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# The Relationship between Genes, Personality Traits, and Political Interest

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**Abstract**

Political interest is one of the strongest predictors of individual political engagement, but little is known about the origins of this political orientation. The goal of this paper is to clarify the role that biological and psychological factors play in the formation of political interest. A series of recent studies in genetics have illustrated that political interest is heritable, and a series of recent studies in political science and psychology have demonstrated that personality traits, many of which are heritable, are related to political interest. In this paper, we make a number of contributions to the literature: (1) we replicate previous analyses showing that political interest and personality traits are heritable, (2) we demonstrate that personality traits are related to interest, and (3) we estimate the extent to which genetic factors account for the correlation between personality traits and political interest. Using two datasets on twins, we find evidence that genetic factors account for a large amount of the correlation between political interest and personality traits. This study provides a more nuanced picture of the biological and psychological bases of political orientations.

**Keywords**

political interest, heritability, twins, personality traits, Big Five, genes, genopolitics

## Introduction

Some people find politics inherently interesting. They tune into the news every night to learn about political events, have favorite political websites, and wait for election returns with breathless anticipation. Other people are completely uninterested in politics. They never watch the news to learn about politics, avoid political websites at all costs, and could care less about who wins and loses elections. Political interest refers to "a state of curiosity, concern about or attention to politics" (Haug 2013, 233), and empirical studies have consistently demonstrated that those who are interested in politics and public affairs are far more likely to be civically engaged than those who are not at all interested in politics and public affairs (Blais and Labbé St-Vincent 2011; Brady, Verba, and Schlozman 1995; Verba, Schlozman, and Brady 1995). In fact, in most individual-level models of political participation, political interest is one of the strongest predictors (Verba, Schlozman, and Brady 1995).

Previous studies on the origins of political interest have primarily focused on demographic attributes and socialization experiences as explanations for why some people are more interested in politics than others. In terms of demographic variables, political scientists have found that age, income, and education are positively correlated with political interest (Blais and Labbé St-Vincent 2011). Demographic variables, however, do not account for all of the variation in political interest.[1] Studies on political socialization have provided additional insights into the origins of political interest. Most studies on socialization and political interest have focused on the transmission of interest from parent to child. Interestingly, Jennings, Stoker, and Bowers (2009) find that there is a fairly weak relationship between parental and child political interest. In fact, they note that in a multivariate analysis, "youth levels of political interest cannot be predicted on the basis of parent attributes, whether parent political interest or parent SES [socioeconomic status]" (Jennings, Stoker, and Bowers 2009, 792). Verba, Schlozman, and Brady (1995) find that some potential measures of socialization (parental political involvement, including both political discussion and community activity) are positively correlated with their children's political interest, although such variables do not fully account for differences in political interest across individuals.

One interesting study that relates to the above-mentioned research on socialization focuses on measuring the

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stability of political interest over the life cycle. According to Prior (2010), political interest could be characterized by a "persistence of early effects" or a "lifelong openness" to contextual influences and reconsideration. He (2010, 748) notes,

> If political interest reflects ongoing evaluations of politics, it might change frequently as elections and other salient political events come and go. But even when the "interestingness" of politics changes, people may not update their political interest if they do not pay much attention or have come to anticipate the political cycle. Instead, political interest may resemble a well rehearsed attitude, a personality trait, or a part of people's political identity.

Using panel data from a number of countries, Prior (2010, 765) finds that political interest is exceptionally stable over time, which supports the persistence of early effects theory, and notes that,

> In order to figure out why political interest is higher among some people than others, it is necessary to understand *how it forms in the first place* [emphasis added]. The stability of interest even among people in their twenties indicates that this formation happens quickly. Given the importance of political interest for democratic governance, it is worth examining in more detail how interest develops in childhood and adolescence.

In the past few years, it appears that researchers have taken Prior's suggestion seriously and have started to think more about the influence of individual differences (e.g., biological, psychological, etc.) that are present early on in life on political interest. A number of studies in political science and genetics, for example, have estimated the extent to which political interest is heritable. The results of those studies have provided solid evidence that there is a genetic basis to political interest. Arceneaux, Johnson, and Maes (2012), for example, estimate that the heritability of political interest is 0.40 in a US sample. Using data from two different contexts, Klemmensen et al. (2012) estimate that the heritability of political interest is 0.43 in a US sample and 0.57 in a Danish sample. In a sample containing Canadian and US twins, Bell, Schermer, and Vernon (2009) estimate that the heritability of political interest is 0.62. More recently, Dawes et al. (2014) find that the heritability of political interest is 0.50 in a sample of Swedish twins. The next question, of course, is how genetic factors translate into political attitudes and orientations. Are they mediated by other individual attributes? Recent research on personality and politics provides some intriguing possibilities for how genes could influence interest in politics.

Related to the studies mentioned above are a series of studies that have explored the connection between individual personality traits and political interest. Denny and Doyle (2008) examine the link between a number of personality traits (measured when individuals were sixteen years old) and political interest later on in life. Their analysis, which uses data from a British sample, indicates that aggressiveness has a positive and significant effect on political interest and that rigidity has a negative and significant impact on interest. Blais and Labbé St-Vincent (2011) find that, in a Canadian sample, altruism has a positive and significant impact on political interest and that conflict avoidance has a negative and significant impact on interest. A number of recent studies on the relationship between personality and interest in politics have focused on the Big Five personality traits, which are Openness, Conscientiousness, Extraversion, Agreeableness, and Neuroticism (or Emotional Stability). Using data from a US sample, Gerber, Huber, Doherty, and Dowling (2011) find that Conscientiousness, Openness, Extraversion, and Emotional Stability have positive and statistically significant effects on interest in politics. Gallego and Oberski (2012) find a positive and significant relationship between Openness and political interest in a Spanish sample. Mondak (2010) finds that Openness has a positive and significant effect on interest in politics and that Agreeableness has a negative and significant impact.

