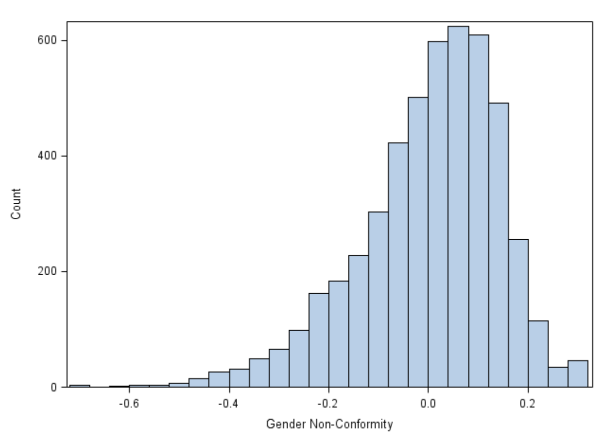
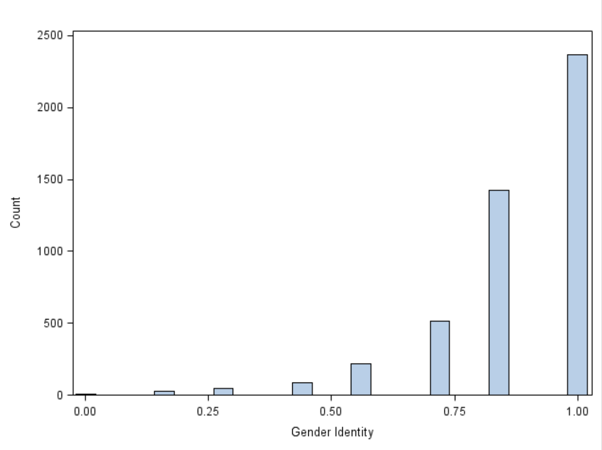
Online Appendix 1: Gender Identity and Childhood Gender Nonconformity





	Childhood Gender Nonconformity				Adult Gender Identity			
	Males (µ .71; sd .11)		Females (µ .70; sd .16)		Males (µ .85; sd .17)		Females (µ .90; SD .15)	
Std. Dev.	Frequency	Percent	Frequency	Percent	Frequency	Percent	Frequency	Percent
< 0.5	768	42.5	895	29.5	611	35.6	808	27.8
0.5-1.0	507	28.1	772	25.5	918	55.8	1675	57.6
1.0-2.0	443	24.5	986	32.5	93	5.4	237	8.2
2.0-3.0	67	3.8	266	8.8	35	2	115	4
> 3.0	22	1.2	114	38	19	1.2	72	2.4
N	1807		3033		1727		2907	

Notes: Childhood Gender Nonconformity yielded a continuous score with 282 discrete values. Scores were standardized within sexes with higher scores being perfectly gender conformant. Adult Gender Identity raw values ranged from 0 to 7 and were standardized within sexes with higher scores being perfectly gender conformant. In order to simplify the table, the values were grouped by standard deviations from the mean (sd). Distributions are similar for males and females. AGI is correlated .22 (p<.01) with Sex, while CGN is only weakly related (.03) to Sex (p<.05).

Online Appendix 2: Correlations between Sex, Gender and Voter Preference

	Voter Preference (Coalition vs. Labor)		**Voter Preference (Major vs. Minor Party)**	
Traits	Correlation	p-value	Correlation	p-value
Sex	-.04	.028	.01	.538
Gender Identification Males	**.11**	<.001	**.13**	<.001
Gender Identification Females	**.10**	<.001	**.12**	<.001
Gender Nonconformity Males	.02	.367	**.14**	<.001
Gender Nonconformity Females	.01	.423	**.11**	<.001

Note: Sample size ranges from 1382-1715 for males and 2217-2897 for females. Sex is coded 0 for female, 1 for male. Coalition is coded 1 and Labor 0; major parties coded 1 and minor parties 0; Adult Gender Identity and Childhood Gender Nonconformity are coded 0 to 1, with 0 being non-conformant and 1 being more consistent with one’s sex.

