Genetic and Environmental Transmission of Political Participation and Ideology in a Post-Communist Country. The case study of Hungary*

Levente Littvay[†], Adam D. Tarnoki[‡], David L. Tarnoki[‡]

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Abstract

Behavior genetic approaches are becoming increasingly popular in political science. Many studies, to date, used a classical twin design to explore both political participation and ideological self-placement in Western democracies but studies in different political contexts, such as post-communist countries, are scarce. This paper is the first to explore the heritability of ideology and political participation in a post-communist country: Hungary. A small sample of twins (from 58 monozygotic families with 38 complete pairs, 19 same sex and 7 opposite sex dizygotic families with 12 complete same sex and 6 complete opposite sex pairs) answered political questions in late January of 2012. Given the small sample extensive assessment of model assumptions is presented and show no cause for concern. Findings on participation match the Western results of high and significant heritability (72.2% with 95% CI: 41.4%-89.9% and no shared environmental effects within the 95% CI). The picture is quite different for the ideological

measures where moderate and significant effect of both heritability and socialization was regularly found in the West. In the post-communist context socialization appears to play a more prominent role and ideology does not seem to be genetically transmitted. Individual differences in liberal-conservative self-placement is 66.5% driven by environmental effects shared by both twins (CI: 45.1%-81.9%) with no heritable effect found within the 95% confidence interval. The same estimate for left-right self-placement is 68.1% (CI: 46.9%-85.1%) with heritability estimated at 0% with 5.5% as the upper CI bound. Based on the Cholesky decomposition of the two ideological measures, 87.3% of the correlation, r=0.536 (95% CI: 0.256-0.731), appears to be driven by the shared environmental sources. Findings further highlight that behavior genetic findings are heavily context dependent. The study extensively discusses the possible causes driving the different findings in the Western and post-communist political contexts.

1   Introduction

Behavior genetic studies are becoming increasingly popular in political science (Alford, Funk and Hibbing, 2005; Hatemi et al., 2011; Hatemi and McDermott, 2012). Several studies used a classical twin design (Medland and Hatemi, 2009) to explore both political participation (Fowler, Baker and Dawes, 2008; Littvay, Weith and Dawes, 2011) and ideological self-placement in western democracies (Alford, Funk and Hibbing, 2005; Hatemi et al., 2010; Verhulst, Eaves and Hatemi, 2012; Hatemi, Eaves and McDermott, 2012). The study at hand is the first to explore the same questions in the post-communist context. A small sample of twins answered political questions in 2012 as part of a pilot study. The purpose of this paper to see how findings in the West compare in the post-communist context. The sample used in this study is admittedly small but findings are clear and highly significant even on such a small sample that it is worthy of presentation. This is the purpose of this paper.[1]

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[1]I just quickly hacked this intro together to make sure the paper appears complete. Will probably have to be rewritten.

2 Ideology in Hungary

NOTE: This section is underdeveloped. I am no expert on the topic. This is where I am hoping to get pointers and feedback. Discussion in the conclusion contains some of my suspicions of what is going on.

3 Data

The twins were recruited from a small volunteer twin registry in Hungary (Littvay, 2012). The web survey was distributed via email late January and closed mid-February. Reminders were sent to all emails asking people to fill out the survey in case they have not yet done so. Targeted emails were not used because the data was gathered anonymously. Twins were matched to each other by birthday; this was possible as no two twin-pairs in the population had the same birthday. Zygosity was assessed with a single question but every member of the registry was already consulted their expected zygosity based on a more extensive questionnaire based assessment that is validated to be accurate (Heath et al., 2003).

The purpose of the data collection was to supplement a meta analysis on ideology (Hatemi, forthcoming). Four questions assessed voter participation intentions were asked.[2] These were then averaged to derive a voter turnout intentions score. This was followed by two ideology questions taken from the Hungarian Election Study[3].

The data came from 58 monozygotic families with 38 complete responses from both of the pairs, 19 same sex and 7 opposite sex dizygotic families with 12 complete same sex and 6 complete opposite sex pairs.[4]. We recognize that the sample is tremendously small and our initial intention was not to publish

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[2]If the there was a *parliamentary election* the upcoming weekend, would you go and vote. Answer options: Definitely not, probably not, probably yes, definitely yes. The other three questions asked about *European parliamentary election, municipal election* and *a referendum* using the exact same wording.

