

Genetic and Environmental Transmission of Political Orientations

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This article reports results from the first twin study of adults in the United States that focuses exclusively and comprehensively on political traits. These data allow us to test whether a common set of genetic and environmental influences act upon a broad variety of values, personality traits, and political attitudes. In short, it allows us to empirically investigate whether there are a core set of predispositions that form the basis of our political orientations and, if so, whether these predispositions are shaped by the same environmental and innate forces. The key finding from our analysis is that there are core political predispositions that are rooted in common genetic and environmental influences and that these predispositions are empirically distinct from broader personality traits.

KEY WORDS: genetics, twin study, values, ideology, authoritarianism, egalitarianism

For many years, political behavior scholars have worked to understand the sources of political attitudes. Early research placed a special emphasis on childhood socialization and argued that parents play an active role in teaching their children how to think about the political world (e.g., Campbell, Converse, Miller, & Stokes, 1960; Jennings & Niemi, 1968; Jennings, Stoker, & Bowers, 2009). More recent work has placed a greater emphasis on immediate influences such as the media (Iyengar & Kinder, 1987), neighborhood context (Huckfeldt & Sprague, 1995), and recent economic performance (Fiorina, 1981). Despite disagreement over the timing of influence, earlier models of political behavior focused mostly on features of the social and political environment. Newer research is generating a renewed interest in the role of individual characteristics such as personality (Caprara, Vecchione, & Schwartz, 2009; Gerber, Huber, Doherty, Dowling, & Ha, 2010; Mondak, 2010) and a new focus on the role of genetic influences in shaping political attitudes and ideology (Alford, Funk, & Hibbing, 2005; Eaves, Eysenck, & Martin, 1989; Eaves et al., 1999; Hatemi, Funk et al., 2009; Hatemi, Hibbing et al., 2010; Martin et al., 1986). Though this research makes a compelling case that genetics have a role to play, the precise nature of this role remains somewhat unclear and skepticism persists—in no small part because people rightfully wonder how people's genes can influence views on temporally bound issues of the day such as school prayer or nuclear power. The most likely answer is not that attitudes on specific issues are heritable, but that issue positions reflect a set of heritable core predispositions, including values and personality traits. These core predispositions, which are influenced by life experiences as well as genes, are used by individuals to navigate the social, economic, and political worlds and as such serve as the basis for specific attitudes on issues of the day (Smith, Oxley, Hibbing, Alford, & Hibbing, 2011).

The Possible Precursors of Political Issue Stances

On the surface, the literature examining the precursors of political attitudes seems rife with disagreement. Public opinion scholars have put forward diverse schemes of "core values" suspected of structuring issue attitudes (see, e.g., Feldman, 1988; Feldman & Johnston, 2009; Goren, 2004; Hurwitz & Peffley, 1987; Jacoby, 2006; Kinder, 2008; McCloskey & Zaller, 1984; Zaller, 1992). Little agreement exists regarding the values that constitute important core beliefs or even how these might be defined. Some scholars recognize the key influence of broad, deeply embedded, longstanding political tendencies, but take their existence for granted rather than seek to explain their nature and origins (e.g., Barker & Tinnick, 2006; Hetherington & Weiler, 2009; Zaller, 1992). Some scholars focus more narrowly on specific values such as economic individualism or humanitarianism as determinants for sets of particular policy attitudes relevant to those values (e.g., Feldman, 1988; Feldman & Steenbergen, 2001; Hurwitz & Peffley, 1987; also see Tetlock, 1986). Others look at the structure of broader core values as a way to determine a wide range of attitudes and policy preferences (Jacoby, 2006). Perhaps the most comprehensive theory of values has been advanced by Schwartz and colleagues (e.g., Schwartz, 1992, 1994; Schwartz et al., 2001; Piurko, Schwartz, & Davidov, 2011), who identifies 10 basic personal values that have broad cross-cultural applicability. These values are held to be universal rather than uniquely political. Specifically, they are viewed as cognitive representations of trans-situational goals that underlie motivation and decision making across the range of human experience. When applied to the political realm, individual variation in these values is suspected of leading to distinct political attitudes as well as differences in broader personal, social, and economic attitudes.