Online Appendix 3: Correlations between Adult Gender Identity, Gender Nonconformity, and Covariates

	Females	1		2		3		4		5		6		7	
1	Adult Gender Identification	1		0.447	**	0.104	**	-0.101	**	-0.047	*	-0.039	*	0.037	*
2	Childhood Gender Nonconformity	0.447	**	1		0.112	**	-0.093	**	-0.063	**	-0.074	**	0.02	
3	Age	0.104	**	0.112	**	1		-0.076	**	-0.082	**	-0.045	*	0.07	**
4	Education	-0.101	**	-0.093	**	-0.076	**	1		0.245	**	0.256	**	0.279	**
5	Mom's Education	-0.044	*	-0.063	**	-0.082	**	0.245	**	1		0.558	**	0.178	**
6	Dad's Education	-0.039	*	-0.074	**	-0.045	*	0.256	**	0.558	**	1		0.201	**
7	Social Class	0.037	*	0.02		0.07	**	0.279	**	0.178	**	0.201	**	1	

Notes: Correlations significant ** p<.001, * p<.05

	Males	1		2		3		4		5		6		7	
1	Adult Gender Identification	1		0.3	**	0.034		0.008		0.05	*	0.029		0.053	*
2	Childhood Gender Nonconformity	0.3	**	1		-0.078	**	-0.063	**	0.025		-0.039		-0.037	
3	Age	0.034		-0.078	**	1		0.111	**	-0.169	**	-0.099	**	0.113	**
4	Education	0.008		-0.063	**	0.111	**	1		0.152	**	0.264	**	0.34	**
5	Mom's Education	0.05		0.025		-0.169	**	0.152	**	1		0.521	**	0.128	**
6	Dad's Education	0.029		-0.039		-0.099	**	0.264	**	0.521	**	1		0.178	**
7	Social Class	0.053	*	-0.037		0.113	**	0.34	**	0.128	**	0.178	**	1	

Notes: Correlations significant ** p<.001, * p<.05

AGI and CGN are correlated but they are not the same latent trait. Age is continuous (19-52). Education is coded no HS diploma, HS diploma, technical/AA degree/less than 4 yrs college, 4 yr university degree, advanced degree. Social Class is a proxy for income and is coded lower, middle, upper.

Our data do not include self report ideology, or other predictors of vote choice, and thus it is not surprising that the best of our models predicts vote choice between left-right (Labor-Liberal) with less than 61% accuracy. However, the inclusion of the gender measures increases accuracy by greater than 4%. Regarding voter preferences for major or minor parties, the model is markedly better (85%). Inclusion of the gender measures improves prediction accuracy substantially (>8%).

Online Appendix 4 *Visual inspection of the MZ and DZ twin pair correlations*

Inspection of the trait specific (phenotypic) MZ and DZ twin pair correlations provide an initial indication of genetic and environmental influences and guide the researcher as to which full model (ACE versus ADE) should be used in the formal variance components analyses (Neale and Cardon 1992). MZ twins are genetically identical and so the expected correlations for additive and non-additive genetic effects between MZ twins are both 1.0 whereas for DZ twins, the correlations for additive and non-additive genetic effects are 0.5 and 0.25 respectively (Fisher et al 1932). Therefore, the presence of additive genetic influences (A) for a given trait or measure are indicated when the DZ twin pair correlation is approximately half that of the MZ twin pair correlation. However, if a trait is influenced by non-additive genetic effects, then the DZ twin pair correlation is expected to be much less than half that of MZ twin pair correlation.

Correlations by Twin Pair Zygosity for CGN and AGI Scales (95% CI)

	MZF	MZM	DZF	DZM	DZOS
Childhood Gender Nonconformity (CGN)	.36 (.29, .43)	.46 (.36, .54)	.02 (-.08, .12)	.16 (.02, .30)	-.01 (-.13, 11)
Adult Gender Identity (AGI)	.25 (.15, .35)	.33 (.19, .45)	.18 (.04, .31)	.10 (-.07, .27)	.07 (-.07, 20)

Notes: MZF (monozygotic female), DZF (dizygotic female), MZM (monozygotic male), DZM (dizygotic male), DZOS (dizygotic unlike sex).

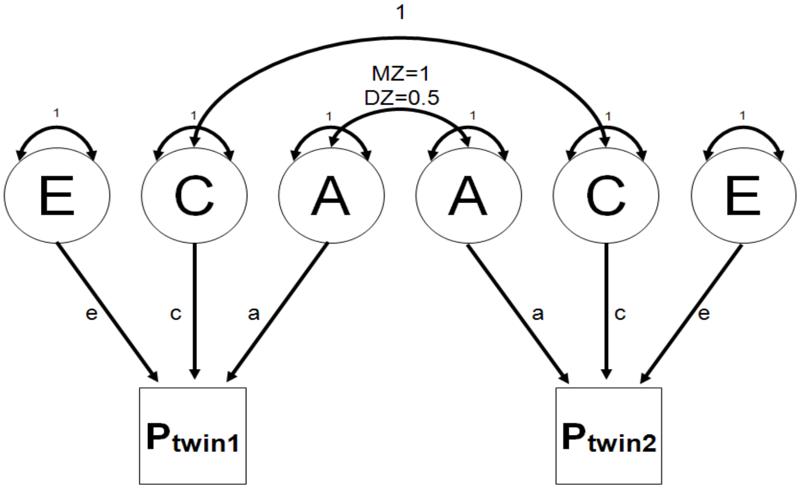
Online Appendix 5- Non-Additive Genetic Influence.

