



Heritability in Political Interest and Efficacy across Cultures: Denmark and the United States

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Interest in politics is important for a host of political behaviors and beliefs. Yet little is known about where political interest comes from. Most studies exploring the source of political interest focus on parental influences, economic status, and opportunity. Here, we investigate an alternative source: genetic transmission. Using two twin samples, one drawn from Denmark and the other from USA, we find that there is a high degree of heritability in political interest. Furthermore, we show that interest in politics and political efficacy share the same underlying, latent genetic factor. These findings add to the growing body of literature that documents political behaviors and attitudes as not simply the result of socialization, but also as part of an individual's genetically informed disposition.

■ **Keywords:** political interest, political efficacy, heritability across cultures

Political interest (PI) refers to citizens' willingness to pay attention to politics at the possible expense of other endeavors (Lupia & Philpot, 2005) and is often described as an important part of a well-functioning democracy (Mansbridge, 1999; Van Deth & Elff, 2004). As such, political interest has proven to be crucial in explaining many politically important outcomes such as attitude formation (Druckman & Lupia, 2000), political participation (Krosnick & Milburn, 1990; Verba, Scholzman & Brady, 1995; Zaller, 1992), political sophistication (Delli Carpini & Keeter, 1996; Iyengar & Kinder, 1987), and political efficacy (Craig, Neimi, & Silver, 1990). In short, politically interested people are more likely to think that government will be responsive to their needs and, at least partly for that reason, to get involved in politics.

While a great deal of research has asserted the importance of PI, there is little understanding of where this interest comes from. The existing literature has largely focused on environmental experiences, and has relied on a series of works by M. Kent Jennings and others (Jennings & Niemi, 1968; Jennings, Stoker, & Bowers, 2009; Shapiro, 2004), who argue that learning to be politically interested is largely a result of parental socialization. However, other studies argue that preadult political socialization is not the sole determinant of adult political behavior. Rather, dispositions, beliefs, and values transmitted from parents

interact with the environmental influences and opportunities that individuals experience later in life to generate different levels of interest in politics (Verba et al., 1995). In addition to sociodemographic factors, important influences include exposure to the media, websites, and peer groups, as well as economic development at the country level (Lupia & Philpot, 2005; Prior, 2005). However, these studies, whether focused on adolescent socialization, economic and educational opportunity, or adult learning account for only a small proportion of the variance in PI across individuals.

A recent analysis of cross-national panel studies by Prior (2010) shows that PI is highly stable within persons, both in the short term and over long periods of time. However, to explain why 'people keep a steady interest over time' (Prior, 2010, p. 747), it is not sufficient to focus simply on socialization and the development of PI early in life. A burgeoning literature in political science has

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focused on biological differences as a potential source for individual differences in political traits. As a result, a wide range of political dispositions, beliefs, and behaviors have been found to be genetically influenced (Alford, Funk, & Hibbing, et al., 2005; Fowler, Baker, & Dawes, 2008, Hatemi et al., 2011; Sturgis et al., 2010). These studies suggest that political traits may be a part of one's core disposition and temperament, much like personality (cf. Bouchard, Lykken, McGue, Segal, & Tellegen, 1990; Verhulst, Hatemi, & Martin, 2010). But, to our knowledge, no studies have explored the genetic basis of PI in a similar manner. Thus, here we extend the literature by decomposing the variance in PI and estimate the share of covariance accounted for by genetic and environmental components.

Political interest is important to explicate because it is believed to have a causal role in the development of one of the most important prerequisites for individuals' inclination to get involved in democratic politics; that is, their sense of feeling efficacious, or the perception that the government will listen to their grievances and needs, and that they can influence what government does (Prior, 2010; Verba et al., 1995). Individuals with low PI tend to have lower political efficacy and are less inclined to participate in politics and to vote (Finkel, 1985; Verba, Burns, & Schlozman, 1997). Political participation is one of the foundations for a healthy democracy. Yet, the entire theory of the causal process between interest and efficacy is based upon the belief that both are socialized. Thus, exploring the nature of the covariance between PI and political efficacy, and whether it is due to environmental factors, or some shared, latent genetic predisposition, or some combination of both, will inform if this view is correct or if the causal theory should be altered.