Given the research outlined above, we believe it is important and worthwhile to expand the study of individual differences and political orientations. In this paper, we are interested in the connection between genes, personality traits, and political interest. As we noted above, previous studies have illustrated that political interest is partially heritable. However, existing studies are only just starting to provide insight into the *mechanisms* that link genes and political attitudes. As previous research (Dawes et al. 2014; Ksiazkiewicz, Ludeke, and Krueger 2016; Mondak et al. 2010; Oskarsson et al. 2015) has suggested, personality traits may be a plausible link between genes and political orientations and behaviors. It is worth noting that a variety of studies in psychology and behavior genetics have confirmed that personality traits (especially the Big Five traits) are genetically heritable (Bouchard 1994, 2004; Loehlin, McCrae, and Costa 1998; McCrae and Costa 2003; Jang, Livesley, and Vernon 1996; Riemann, Angleitner, and Strelau 1997; Stelmack 1991; Vernon et al. 2008).[2] Thus, personality traits may mediate genetic influences on political interest. To our knowledge, only one study has analyzed genetic factors, personality traits, and political interest *simultaneously*. Dawes et al. (2014) examine the relationship between genes, three psychological traits (cognitive ability, extraversion, and self-efficacy), and political interest. They find that the genetic correlations between political interest and all three psychological traits are statistically significant. Interestingly, genetic factors account for at least

50 percent of the total correlation between the traits and political interest.

We build on the research by Dawes et al. (2014) by examining the genetic overlap between personality traits and political interest. We focus on the connection between genes, the Big Five traits, and political interest. While Dawes et al. (2014) examined one of the Big Five traits (Extraversion), we believe it is important to consider the other four traits as well. As Dawes et al. (2014, 900) note ". . . our findings suggest that future work must consider other potential mediators." The Big Five traits represent an important starting point for examining the relationship between genes, personality, and political behaviors and orientations. In brief, "The Big-Five framework suggests that most individual differences in human personality can be classified into five broad, empirically derived domains" (Gosling, Rentfrow, and Swann 2003, 506). The Big Five are among the most widely researched personality traits within the field of psychology and, as John and Srivastava (1999) note, "After decades of research, the field is approaching consensus on a general taxonomy of personality traits, the 'Big Five' personality dimensions."

Gerber, Huber, Doherty, and Dowling (2011) provide theoretical expectations for how each of the Big Five traits could influence political interest. Extraversion should be positively related to political interest given that extraverts are likely to experience social benefits or returns by being attentive to politics (e.g., being able to talk about politics and issues in social settings). As Gerber, Huber, Doherty, and Dowling (2011, 38) note, political information has a "social usefulness." Extraverts also tend to be assertive and may like acquiring information that enables them to assert their ideas and beliefs. Openness should be positively related to political interest as well. Those with high scores on this trait should enjoy the exchange of ideas that happens in politics. Neuroticism should be negatively connected to political interest. Those who are less emotionally stable (have higher scores on Neuroticism) tend to experience high levels of anxiety and may avoid politics because they find exposure to conflict to be something that induces anxiety or is upsetting. Conscientiousness should be positively associated with interest in politics. Those with high scores on this trait tend to be dutiful and like to adhere to social norms. If being interested in politics is viewed as something that is a norm or obligation, Conscientious individuals should report higher levels of interest than their counterparts. Finally, Agreeableness should be negatively associated with interest in politics. Agreeable people tend to dislike conflict and prefer cooperation. Conflict is inherent in politics, so being attentive to politics may not appeal to those with high scores on Agreeableness.

Given previous research on the link between the Big Five traits and political interest (and strong theoretical expectations about how each trait will be related to interest), the heritability of personality traits, and the heritability of political interest, we are interested in determining whether there is genetic overlap between personality traits and political interest. After discussing our data and measures, our analysis proceeds as follows: (1) we replicate previous analyses showing that political interest and the Big Five personality traits are heritable, (2) we demonstrate that personality traits are related to interest, and (3) we estimate the extent to which genetic factors account for the correlation between personality traits and political interest.

## Data and Measures

### Samples

*Midlife Development in the United States (MIDUS) Study.* The first dataset used in this study comes from the National Survey of MIDUS.[3] The MIDUS survey was conducted in 1995–1996. The baseline MIDUS study is based on data from four subsamples, which include a national random digit dialing (RDD) sample, oversamples from five metropolitan areas, a sample of siblings of individuals from the RDD sample, and a national RDD sample of twin pairs.[4] In this paper, we rely on the data from the sample of twin pairs. Twin pairs were recruited in a two-part sampling design. The first part of the design involved screening a representative national sample of approximately fifty thousand households for the presence of a twin. Those who reported the presence of a twin in the family were then asked whether it would be acceptable for the research team to contact the twins to solicit their participation in the MIDUS study (60% gave permission to contact). All respondents were invited to participate in a phone interview and to complete two self-administered surveys. The twin subsample was administered a short screening survey to assess zygosity and additional twin-specific information.[5]

*Minnesota Twins Political Survey data.* The Minnesota Twins Political Survey is a recent dataset that was collected based on a sample of twins from the Minnesota Twin Family Registry.[6] The registry contains eight thousand pairs of twins born between 1936 and 1955 in Minnesota. The Minnesota Twins Political Survey data were collected using a web survey in 2008, followed by a paper-and-pencil survey in 2009 collected with support from the National Science Foundation Grant SES-0721378 (John R. Hibbing, Principal Investigator).

### Measures

*MIDUS Study measures.* To measure political interest in the MIDUS Study, we use the following question: Here is

a list of hypothetical situations. Please rate how much obligation you would feel if they happened to you, using a 0 to 10 scale where 0 means *no obligation at all* and 10 means *a very great obligation*. If the situation does not apply to you, please think about how much obligation you would feel if you were in this situation: *To keep fully informed about national news and public issues*. The response to this question is coded on an 11-point scale ranging from 0 = *no obligation at all* to 10 = *a very great obligation*. The MIDUS study included very little political content, so this is the only measure of political interest available in the dataset. We note that this is not a standard measure of political interest (it does not explicitly mention politics and also asks about obligation, which is not the standard question wording), but we believe that it is worth investigating as it still gets at attentiveness to public issues.[7]