Yet another set of scholars eschews reference to values and instead focuses on the role played by various personality traits as important precursors to political attitudes. These traits are viewed as an individual's habitual patterns of emotion, behavior, and thought and, much like the research on values, considerable disagreement exists about what these traits are and how they provide the foundation for political attitudes. There are a number of literatures that explore personality as having

an explicit social dimension that directly influences political orientations and attitudes. Perhaps the most enduring of these has been the concept of the authoritarian personality (Adorno, Frenkel-Brunswik, Levinson, & Sanford, 1950), which was developed in an attempt to understand the rise of fascism during the 1930s and 1940s. Over time, the original authoritarianism scale has been modified and labeled right-wing authoritarianism (Altemeyer, 1996). Despite wide use in studies across a range of disciplines and subfields, right-wing authoritarianism (RWA) has generated considerable debate, particularly regarding the normatively negative portrayal of conservatism and the possible overlap between measures of authoritarianism and the dependent variable (ideology) it is employed to explain (e.g., Feldman, 2003; Martin, 2001). In part as a response to these critiques, several alternative perspectives on authoritarianism have recently been developed focusing less on the issue content of authoritarian views and more on the psychological needs underlying authoritarian views. Whether focusing on authoritarianism as a general predisposition to be intolerant of difference (Stenner, 2005), a sensitivity to violations of social conformity (Feldman, 2003) or orientations towards child rearing (Hetherington & Weiler, 2009), these theories of authoritarianism emphasize the breadth of authoritarianism as a personality dimension.

Another form of personality trait related to social relations that has direct political implications is social dominance orientation (SDO), developed by Sidanius and Pratto and colleagues (Sidanius & Pratto, 2001; Pratto, Sidanius, Stallworth, & Malle, 1994). SDO taps individual preferences for hierarchy in intergroup relations and, like RWA, is conceived as a deep-seated personality dimension that influences political views. SDO shares some theoretical connections with right-wing authoritarianism but the two concepts are held to be empirically distinct (Sibley, Robertson, & Wilson, 2006).

Somewhat more recently, political psychologists have embraced the Big Five (or Five Factor Model) that has been at the center of research in trait psychology over the last 30 years (see, e.g., Goldberg, 1990, 1992, 1993; McCrae & Costa, 2003). The dimensions of the Big Five are openness to experience, conscientiousness, extraversion, agreeableness, and emotional stability, and collectively they are thought to organize and summarize the vast majority of individual personality variance. A number of studies have investigated the influence of the Big Five on political ideology (see, e.g., Carney, Jost, Gosling, & Potter, 2008; Gerber et al., 2010; Mondak, 2010; Mondak & Halperin, 2008) with the consistent findings being that openness to experience predicts a liberal ideology and conscientiousness predicts a conservative ideology. Jost and colleagues (Carney et al., 2008; Jost, 2006; Jost, Glaser, Kruglanski, & Sulloway, 2003) incorporate these findings into their larger theory of conservatism as motivated social cognition, which conceives of conservative ideology as being a downstream product of comfort with inequality and a preference for preservation of the societal status quo resulting from a psychological need for certainty.

A related approach accounts for differences in ideology based on the “moral foundations” that individuals use to evaluate the world (Graham, Haidt, & Nosek, 2009; Haidt & Graham, 2007; Haidt & Joseph, 2004). In this theory, human morality can be evaluated using five different “domains.” Liberals evaluate morality using domains relating to harm avoidance and fairness/reciprocity. Conservatives utilize these domains, but they also base their judgments on loyalty, authority, and purity dimensions.

Readers can be excused if they look upon these expansive and varied literatures and see only chaos. Core political values, personality traits, psychological needs, and moral foundations all jockey for influence, and within each category are several conceptualizations empirically represented by varied measurement strategies. However, instead of dwelling on the differences between the various approaches employed, we are struck by the remarkable commonality across all of this research. First, there is widespread agreement in these literatures that the views held by citizens on contemporary issues of the day are the product of not only characteristics of the immediate political environment but also deep-seated predispositions. Scholars vary in the degree to which they specify this dynamic, but the larger vision seems noncontroversial. None of the reviewed literature claims that personality

traits or moral foundations *determine* ideology in isolation from the environment encountered by citizens. Issues rise and fall from the political agenda (Carmines & Stimson, 1989), and elites choose which political cleavages to exploit (Zaller, 1992). At the same time, it is equally apparent that citizens do not respond to environmental changes in exactly the same way. For some Americans, the events of 9/11 led to a sharp reevaluation of the relative value of physical security versus civil liberties, while other citizens in identical circumstances were unaffected. Clearly, individuals vary in their reaction to the political environment.