Here, in this paper, we conduct a univariate behavioral-genetic study of PI and explore if individual differences in PI are due only to social or environmental factors, as assumed in the extant literature, or if individual variance in PI also part of individuals' dispositions, influenced by genetic factors. We also examine the nature of the covariation between PI and political efficacy, which is believed to be causally influenced by PI through environmental mechanisms. We do so by conducting a bivariate Cholesky decomposition to estimate the magnitude of the covariation between the latent genetic and environmental factors.

Of additional importance, most behavior genetics studies of political traits have focused on the US and Australia (Bouchard et al., 1990; Eaves, Eysenck, & Martin, 1989; Hatemi, Morley, Medland, Heath, & Martin, 2007). The populations in these countries share remarkably similar political cultures. Thus, it has yet to be demonstrated if within-population differences in political traits are similar across culturally and institutionally different populations. If PI is similarly genetically and environmentally influenced in highly diverse cultural contexts and

populations, the likelihood increases that the association is indeed a general phenomenon (cf. Przeworski & Teune, 1970). We address this lacuna through analyses of two recent twin samples, one from the United States and one from Denmark. These countries represent two very different political cultures in the Western world. Both countries are high-income developed democracies, but the US is a large and culturally heterogeneous society with comparatively high income dispersion. Denmark is a small and culturally homogenous society with one of the world's lowest levels of income inequality.

Method

Samples

Twins were recruited from two separate registries in Denmark and the USA. The Danish study was conducted by the Danish Twin Registry at the University of Southern Denmark, one of the oldest population-based twin registries in the world, which contains data on more than 75,000 twin pairs born in Denmark over the last 130 years (Skytthe, Kyvik, Holm, Vaupel, & Christensen, 2002). The sample used in this survey consists of 19 to 39-year-old twins who had previously participated in twin surveys (6,707 individuals). Mailed invitations to participate in this web-based survey were sent out on October 1, 2009, and the last respondent had completed the survey on February 16, 2010. Two reminder letters were sent to nonrespondents. The overall response rate was 54% ($N = 3,616$). The US population was recruited from the Minnesota Twin Study, detailed further in this special issue (for further details see Smith et al., 2012). The US study was originally conducted in July–December 2008, with a second follow up to increase the number of dizygotic twin pairs from July 13 to October 30, 2009. The complete sample consisted of twins aged from 55 to 65 years (2,013 individuals). The overall response rate was 67% ($N = 1,349$).

As Table 1 shows, the Danish dataset consists of 1,076 twin pairs, 440 monozygotic (MZ), 375 same-sex dizygotic (DZ) and 261 opposite-sex pairs; whereas the Minnesota dataset includes only same-sex twin pairs comprised of 348 MZ pairs and 231 DZ pairs. Zygosity was determined using similarity questions, a method which has been shown to provide at least 95% agreement with blood typing (Martin & Martin, 1975; Christensen et al., 2003). In both samples, women are slightly overrepresented. In the US sample, the age range is restricted to 55–65 years.

Measures

Political interest was measured by the sum scores of three Likert-type questions in the Danish survey ($\alpha = .80$). The first asked, 'How often do you follow politics in the news on television or on the radio or in the daily papers?' The second asked, 'How much interest do you generally have in what is going on in politics?' and finally, 'How important is politics in your life?' In the Minnesota sample, we relied

TABLE 1

Twin Samples by Zygosity, Sex, and Age

Zygosity	Female	Male	OS	Age
MZDK	283	157	-	30.1
DZDK	243	132	261	29.2
MZUS	209	139	-	57.7
DZUS	148	83	-	58.0

Note: OS= Opposite Sex; MZDK= Monozygotes Denmark; DZDK= Dizygotes Denmark; MZUS= Monozygotes United States; DZUS= Dizygotes United States

on two questions ($\alpha = .70$). The first was 'How interested are you in politics and public affairs?' and the second 'How often do you have discussions about politics with others?'

Political efficacy, also an additive score of Likert-type scales, was measured in the Danish study by two items: 'People like me have no influence on what the government does' and 'The government does not care about what people like me think' ($\alpha = .88$). The Danish survey also included two additional items replacing *government* with *city council* in order to allow for differences across levels of government. The US study included similarly worded questions, but in the second set, *government* was replaced by *public officials* ($\alpha = .80$). The correlation between PI and political efficacy is .27 and .16 in the Danish and Minnesota samples, respectively.

