce figures and numbers are available at <https://osf.io/s9mvj/>.

### **Data**

Below, we provide additional information about each dataset before proceeding to our analysis. We encourage readers to visit the publicly available data centers for more detailed information.

*American National Election Study 2010-2012 (ANES 2010-2012).* Data from ANES 2010-2012 was collected in early October 2010, May-June 2011, December 2011, and February 2012. Independent samples representative of a cross-section of U.S. eligible voters, were recruited to participate in each survey. Samples were recruited using address-based and random-digit dial probability sample and respondents were interviewed via a web-based format (computers and internet were made available to participants who did not have access at their place of residence). We relied upon data collected in the final wave (February 2012). For more information, see DeBell, Wilson, Segura, Jackman, and Hutchings (2011).

*American National Election Study 2012 (ANES 2012).* Data collection for ANES 2012 began in September 2012 and concluded in January 2013. Two independent samples, each representative of a cross-section of U.S. eligible voters, were recruited to participate in both surveys, which were administered up to two months before and after the 2012 U.S. Presidential Election. One sample was interviewed face-to-face, and the other was interviewed via a web-based format (computers and internet access were made available to participants who did not have access at their place of

residence). For the internet sample, pre and post-election surveys were each separated into 2 shorter surveys, whereas face-to-face interviews were not. Participants for face-to-face interviews were recruited using address-based sampling; the internet sample was recruited by the use of random digit dialing. Because all measures were administered to each set of participants, we relied upon data from both (for more information, see American National Election Studies, 2014).

*American National Election Study 2016 (ANES 2016).* Data collection for ANES 2016 began in early September 2016 and concluded in January 2017. Two independent samples, each representative of a cross-section of U.S. eligible voters, were recruited to participate in both surveys, which were administered up to two months before and after the 2016 U.S. Presidential Election. One sample was interviewed face-to-face, and the other was interviewed via a web-based format (computers and internet access were made available to participants who did not have access at their place of residence). All participants were recruited using address-based sampling. We relied upon data from both sets of participants, all of whom completed the same measures (for more information, see American National Election Studies, 2018).

*British Election Study (BES).* We relied on an internet panel survey from the BES in the United Kingdom that tracks the same respondents since February 2014, with additional recruitment of participants to replace those who drop out. The specific data analyzed here was collected for BES by YouGov in June 2017 (for more information, see Fieldhouse et al., 2015).

*Swiss Household Panel (SHP).* The SHP is a panel survey with repeated interviews of a large group of Swiss citizens each year since 1999. A new sample was added to the panel in 2004 and again in 2013. Each sample was recruited using a stratified random sample of private households.

Information is collected at both the household and individual-level using a computer assisted telephone interview technique. We relied upon data collected from September 2009 to February 2010 (Wave 9). For more information, see Voorpostel et al. (2016).

*Longitudinal Internet Studies in the Social Sciences (LISS)*. LISS is a representative internet panel with data consisting of 5000 households, randomly selected from the municipal registers in the Netherlands. All participants were paid for each completed wave, and people were provided a computer and Internet connection if they did not have it already. We relied upon data collected in May 2008 (personality variables) and December 2008 (political variables). For more information, see Scherpenzeel and Das (2010).

*Latin American Public Opinion Project (LAPOP)*. The data is collected in the 2010 wave of the Latin American Public Opinion Project, AmericasBarometer. The survey was in the field in 26 countries but the relevant measures are not available in all countries. Accordingly, the effective sample consists of 21 countries with face-to-face interviews. In each country, the survey used a national probability design. We estimated the models with country fixed effects for this data (for more information, see Latin American Public Opinion Project, n.d.).

*Swiss Election Study (SELECTS)*. The data is collected online as part of a panel/rolling cross-section study in the period from May 2015 to March 2016 on Swiss nationals aged 18 years or older. The sampling frame is based on an individual register maintained by the Swiss Federal Statistics Office (for more information, see FORSbase, 2018).

*New Zealand Election Study (NZES)*. In relation to the general election held in September 2014, a sample of people were randomly selected from the electoral polls and either returned the

survey by post or completed the survey online (for more information, see Vowles, Coffe, & Curtin, 2017).

*Canadian Election Study (CES)*. The data is collected in relation to the Canadian federal election in 2015. While the survey is a multi-mode survey consisting of both web and phone questionnaires, the data on the Big Five measures was only collected on the online sample. The web survey was fielded by sampling panel respondents from Survey Sampling International (for more information, see Canadian Election Study, n.d.).

The ten representative datasets give us a total  $N$  of 112,313. However, as some respondents did not disclose information on student status or internet access in the datasets, the total  $N$  for the analyses is 100,822. Table 1 provides an overview of the 10 data sources, the country coverage, total  $N$  and group  $N$ s for the convenience sample indicators as well as information on the measures of personality traits and the political variables.