[3]Many use the terms *left wing* and *right wing* to describe political positions. This picture shows steps on this *left wing* and *right wing* scale. Where would you place your own political standing? Answer categories were 10 unnumbered radio buttons with *Left Wing* and *Right Wing* placed at the two ends. The second question was the same with *left wing* and *right wing* replaced by *liberal* and *conservative*

[4]No individual's response was discarded. All analyses presented are done with full information maximum likelihood estimation.

these results but to use them as part of the above mentioned meta-analysis and possibly as a pilot for the a grant proposal. But, as it is presented below, the results are surprisingly strong despite statistical power issues. Still, the small sample is cause for the extreme caution visible in this article. Given the possibility of a few cases substantially impacting the findings in such small samples, we considered several procedures to assess this bias. Eventually we decided on a bootstrap to estimate the uncertainty associated with the results.[5] Additionally, we present a very extensive test of the model assumptions and, when needed, sensitivity analyses of the claims.

4 Assumptions Testing

We begin by comparing the male/female and MZ/DZ twins on age and all three dependent variables of interest. Comparison is done both on the mean and the standard deviation of the dependent variables. The mean comparison allows us to see the extent the model extrapolates to individuals who are scarcely represented in our sample. The variance comparison is even more important as if variances differ across zygosity or gender, these need to be considered and explicitly modeled, otherwise the results could be biased. Table 1 shows the comparisons.[6] As it is readily apparent from Table 1, the differences between identical twins and fraternal twins are minimal both their means and variances. The most noteworthy difference is in the variance for participation but even this difference is insignificant.[7] There is also little noteworthy difference between males and females. The females in the sample are, on average, 5 years older. This difference is corrected with a linear model, but the possibility of invalid extrapolation needs to be considered. Age and sex corrections for the saturated twin model are presented in Table

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[5]First a jackknife estimator was considered but upon further consideration bootstrap estimates have similar (possibly better) properties and the added benefit of providing empirical confidence intervals.

[6]Expected mean estimates are derived from a family clustered regression model where centered age, sex and zygosity are controlled for. Hypothesis test of the mean differences are the regression coefficients of the corresponding predictors. Variance differences are tested with a multi-group structural equation model using robust nested chi-square test where the variances are first estimated and then equated. Variance comparison models also include the listed controls.

[7]Note that these variances can be turned into standard deviations for easier interpretation by taking their square-root.

2 showing no significant effect of any of these covariates. The impact of age on participation does reach p¡0.1. Fortunately these differences only appear to matter for participation but the findings regarding this dependent variable appear to be the most robust and comparable to findings in Western cultures. For this reason we do not believe that this slight and insignificant difference causes bias that substantively modifies the findings.

Co-twin correlations for the different zygosity groups are a reasonable pre-test for what we can expect from the classical twin models. If co-twin correlations for monozygotic twins are similar in magnitude to dizygotic twins, we can expect no genetic effect. The magnitude of this similarity is what foreshadows the impact of the environment shared by the co-twins. But if monozygotic twins are more similar to each other than dizygotic twins, that suggests the presence of a heritable effect.

In this analysis both same and opposite sex DZ twins pairs are included (to maximize statistical power). In heritability analysis, this can be problematic if there is a sex specific socialization or sex chromosome specific genetic process driving the phenotype. If either of these mechanisms are present, the co-twin correlations of the opposite sex dizygotic twin pairs will be deflated compared to the same sex dizygotic pairs. In case these two groups are not modeled separately, and opposite sex twin paris are not removed, the overall DZ co-twin correlations will be deflated inflating heritability estimates by widening the gap between MZ and DZ co-twin correlations. We do not have the statistical power in this sample to model all zygosities and sexes separately in our model, but looking at the co-twin correlations (Table 3) there is no need to do so. In the case of the two ideological questions the opposite sex co-twin correlations are actually slightly higher than the same sex co-twin correlations (though note that this difference is not at all significant). The MZ co-twin correlations are comparably large, or even slightly, but insignificantly, larger in these instances suggesting the complete absence of any genetic effect. For participation, there appears to be absolutely no co-twin correlation for dyzigotic twins independent of if they are the same sex or not. In fact, for both DZ subgroups there is a slight and insignificant negative co-twin correlation which remains even if the DZ sample is pooled. Additionally, MZ co-twin correlations of participation intention are also strong suggesting that a strong genetic effect is present. In fact MZ co-twin correlations over twice the size of the DZ co-twin correlations point to the possible presence of genetic dominance. For this reason, this possibility is explicitly modeled in the next section.