To measure the Big Five personality traits, we make use of a series of adjective-based ratings. The use of adjectives is widely viewed as a valid and reliable way of measuring individual personality traits (Gosling, Rentfrow, and Swann 2003; John and Srivastava 1999). Respondents in the MIDUS study were asked to rate themselves on thirty different adjectives. Each of the questions asked respondents to "Please indicate how well each of the following describes you," with the response categories being *a lot*, *some*, *little*, and *not at all*. The adjectives were as follows: for Extraversion (outgoing, friendly, lively, active, talkative, dominant, self-confident, assertive, forceful, and outspoken), for Emotional Stability (moody, worrying, nervous, and calm), for Openness (creative, imaginative, intelligent, curious, broad-minded, sophisticated, and adventurous), for Conscientiousness (organized, responsible, hardworking, and careless), and for Agreeableness (helpful, warm, caring, softhearted, and sympathetic). All of the adjectives were scaled so that higher values corresponded to higher levels of the Big Five trait they were designed to capture. For each Big Five trait, the corresponding measures were summed, and then each of the five overall personality measures was divided by its maximum possible value so that the variables range from 0 to 1. The personality measures are fairly reliable, with Cronbach's alpha scores as follows: 0.85 (Extraversion), 0.81 (Agreeableness), 0.58 (Conscientiousness), 0.75 (Emotional Stability), and 0.78 (Openness).

*Minnesota Study measures.* To measure political interest in the Minnesota Study, we make use of the following question: "How interested are you in politics and public affairs?" Possible responses were as follows: *very interested*, *somewhat interested*, *not too interested*, or *not at all interested*. This is a standard measure of political interest and has been used in many previous studies.

To measure the Big Five traits, we make use of the Big Five Inventory (BFI), which is described in detail by John, Donahue, and Kentle (1991).[8] The BFI asks respondents to determine how well a variety of different descriptions apply to them. There are forty-four different items included in the BFI. For example, one of the items used to measure Extraversion is "I see myself as someone who is talkative." For each of the forty-four items, the response categories were as follows: *disagree strongly*, *disagree a little*, *neither agree nor disagree*, *agree a little*, *agree strongly*. The overall Big Five measures are created by averaging the items for each Big Five domain. The BFI measures are fairly reliable, with Cronbach's alpha scores as follows: 0.87 (Extraversion), 0.76 (Agreeableness), 0.75 (Conscientiousness), 0.83 (Emotional Stability), and 0.83 (Openness).

## Analysis and Results

Our analysis is comprised of two steps. First, we estimate univariate twin models to determine how much of the variation in political interest and the Big Five personality traits can be attributed to genetic and environmental factors. A twin study leverages the fact that monozygotic (MZ) twins share 100 percent of their genes while dizygotic (DZ) twins share on average 50 percent of their genes. By comparing the trait similarity among MZ twin pairs with that of DZ twin pairs, we can obtain an estimate of the degree to which genes influence that trait.[9] More formally, the univariate twin model assumes that the *variance* in an observed trait can be partitioned into additive genetic factors (A), environmental factors that are shared or common to cotwins (C), and unique environmental factors (E). This is the so-called ACE model.[10] Common environment includes the family environment in which both twins were raised and any other factor to which both twins were equally exposed. In contrast, the unique environment includes influences that are experienced individually. The role of genes or environment is not measured directly but its influence is inferred via its effect on the covariances of twin siblings (Neale and Cardon 1992).[11]

Second, to estimate how much of the *covariation* between interest and each of the personality traits we study can be attributed to the same genetic source, we use a Cholesky decomposition model (Martin and Eaves 1977). The Cholesky model assumes that the latent factors underlying personality also influence interest in politics but that the latent factors underlying interest in politics do not affect personality.[12] The parameter estimates generated by this bivariate model can be used to construct quantities of interest. The genetic correlation quantifies the degree to which the genetic endowment of two traits covaries. A correlation of 0 means that the two

**Table 1.** Summary Statistics Broken Out by Zygosity and Gender.

| | MZ twins | | | | DZ twins | | | |
|---|---|---|---|---|---|---|---|---|
| | Male | | Female | | Male | | Female | |
| | *M* | *SD* | *M* | *SD* | *M* | *SD* | *M* | *SD* |
| MIDUS | | | | | | | | |
| Interest | 7.05 | 2.36 | 6.96 | 2.51 | 7.29 | 2.39 | 6.95 | 2.52 |
| Extraversion | 0.73 | 0.14 | 0.73 | 0.14 | 0.76 | 0.13 | 0.72 | 0.13 |
| Agreeableness | 0.85 | 0.12 | 0.90 | 0.10 | 0.85 | 0.12 | 0.91 | 0.10 |
| Conscientiousness | 0.84 | 0.11 | 0.89 | 0.10 | 0.85 | 0.10 | 0.87 | 0.11 |
| Emotional Stability | 0.71 | 0.18 | 0.68 | 0.17 | 0.70 | 0.15 | 0.68 | 0.16 |
| Openness | 0.74 | 0.13 | 0.75 | 0.13 | 0.76 | 0.12 | 0.73 | 0.13 |
| *n* | 160 | | 258 | | 260 | | 296 | |
| Minnesota | | | | | | | | |
| Interest | 3.13 | 0.75 | 3.07 | 0.70 | 3.15 | 0.72 | 3.02 | 0.67 |
| Extraversion | 3.86 | 0.84 | 3.93 | 0.87 | 3.87 | 0.84 | 3.98 | 0.86 |
| Agreeableness | 4.61 | 0.54 | 4.79 | 0.56 | 4.61 | 0.53 | 4.84 | 0.50 |
| Conscientiousness | 4.68 | 0.55 | 4.76 | 0.58 | 4.70 | 0.59 | 4.80 | 0.54 |
| Openness | 4.22 | 0.65 | 4.24 | 0.70 | 4.31 | 0.67 | 4.25 | 0.70 |
| Emotional Stability | 3.89 | 0.81 | 3.70 | 0.78 | 3.95 | 0.75 | 3.76 | 0.81 |
| *n* | 298 | | 178 | | 452 | | 354 | |

MZ = monozygotic; DZ = dizygotic; MIDUS = National Survey of Midlife Development in the United States; Minnesota = Minnesota Twins Political Survey.

traits are influenced by completely different genes, and a correlation of 1 (or −1) means the same genes influence both traits. Another meaningful quantity is the percentage of the phenotypic correlation between two traits that can be explained by additive genetic factors.[13]

All of our analyses are based on complete same-sex twin pairs reared together with nonmissing responses for political interest and the Big Five personality traits. All measures are residualized of age and gender.[14] Summary statistics for the two samples, broken out by zygosity and gender, are provided in Table 1.