Table 1

*Overview of Data Sources*

		Data Source									
		BES	SHP	LISS	LAPOP	SELECTS	NZES	CES	ANES 2012	ANES 2010-2012	ANES 2016
		U.K.	Switzerland	Netherlands	21 countries	Switzerland	New Zealand	Canada	U.S.	U.S.	U.S.
Survey Info	Country										
	Big Five measure	TIPI	BFI-10	IPIP	TIPI	BFI-S	TIPI	TIPI	TIPI	TIPI	TIPI
	Total <i>N</i>	29,484	6,763	5,537	35,440	7,223	2,406	3,683	5,468	1,245	3,573
	Student <i>N</i> (%)	1,142 (4%)	754 (11%)	497 (9%)	2,986 (8%)	515 (7%)		175 (5%)	404 (7%)		
	Internet <i>N</i> (%)			5,213 (94%)	18,326 (52%)		2,193 (91%)		4,779 (87%)	1,046 (84%)	3,213 (90%)
Political Variables	L-R Ideology	X	X	X	X	X	X	X	X	X	X
	Involvement	X	X	X	X	X	X	X	X	X	X
	Knowledge	X		X	X	X	X	X	X	X	X
	Efficacy	X		X	X	X	X	X	X	X	X
	Interest	X	X	X	X	X	X	X	X	X	X
	Participation	X	X	X	X	X	X	X	X	X	X
	Sat. Dem.	X	X	X	X	X	X	X	X		X
	Media use	X		X	X	X	X	X	X	X	X
	Political trust	X	X	X	X	X			X		X

*Note:* X signifies the presence of a particular variable in the dataset. BES, British Election Study; SHP, Swiss Household Panel; LISS, Longitudinal Internet Studies in the Social Sciences; LAPOP, Latin American Public Opinion Project; SELECTS, Swiss Election Study; NZES, New Zealand Election Study; CES, Canadian Election Study; ANES, American National Election Study; Sat. Dem, Satisfaction with Democracy; BFI-10, Big Five Inventory – 10-item version (Rammstedt & John, 2007); BFI-S, GSOEP Big Five Inventory (Hahn, Gottschling, & Spinath, 2012); TIPI, Ten Item Personality Inventory (Gosling et al., 2003); IPIP, International Personality Item Pool (Goldberg et al., 2006); L-R ideology, Left-right ideology.

## **Results**

Table 2 presents the meta-analytic correlation estimates between each of the Big Five and the political variables in question, obtained using the full representative samples. While interpreting the size and direction of the correlations between personality and political characteristics is beyond the scope of the present work, these findings are in line with previous studies.

Our primary interest concerns heterogeneity in the correlations between personality traits and political variables between the nationally representative samples and the two non-representative subsets of interest. To formally test this, we estimated a series of regression models where we interacted each Big Five personality trait with the convenience sample characteristic for each of the available political variables in each sample (all direct and moderation effect estimates and 95% confidence intervals are available as figures in supplementary material C). To ensure comparability across the models and ease the interpretation, we standardized all variables in the analysis (i.e., subtracted the mean and divided by two standard deviations).

Table 2

*Meta-Analytic Estimates, Weighted Average Correlations*

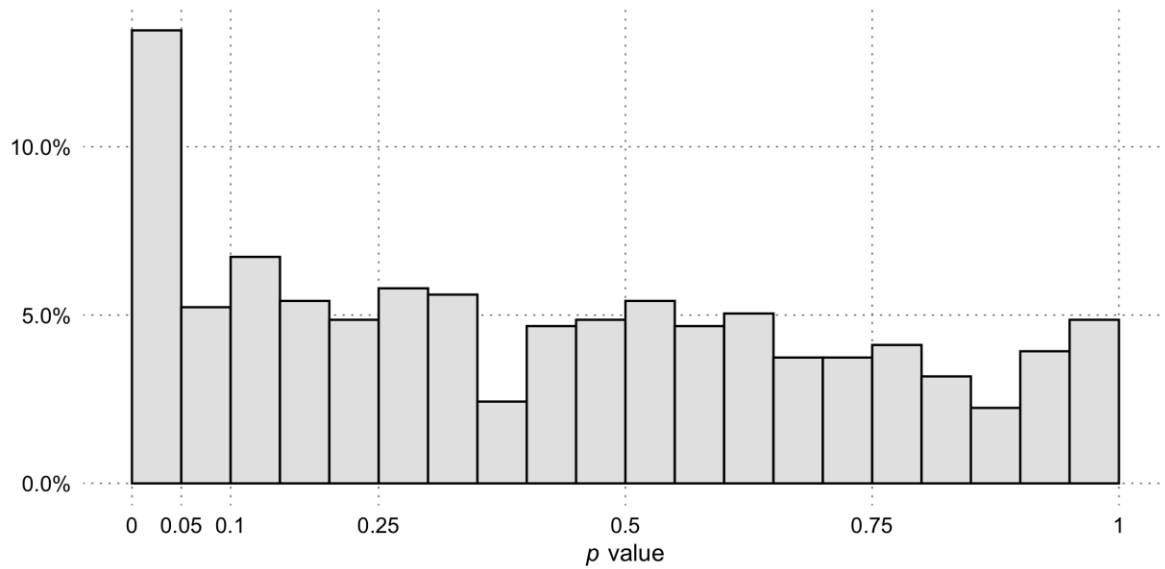
	<i>N</i>	Openness [95% CI]	Conscientiousness [95% CI]	Extraversion [95% CI]	Agreeableness [95% CI]	Neuroticism [95% CI]
Efficacy	84,186	0.07 [0.062, 0.075]	0.03 [0.019, 0.032]	0.05 [0.045, 0.058]	0.02 [0.016, 0.030]	-0.07 [-0.073, -0.059]
L-R Ideology	75,994	-0.10 [-0.110, -0.096]	0.08 [0.074, 0.089]	0.00 [-0.004, 0.010]	-0.02 [-0.023, -0.009]	-0.05 [-0.059, -0.045]
Interest	97,321	0.12 [0.114, 0.127]	0.05 [0.041, 0.054]	0.07 [0.061, 0.074]	-0.01 [-0.018, -0.005]	-0.05 [-0.060, -0.048]
Involvement	81,885	0.10 [0.093, 0.106]	0.00 [-0.005, 0.009]	0.07 [0.060, 0.073]	0.01 [-0.001, 0.013]	-0.02 [-0.022, -0.009]
Knowledge	73,422	0.06 [0.054, 0.068]	0.08 [0.068, 0.082]	0.01 [0.000, 0.014]	0.01 [0.003, 0.018]	-0.10 [-0.102, -0.088]
Media Usage	85,172	0.08 [0.072, 0.085]	0.07 [0.068, 0.081]	0.08 [0.070, 0.083]	0.03 [0.028, 0.042]	-0.05 [-0.057, -0.043]
Participation	86,889	0.02 [0.017, 0.031]	0.05 [0.044, 0.057]	0.02 [0.015, 0.028]	0.03 [0.024, 0.037]	-0.04 [-0.049, -0.036]
Political Trust	69,595	-0.02 [-0.030, -0.015]	0.01 [0.004, 0.018]	-0.01 [-0.015, 0.000]	0.07 [0.058, 0.073]	-0.03 [-0.040, -0.025]
Sat. Democracy	92,798	0.04 [0.030, 0.043]	0.08 [0.077, 0.089]	0.05 [0.041, 0.054]	0.06 [0.056, 0.069]	-0.09 [-0.094, -0.082]