5 The ACE Model

The univariate ACE model uses a structural equation model to decompose the variance in any phenotype into (A) additive genetic, (C) common environmental and (E) unique environmental variance. The model gives us a the relative proportions of the impact of all of these components, hold assumption violations present in the model. A bivariate extension of the ACE model, the Cholesky decomposition not only decomposes the variance in the two dependent variables in question, it also decomposes the covariance between the two variables of interest into the same A, C and E components.

(NOTE: Once again, I will probably will have to more extensively write about how this is done. Until then, if interested, please consult Littvay, Weith and Dawes (2011) for a summary or **?** for a more formal discussion.)[8]

All analyses were conducted using full information maximum likelihood estimation in Mplus 6.12. Cluster corrected mean and variance estimations used a robust maximum likelihood to ensure the correct p-values under a clustered sample.[9] Where (empirical) confidence intervals are reported, they were derived with a Bollen-Stine bootstrap. This was important as symmetric confidence intervals are inappropriate for correlations and ACE model results due to an algebraic transformation of the key estimated parameters. Additionally, the bootstrap estimates make the results more robust to a single or few cases heavily influencing our results in the small sample.

Table 4 presents the findings of the ACE models. Based on the recommendations of Medland and Hatemi, for this small sample we only interpret the full ACE models and not the reduced models. Reduced models are presented following twin modeling conventions. From the results it is clear that, much like in other studies of Western cultures, we find a significant additive genetic effect (72.4%, with 95% c.i.: 41.4%, 89.9%) and absolutely no common environmental effect (0%, with 95% c.i.: 0% and 0%). After model reduction the AE model appears to fit the best, though the BIC statistic favors the ADE model suggesting the possible presence of dominance. But when estimated this effects is barely significantly different from 0 (1% for lower c.i.). By contrast neither ideological questions show an additive genetic ef-

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[8]http://www.ceu.hu/sites/default/files/publications/ssqu-2011.pdf   or http://ussc.edu.au/ussc/assets/media/docs/publications/10_Medland_Hatemi_ Poli_Anal_2009.pdf

[9]Cluster corrections were necessary because two observations from the same family are less independent of each other than two individuals from two different families.

fect (left-right: 0%, with 95% c.i.: 0% and 0% and liberal-conservative 0%, with 95% c.i.: 0% and 5.5%) which is a departure from findings in established democracies. A sizable and significant proportion of the variance is explained by the twins' shared environments (left-right: 70.8%, with 95% c.i.: 51.5% and 83.3% and liberal-conservative 66.8%, with 95% c.i.: 48.5% and 83.5%). For the left-right scale the AE model fits significantly better but for the liberal-conservative question the chi-square difference test just barely misses the threshold of significance despite being favored by both AIC and BIC model fit statistics. Still, the ACE model confidence intervals show well that even if there is a genetic effect present, it is very low.

Since both left-right and liberal-conservative self-placement are higly correlated (r=0.536, 95% c.i.=0.256, 0.731), we conduct a cholesky decomposition ACE model to see what proportion of the covariation comes from which variance components.

According to the less parsimonious ACE model 91.4% of the covariance come from common environmental sources (95% c.i.: 61.8%, 136.2%).[10] In the more parsimonious (but not significantly worse fitting) AE model, this estimate is 87.3% (95% c.i.: 53.6%, 114.2%).

6 Limitations

Obviously the first limitation of the study is that the sample is incredibly small. As a function of this, confidence intervals are quite wide. Still, many of the findings are significant and suggestive of a different mechanism driving ideological self placement, but not intended participation, in post-communist countries than in the democratic societies more heavily studied to date. It is impossible to claim that these results are definitive, but they point to a direction that suggest additional research in less established democracies would be a fruitful endeavor and a worthwhile investment.