The univariate estimates of heritability and unique environment for the two samples are shown in Table 2. The heritability estimate for the measure of political interest in the MIDUS sample is 0.24, and the measure in the Minnesota sample is 0.36. Both estimates are significantly different from zero at the 5 percent level. Both estimates are lower than Dawes et al. (2014), Klemmensen et al. (2012), and Bell, Schermer, and Vernon (2009) based on Swedish, Danish, and Canadian twins, respectively, but very close to Klemmensen et al. (2012) and Arceneaux, Johnson, and Maes (2012) based on the same US sample of Minnesota twins. The point estimates for common environment are at or near zero for both measures of interest, and neither of the estimates is significantly different from zero. This is also consistent with earlier studies (Arceneaux, Johnson, and Maes 2012; Bell, Schermer, and Vernon 2009; Dawes et al. 2014; Klemmensen et al. 2012).[15]

All five of the Big Five personality traits are significant in the Minnesota sample, and the estimates range from 0.30 to 0.50. Four of the Big Five personality traits are significant in the MIDUS sample (the estimate for Agreeableness is not significant), and estimates range from 0.37 to 0.49. These estimates are in line with earlier twin studies of the Big Five personality traits (Jang, Livesley, and Vernon 1996; Loehlin, McCrae, and Costa 1998; Riemann, Angleitner, and Strelau 1997; Vernon et al. 2008). The point estimates for common environment are zero for all of the Big Five traits. This is also consistent with earlier work. Loehlin, McCrae, and Costa (1998), Jang, Livesley, and Vernon (1996), and Riemann, Angleitner, and Strelau (1997) all report common environment estimates of zero for all Big Five personality traits, whereas Vernon et al. (2008) report nonzero estimates for Extraversion (0.07) and Agreeableness (0.04) but both are statistically indistinguishable from zero.[16] In addition, Funk et al. (2013) find that common environment explains none of the variation in Big Five personality traits based on the same Minnesota sample that we analyze as part of this study.

The second step of our analysis quantifies the amount of the covariation between interest and each of the personality traits that can be attributed to a common genetic source. As a starting point, Table 3 presents the correlations between interest and the Big Five personality traits in the MIDUS and Minnesota samples. The correlations are small to moderate, ranging from 0.03 to 0.30 in absolute value. It is

**Table 2.** Heritability Estimates for Political Interest and Each of the Big Five Personality Traits.

| | MIDUS | | | Minnesota | | |
|---|---|---|---|---|---|---|
| | $h^2$ | $c^2$ | $e^2$ | $h^2$ | $c^2$ | $e^2$ |
| Interest | 0.24 | 0.00 | 0.76 | 0.36 | 0.03 | 0.61 |
| | [0.03, 0.34] | [0.00, 0.16] | [0.66, 0.87] | [0.06, 0.47] | [0.00, 0.29] | [0.53, 0.70] |
| Extraversion | 0.45 | 0.00 | 0.55 | 0.50 | 0.00 | 0.50 |
| | [0.18, 0.53] | [0.00, 0.23] | [0.47, 0.65] | [0.33, 0.57] | [0.00, 0.14] | [0.43, 0.58] |
| Agreeableness | 0.22 | 0.00 | 0.78 | 0.30 | 0.00 | 0.70 |
| | [0.00, 0.32] | [0.00, 0.20] | [0.68, 0.88] | [0.07, 0.38] | [0.00, 0.19] | [0.62, 0.79] |
| Conscientiousness | 0.39 | 0.00 | 0.55 | 0.32 | 0.00 | 0.68 |
| | [0.16, 0.48] | [0.00, 0.21] | [0.47, 0.65] | [0.06, 0.41] | [0.00, 0.22] | [0.59, 0.77] |
| Openness | 0.37 | 0.00 | 0.63 | 0.50 | 0.00 | 0.50 |
| | [0.09, 0.46] | [0.00, 0.19] | [0.54, 0.73] | [0.38, 0.57] | [0.00, 0.09] | [0.43, 0.59] |
| Emotional Stability | 0.49 | 0.00 | 0.51 | 0.37 | 0.00 | 0.63 |
| | [0.26, 0.56] | [0.00, 0.20] | [0.44, 0.59] | [0.12, 0.46] | [0.00, 0.22] | [0.54, 0.72] |

Parameter estimates and 95% confidence intervals in brackets are shown for a univariate ACE model. MIDUS = National Survey of Midlife Development in the United States; Minnesota = Minnesota Twins Political Survey.

**Table 3.** Phenotypic Correlations between Each Personality Trait and Political Interest.

| | MIDUS | Minnesota |
|---|---|---|
| Extraversion | 0.23 | 0.17 |
| | [0.17, 0.28] | [0.12, 0.22] |
| Conscientiousness | 0.18 | 0.04 |
| | [0.12, 0.24] | [−0.02, 0.09] |
| Agreeableness | 0.16 | 0.03 |
| | [0.09, 0.22] | [−0.02, 0.09] |
| Openness | 0.30 | 0.26 |
| | [0.24, 0.35] | [0.21, 0.31] |
| Emotional Stability | 0.12 | 0.07 |
| | [0.05, 0.18] | [0.01, 0.12] |

The 95% confidence intervals are in brackets. MIDUS = National Survey of Midlife Development in the United States; Minnesota = Minnesota Twins Political Survey.

worth noting that in both samples, the largest correlation is between Openness and political interest. This finding is consistent with Gerber, Huber, Doherty, and Dowling (2011), who report that of the Big Five traits, Openness has the largest effect on interest in politics.