*Note:* Meta-analytic estimates represent the weighted average correlation (Fisher's z transformed) across all samples for the relationship between each Big Five trait and personality variable. Sat. Democracy, Satisfaction with Democracy; L-R Ideology, Left-Right Ideology.

Figure 1 graphically represents the  $p$  values for all estimated interaction tests. Results indicated that a majority of personality effects on political variables did not differ significantly as a function of the selection variables examined here. That is, in general, samples limited to the selection variables we examined (as most convenience samples are) do not misrepresent the correlations between personality traits and political variables that would be obtained with a representative sample from the target population.

However, there was an overrepresentation of statistically significant  $p$  values in the distributions of test outcomes. The  $p$  values were not distributed equally across the range of possible results, but instead there was an overrepresentation of results with  $p$  values that are at or close to statistical significance. This suggested that there were some differences in the relationship between personality traits and political variables as a function of the selection variables used for convenience samples, which motivated further exploration.

We found no evidence that any particular Big Five trait was markedly more likely to be influenced in its relationships with the variables by these moderators than the others. The number of significant and near-significant moderations for each trait across both moderators ranged from 20 to 29 (see supplementary materials for details). There were some specific comparisons (e.g., within the internet-based analyses, Agreeableness's 14 significant and near significant moderations vs. Neuroticism's 7) that future work might further consider. Nevertheless, in the absence of any hypothesized differences and given drawbacks of multiple testing, we saw no strong evidence that a single Big Five trait is more or less prone to produce differing results between the representative and non-representative samples.



*Figure 1:* Significance tests for differences across selection variables. Distribution of  $p$  values from interaction tests between the Big Five traits and convenience sample indicator (student status and internet access) for all political variables in the ten samples. See supplementary material C for all interaction effects.

In Figure 2, we graphically represent the results from the interaction tests and show how results differed between students and the full representative samples. Most of the estimates are distributed around 0 and do not indicate systematic differences, nor did we observe any traits for which interaction tests are highly replicable. Indeed, there is no single interaction for which there was not at least one (significant or non-significant) result in the opposite direction as the other results. For the most frequently-replicated relationship – concerning Conscientiousness and political knowledge – we observed that in three of five samples the level of political knowledge was significantly more positively linked with Conscientiousness among the general population than among students. However, another sample exhibited a significant result in the opposing direction.

There was some evidence of a more pronounced relationship between Openness and both political knowledge and efficacy among the general population than among students. However, each of these results were observed in only two samples (with non-significant results in either direction for an additional three and four samples, respectively). Furthermore, Agreeableness and political interest were significantly more positively linked among the general population than among students in two samples, but with five non-significant results in either direction this result too must be interpreted with caution.