Analysis and Results

Table 2 reports means and variance for the two traits. For political efficacy, no significant differences in variances exist between MZ and DZ twins, between males and females, or between various age groups (not included in Table 2) in either country sample. Overall, the assumption of homogeneity is met for political efficacy in both samples. For PI, there is a small, but significant, mean difference between the sexes in both the Danish and the American samples. However, the variance between the

TABLE 2

Political Interest and Efficacy: Means and Variances by Sex and Zygosity

	Denmark		United States	
	Political interest	Political efficacy	Political interest	Political efficacy
Female	2.31 (1.06)*	2.73 (.48)	2.26 (.40)*	2.49 (.50)
Male	1.85 (1.04)*	2.70 (.53)	2.13 (.42)*	2.40 (.49)
MZ	2.22 (1.08)	2.75 (.48)	2.19 (.42)	2.47 (.49)
DZ	2.07 (1.12)	2.70 (.50)	2.20 (.38)	2.41 (.46)
All	2.13 (1.10)	2.72 (.50)	2.21 (.41)	2.46 (.50)

Note: Mean scores measured on a scale from 0 to 5, Variances in brackets MZ = monozygotic twins; DZ = dizygotic twins * Significant difference in means, $p < .05$.

sexes does not differ (.42 for men and .40 for women in the US sample, and 1.04 and 1.06, respectively, in the Danish sample). Thus, in order to increase statistical power and compare the Danish and Minnesota data, we pool same-sex and unlike sex pairs but include sex as a definition term in the structural model in order to model the mean effects separately for each sex. We estimate the model separately for each country.

Intra-pair correlations by zygosity for the two traits are presented in Table 3. In both the Danish and US samples, the correlations between MZ cotwins are significantly larger than the correlations between DZ cotwins (none of the confidence intervals overlap at the 95% level), which provides initial support for the presence of genetic influences and reason to explore structural models to quantify the share of genetic influences.

To further examine the heritability of political interest and efficacy, we conducted univariate genetic models of both traits by maximum likelihood estimation in Mx (Neale, Boker, Xie, & Maes, 2003). Estimates of the genetic, shared, and nonshared environmental variance components of political interest and efficacy are presented in Table 4, with the components of variance due to additive genetic (A), common environmental (C), and unique environmental (E) influence tabulated (for detailed explanations of the methodology and theory, along with limitations and recent criticisms, see Medland & Hatemi, 2009; Neale & Cardon, 1992). In order to determine the importance of the ACE components, the full models were tested against reduced models in which the A or C matrices of factor loadings were fixed to zero.

As the table demonstrates, the best-fitting models in both the Danish and US cases are AE models for both traits. The common environment is not significantly dif-

TABLE 3

Cotwin Correlations, Political Interest and Efficacy: Denmark and the United States

Denmark	Cotwin correlations	
Interest in politics Scale score	MZ	DZ
	.57 [.50, .63]	.27 [.20, .34]
Political efficacy Scale score	.40 [.32, .48]	.21 [.13, .28]
	N (pairs)	440
United States	Cotwin correlations	
Interest in politics Scale score	MZ	DZ
	.45 [.37, .53]	.25 [.13, .37]
Political efficacy Scale score	.41 [.32, .49]	.13 [0, .25]
	N (pairs)	348

Note: MZ = monozygotic twin pairs; DZ = dizygotic twin pairs. (95 % confidence interval).

TABLE 4
Univariate Analyses of Political Interest and Efficacy: Denmark and the United States

	Variance components estimates			$\Delta\chi^2$	Δdf	AIC	p-value
	a ²	c ²	e ²				
Denmark							
Political interest 3-item scale, ACE	.57 (.44, .62)	.00 (.00, .11)	.43 (.38, .49)			-6247.065	
AE (best fitting model)	.57 (.57, .58)		.43 (.42, .43)	0	1	-6249.065	1
CE		.38 (.38, .39)	.62 (.62, .62)	42.889	1	-6206.176	< .001
E	0	0	1	438.276	1	-15002	< .001
Political efficacy 4-item scale, ACE	.35 (.08, .48)	.05 (.00, .27)	.60 (.52, .70)			87.568	
AE (best fitting model)	.41 (.32, .48)		.59 (.52, .69)	1.94	1	85.762	.66
CE		.31 (.24, .38)	.69 (.62, .76)	6.435	1	92.003	.01
E	0	0	1	71.95	1	154.823	< .001
United States							
Political interest 2-item scale, ACE	.34 (.06, .50)	.08 (.00, .33)	.57 (.50, .66)			-172.684	
AE (best fitting model)	.43 (.35, .51)		.57 (.50, .65)	.418	1	-174.266	.52
CE		.36(.29, .43)	.64 (.57, .71)	5.849	1	-168.835	.01
E	0	0	1	84.888	1	-85.95	< .001
Political efficacy 2-item scale, ACE	.38 (.19, .46)	.00 (.00, .16)	.62 (.54, .70)			1912.107	
AE (best fitting model)	.38 (.30, .46)		.62 (.54, .70)	0	1	1910.107	1
CE		.29 (.22, .36)	.71 (.64, .77)	11.24	1	1921.347	< .001
E	0	0	1	55.125	1	1974.472	< .001