Because the correlations for Conscientiousness, Agreeableness, and Emotional Stability are small in magnitude, making it difficult to decompose their covariance without a very large sample, we exclude them from the bivariate analysis of the Minnesota sample. Also, based on the insignificant heritability estimate in the univariate model, we exclude Agreeableness from bivariate analysis of the MIDUS sample. Finally, as the common environment point estimates for political interest and personality traits are at or close to zero and insignificant in the univariate models, we estimate a bivariate model assuming that the common environment correlation is zero. However, we also present the results for the unrestricted models in the online appendix available with the manuscript on the PRQ website.[17]

The genetic and environmental correlations and the percentage of the total correlation due to genetic and environmental factors are presented in the top and bottom panel of Table 4, respectively. The estimates are also graphically illustrated in Figure 1. All four of the genetic correlations are significant. Based on the MIDUS sample, genetic factors make up 66 percent of the correlation between Extraversion and political interest.[18] Genetic factors also account for 72 percent of the correlation between Emotional Stability and interest in the MIDUS sample. Just more than half of the correlation between Openness and political interest can be attributed to genetic factors in both samples.

These results suggest that common genes account for a majority of the correlation between political interest and personality. However, it is important to point out that the phenotypic correlations listed in Table 3 suggest personality traits, and, thus, genetic factors related to them, only explain part of the variation in political interest. Based on the results in Table 2 and Table 4, the correlations between political interest and Big Five personality traits that can be attributed to genetic factors are 0.09 for Conscientiousness and Emotional stability, 0.17 for Openness, and 0.15 for Extraversion in the MIDUS sample, and, in the Minnesota sample, the correlations are 0.07 for Extraversion and 0.15 for Openness.[19] In the MIDUS sample, this implies that genetic factors related to Openness account for 2.89 percent of the variation in political interest (squaring the correlation that can be attributed to genetic factors). In the Minnesota sample,

**Table 4.** Top Panel: Genetic ($r_g$) and Unique Environmental ($r_e$) Correlation and 95% CIs from a Bivariate Cholesky AE Model of Political Interest, with Each of the Big Five Personality Traits. Bottom Panel: Percentage of Total Correlation due to Genetic and Unique Environmental Correlation and 95% CIs from a Bivariate Cholesky AE Model of Political Interest with Each of the Big 5 Personality Traits.

| | MIDUS | | Minnesota | |
|---|---|---|---|---|
| | $r_g$ | $r_e$ | $r_g$ | $r_e$ |
| Extraversion | 0.46 [0.23, 1.00] | 0.12 [0.02, 0.23] | 0.16 [0.00, 0.38] | 0.19 [0.09, 0.29] |
| Conscientiousness | 0.29 [0.04, 1.00] | 0.14 [0.03, 0.24] | | |
| Openness | 0.58 [0.33, 1.00] | 0.19 [0.08, 0.29] | 0.35 [0.20, 0.62] | 0.20 [0.11, 0.30] |
| Emotional Stability | 0.26 [0.03, 1.00] | 0.05 [−0.06, 0.16] | | |
| | $\%r_g$ | $\%r_e$ | $\%r_g$ | $\%r_e$ |
| Extraversion | 0.66 [0.35, 0.95] | 0.34 [0.05, 0.65] | 0.41 [0.00, 0.71] | 0.59 [0.29, 1.00] |
| Conscientiousness | 0.49 [0.07, 0.87] | 0.51 [0.13, 0.93] | | |
| Openness | 0.56 [0.31, 0.80] | 0.44 [0.20, 0.69] | 0.58 [0.35, 0.78] | 0.42 [0.22, 0.65] |
| Emotional Stability | 0.72 [0.11, 1.42] | 0.28 [−0.42, 0.89] | | |

CI = confidence interval; MIDUS = National Survey of Midlife Development in the United States; Minnesota = Minnesota Twins Political Survey.

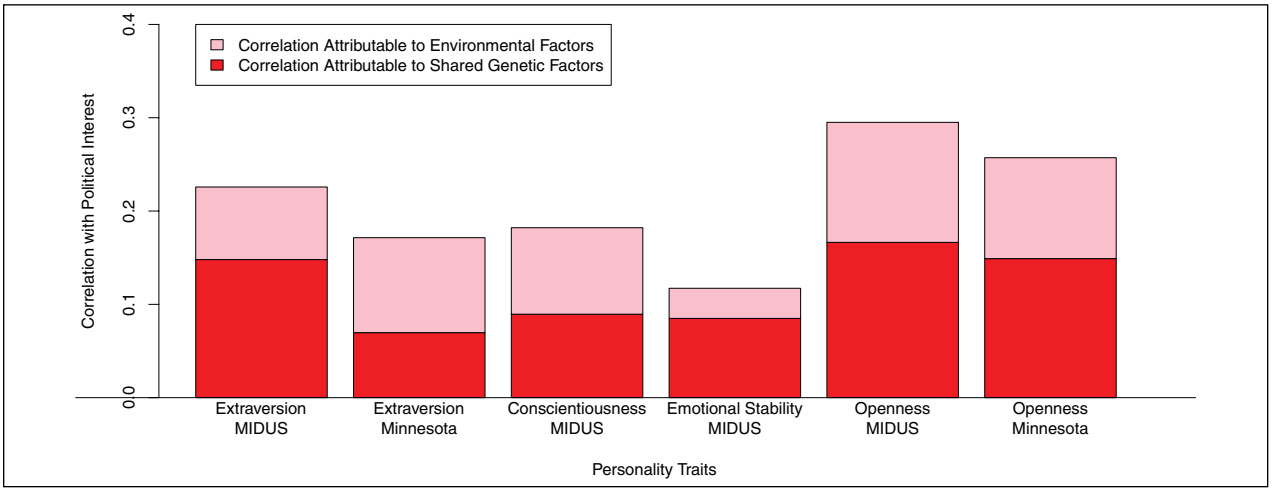


**Figure 1.** Correlations between political interest and personality traits.
The overall height of the bar is the total correlation, the dark portion is the genetic component, and the light portion is environmental component. MIDUS = National Survey of Midlife Development in the United States; Minnesota = Minnesota Twins Political Survey.

genetic factors related to Openness account for 2.21 percent of the variation in political interest.[20] To put our results in context, two recent studies of electoral competition accounted for approximately 7 to 8 percent of the variation in political interest (Flavin and Shufeldt 2015; Gimpel, Kaufmann, and Pearson-Merkowitz 2007).