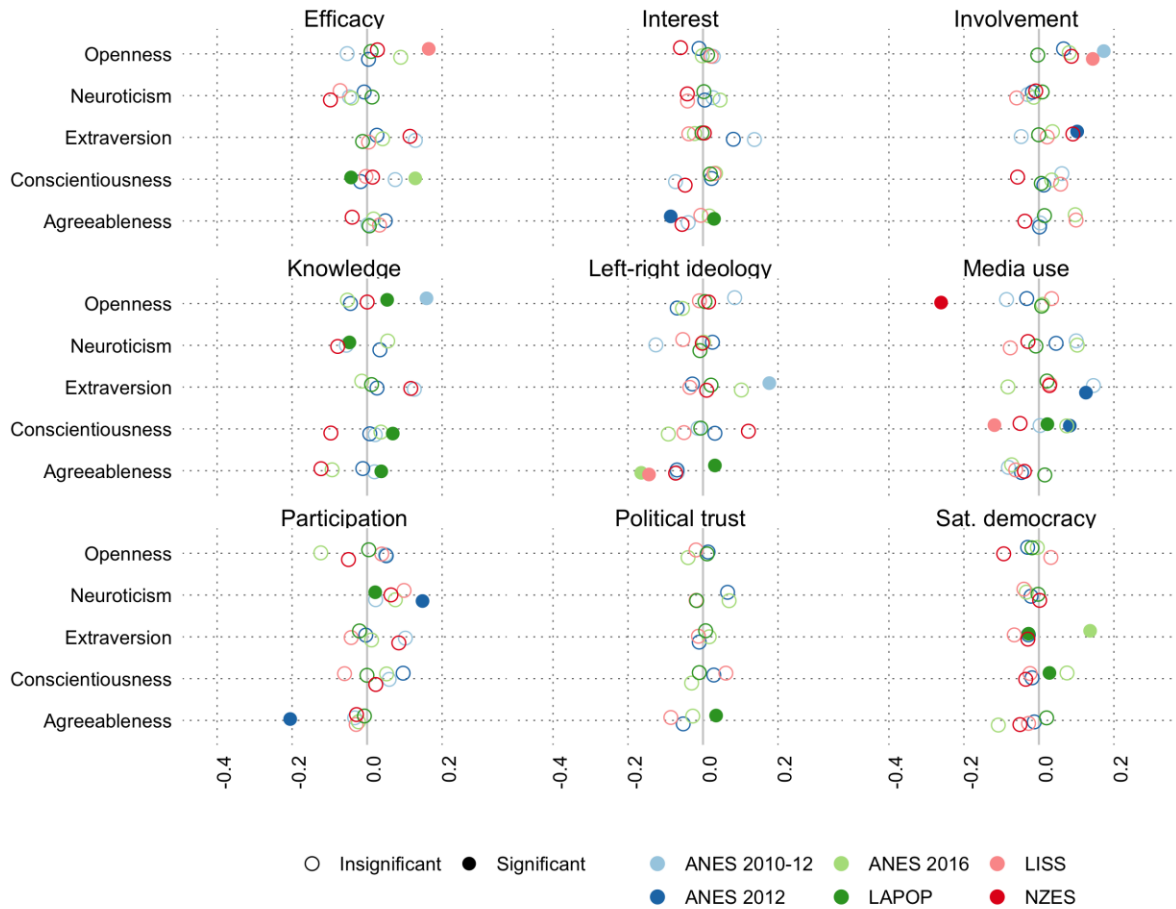
*Figure 2:* Parameters from interaction tests, students. Statistical tests for significant differences in the correlation between personality traits and political variables among students and the representative sample. Significant effects are indicated by  $p < .05$ . All estimates are from linear regression models. For more detailed results, see supplementary material C. Filled rectangles represent significant effects, whereas unfilled rectangles represent non-significant effects. BES, British Election Study; SHP, Swiss Household Panel; LISS, Longitudinal Internet Studies in the Social Sciences; LAPOP, Latin American Public Opinion Project; SELECTS, Swiss Election Study; CES, Canadian Election Study; ANES, American National Election Study; Sat. democracy, Satisfaction with Democracy. High scores on ideology represent more conservative responses.

Figure 3 shows similar results for internet users. Again, there were no interactions that were particularly replicable. Only two relationships (participation with both Agreeableness and Neuroticism) had interaction effects in a consistent direction for all six samples, but with only one significant moderation apiece, interpreting these results is premature. Perhaps the most intriguing

relationship concerned Extraversion and media use. Across six samples we observed two significant interactions and one marginally significant effect ( $p = .07$ ) all indicating a more positive link between the variables among internet users, with three other nonsignificant results in either direction. Finally, Openness and political knowledge were more positively linked among internet users in two of five samples, with nonsignificant results in either direction for the remainder. Accordingly, the overall pattern suggests that the relationship between personality and most political variables assessed here does not vary systematically as function of selection variables that commonly distinguish convenience samples.

We conducted an additional set of supplementary analyses to quantify the typical absolute size of each moderation effect in each relevant sample. The significance of these are briefly discussed below, and supplementary material D presents these results in detail.





*Figure 3.* Parameters from interaction tests, internet users. Statistical tests for significant differences in the correlation between personality traits and political variables among internet users and the representative sample. Significant effects are indicated by  $p < .05$ . All estimates are from linear regression models. For more detailed results, see supplementary material C. Filled rectangles represent significant effects, whereas unfilled rectangles represent non-significant effects. LISS, Longitudinal Internet Studies in the Social Sciences; LAPOP, Latin American Public Opinion Project; NZES, New Zealand Election Study; ANES, American National Election Study. High scores on ideology represent more conservative responses.

## Discussion

Psychological research is always concerned with testing hypotheses about the relationship among different concepts of interest. However, often little concern is given to whether or not (and how) hypothesized phenomena are theoretically expected to vary across contexts, methodologies, or populations (Berrens et al., 2003; Causadias, Vitriol, & Atkin, 2018; Church, 2016; Henrich, Heine, & Norenzayan, 2010). Those studying the psychology of politics commonly assume that utilizing convenience samples can elucidate the psychological processes that underpin mass politics and electoral outcomes (e.g., Chen et al., 2014). Yet few studies have empirically investigated whether these assumptions are appropriate or misguided.