A second clear point of commonality is that all of these studies understand the predispositions that structure political orientations and attitudes to be psychologically based constructs that reach beyond the political domain. In other words, stances on issues of the day are guided by needs and desires manifested in interpersonal, social situations far from the explicitly political realm. Whether the focus of the particular study is on values such as egalitarianism, or on personality dimensions such as openness to experience, the consensus is that political issue positions are a part of broader preferences for social life.

Third, and critically for present purposes, all of the reviewed approaches are compatible with the view that genetics play at least some role in shaping political attitudes. The prevailing theoretical framework across all of these studies is that predispositions of various kinds structure our political views. In many of these instances, the authors explicitly note (or empirically test) the genetic basis of the predispositions being studied. For example, it is well-established that personality dimensions including the Big Five are to a substantial degree genetically heritable (e.g., Jang, McCrae, Angleitner, Riemann, & Livesley, 1998; Kandler, Riemann, Spinath, & Angleitner, 2010b; Loehlin, 1992; Loehlin, McCrae, Costa, & John, 1998; Riemann, Angleitner, & Strelau, 1997). Authoritarianism has also been demonstrated to have a substantial heritable component (McCourt, Bouchard, Lykken, Tellegen, & Keyes, 1999; Scarr & Weinberg, 1981). Even studies that do not explicitly account for the heritability of predispositions can be seen from a genetic perspective. For example, Zaller suggests predispositions are “a distillation of a person’s lifetime experiences, including childhood socialization and direct involvement with the raw ingredients of policy issues” (1992, p. 23), but he goes on to acknowledge a possible role for “inherited” traits in shaping political attitudes.

The common theoretical framework that emerges from the existing literature is one in which genes play a role in influencing predispositions for certain temperaments and behaviors, and these predispositions then interact with the immediate environment to form political attitudes. While this framework tends to be implicit in many of the studies considered here, at times it is spelled out more directly. Jost (2009, 2011) outlines a theory of “elective affinities” that traces the process, starting with genetics, by which dispositions become instantiated in neurological (Amodio, Jost, Masters, & Lee, 2007) and physiological (Oxley et al., 2008) traits. Smith et al. (2011) also trace a causal chain which lays out the intermediate steps between genes and political attitudes, including personality traits and values. And Bouchard’s vision (2009) is that authoritarian tendencies, political conservatism, and religious orthodoxy all emanate from a common source.

We build on this work by examining political ideology and several measures of the predispositions held by various research literatures to constitute the deep-seated psychological constructs underlying political orientations. Regardless of whether they travel under the banner of predispositions, values, personality traits, or just plain ideology, if the arguments of the relevant literatures are correct, then empirically these constructs should: (1) covary with each other, and (2) that the shared variance should reflect a common set of genetic and environmental influences. For reasons of survey length and respondent fatigue, it is obviously impossible to include batteries on all the potential precursors mentioned above, but our survey instrument does include a number of them. More specifically, we collected information on two measures of personality (the Big Five and a right-wing authoritarianism scale) and two constructs rooted more closely in the values

tradition—an egalitarianism index (Feldman & Steenbergen, 2001) and the society works best index (Smith et al., 2011).

Two points should be noted before we proceed. One is that some of the best recent work on predispositions has attempted to disentangle the influence of genes and environmental factors on predispositions. For example, Bleidorn et al. (2010) and Kandler et al. (2010a) examine longitudinal data and find a complex interplay between genes and environmental factors over the life course. This work highlights the important point that though we refer to predispositions as having substantial heritable components, this does not mean that they are *determined* by genetic factors. Environmental factors exert influence throughout the lifespan. Second, some work has sought to disentangle the causal order between personality traits and values. Caprara et al. (2009) examine the Big Five and Schwartz's 10 basic personal values together and conclude that values mediate the influence of personality traits on political attitudes. Work of this kind is to be strongly encouraged; what we are doing here, however, is not testing whether traits mediate values (or vice versa) into political orientations. Our key hypotheses are that, regardless of the causal interplay, these concepts covary and, more importantly, that this covariance is rooted in common environmental and genetic influences.

Data and Methods

To investigate the shared environmental and genetic influences on the covariance of traits, values, and political orientations, we employ a heritability analysis based in the classic twin design developed in behavioral genetics. Briefly, the aim of a heritability analysis is to take the variance of an observed trait and partition it into variance that can be attributed to genetic influence and variance attributed to nongenetic (environmental) influence. This decomposition of variance is made possible by taking advantage of a naturally occurring experiment involving particular types of siblings, i.e., twins.

