Exploring the Genetic Component of Political Participation
Brad Verhulst
Virginia Institute for Psychiatric and Behavioral Genetics
Virginia Commonwealth University

Theories of political participation, and especially voting behavior, have focused on the social components of politics at the expense of innate, genetic components. Specifically, it is argued that people will participate if the probability that their participation will influence the outcome outweighs the costs of actually participating (Downs, 1957). The problem with this conceptualization is that the costs incurred by political participation, undoubtedly outweigh the probability that an individual's contribution will have any tangible influence on political outcomes. Accordingly, the act of participation quickly becomes irrational. The problem with the conclusion that people frequently engage in this irrational behavior necessitates a modification to the original theory. Specifically, because the probability of actually affecting a political outcome is so small, the addition of a parameter that captures the benefits that an individual receives from engaging in the action that do not depend on an individual's vote affecting the election outcome. Thus, it is necessary to incorporate a psychological benefit from simply voting (Riker and Ordeshook, 1968).

It is precisely this psychological benefit that has become the crux of the political participation literature. The two major factors contributing to this psychological benefit are political efficacy and political knowledge. Thus, higher levels of political efficacy, or the belief that their actions are important and can make a difference, greatly enhance the probability that the individual will participate. Similarly, the more knowledgeable that an individual is about political affairs, the more likely that the will derive pleasure from learning about the politics and subsequently the larger the benefit that they will derive from actually participating. Related, people with higher levels of education tend to participate in larger numbers, in part because of the fact that they are generally more interested in politics, but there is also an independent effect of education on the likelihood of participation.

More recently, political scientists have begun to explore whether stable individual differences, or personality traits, affect the likelihood an individual will participate (Mondak et al 2010). Specifically, political scientists have explored the personality traits from the Five Factor Model (FFM) of personality: Openness to Experience, Conscientiousness, Extraversion, Agreeableness, and Neuroticism. Three of these personality traits has a specific expectation regarding the likelihood that an individual will participate. The personality trait that best captures the "duty" term is conscientiousness, or the extent to which an individual acts in accordance with social norms their private beliefs. People who score high on conscientiousness should be more likely to turnout. Because voting is an inherent social activity, extraverts should be relatively more likely to turnout as they are more likely to engage in social behaviors. Furthermore, people who are more open to new experiences are also likely to turnout. There are no reasons to expect that neuroticism and agreeableness should have any impact on turnout.

Finally, partisans from both parties should be motivated to turnout in equal numbers, suggesting a null relationship between party identification and turnout. Furthermore, recently women have had higher levels of turnout than men.

Method

Respondents. The sample is derived from the Minnesota Political Attitudes Survey of Twin. The sample was recruited from the larger Minnesota area in the 2009-2001. The sample contains 1349 individuals, from 741 pairs of twins. For more detail on the sample structure, ascertainment, and questionnaire see Hibbing et al (2008).

Participation. The participation index was calculated as the sum of five dichotomous items: Whether the respondent attended a political rally, worked on a campaign, contributed to a political party, were contacted by either of the political parties, and whether or not they intended on voting (alpha = 0.70)

Efficacy. Efficacy was measured by a 10 item additive efficacy scale (alpha = 0.74).

Knowledge. Political knowledge was measured by a five item knowledge battery (alpha = 0.73)

Party Identification. Was measured on a 5 point scale ranging from Democrat (low) to Republican (high).

Education. The education item was designed as a 6 point scale ranging from did not finish high school (low) to professional or graduate training (high).

Male. Is the gender variable with Males coded high).

Personality Traits: All of the personality traits were assessed using ten item scales. All of the personality traits had reasonably decent measurement properties. (Openness alpha = 0.82, Conscientiousness alpha = 0.76, Extraversion alpha = 0.86, Agreeableness alpha = 0.74, Neuroticism alpha = 0.83).

Preliminary Results

The analyses progress in three stages. In the first stage I explore the phenotypic relationships between political participation and the relevant predictors. In the second stage, using a univariate variance decomposition model I examine the proportion of variance in each variable that can be attributed to genetic or environmental sources of variance. Finally, in the last analysis, I conduct a cholesky decomposition to examine the genetic and environmental covariance between political participation and the relevant predictors.

Phenotypic Relationships. As can be seen in Table 1, in line with our expectations, higher levels of political efficacy, political knowledge and education increase the probability that citizens will participate in politics. Also in line with my expectations, openness to experience and extraversion also increase the likelihood that individuals will engage in political activities. Interestingly, conscientiousness has the opposite effect of what I expected. Specifically, those who are more conscientious are actually less likely to participant in political affairs. Finally, although women are slightly more likely to turnout to vote relative to their male counterparts, this did not translate into higher levels of participation in this study.

[Insert Table 1 Here]

Several reduced models were fit that allowed me to simplify subsequent analyses. First, as can be seen in the second column of Table 1. The statistical estimates change minimally when the non-significant parameters are excluded from the model, and the substantive meanings are unaffected by the model specification. As such, in subsequent analyses I focus on the significant predictors. Furthermore, the results are consistent across Zygosity groups, suggesting that the within person effects of the variables on political participation are not affected by whether the respondent is a Mz or Dz twin.

Univariate Variance Decomposition. In the second stage of our analysis, I decomposed the variance of the political participation and the significant predictors identified above into three separate sources of variance: additive genetic, common environment, and unique environment (for a detailed explanation of the methodology and theory, along with limitations and criticisms see Medland and Hatemi 2009). The additive genetic factor (A) is the sum of the linear additive influence of all individual genes on the dimensions. The common or shared environmental factor (C) accounts for systematic attempts at socialization, within family similarity in environment, and common social background (e.g., family income, neighborhood, etc). The unique environment factor (E) represents unique, random, idiosyncratic or unshared environmental.