## Study Limitations

There are several limitations to our study. A significant genetic correlation could be interpreted as evidence of personality traits *mediating* the relationship between genes and political interest (Mondak 2010). This would imply a causal ordering. However, alternatively, personality traits

and interest may share the same underlying genetic mechanism but not share a causal relationship (Posthuma et al. 2003). The latter scenario, known as *pleiotropy*, implies that genetic factors are a confounder. The Cholesky model does not allow us to adjudicate between different types of possible relationships. Scholars are currently working to develop a better understanding of the direction of causality when it comes to genes, personality, and political traits (Dawes et al. 2014; Hatemi and Verhulst 2015; Oskarsson et al. 2015; Verhulst, Eaves, and Hatemi 2012). Verhulst, Eaves, and Hatemi (2012), using a so-called direction of causation (DoC) model, tested whether personality traits causally influence political attitudes. The authors found that personality traits did not cause political attitudes in any of the cases they studied. Instead, they reported evidence of pleiotropy, reverse causality, and reciprocal causation. Dawes et al. (2014) also used a DoC model to test the relationship between personality traits and several political behaviors and predispositions. Their results based on the DoC model suggest a pleiotropic relationship between personality traits and interest in politics. However, Dawes et al. (2014) do not measure the Big Five and are, therefore, unable to examine the direction of causality between the Big Five traits and political interest.[21] Ultimately, we believe that additional datasets are necessary to get a better handle on the causal ordering. We especially encourage the collection of longitudinal datasets so that questions about causality can be examined with more sophisticated datasets and additional measures.

In addition, although we have applied standard methodology, it is well known that the assumptions needed for the twin models we employ to be identified are quite strong, especially the equal environments assumption. A violation of the equal environments assumption leads to an upward bias in heritability and a downward bias in common environment estimates. In the future, we suggest the use of samples that incorporate other sibling types and pedigrees to evaluate some of the moment restrictions assumptions in the twin model. A variety of new analytical tools have also recently been developed that rely on direct measures of genetic relatedness, and, thus, do not rely on the equal environments assumption, to estimate heritability (Visscher, Yang, and Goddard 2010; Yang et al. 2010; Yang et al. 2011).

We should also note that a number of recent studies (Ludeke and Carey 2015; Ludeke, Tagar, and DeYoung 2016; Ludeke, Weisberg, and DeYoung 2013) have pointed out that some personality traits may be viewed as desirable, which could lead people to report exaggerated levels of those traits.[22] To assess the possibility that measures of the personality traits we study here are correlated due to patterns of socially desirable responding, we regress political interest on all five traits with age and gender controls.[23] The results of the regression models for the MIDUS and Minnesota samples are included in the Online Appendix Table 5. Overall, we find that in the Minnesota sample, both Extraversion and Openness remain statistically significant ($p < .05$) when examined in a multivariate model. In the MIDUS sample, Openness and Conscientiousness are statistically significant ($p < .05$), as they were in the bivariate correlations presented in Table 3. We do find, however, that the significance level for Extraversion (which correlates with Openness at .59 in the MIDUS dataset) drops to $p = .20$ in the multivariate regression, and the significance level for Emotional Stability (which had the weakest relationship with political interest in the MIDUS dataset) drops to $p = .22$ in the multivariate regression.[24] We note that Extraversion and Emotional Stability are signed as anticipated, both showing a positive relationship with political interest. These results suggest that we should be most confident that the relationship between Openness and political interest is not inflated by socially desirable responses. At this point, the results for the other traits in the MIDUS dataset should be taken as suggestive, with additional research and replication being necessary to understand the nature of the relationship between these traits and political interest.

## Discussion and Future Research

Our primary contribution in this paper is to clarify the relationship between personality and political interest. Political behavior scholars have made the important finding that personality traits are related to participation and orientations (Gerber, Huber, Doherty, Dowling, Raso, and Ha 2011; Mondak 2010; Mondak et al. 2010). However, most previous studies in political science have focused on connections between personality and political variables, and have not examined whether and how genes play a role (Gerber, Huber, Doherty, Dowling, Raso, and Ha 2011; Mondak 2010; Mondak et al. 2010). Indeed, most previous studies on personality traits and political behavior conducted by political scientists have used datasets that do not permit the estimation of the extent to which personality and political traits are heritable or the measurement of the amount of genetic overlap between personality and political attributes. By using datasets that contain samples of twins, measures of personality, and measures of political interest, we have started to fill in some of the missing pieces from previous studies (although, as we note below, much more work needs to be done to build on our findings). Indeed, while Mondak et al. (2010) developed a conceptual model suggesting that biological factors may be important to political attitudes and behaviors (especially through personality attributes), they did not empirically test whether genetic *and* personality factors shape political traits. We have provided insights into how biological and

psychological factors shape political interest. We found that genetic factors account for a fairly large proportion of the correlation between political interest and four of the Big Five personality traits. Our results suggest that most of the relationship between personality and political interest can be explained by the same set of genes.

Our findings are important because they shed light on the origins of a political orientation that has been central in many theoretical and empirical accounts of political behavior for decades. Amazingly, despite the explanatory power of political interest in political behavior models, scholars have little understanding of why people have different levels of interest in politics. Given previous studies on political socialization, which have indicated that many political attitudes and behaviors such as partisanship and voter turnout are heavily influenced by one's family environment while growing up, one might expect that political interest would be heavily influenced by parental socialization. A close reading of the socialization literature, however, reveals that variables related to parental socialization do not account for a large amount of the variation in political interest, at least not in the US context. In fact, some of the variables that might be expected to predict political interest, such as parental political interest, parental education, and family income, are not statistically significant (Jennings, Stoker, and Bowers 2009, 792). This begs the question of where political interest comes from. Our results add to the growing body of literature suggesting that deeply rooted predispositions influence political orientations (see recent reviews by Hatemi et al. [2011]; Hatemi and McDermott [2012]; Hatemi, Byrne, and McDermott [2012]). Although it may be tempting to interpret our results as evidence that people are "programmed" to be interested (or not) in politics, we would caution against such an interpretation. Biological and psychological factors are rarely determinative. Instead, our results indicate that people's biological and psychological traits can predispose them toward particular political orientations.