Monozygotic twins (MZs) develop from a single fertilized egg and thus share their entire structural DNA. Dizygotic twins (DZs), like any other set of siblings share an average of 50% of their DNA. If we assume that MZ twins and DZ twins are raised in similar environments (e.g., same parents, same household, same culture, during exactly the same time span), the aspects of their shared environment that make them similar on any given trait are being held constant. If these broad environmental influences are the sole determinants of the trait being studied, then there should be no significant MZ-DZ differences on that trait. However, if these environmental determinants of trait similarity are held constant, and MZ twins are observed to be more alike than DZ twins, the greater similarity of MZ twins must logically be due to genetic influences or error (see Smith et al., 2012, and Smith and Hatemi, 2011, for a broader discussion of the assumptions and methods of the classic twin design and their application to political traits). Using this basic logic, the classic twin design allows variance in any measured trait to be partitioned into three basic categories; genetic influences that make twins similar on the observed trait (additive genetic influence, or A), environmental influences that make twins similar on the observed trait (common environment, or C), and environmental influences that make twins dissimilar on the observed trait (unique environment, or E).

This same logic can be extended to partition the covariance of traits. So, for example, we can decompose the variance of a measure of values into its ACE components and in a separate analysis do the same for a measure of political attitudes. This represents two univariate analyses that will yield ACE estimates for values and a separate set of ACE estimates for political attitudes. More important for our purposes is that we can also take the covariance of values and political attitudes and assess the overlap of ACE components underlying that covariance. If political attitudes are rooted in deep-seated psychological constructs like values and personality traits, these should all covary with each other, and a multivariate heritability analysis allows us to examine if that covariance is rooted in a common set of genetic and environmental influences. It is just such an analysis that we will use to test our key hypotheses.

The data used here are from a twin study of adults in the United States from the Minnesota Twin Registry (MTR); the survey focused on social and political issues, values, and behaviors.¹ The MTR is a birth-record–based registry containing approximately 8,000 twin pairs born in Minnesota from 1936 to 1955. The twins were recruited to the registry in middle age, from approximately 1983 to 1990. The sample of twins for this study was born from 1947 to 1956. Dizygotic twins of unlike sex were not recruited for the study. For more details on the registry see Lykken, Bouchard, McGue, and Tellegen (1990) and Krueger and Johnson (2002). It should be noted that our sample is clearly not representative of adults in the United States—it is middle-aged, overwhelmingly white, and geographically concentrated in the Midwest.

The bulk of the surveys were collected between July 24 and December 22, 2008 with a second period of data collection from July 13 to October 30, 2009 in order to increase the number of complete twin pairs in the study. Most respondents completed the survey via the web. A survey invitation was sent to the twins by postal mail with a follow-up letter sent as needed. A small number of respondents during the 2008 data collection completed a paper version of the questionnaire if their Internet access was limited. During the second period of data collection, all of the 146 respondents completed the survey by paper. All respondents were offered \$35 for completion of the survey as an incentive to complete the fairly lengthy questionnaire (approximately 30 to 40 minutes) and as a token of appreciation.

A total of 1,349 individuals completed the survey. Of these, 1,192 were members of twin pairs, and 157 had a twin that did not complete the survey. The analysis for heritability is limited to the 1,192 respondents that were part of a matched twin pair. This group was comprised of 286 monozygotic male twins (143 twin pairs), 172 dizygotic male twins (86 twin pairs), 426 monozygotic female twins (213 twin pairs), and 308 dizygotic female twins (154 twin pairs).

The focus of our analysis is on two personality measures, two value measures, and two measures of political ideology. The first personality measure is a 44-item battery from John, Donahue, and Kentle (1991) to calculate individual measures for the personality traits extroversion, agreeableness, conscientiousness, neuroticism, and openness. The second personality measure is a right-wing authoritarianism scale created using the average of responses to a shortened 15-item battery developed by Zakrisson (2005). The two value measures are an egalitarianism scale, measured as the average response to five items that is adapted from Feldman and Steenbergen (2001), and a society works best index, which consists of an additive scale of social orientations for 12 items developed by Smith et al. (2011). The two measures of political ideology are a 7-point ideological self-report (1 = *extremely liberal*, 7 = *extremely conservative*), and a Wilson-Patterson Index, which is a measure of conservatism based on responses to 27 issues adapted from Wilson and Patterson (1968). All of our measures of personality, values, and ideology are based on self-reports from subjects.