Notes: A/a² = additive genetic; C/c² = common environment; E/e² = unique environment. $\Delta\chi^2$ = Diff. in Chi-square; Δdf = Diff. in degrees of freedom; AIC = Akaike's Information Criterion [95% CI]

ferent from zero in either of the samples, suggesting that the common environment plays little role in explaining individual differences in political interest and efficacy. This finding runs contrary to the general belief in the political sciences. Furthermore, we find that the level of heritability in the Danish sample (.57 for PI and .41 for efficacy) is comparable, though statistically different, from that of the US sample (.43 for PI and .38 for efficacy).

To examine the relationship between political interest and efficacy in more detail, we conduct a bivariate Cholesky decomposition, which estimates the sources of covariation between these traits. The Cholesky is a fully saturated factorization of the data that has as many latent factors per variance component as there are variables. The first factor loads on all variables in the analysis. The

second variable in the model is assumed to be caused by a second latent factor that also explains part of the variance of all variables except the first; and so on, with the last factor loading only on the last variable (Loehlin, 1996).

Table 5 provides the model-fitting results for the Cholesky decompositions and the estimates of the amount of covariation shared through each A, C, and E element between traits. The greater part of the covariation between political interest and efficacy, whether in Denmark or the US, is due to a common genetic factor. Thus, it appears that the well-established relationship between political interest and efficacy is, to a large extent, explained by a common latent genetic factor, and not by shared environment or socialization.

TABLE 5
Bivariate Analysis of Heritability in Political Interest and Efficacy: Correlated Factors Model, Denmark and the United States

	Parameter estimates			$\Delta\chi^2$	Δdf	AIC	p-value
	% r = A	% r = C	% r = E				
Denmark							
Political interest with efficacy (r = .27)							
ACE/ACE (M = F)	.56	.2	.24			6694.144	
AE/AE (best fitting model)	.79	0	.21	1.097	3	6689.241	.77
CE/CE		.61	.39	44.273	3	6733.514	< .001
E/E			1	297.45	5	6980.691	< .001
United States							
Political interest with efficacy (r = .16)							
ACE/ACE (M = F)	.44	.37	.19			3522.373	
AE/AE (best fitting model)	.83	0	.17	1.073	3	3517.446	.78
CE/CE		.78	.22	14.824	3	3532.27	< .01
E/E			1	154.395	5	3665.841	< .001

Notes: A/a² = additive genetic; C/c² = common environment; E/e² = unique environment. M = F is males and females equated. ; $\Delta\chi^2$ = Diff. in Chi-square; Δdf = Diff. in degrees of freedom; AIC = Akaike's Information Criterion.

Conclusion

Political interest is highly stable within persons over long periods of time (Prior, 2010). However, contrary to earlier studies, our analysis suggests that focusing simply on socialization or the development of interest early in life is insufficient to account for the development or stability of political interest. Rather, individual differences in political interest have a substantial genetic and unique environmental component, whereas common environmental factors mean very little. Thus, as Wolak (2010) notes, political interest may be part of an individual's 'political personality' and psychological disposition, and may be far less malleable or socialized than once believed. The heritability estimates for political efficacy are somewhat smaller, but again, shared environment seems to add little to our understanding of the roots of political efficacy. Furthermore, our analyses showed that political interest and political efficacy, to a large extent, share the same underlying genetic disposition. That is, the vast majority of the covariance between political interest and political efficacy is genetically informed. Finally, the degree of heritability in Denmark and the US is remarkably similar, despite the fact that the samples are drawn from two populations that are culturally and socially very different. In both contexts, shared environment and early-life socialization are much less important than usually argued in mainstream political science. Our findings mimic a pattern similar to that found for ideology, participation, and partisan intensity in recent work on the genetic basis of political attitudes and behaviors. In general, political traits seem to have a significant genetic component.

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