The C parameter did not account for a significant amount of variance in any trait. Therefore, in the models presented in Table 2 the C parameter is excluded. As can be seen in Table 2, all of the variables have a substantial portion of the variance that is accounted for by the additive genetic component.

[Insert Table 2 Here]

Cholesky Decomposion. The preceding steps were necessary to begin to examine the nature of the relationships between the predictors and political participation. To explore this relationship, we utilize a common multivariate genetic technique called the Cholesky decomposition. The Cholesky builds on the univariate ACE model by simultaneously decomposing the variance of multiple traits into additive

genetic, common environment and unique environment variances and explores the amount of the relationship between the personality trait and the political attitude that can be accounted for by each level of variance. Specifically, the cholesky analysis allows us to explore the extent to which the various predictors account for variance in political participation due to the fact that the variables share latent common genetic precursors or common unique environmental factors. Because the Cholesky Decomposition is a saturated model, it can be mathematically transformed in a number of different ways. The model that I present herein is the simple untransformed cholesky that estimates the amount of variance that is shared between the various traits. For multivariate Cholesky decompositions the ordering of items is an essential component of the analysis (Loehlin 1996): the parameter estimates are conditional on the order in which variable were entered into the analysis similar to step-wise regression. As such, the bottom row of the Additive Genetic and Unique Environment panels in Table 3 can be interpreted as the amount of variance in political participation that can be accounted for by the predictor.

[Insert Table 3 Here]

The starkest result from Table 3 is that the relationships between the predictors and political participation are almost exclusively found at the additive genetic level. In fact, the only significant predictor at the unique environmental level is the respondent's level of political knowledge, and the effect is relatively small. Thus, rather than political participation being driven by environmental components, participation appears to be underscored by genetic predispositions.

Preliminary Conclusion

The original calculus of political participation suggested that people would participate in politics so long as the probability that their action would affect political change outweighed the costs of participation. This expectation, however, fails to capture the way people actually behave. People actually do participate in politics at non-trivial levels. To account for the discrepancy between the theory of why people participate and observational accounts that violate these theoretical assumptions an additional parameter was added to the theory: the individual's sense of civic duty. In this paper I have operationalized civic duty as several conceptually distinct individual difference measures that have been suggested in the political participation literature. In line with most of the literature in political participation predictors have the expected effects. Furthermore, when the predictors are decomposed into discrete variance components, none of the individual difference measures have a common environmental variance component, which is consistent with most individual difference measures. In the multivariate Cholesky analysis, the predictors only accounted for genetic variance in political participation. Thus it appears that the motivation to participate in politics derived from individual's sense of civic duty is based, in some way, on their genetic predisposition to engage with the political world.

Table 1: Factors Influencing the Likelihood of Political participation at the Phenotypic level

Participation	Full Model	Reduced Model	MZs only	DZs only
Efficacy	0.180*** (0.048)	0.191*** (0.045)	0.205*** (0.058)	0.180** (0.070)
Openness	0.225*** (0.048)	0.224*** (0.046)	0.240*** (0.062)	0.210** (0.066)
Conscientiousness	-0.189*** (0.057)	-0.169*** (0.050)	-0.181** (0.066)	-0.138^{+} (0.075)
Extraversion	0.157*** (0.041)	0.177*** (0.037)	0.140** (0.050)	0.237*** (0.056)
Agreeableness	0.010 (0.064)			
Neuroticism	-0.017 (0.043)			
Party ID	-0.021 (0.030)			
Knowledge	0.267*** (0.028)	0.264*** (0.025)	0.243*** (0.034)	0.293*** (0.037)
Education	0.048*** (0.007)	0.046*** (0.006)	0.045*** (0.009)	0.047*** (0.010)
Male	0.026 (0.017)			
Intercept	-0.174* (0.078)	-0.211*** (0.047)	-0.161** (0.062)	-0.298*** (0.072)
N(clusters)	1184 (717)	1311 (741)	768 (426)	543 (315)
R-squared	0.272	0.284	0.269	0.311
RMSE	0.252	0.249	0.252	0.244

Table 2: Univariate Variance Decomposition estimates

	Unstandardized Path Estimates		Standardized Variance Components	
	a	e	A	E
Participation	0.196	0.212	0.448	0.552
Efficacy	0.106	0.125	0.417	0.583
Openness	0.122	0.121	0.505	0.495
Conscientiousness	0.082	0.116	0.333	0.667
Extraversion	-0.153	-0.149	0.512	0.488
Knowledge	0.238	0.211	0.559	0.441

Table 3: Cholesky Decompositions for the Effect of Various Predictors on Political Participation (Unstandardized Estimates)

		Efficacy	Knowledge	Openness	Extraversion	Conscientiousness	Participation
Additive Genetic	Efficacy	**0.105**					
	Knowledge	**0.120**	**0.204**				
	Openness	0.018	0.025	**0.118**			
	Extraversion	-0.001	-0.017	0.063	**0.138**		
	Conscientiousness	0.010	-0.007	-0.006	**0.032**	**0.074**	
	Participation	**0.087**	**0.110**	**0.055**	**0.035**	-0.028	**0.116**
Unique Environment	Efficacy	**0.126**					
	Knowledge	0.002	**0.213**				
	Openness	0.000	0.013	**0.120**			
	Extraversion	0.004	0.012	0.047	**0.141**		
	Conscientiousness	-0.003	0.001	0.029	0.009	**0.113**	
	Participation	0.020	**0.035**	0.020	0.014	-0.008	**0.215**

Note: Pathways in bold are significant at p<0.05.