Using these measures, our empirical analysis has three primary purposes: (1) to investigate the relative levels of genetic and environmental influences on each of these variables; (2) to assess the covariance of these measures, and, (2) to examine whether that covariance has common genetic and environmental influences.

Results and Analysis

Table 1 presents a basic examination of covariance among our measures; there is no differentiation here between twin type, just simple correlations between personality, values, and ideology. Even though the covariance analysis here is limited to a series of bivariate comparisons, Table 1

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Table 1. Correlations among Personality Traits, Value Orientations, and Political Ideology

	Extroversion	Agreeableness	Conscientiousness	Neuroticism	Openness	Right-Wing Authoritarianism	Society Works Best	Egalitarianism	Self-Identified Ideology	Wilson-Patterson Index
Personality										
Extroversion	1.0									
Agreeableness	.16** (1163)	1.0								
Conscientiousness	.23** (1166)	.35** (1158)	1.0							
Neuroticism	-.32** (1170)	.37** (1155)	-.34** (1161)	1.0						
Openness	.34** (1170)	.11** (1162)	.11** (1164)	0.17** (1161)	1.0					
Right-Wing Authoritarianism	.02 (1033)	.03 (1027)	.07** (1028)	.01 (1025)	-.23** (1033)	1.0				
Values										
Society Works Best	-.03 (1159)	-.14** (1153)	.03 (1157)	-.02 (1151)	-.11** (1158)	.48** (1026)	1.0			
Egalitarianism	.02 (1164)	-.05 (1155)	.05* (1159)	-.14** (1156)	-.09** (1162)	.30** (1036)	.47** (1155)	1.0		
Ideology										
Self-Identified ideology	-.00 (1167)	-.05 (1158)	.05* (1162)	-.04 (1159)	-.16** (1165)	.58** (1038)	.53** (1158)	.49** (1171)	1.0	
Wilson-Patterson Index	-.00 (1164)	-.00 (1165)	.06** (1169)	-.04 (1166)	-.20** (1172)	.79** (1040)	.57** (1171)	.49** (1171)	.71** (1174)	1.0

Note: Entries are Pearson's r (N).
 *** = $p < .05$, * = $p < .10$.

immediately and intuitively conveys our first notable finding: statistically, these measures seem to be picking up only two underlying concepts. The first is personality as tapped by the Big Five measures, which tend to be at least moderately correlated with each other. The second is everything else; regardless of whether the measure is designed to tap into personality (right-wing authoritarianism), values, or ideology, these five variables are clearly related. The modest overlap that is observed between the Big Five personality traits and the other measures is consistent with existing research, i.e., openness tends to be correlated with personality traits, values, and ideological leanings that are associated with liberal orientations and (to a somewhat lesser degree) that conscientiousness is associated with conservative leanings. What is most striking, however, is the split between the Big Five and everything else. In this admittedly simple analysis, the measures of ideology, values, and right-wing authoritarianism share substantial variance with each other but much less variance (often none at all) with the dimensions of the Big Five.

This finding is confirmed by a more sophisticated analysis of the underlying variance. A factor analysis (principal components) of all 10 variables reported in Table 1 results in three factors with eigenvalues greater than 1.0. Rotating (varimax) the component matrix leads to a clear confirmation of the inference taken from Table 1: Right-wing authoritarianism, the two value measures, and the two measures of ideology reflect a single underlying dimension. All of these measures load on a single factor (.70 or higher). A second factor reflects agreeableness, conscientiousness, and neuroticism (factor loadings of .81, .73, and $-.61$), a third represents extroversion and openness (.74 and .80, respectively).² Table 1 shows that Big Five personality traits (notably openness and conscientiousness) clearly do have some relationship with the other five variables in our analysis. Yet the most obvious takeaway from this part of the analysis is that those other five variables are clearly converging on a core underlying dimension. The analysis cannot adjudicate whether this dimension is best called a personality trait, a set of values, or simply a consistent set of issue attitudes tucked under the umbrella of ideology, but empirically speaking this dimension is clearly present.

It is important to note that just because the correlation between, say, conscientiousness and self-identified ideology is small (.05) does not mean that these variables cannot share common genetic or environmental influences. Indeed, though the shared variance may be small, 100% of that shared variance could be coming from a common set of genetic influences. In short, even though our first set of analysis indicates our measures represent two distinct dimensions—a set of broad personality traits and a core psychological construct tied to politics—the connections between the various components of these dimensions is unclear and still worth investigating.