The extent to which this oversight is seen as problematic may depend in part on one's field of study. Our experience suggests political scientists and sociologists place a strong priority on the use of samples representative of target populations. In contrast, psychologists have historically prioritized obtaining accurate measurement of the constructs under study and, accordingly, have been comparatively more willing to use convenience samples in which longer assessments can be economically collected. Simons, Shoda, and Lindsay (2017) posit that, irrespective of which perspective has more merit, researchers must at least engage in explicit and thoughtful deliberation on the likely generalizability of their findings. We believe these considerations are instructive for and in light of the results of the present research.

A first issue concerns the generalizability of our observations across cultural context. For example, students represent the most “WEIRD” segments of a given population (e.g., Western, Educated, Industrialized, Rich, and Democratic samples; Henrich, Heine, & Norenzayan, 2010). Given this, it may be that our samples – primarily based on WEIRD nations – understate the difference between students and nonstudents in less developed countries, where higher education

is available to a comparatively thinner slice of the population. A similar line of reasoning suggests that differences between internet users and non-users in developing countries may be larger than that for WEIRD nations. However, it is noteworthy that the average moderation effect size in our single “non-WEIRD” dataset (LAPOP) provided no indication that this was the case. As shown in supplementary material D, the moderation effect sizes for both students and internet users in LAPOP were not larger than that observed in our other samples. More generally, it is possible that one reason we do not see consistent moderation across samples even for significant interactions between a given personality trait and student status or internet access is that these relationships differ across cultural contexts. While we do not see consistent replication in the significant interaction we observe within the same cultural context (e.g., ANES), this possibility remains an important direction for future investigations.

It is also important to consider whether our conclusion that the political effects of personality generalize from student or internet populations to representative samples are consistent with observations in other research domains. Studies such as the present one are not, to our knowledge, common for other topics. This paucity of attention to the question of generalizability may reflect different norms across disciplines as well as the feasibility of conducting such studies. The present study was greatly facilitated by the public availability of representative surveys on diverse populations. Researchers focused on other issues may not readily have available to them comparable resources. The results of our study might provide researchers using convenience samples in other domains some modest degree of comfort. After all, despite well-recognized mean-level differences in both personality (Clifford et al., 2015; Lüdtke et al., 2011) and political characteristics (Delli Carpini & Keeter, 1996; Pew Research Center, 2016) between the general population and both students and internet users, we observed minimal replicable differences

between the general population and these subgroups in how personality and political characteristics relate. It is possible that the correlations between personality and behavior in other domains – such as health, the work-place, or interpersonal relationships – will also be similar for convenience and representative samples. Future research should examine this possibility.

Indeed, we strongly encourage ongoing empirical investigations of the generalizability of observed effects on convenience samples, especially for measures, constructs, cultural contexts, and selection variables not examined here. One important limitation of our study concerns the use of abbreviated measures of personality, which can attenuate the observed relationship between personality and political characteristics (Bakker & Leles, 2018), and limit the power of any given sample to detect moderation across selection variables in representative samples. For this reason, future research might examine the extent to which the relationship between long-form measures of personality traits and political variables vary as a function of selection variables for convenience samples. However, it is noteworthy that our own results provided no indication that this would be the case: The one sample analyzed here that used a longer-form personality assessment (LISS) exhibited moderation effects that were highly comparable to those obtained from our other samples (see supplemental material D).

Similarly, investigating variability across sub-groups within the two selection variables also represent potentially fruitful avenue for extending our analysis. While our primary focus is on variability in the correlation between personality traits and political variables as a function of general status as a student and access to the Internet, it is possible that these relationships differ among students (e.g., psychology vs. political science major) or between different kinds of individuals with access to the Internet (e.g., MTurkers vs. Twitter-users).

More generally, the members of these representative samples who come from the sub-population from which convenience samples are commonly drawn may be distinct from the actual participants who routinely make up such convenience samples – for example, a student who consents to participate in a national representative survey for which they were randomly selected may well be different from a student who signs up for a campus study. Unfortunately, limitations on the available data mean that exploring this possibility must be left to future work. To meaningfully address whether there is replicable moderation by sample type requires multiple samples in which the same measures are used by both representative and convenience samples (given previously demonstrated effects of not only measurement length but also the specific measure utilized: Bakker & Leles, 2018; Sibley & Duckitt, 2008). This occurs infrequently: A recent review concerning the political characteristic most frequently studied in connection with personality (namely, political ideology) located only two studies on students and one study on internet participants that used the personality measure (the TIPI) favored by representative samples (Bakker & Leles, 2018). To further address this question, then, future studies on convenience samples could supplement their planned assessments with some of the highly abbreviated assessments favored by representative samples, allowing further comparison between results obtained from different types. Ideally, these studies would be conducted in societies for which representative samples with the same measures have been collected, as previous meta-analytic research on personality and ideology indicated the possibility of regional variation in the relationship between personality and politics (Sibley et al., 2012).

Nonetheless, we suggest that the present evidence provides researchers with grounds for some confidence in the generalizability of the observed relationship between personality and political variables when relying on student samples or samples constrained to participants who

have internet-access. For many research questions, convenience samples are often satisfactory and may even be desirable, given the costs associated with recruiting a more representative sample.

### ***Conclusion***

The intersection of personality and politics is intensively studied, as individual differences in political beliefs and behavior are increasingly incorporated into a broader framework of psychological individual differences (e.g., Lee, Ashton, Griep, & Edmonds, 2018; Sibley, Harding, Perry, Asbrock, & Duckitt, 2010). Using data from 10 surveys obtained from samples representative of countries from around the world, we found that the connection between personality and political behavior was largely similar no matter whether one used the full samples or explored the sub-samples most typically used in convenience-sample research on the topic (students and internet users). Our findings therefore suggest that an appropriate way forward for the study of personality and politics – and, conceivably, many other topics as well – includes affordable, non-representative samples completing full versions of reliable psychological instruments.