As with most twin studies the generalizability of the results are limited, and the fact that this is a volunteer registry further amplifies this concern. When the ideology results were first assessed the authors approached the results with suspicion seeking alternative explanations of the surprisingly high and zygosity invariant co-twin correlations. For example, twins discussing

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[10]At first glance it might seem off that over a 100% of the variance can come from one latent source, but this is possible because another latent source could be counterbalancing by producing a relationship with the opposite sign.

among each other about this question could raise both MZ and DZ co-twin correlations and increase the estimated proportion of common environmental effects. The twins in the Hungarian registry are used to medical examinations and never received such a questionnaire before. The unusually high number of follow up questions sent to the principle investigator highlight well how this questionnaire could have puzzled the participants. Given the nature of the web-questionnaire, twins cannot be prevented from talking to each other and this puzzlement could have lead to discussions with their co-twin before the questionnaire's completion by both twins. If such discussions took place for both MZ and DZ twins common environmental estimates could be biased upwards if the twins discussed their answers. Such issues are difficult to control for, hence our suspicion. It was the results of the participation questions that eventually alleviated these concerns. The participation results show the exact opposite behavior compared to western samples. If anything DZ co-twin correlations are lower than seen in other participation studies. In fact the correlation is an insignificant negative relationship. If discussions of the survey took place, there is no reason to believe that they would be limited to the ideology questions ignoring the participation questions. Also, this alleviates other suspicions that would inflate co-twin correlations though we did not think of another plausible mechanism. If there was such a mechanism at play, these DZ co-twin correlations should also be inflated, but that does not appear to be the case. For this reason, though bias can never be ruled out completely, we are confident that such suspected biases are not present in our analysis.

The classical twin design makes several assumptions that are discussed in detail elsewhere (Medland and Hatemi, 2009). But, as it should be apparent from this article, we take these assumptions very seriously and present extensive assumptions testing even going beyond prior behavior genetic works in political science.

7   Discussion

Similarities in the results between the East and the West are easy to explain by simply claiming that the underlying physiological and psychological mechanisms underlying political participation are probably simply similar in both cultures. Fowler, Baker and Dawes (2008)explained participation as a form of societal political cooperation Littvay, Weith and Dawes (2011)

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empirically tested a genetic pathway where general sense of control and political efficacy predicted voting obligation. Mondak (2010) tied voting to personality though the causal direction between these two is still implicitly contested (Verhulst, Eaves and Hatemi, 2012). Classic behavioral models of turnout that relied on sociodemographic predictors never performed well (Fowler, Baker and Dawes, 2008; Plutzer, 2002), but the relevant covariates appear to act very similarly in the US and Central and Eastern European contexts (Robert, 2012). No reason comes to mind why any of these should affect participation differently in the Central and Eastern European context than in cultures with more established Democratic traditions.

But the results differ for ideology. While it would be convenient to reach for the political socialization literature, we know that, at least until 2005 (Alford, Funk and Hibbing, 2005), all familial transmission of political attitudes were assumed to be socialized.[11] We could use these theories to argue for a socialization effect in Hungary, but why would we expect these theories to work in the Hungarian context when they failed empirical tests in the American and Australian studies that empirically separated genetic transmission from socialized effects. Believe the Michigan model or not, it appears that, at least in Hungary, familial transmission is indeed socialized. But the possible reasons for the differences are unclear and any explanation would be strictly speculation without additional empirical exploration. For purposes of theoretical guidance for future research, we speculate.

At the time of the data collection the right wing conservative government, lead by the political party *Fidesz*, was in control.[12] While *Fidesz* does stand for ideological values consistent with their right leaning conservative identity (such as a flat tax, strict punishment for breaking the law, strong patriotic and arguable nationalistic, Christian democratic values). On the other hand, at the time, the *Fidesz* government was in the middle of a multi-year scheme to nationalize all private pension accounts, raised taxes on some of the most wealthy corporations and introduced electronic transaction taxes. These policies are analogous to the extreme left ideology of the Occupy Wall Street movement in the United States. Conversely, the same

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[11]Despite prior research in general science journals showing the contrary (Eaves and Eysenck, 1974; Martin et al., 1986).