The second part of our empirical analysis is a series of univariate heritability analyses, that is, we generate a set of unique ACE estimates for each of our measures. As described above, the object of a univariate analysis is to partition the variance of a single observed variable (a phenotype) into the latent (unobserved) components associated with genetic influence (A), common environment (C), and unique environment (E). Statistically speaking, using MZ and DZ twin pairs to accomplish this variance decomposition is analogous to an ANOVA and can be accomplished in a variety of ways, the three most common being a structural equations (SEM) approach, a regression approach, or the Falconer approach which is based on simple correlations (for a review of the pros and cons of these different methods, see Smith & Hatemi, 2011). Despite statistical limitations of the Falconer approach, all three analytic approaches yield substantively the same inferences in this case; we present the Falconer results in Table 2 for ease of presentation.

The Falconer approach uses nothing more than a handful of assumptions, differences between MZs and DZs on standardized measures of covariance (i.e., simple correlations), and some trivial

² We also tested the factor structure using a number of other approaches. For example, a principal axis factor analysis also yields a three-factor solution with the five more explicitly political items loading on one factor and the Big Five traits divided across the other two factors.

Table 2. Univariate Heritability Estimates for Personality Traits, Values, and Ideology

	rMZ	rDZ	Heritability (A) (2*(MZ-DZ))	Shared Environment (C) (2*DZ)-MZ	Unique Environment (E) 1-MZ
Personality					
Extroversion	.52** (348)	.17** (233)	.70	-.18	.48
Agreeableness	.34** (344)	.15** (229)	.38	-.02	.66
Conscientiousness	.34** (345)	.13** (231)	.42	-.08	.66
Neuroticism	.41** (341)	.20** (232)	.42	-.01	.59
Openness	.52** (349)	.09 (230)	.43	-.52	.48
Right-Wing Authoritarianism	.60** (275)	.36** (183)	.48	.12	.40
Values					
Society Works Best	.42** (343)	.15** (232)	.54	-.12	.58
Egalitarianism	.40** (347)	.15** (229)	.50	-.10	.60
Ideology					
Self-Identified ideology	.50** (348)	.22** (231)	.56	-.06	.50
Wilson-Patterson Index	.64** (354)	.35** (237)	.58	.06	.36

Note: Entries are Pearson's r (N).

** $p < .05$, * $p < .10$.

arithmetic to decompose variance (Falconer, 1960; Smith & Hatemi, 2011). MZ and DZ correlations are presented in the first two columns of Table 2, and the formulas employed to decompose variance from these correlations are presented in the heads of columns 3, 4, and 5, which respectively list estimates of A, C, and E for each variable.

The key finding here is that, for all 10 variables, sizeable portions of variance can be attributed to genetic influence and unique environment, while, at best, relatively trivial amounts of variance can be attributed to common environment. Two important limits of the Falconer approach are that it can result in negative ACE estimates (seen for several estimates of C in Table 2), which make no substantive sense, and it does not allow statistical testing of ACE parameters, that is, it does not allow us to test where a particular A, C, and E estimate is significantly different from zero. SEM approaches address both of these problems, and our SEM analyses (not shown) often indicate that the C estimates are frequently not significantly different from zero and that the best-fitting model of variance components is not ACE but AE. In other words, regardless of the method employed, what we consistently find is that the variance in all ten of these variables seems to be strongly influenced by genetics and unique life experiences, but much less so by the shared environment of twins. These findings are broadly consistent with previous research that has looked at the heritability of personality traits (e.g., Jang, Livesely, & Vernon, 1996), right-wing authoritarianism (McCourt et al., 1999), and the Wilson-Patterson ideology measure (Alford et al., 2005; Boucharde et al., 2003; Martin et al., 1986). As far as we are aware, we are the first to report a heritability analysis on the society works best and egalitarianism values measures, as well as for the self-reported ideology scale. The ACE estimates for these variables join a line of other studies of related social and political traits reported

to have significant genetic and unique environmental influences, with more modest common environmental influences (Bouchard, 2004; Bouchard & McGue, 2003).