We focused on the link between personality and political variables because it is among the more commonly studied psychological constructs in political contexts. Measures of personality traits are also frequently included in representative samples that are recruited for the study of political psychology and electoral outcomes (e.g., Gerber et al., 2011; Mondak & Halperin, 2008), which makes the current investigation possible. However, future research should examine heterogeneity in the relationship between other personality traits and other psychological constructs (including but not limited to political variables) as a function of selection criterion for commonly used convenience samples. More generally, our approach can and should be adopted

for other types of hypothesized relationships. Doing so will help advance a robust, replicable, and externally valid understanding of personality psychology.

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## References

- American National Election Studies. (2014). *User's guide and codebook for the ANES 2012 time series study*. An Arbor.
- American National Election Studies. (2018). *User's guide and codebook for the ANES 2016 Time Series Study*. Ann Arbor, Michigan, and Palo Alto, California.
- Bakker, B. N., & Lelkes, Y. (2018). Selling ourselves short? How abbreviated measures of personality change the way think about personality and politics. *The Journal of Politics*, 80(4), 1311–1325. <https://doi.org/10.1086/698928>
- Berinsky, A. J., Huber, G. A., & Lenz, G. S. (2012). Evaluating online labor markets for experimental research: Amazon.com's Mechanical Turk. *Political Analysis*, 20(3), 351–368. <https://doi.org/10.1093/pan/mpr057>
- Berrens, R. P., Bohara, A. K., Jenkins-Smith, H., Silva, C., & Weimer, D. L. (2003). The advent of internet surveys for political research: A comparison of telephone and internet samples. *Political Analysis*, 11(01), 1–22. <https://doi.org/10.1093/pan/11.1.1>
- Best, S. J., Krueger, B., Hubbard, C., & Smith, A. (2001). An assessment of the generalizability of internet surveys. *Social Science Computer Review*, 19(2), 131–145. <https://doi.org/10.1177/089443930101900201>
- Canadian Election Study. (n.d.). Introduction. Retrieved from <https://ces-ecr.arts.ubc.ca/english-section/home/>
- Causadias, J. M., Vitriol, J., & Atkin, A. L. (2018). Do we overemphasize the role of culture in the behavior of racial/ethnic minorities? Evidence of a cultural (mis )attribution bias in American psychology. *American Psychologist*, 73(3), 243–255. <https://doi.org/10.1037/amp0000099>

- Chen, P. G., Appleby, J., Borgida, E., Callaghan, T. H., Ekstrom, P., Farhart, C. E., ... Williams, A. (2014). The Minnesota Multi-Investigator 2012 Presidential Election Panel Study. *Analyses of Social Issues and Public Policy*, 14(1), 78–104.  
<https://doi.org/10.1111/asap.12041>
- Church, A. T. (2016). Personality traits across cultures. *Current Opinion in Psychology*, 8, 22–30. <https://doi.org/10.1016/j.copsyc.2015.09.014>
- Clifford, S., Jewell, R. M., & Waggoner, P. D. (2015). Are samples drawn from Mechanical Turk valid for research on political ideology? *Research & Politics*, 2(4), 1–9.  
<https://doi.org/10.1177/2053168015622072>
- Cooper, C. A., McCord, D. M., & Socha, A. (2011). Evaluating the college sophomore problem: The case of personality and politics. *The Journal of Psychology: Interdisciplinary and Applied*, 145(1), 23–37. <https://doi.org/10.1080/00223980.2010.528074>
- Coppock, A. (2019). Generalizing from survey experiments conducted on Mechanical Turk: A replication approach. *Political Science Research and Methods*, 7(3), 613–628.  
<https://doi.org/10.1017/psrm.2018.10>
- Coppock, A., & Green, D. P. (2015). Assessing the correspondence between experimental results obtained in the lab and field: A review of recent social science research. *Political Science Research and Methods*, 3(1), 113–131. <https://doi.org/10.1017/psrm.2014.10>
- DeBell, M., Wilson, C., Segura, G., Jackman, S., & Hutchings, V. (2011). *Methodology report and user's guide for the ANES 2010–2012 Evaluations of Government and Society Study*. Palo Alto, CA, and Ann Arbor, MI.
- Delli Carpini, M. X., & Keeter, S. (1996). *What Americans know about politics and why it matters*. Yale University Press.