Prior (2010, 747) has noted,

> In light of the strong relationship between political interest and citizen involvement it is tempting to prescribe a boost in political interest as a way to improve democratic governance through a more informed public, higher rates of participation, and greater political equality. Yet political science could provide little guidance for such an effort. We do not understand where political interest comes from and could thus not recommend how to increase it.

Although the primary goal of this paper was to provide a more complete understanding of the etiology of political interest, elements of our findings may have implications for those interested in enhancing levels of political interest among individuals. Many civic organizations have tried or are trying to increase citizens' (especially young peoples') levels of political interest and engagement and are working to develop interventions designed to do so.[25] One implication of our results is that interventions designed to enhance political interest may have different effects on people depending on their deep-seated predispositions. Although scholars (Settle et al., forthcoming) have demonstrated that it is possible to measure the extent to which genetic factors moderate political interventions, a more practical starting point for those interested in understanding how people react to interventions designed to increase political interest is to consider personality, which can be easily measured using surveys.[26] While an intervention may increase political interest for individuals with a particular personality trait or set of traits, it may not work at all (or may have a negative effect) for individuals with a different personality trait or set of traits. Do some traits make people more open (or resistant) to efforts at persuasion? Studies in political science are just beginning to examine the extent to which psychological and biological predispositions shape receptivity to political interventions and messages (Gerber et al. 2013; Settle et al., forthcoming; Weinschenk and Panagopoulos 2014), although preliminary results indicate that some personality and genetic predispositions strongly influence responsiveness to voter mobilization efforts and political advertisements. A recent analysis provides some insight into interventions that could be effective at increasing attention to and participation in politics. Gerber et al. (2013) tested whether the Big Five personality traits moderate the effect of different appeals designed to increase voter turnout. One of their mobilization messages was particularly effective at increasing voter turnout among those with high scores on Openness. More specifically, one of their mobilization postcards contained information on the instrumental benefits of voting.[27] As Gerber et al. (2013, 695) note, "Variation in personality traits may affect how people respond to the prospect of failing to take advantage of an opportunity to be pivotal in determining an election outcome." Although Gerber et al. (2013) focus on voter turnout as their dependent variable, it would be worthwhile to examine whether such mobilization messages also interact with personality traits to influence political orientations such as political interest. It is possible that messages such as the one explored by Gerber et al. (2013) influence voter turnout and orientations such as political interest or that they influence voter turnout by increasing political interest, which has been shown to be an important antecedent of voter turnout. Examining the extent to which different messages and interventions interact with deeply rooted predispositions to influence behaviors and political orientations will be an important next step for researchers. It

would be useful to start by examining the interaction between previous messages and interventions, such as those examined by Gerber et al. (2013), and personality traits and predispositions, but scholars should also develop and test new messages and interventions that could theoretically affect orientations of interest. Overall, our results indicate that people do not come into the political arena as "blank slates." Instead, people have different predispositions (some are biologically based) that may shape how they react to politics, messages, events, or interventions. We strongly encourage future research on the extent to which individual differences influence receptivity to interventions and messages that are aimed at increasing political interest or other political orientations, such as efficacy, civic duty, or trust.

We believe that one important step for future researchers is to consider more complicated models where biological and psychological predispositions interact with environmental factors to shape political behavior. Indeed, in the theoretical model of political behavior developed by Mondak et al. (2010), they note that the effects of predispositions on political behavior may be shaped by contextual variables. In this study, we have focused on biological and psychological factors, but future scholars could build on this study by examining whether and how contextual factors (e.g., neighborhood context, state political environment, levels of political competition, etc.) play into the development of political interest.

Our results suggest a number of additional potential avenues for future research. In this paper, we focused on the Big Five traits, but it would be useful to consider the role of psychological traits that are not included in the Big Five model in shaping political interest (and also to consider whether those traits have genetic overlap with political interest). Psychological variables such as need to evaluate, need for cognition, conflict avoidance, and cognitive ability may be worth investigating in future studies. Unfortunately, such measures were not included in either of the datasets we used in this paper.

Future studies should also investigate the link between genes, personality traits, and other political orientations. In this paper, we focused on political interest, but there are other important political orientations that deserve study. We encourage other researchers to use this study as a guide for future investigations on the biological and psychological bases of political orientations. We should also note that we strongly encourage the collection of new datasets. Although we used two separate datasets to understand how biological and psychological factors shape political interest, we did face some data and measurement limitations. For example, the measures we used were not identical across studies. We also only had measures of the Big Five personality traits, but there are certainly other psychological traits worth investigating. In the future, it would be useful to collect additional datasets, which could be used to replicate existing studies, including this one, but could also be used to test new hypotheses altogether.

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## Notes

1. Indeed, Gimpel, Kaufmann, and Pearson-Merkowitz (2007) develop a model of political interest that includes a variety of demographic variables and the model fit ($R^2$) is .10.
2. See the Online Appendix Table 3 available with the manuscript on the PRQ website for a summary of four recent twin studies of the heritability of Big Five personality traits.
3. The study was conducted by the MacArthur Foundation Research Network on Successful Midlife Development.
4. In all of the subsamples, all eligible participants were non-institutionalized, English-speaking adults in the coterminous United States, aged twenty-five to seventy-four.
5. For the twin subsample, the response rate for the phone survey was 60 percent and 92 percent for the self-administered surveys. Additional details about the National Survey of Midlife Development in the United States (MIDUS) Study are available at the following website: http://www.midus.wisc.edu/midus1/index.php.
6. The data employed in this project were collected with the financial support of the National Science Foundation in the form of SES-0721378, Principal Investigator (PI): John R. Hibbing; Co-PIs: John R. Alford, Lindon J. Eaves, Carolyn L. Funk, Peter K. Hatemi, and Kevin B. Smith, and with the cooperation of the Minnesota Twin Registry at the University of Minnesota, Robert Krueger and Matthew McGue, directors. We thank Hibbing et al. for making the data publicly available.
7. There is a concern that the MIDUS measure we use ("How much obligation would you feel to keep fully informed about news and public issues") fails to capture interest in politics. It may be the case that citizens feel obligated to watch the news but do not care about political stories. As a consequence, this could inflate our reported correlation between conscientiousness and being informed because conscientious individuals possibly feel an overall obligation to do things consistent with being a good citizen such as being informed about news and public issues. We thank an anonymous reviewer for bringing this possible concern to our attention. In an attempt to validate whether the MIDUS measure captures, at least in part, an interest in politics, we sought a dataset that contained a question similar to the one