The central conclusion stemming from our univariate analyses is that taken individually, all of our measures have significant genetic and (unique) environmental influences. The key question is whether these are the *same* genetic and environmental influences. We use a multivariate analysis to assess this possibility. The objective of a multivariate analysis is not simply to decompose the variance of a single variable into A, C, and E components, but to decompose the shared variance of multiple variables into these same components. A standard approach to multivariate behavioral genetic analysis is to use goodness-of-fit measures to compare three models that have different assumptions about the sources of shared variance in the observed measures. The first of these is a multivariate Cholesky model, which conceptualizes all indicator variables as separate scales at the genetic level (this is a “saturated model” that serves as the basis of comparison with other models using goodness-of-fit tests). The second is an independent pathway model. This model assumes that shared variance is due to a set of shared latent ACE influences (common factors) and as well as a set of latent ACE influences that are unique to each variable. The third is the common pathway model, which conceptualizes covariance between variables as a product of a single underlying latent variable that reflects the same set of A, C, and E influences on all variables. If a common pathway model is found to best fit the data, it is reasonable to infer that the variables included in the analysis represent a single coherent construct, that is, all the variables are rooted in the same genetic and environmental influences and as such can be considered measures of a single phenotype.

In a multivariate analysis (not shown), we first included all 10 variables in the model but found little evidence of such a phenotype, that is, we reject the independent and common pathway models. We do see some evidence of common genetic and environmental influences, but these influences are split due to the clear empirical distinction between the Big Five personality traits and the other five variables. The resulting genetic correlations of this analysis show low levels of overlap between Big Five traits and the other variables (i.e., variance attributed to genetic influences in the Big Five traits had little correlation with analogous variance in the other five variables). The variance in openness and conscientiousness attributed to genetic influences did show some modest relationship with the analogous variance in the more political variables, but even here the correlations were, at most, .20. The comparable environmental correlations between Big Five traits and the other variables were substantively zero. In short, a comprehensive multivariate genetic analysis leads to the inference foreshadowed by the Table 1 correlations and the factor analysis reported earlier: The Big Five traits are an empirically distinct concept from the other variables and are (mostly) shaped by a different set of environmental and genetic influences.

Our multivariate analysis becomes more interesting when we drop the Big Five and treat the remaining variables as reflecting some underlying core psychological construct that reflects political predispositions. This clearly is empirically justified; a factor analysis of these five variables alone results in a single dimension that explains approximately 65% of the variance. Individual loadings on this factor range from .67 (egalitarianism) to .90 (Wilson-Patterson). There is no trace of a second factor. Our univariate heritability analyses find a consistent pattern, with about half the variance in these measures attributed to broad genetic influences (A), about half attributed to unique environmental experiences (E), and, at best, modest common environmental influences (C). Again, the big question is whether these reflect a common set of genetic and environmental influences for these five variables.

The short answer to this question is yes. Using the Bayesian Information Criterion (BIC) as our criterion for goodness of fit, the multivariate model that best fits the data for these five variables was the independent pathway model (see Table 3). This means we must stop short of the inference that we would draw from a common pathway model, that is, that these five variables are measures of a single underlying phenotype. It does mean, however, that we can infer these variables share common

Table 3. Model Fit for Multivariate Analysis of Right-Wing Authoritarianism, Society Works Best, Egalitarianism, Self-Identified Ideology, and Wilson-Patterson Index

	BIC
Cholesky	-10696.594
Independent Pathway	-10718.931
Common Pathway	-10679.862

Note: Best-fitting model is in bold.

Table 4. Variance Accounted for by Common and Unique Factors in Independent Pathway Model

	Common Factors			Unique Factors		
	A	C	E	A	C	E
Ideology	.33	.11	.17	.05	.00	.34
Wilson-Patterson	.31	.28	.28	.01	.01	.12
Egalitarianism	.42	.00	.07	.00	.00	.52
Right-Wing Auth.	.09	.42	.27	.03	.00	.19
Society Works Best	.27	.03	.15	.09	.02	.44

genetic and environmental influences. The independent pathway model conceptualizes the underlying structure of multiple variables as best captured by three latent factors that are common to all measured variables (representing A, C, and E components that are shared by variables) and three latent factors that are unique to each of the measured variables (representing A, C, and E components that are not shared).

Table 4 reports the variance accounted for by each model parameter in the independent pathways model. The rows in Table 4 reflect the proportion of variance in the associated variable that the model estimates is due to common or unique factor parameters (some of the rows do not quite total 1.0 due to rounding). So, for example, 61% of the variance in self-reported ideology can be attributed to factors common to all five variables in the model (.33 to A, .11 to C, and .17 to E). The remaining 39% is due to factors unique to this variable, and these seem to be modestly genetic, but largely due to unique environment.