- Druckman, J. N., & Kam, C. D. (2011). Students as experimental participants: A defense of the 'narrow data base. In J. N. Druckman, D. P. Green, J. H. Kuklinski, & A. Lupia (Eds.), *Cambridge Handbook of Experimental Political Science* (pp.70-101). New York: Cambridge University Press.
- Duckitt, J., & Sibley, C. G. (2016). Personality, ideological attitudes, and group identity as predictors of political behavior in majority and minority ethnic groups. *Political Psychology*, 37(1), 109–124. <https://doi.org/10.1111/pops.12222>
- Federico, C. M., & Schneider, M. C. (2007). Political expertise and the use of ideology: Moderating effects of evaluative motivation. *Public Opinion Quarterly*, 71(2), 221–252. <https://doi.org/10.1093/poq/nfm010>
- Fieldhouse, E., Green, J., Evans, G., Schmitt, H., van der Eijk, C., Mellon, J., & Prosser, C. (2015). British Election Study Internet Panel Wave 10. <https://doi.org/10.15127/1.293723>
- FORSbase. (2018). Swiss Electoral Studies (Selects) 2015. Retrieved from <https://forsbase.unil.ch/project/study-public-overview/15433/1/>
- Gerber, A. S., Huber, G. A., Doherty, D., Dowling, C. M., & Ha, S. E. (2010). Personality and political attitudes: Relationships across issue domains and political contexts. *American Political Science Review*, 104(1), 111-133. <https://doi.org/10.1017/S0003055410000031>
- Gerber, A. S., Huber, G. A., Doherty, D., Dowling, C. M., Raso, C., & Ha, S. E. (2011). Personality traits and participation in political processes. *Journal of Politics*, 73(3), 692–706. <https://doi.org/10.1017/S0022381611000399>
- Goldberg, L. R., Johnson, J. A., Eber, H. W., Hogan, R., Ashton, M. C., Cloninger, C. R., & Gough, H. G. (2006). The International Personality Item Pool and the future of public-domain personality measures. *Journal of Research in Personality*, 40(1), 84–96.

<https://doi.org/10.1016/j.jrp.2005.08.007>

Gosling, S. D., Rentfrow, P. J., & Swann, W. B. (2003). A very brief measure of the Big-Five personality domains. *Journal of Research in Personality*, 37(6), 504–528.

[https://doi.org/10.1016/S0092-6566\(03\)00046-1](https://doi.org/10.1016/S0092-6566(03)00046-1)

Gosling, S. D., Vazire, S., Srivastava, S., & John, O. P. (2004). Should we trust web-based studies? A comparative analysis of six preconceptions about Internet questionnaires.

*American Psychologist*, 59(2), 93–104. <https://doi.org/10.1037/0003-066X.59.2.93>

Hahn, E., Gottschling, J., & Spinath, F. M. (2012). Short measurements of personality – Validity and reliability of the GSOEP Big Five Inventory (BFI-S ). *Journal of Research in*

*Personality*, 46(3), 355–359. <https://doi.org/10.1016/j.jrp.2012.03.008>

Hanel, P. H. P., & Vione, K. C. (2016). Do student samples provide an accurate estimate of the general public? *PLoS ONE*, 11(12), e0168354.

<https://doi.org/10.1371/JOURNAL.PONE.0168354>

Henrich, J., Heine, S. J., & Norenzayan, A. (2010). The weirdest people in the world? *The Behavioral and Brain Sciences*, 32(2–3), 61–83.

<https://doi.org/10.1017/S0140525X0999152X>

Hooghe, M., Stolle, D., Mahéo, V. A., & Vissers, S. (2010). Why can't a student be more like an average person? Sampling and attrition effects in social science field and laboratory

experiments. *Annals of the American Academy of Political and Social Science*, 628(1), 85–

96. <https://doi.org/10.1177/0002716209351516>

Johnston, C. D., Lavine, H., & Federico, C. M. (2017). *Open versus Closed*. Cambridge:

Cambridge University Press. <https://doi.org/10.1017/9781316341452>

Kandler, C., Bleidorn, W., & Riemann, R. (2012). Left or right? Sources of political orientation:

- the roles of genetic factors, cultural transmission, assortative mating, and personality. *Journal of Personality and Social Psychology*, 102(3), 633–645.  
<https://doi.org/10.1037/a0025560>
- Krupnikov, Y., & Levine, A. S. (2014). Cross-sample comparisons and external validity. *Journal of Experimental Political Science*, 1(1), 59–80. <https://doi.org/10.1017/xps.2014.7>
- Landers, R. N., & Behrend, T. S. (2015). An inconvenient truth: Arbitrary distinctions between organizational, Mechanical Turk, and other convenience samples. *Industrial and Organizational Psychology*, 8(2), 142–164. <https://doi.org/10.1017/iop.2015.13>
- Latin American Public Opinion Project. (n.d.). AmericasBarometer 2010. Retrieved from <https://www.vanderbilt.edu/lapop/ab2010.php>
- Lee, K., Ashton, M. C., Griep, Y., & Edmonds, M. (2018). Personality, religion, and politics: An investigation in 33 countries. *European Journal of Personality*, 32(2), 100–115.  
<https://doi.org/10.1002/per.2142>
- Ludeke, S. G., & Larsen, E. G. (2017). Problems with the Big Five assessment in the World Values Survey. *Personality and Individual Differences*, 112, 103–105.  
<https://doi.org/10.1016/j.paid.2017.02.042>
- Lüdtke, O., Roberts, B. W., Trautwein, U., & Nagy, G. (2011). A random walk down university avenue: Life paths, life events, and personality trait change at the transition to university life. *Journal of Personality and Social Psychology*, 101(3), 620–637.  
<https://doi.org/10.1037/a0023743>
- Mellon, J., & Prosser, C. (2017). Twitter and Facebook are not representative of the general population: Political attitudes and demographics of British social media users. *Research & Politics*, 4(3), 1-9. <https://doi.org/10.1177/2053168017720008>