[12]In fact, they controlled two-thirds of the parliament giving them complete control over the constitution and the power to change any laws. *Fidesz* received quite a bit of international media attention when they seized their opportunity to introduce, what people described as, severe constitutional and institutional changes in the country.

could be said for the largest leftist party in Hungary, the *Hungarian Socialist Party*. As the more moderate successor of the old communist *Hungarian Socialist Worker's Party*, prevalent political rhetoric from the right painted them as true communists at heart. More realistically they are traditional European social democrats with an emphasis on social fairness (say, through a progressive tax scheme). Yet the Socialists were the ones arguing against taxes on wealthy corporations and electronic transactions, arguing for privatized pensions schemes, and they are the best friend and protector of free market capitalism and big business in Hungary.

These ideological stands and policies are hardly consistent with any established value structure. Even over 20 years after the post-communist transition leading political powers in Hungary are quite value inconsistent. It is easy to imagine how the past 20 years allowed for little or no ideology based political party system to emerge. In fact, support for political parties in Hungary are still heavily based on leader evaluations, clientelistic structures and familial relations to the old communist regime. People who were beneficiaries of the system, winners of the transition are more likely to vote for leftist parties while people who were hurt by the old regime would never consider any identification with the successor party.

Under these circumstances, it is easy to imagine that ideological identification means little more than a form of group identification with parties that, often arbitrarily, own the ideological labels. Other forms of group identification, (such as religious denomination or even party identification) are found to be heavily socialized in the Western context (Bouchard et al., 1999; Kirk, Eaves and Martin, 1999; Koenig et al., 2005; Alford, Funk and Hibbing, 2005; Hatemi et al., 2009; Settle, Fowler and Dawes, 2009). For this reason, the findings are not entirely counterintuitive and point to both new understanding of ideological content in post-communist societies and new research possibilities to understand the underlying mechanisms of ideological self placement.

One of the first critics of behavior genetic approaches in political science was Evan Charney who based his critique heavily on the context and fluidity of ideological self placement. While his criticism narrowly focused on behavior genetic assessments of ideology, his critique extends to all comparative (and as phrased even non-comparative) empirical research that attempts to say anything about ideology (Charney, 2008*a*,*b*). Charney was both right and wrong in his exposition. He was wrong in assuming that genetic and physiological processes would be universal across populations. That is sim-

ply false. But he was right to claim that ideology is a fluid and context dependent phenomenon and our findings, ironically, back this claim strongly.

8   Future Research

Mainly due to availability of data, most behavior genetic ideological research, to date, was conducted in Western Democracies using the Wilson-Patterson index (Alford, Funk and Hibbing, 2005; Hatemi et al., 2010; Verhulst, Eaves and Hatemi, 2012; Hatemi, Eaves and McDermott, 2012). The WP asks simple, single or few word issues which the respondent has to endorse, reject or express uncertainty about. While the benefits of the Wilson Patterson is undeniable. It allows for multi-dimensional ideological assessment (even if such is rarely done). It is continuous with a normal distribution. But this measure assumes, at minimum, a consistency between issue positions and ideological standing. If there is anything to the above theorization concerning the difference between established democracies and, at least, one post-communist society, correlation between issue positions and ideological self placement should be lower in the latter case. Phenotypic and behavior genetic evaluation would be an excellent first step in assessing the relationship between issue positions and ideological self-placement in both the Western and Post-Communist contexts. If this relationship is stronger and predominantly genetic in the west and weaker and predominantly environmental in Post-communist societies would bring evidence to the claims above.

For the issue of turnout, it would be interesting to see if general sense of control and the more specific political efficacy shows genetic covariation (as found by Littvay, Weith and Dawes (2011) in two US samples).

9   Conclusion

This study provided the first behavior genetic assessment of political traits in a post-communist context. We hope many such studies will follow. The findings are strong but the results should be interpreted with caution given the small, volunteer twin sample. The results of this study come as a stark reminder of the warning that behavior genetic findings are population specific. While the results for political participation is quite comparable to findings presented from the United States, the findings for ideology show a clear con-

trast. This could be due to different contextual meaning of ideological characteristics or different gene-expression in the post-communist environment. Hatemi (forthcoming) initiated an extensive multi-country meta analysis of ideological politicians in many countries. More of such studies will serve to disambiguate the various findings under different contexts and will help us raise new and novel political research questions. For now, this study remains the one that comes from the most different political culture as compared to already published behavior genetic evaluations in political science.

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