As Table 4 indicates, the common factors account for the lion's share of the variance in these five variables, though there are some interesting differences. Shared genetic influences range from 9% to 42% of the indicators' variance. Four of the variables seem to share a fairly large common set of genetic influences, the notable exception being right-wing authoritarianism. The latter seems to be more rooted in a shared set of environmental influences. Unique influences account for a relatively small percent of the variance in these variables (in the case of the Wilson-Patterson as little as 14%). Generally speaking, unique A and C influences were trivial. The E component, representing influences that make twins more dissimilar and are unique to the indicator variable, was more sizable, accounting for between 12 and 52% of a variable's variance.

While the rejection of the common pathways models means we must be cautious in conceptualizing these five variables as representing a single, coherent phenotype, our overall pattern of results underscores their shared underpinnings. These measures may seem an unusual set given that authoritarianism is often treated as a personality trait, egalitarianism and the society works best index are treated as values, and ideology is often treated as something distinct from either of those labels. These variables certainly can be, and frequently are, theoretically distinguished as independent concepts linked together in various causal chains. At least in our data, however, empirically speaking

they share a large degree of variance and a good portion of that variance is clearly rooted in a common set of genetic and environmental influences.

Conclusion

A central research aim for political psychology is investigating the precursors of political attitudes and orientations. It is widely accepted that political attitudes are products of more than rational calculation or particular contexts. Though traveling under various labels (“predispositions,” “values,” “personality traits,” “moral foundations”) in a number of different literatures, a common thread in this research is that some deep-seated psychological construct or constructs, rooted in genetic as well as environmental influences, serve as a basis for shaping perceptions, preferences, and choices as we navigate our social and political worlds.

In this article we investigated a range of concepts proffered as candidates for the core predispositions that underlie political attitudes. Rather than treat these concepts as empirically and theoretically distinct, we sought to explore their common roots. We reasoned that if these concepts, in effect, were triangulating on a single underlying concept, they should covary with each other as well as with political attitudes. Moreover, that shared variance should be rooted in the same set of environmental and genetic influences.

Our findings raise some interesting issues. We find that broad personality traits are clearly empirically distinct from measures of values and political ideology. While there is some overlap between personality traits, as measured by the Big Five, and other measures of political predispositions, these more general personality traits are clearly distinct from the other indicators. Factor analyses showed that the values (including society works best and egalitarianism), ideology, and the more specific personality trait of right-wing authoritarianism are distinct from the Big Five personality traits. And while there is clear evidence that all of these measures are influenced by both genetic and environmental factors, there is no support in multivariate genetic analyses that they share the same genetic and environmental influences.

Rather than a single general or universal underlying construct, we found something that seems to be more clearly rooted in the broader social and political realm. All five measures of predispositions, whether they are labeled as values, ideology, or personality, follow a similar heritability pattern. The univariate heritability analyses showed that each has significant genetic influences and significant environmental influences, with the latter concentrated in unique rather than shared environment. Importantly, a common set of these genetic and environmental influences seem to be underlying the ideology, values, and personality measures outside of the Big Five dimensions. While there is also evidence for some unique environmental influences underlying each of these measures, we are struck by the degree to which the *same* genetic and environmental influences are present across this set. Our empirical analysis stops us short of inferring that these measures are tapping into a single phenotype, that is, a core underlying psychological construct that might be termed “political predisposition” or “bedrock political beliefs.” But empirically, there is clear evidence of shared influence that points in that direction. Thus, these measures are tapping into the same underlying psychological construct to a considerable degree, and this construct seems to be related to the broad issues of social structure and order—in other words, politics.

What are the implications of these findings for our understanding of the precursors of political attitudes? One way to think about the empirical distinctiveness of the Big Five personality traits is to consider such personality measures are reflecting general response tendencies to social situations. By comparison, our other constructs have more explicitly social and political content, including right-wing authoritarianism, value indices, and measures of political ideology. The distinctiveness of general personality traits, such as agreeableness and extroversion, from these other constructs, by no means contradicts the established finding (Caprara et al., 2009; Gerber et al., 2010; Mondak, 2010;

Mondak & Halperin, 2008) that some general personality traits correlate with political orientations. Rather, it suggests that more explicitly social and political traits tend to stick together and also that broad elements of political orientations tend to be traceable to common environmental and genetic influences—common influences that are mostly separate from those shaping the Big Five. To be sure, some general personality traits overlap modestly but importantly with political orientations but, given that political predispositions load on such different factors from general personality variables and appear to spring largely from distinct sources, they are clearly distinct. However, rather than separating these two conceptually and pursuing each line of research as separate tracks, it may be more fruitful to entertain the possibility that political predispositions constitute another dimension of personality.

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