asked in MIDUS as well as a more standard measure of political interest. The Youth Development Study (the items we use are in Part 18, G2, Wave 16, which was conducted in the year 2005) asked the question, "Living in a community involves both rights and obligations. Please rate the importance of the following activities: Keeping yourself informed about public issues/news," as well as the more traditional political interest item, "Please indicate below how much you agree or disagree with the following statements: I am interested in politics." In the study, the two items correlate at $r = .58$, $p < .00$ ($N = 747$). While there is not perfect overlap, this suggests that the MIDUS question is a fairly good measure of interest in politics. We note that although these items are worded in fairly different ways and it would be preferable if they were more strongly correlated, we believe that each is still worth analyzing. When possible, it is important to use multiple datasets to examine hypotheses. Future researchers interested in studying genes, personality, and political interest should consider asking a battery of different political interest items in surveys so that it is possible to calculate reliability scores and construct indices that capture political interest (and hopefully reduce measurement error). It would also be desirable to conduct replications of this study in other time periods, contexts, and countries.

8. See the following article for a copy of the survey instrument: pages.uoregon.edu/sanjay/pubs/bigfive.pdf.
9. Identification of the univariate twin model based on monozygotic (MZ) and dizygotic (DZ) twins reared together requires the so-called *Equal Environments Assumption* (EEA). A violation of the EEA leads to an upward bias in heritability and a downward bias in common environment estimates. Several recent studies attempting to test for upward bias in the heritability of political attitudes have failed to find evidence of an EEA violation (Hatemi et al. 2009; Hatemi et al. 2010; Littvay 2012; Smith et al. 2012). A more detailed discussion of the EEA is contained in the online appendix.
10. For a primer of biometric modeling geared for political scientists, see Medland and Hatemi (2009).
11. A more detailed description of the univariate model is presented in the online appendix.
12. A more detailed description of the bivariate model is presented in the online appendix.
13. We denote the genetic correlation as $r_g$, the common environment correlation as $r_c$, and the unique environment correlation as $r_e$ and the percentage of correlation accounted for by genetic factors as $\%r_g$, accounted for by common environment $\%r_c$, and by unique environment as $\%r_e$. By construction $\%r_g$, $\%r_c$, $\%r_e$ must sum to 1 but $r_g$, $r_c$, $r_e$ do not (necessarily) sum to 1. Formal derivations of each quantity are presented in the online appendix.
14. The twin models are estimated using the Mx software package (Neale et al. 2003).
15. Online Appendix Table 4 contains the estimates for each component of the ACE model for each of these studies. Across all of the studies, the common environment estimate is not significantly different from zero.
16. The heritability and environment estimates are provided in the Online Appendix Table 3.
17. Fit statistics comparing the restricted and unrestricted models are presented in the Online Appendix Table 2 and estimates from the unrestricted model are presented in the Online Appendix Table 1. In all cases, the common environment correlation is insignificant in the full model.
18. Based on different measures of political interest and extraversion, Dawes et al. (2014) found that 58 percent of the correlation between extraversion and interest could be attributed to genetic factors in a sample of Swedish twins.
19. The phenotypic correlation, $r = r_g\sqrt{h^2_{interest} \times h^2_{personality}} + r_c\sqrt{c^2_{interest} \times c^2_{personality}} + r_e\sqrt{e^2_{interest} \times e^2_{personality}}$. We compute $r_g\sqrt{h^2_{interest} \times h^2_{personality}}$ based on estimates from Table 2 and Table 4.
20. In the MIDUS sample, this accounts for 12 percent of the heritable variation (based on the heritability estimate of 0.24). In the Minnesota sample, this accounts for 6.13 percent of the heritable variation (based on the heritability estimate of 0.36).
21. In addition, the authors of that study are careful to point out a technical limitation associated with direction of causation (DoC) models that made it difficult to establish the true relationships behind directional hypotheses.
22. Ludeke, Tagar, and DeYoung (2016) test this using peer reports of personality. Unfortunately, the datasets we use in this paper only include self-reported measures of personality.
23. We thank an anonymous reviewer for suggesting this idea.
24. Correlation matrices for the Big Five traits for both samples are included in Online Appendix Table 6.
25. See, for example, http://www.civicyouth.org/PopUps/WorkingPapers/WP24Iyengar.pdf.
26. It is important to recall that personality traits are heritable, as we demonstrated earlier and as many studies in psychology have demonstrated. Studies have repeatedly shown that personality traits are remarkably stable over time—even among young people (McCrae and Costa 2003; McCrae and John 1992; Pullman, Raudsepp, and Allik 2006). Thus, those interested in designing interventions to enhance political interest would be much better served by thinking about the type of information that would resonate well with people who have particular personality traits rather than trying to alter personality traits.
27. The message on the postcard was as follows:

    In the last midterm election, Congressman Joe Courtney won the election in Connecticut's Second District by only 83 votes! This was an occasion where if a few more people voted, the outcome of the election could have been different. In other words, a different person could have been elected. One Connecticut voter was quoted as saying "I usually vote, but I stayed home for this election. It drives me crazy to think that my vote could have changed the outcome and I just sat at home! It's really frustrating and I feel pretty embarrassed."

## Supplemental Material

The datasets used in this paper are publicly available and can be downloaded at the following websites: http://www.midus.wisc.edu/data/ (National Survey of Midlife Development in the United States [MIDUS] dataset) and http://www.unl.edu/polphyslab/data (Minnesota Twins Political Survey). The authors will share all code necessary to replicate the analyses presented in the paper.

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