- Mondak, J. J., & Halperin, K. D. (2008). A framework for the study of personality and political behaviour. *British Journal of Political Science*, 38(02), 335–362.  
<https://doi.org/10.1017/S0007123408000173>
- Mullinix, K. J., Leeper, T. J., Druckman, J. N., & Freese, J. (2015). The generalizability of survey experiments. *Journal of Experimental Political Science*, 2(2), 109–138.  
<https://doi.org/10.1017/XPS.2015.19>
- Peterson, R. A. (2001). On the use of college students in social science research: Insights from a second-order meta-analysis. *Journal of Consumer Research*, 28(3), 450–461.  
<https://doi.org/10.1086/323732>
- Pew Research Center. (2016). A wider ideological gap between more and less educated adults. Retrieved from <http://www.people-press.org/2016/04/26/a-wider-ideological-gap-between-more-and-less-educated-adults/>
- Rainie, L. (2010). Internet, broadband, and cell phone statistics. *Pew Internet and American Life Project*, 5(479–530). Retrieved from <http://www.pewinternet.org/2010/01/05/internet-broadband-and-cell-phone-statistics/>
- Rammstedt, B., & John, O. P. (2007). Measuring personality in one minute or less: A 10-item short version of the Big Five Inventory in English and German. *Journal of Research in Personality*, 41(1), 203–212. <https://doi.org/10.1016/j.jrp.2006.02.001>
- Rentfrow, P. J., Jost, J. T., Gosling, S. D., & Potter, J. (2004). Statewide differences in personality predict voting patterns in 1996–2004 US presidential elections. In J.T. JOST, A.C., Kay & H. Thorisdottir (Eds.), *Social and psychological bases of ideology and system justification* (pp. 314–349). Oxford, United Kingdom; Oxford University Press.
- Roets, A., Cornelis, I., & Van Hiel, A. (2014). Openness as a predictor of political orientation

- and conventional and unconventional political activism in Western and Eastern Europe. *Journal of Personality Assessment*, 96(1), 53–63.  
<https://doi.org/10.1080/00223891.2013.809354>
- Schalm, R. L., & Kelloway, E. K. (2001). The relationship between response rate and effect size in occupational health psychology research. *Journal of Occupational Health Psychology*, 6(2), 160–163. <https://doi.org/10.1037/1076-8998.6.2.160>
- Scherpenzeel, A. C., & Das, M. (2010). "True" longitudinal and probability-based internet panels: Evidence from the Netherlands. In Das, M., Ester, P., & Kaxzmirek, L. (Eds.) *Social and behavioral research and the internet: Advances in applied methods and research strategies* (pp. 77–104). New York: Taylor & Francis.
- Schönbrodt, F. D., & Perugini, M. (2013). At what sample size do correlations stabilize? *Journal of Research in Personality*, 47(5), 609–612. <https://doi.org/10.1016/j.jrp.2013.05.009>
- Sears, D. O. (1986). College sophomores in the laboratory: Influences of a narrow data base on social psychology's view of human nature. *Journal of Personality and Social Psychology*, 51(3), 515. <https://doi.org/10.1037/0022-3514.51.3.515>
- Sibley, C. G., & Duckitt, J. (2008). Personality and prejudice: A meta-analysis and theoretical review. *Personality and Social Psychology Review*, 12(3), 248–279.  
<https://doi.org/10.1177/1088868308319226>
- Sibley, C. G., Harding, J. F., Perry, R., Asbrock, F., & Duckitt, J. (2010). Personality and prejudice: Extension to the HEXACO personality model. *European Journal of Personality*, 24(6), 515–534. <https://doi.org/10.1002/per>
- Sibley, C. G., Osborne, D., & Duckitt, J. (2012). Personality and political orientation: Meta-analysis and test of a Threat-Constraint Model. *Journal of Research in Personality*, 46(6),



- 664–677. <https://doi.org/10.1016/j.jrp.2012.08.002>
- Simons, D. J., Shoda, Y., & Lindsay, D. S. (2017). Constraints on Generality (COG): A proposed addition to all empirical papers. *Perspectives on Psychological Science*, 12(6), 1123–1128. <https://doi.org/10.1177/1745691617708630>
- Van Deursen, A. J., & van Dijk, J. A. (2015). Toward a multifaceted model of Internet access for understanding digital divides: An empirical investigation. *The Information Society*, 31(5), 379–391. <https://doi.org/10.1080/01972243.2015.1069770>
- Van Hiel, A., Cornelis, I., & Roets, A. (2007). The intervening role of social worldviews in the relationship between the Five-Factor Model of personality and social attitudes. *European Journal of Personality*, 148(2), 131–148. <https://doi.org/10.1002/per.618>
- Vecchione, M., & Caprara, G. V. (2009). Personality determinants of political participation: The contribution of traits and self-efficacy beliefs. *Personality and Individual Differences*, 46(4), 487–492. <https://doi.org/10.1016/j.paid.2008.11.021>
- Voorpostel, M., Tillmann, R., Kuhn, U., Lipps, O., Ryser, V. A., & Schmid, F. (2016). *Swiss house-hold panel user guide (1999–2016)*. Lausanne.
- Vowles, J., Coffe, H., & Curtin, J. (2017). *A bark but no bite: Inequality and the 2014 New Zealand general election*. ANU Press.
- Wang, W., Rothschild, D., Goel, S., & Gelman, A. (2015). Forecasting elections with non-representative polls. *International Journal of Forecasting*, 31(3), 980–991. <https://doi.org/10.1016/j.ijforecast.2014.06.001>