The concepts of familial and personal experience are common in the extant political behavior literature, but only recently has the potential for genetic influences been introduced (Alford, Funk and Hibbing 2005; Fowler and Dawes 2008; Hatemi, Medland and Eaves 2009), and thus it is beneficial to discuss the differences between additive and non-additive genetic influence in more detail.

Additive genetic influences reflect the additive effects of all individual alleles at loci influencing a trait. It is simply the combined influence of all genes. On the other hand, dominance is used by Classical Mendelian theory to describe when a particular trait in offspring favors one parent's genetic contribution more than the other (Neale et al 2003). Specifically, the child will *not* receive a genetic contribution for a given locus (allele) exactly midway between that of the two parents. For example, consider the simple case where one homozygous parent is typed AA for a given genetic marker, mating with another homozygous parent typed bb. In this scenario, under normal Mendelian transmission, their offspring would receive a genotype for the given locus as Ab. However, if the trait was genetically dominant, and in our example parent AA held the dominant genotype, the child would have a genotype that more closely reflected the AA genotype for that locus (Fisher, Immer and Tedin 1932). In effect, a specific set of genes is being transmitted in a "dominant" fashion from the AA parent. Thus, covariation due to non-additive (D) genetic effects depends on a child inheriting the same copies of the gene, and acts to reduce the covariation between DZ twins and sibling pairs who inherit the same copies of a gene about a quarter of the time, as compared to MZ pairs who always inherit the same copies of a gene.

Most studies of behavior traits do not test for non-additive genetic influence (D) because of sample size and power constraints (Keller and Coventry 2005). However, evidence for dominance has been reported for personality and identity constructs (Rebollo and Boomsma 2006) and so we consider the possibility of non-additive influence for gender, as it bears a strong resemblance in manifestation to other seemingly deep seated aspects of personality. However, only in samples that contain extended kinships (e.g., parents, non twin siblings, twins, etc.) can common environmental (C) and non-additive genetic influences (D) be modeled simultaneously. That is, when limited to data from only twins reared together, C and D are confounded. Therefore, the decision of whether to fit an ACE or ADE model was based on: (1) whether the DZ twin pair correlations are greater than half that of the MZ twin pairs correlations (indicating non-additive genetic influence); and (2) model parsimony.

Online Appendix 6 : ACE path diagram with labeled paths



The above path diagram is an explicit representation of the model where the expected covariance between two siblings for a given trait . “A” is additive genetic (2*(r_{MZ}-r_{DZ})), “C” is common environment (2*r_{DZ}-r_{MZ}) and “E” is unique environment (1 - r_{MZ}). For ADE models, D replaces C in the path model. Correlations between the latent genetic factors are 1 for monozygotic twins (both A and D) who share 100% of their genes, and .5 for (A), and .25 for (D) for dizygotic twins, including unlike sex pairs, who share on average 50% of the similarity in genetic transmission from their parents. Correlations between the latent common environment factors (C) are 1 in both MZ and DZ twin pairs by definition, as the twin pairs used here were raised together. The latent factor for (E) is free (uncorrelated). Unique Environment includes measurement error.
All structural models were estimated in Mx (Neale et al. 2003)

Online Appendix 7

Considerations and Limitations

There are important considerations when utilizing variance components models from a population sample of twins reared together. First, the results are population specific and additional studies on different populations are required before making any claim that the findings are generalizable. Populations in both liberal regions where strict gender oppression is largely absent and more illiberal regions where such oppression is largely present, are necessary. Second, the period of time is relevant. As liberal governments and regions begin to further accept more fluid concepts of masculinity and femininity, as well as sexuality, respondents are also more likely to be open to self-identification and more willing to embrace flexible definitions of their own relevant gender identity. This study was conducted in the 1990's in Australia where gender or sex was not a major issue in the election; to what degree studies in London, Moscow, or Baghdad, performed in 2011, will provide converging or contrasting results are unknown. Of course such concerns with external validity are by no means unique to twin study designs.

The results are also contingent on the assumption that the more similar environment MZ twin pairs share in childhood has no significant effect on the trait under analysis. MZ twins more often dress alike, share a room, and are more likely to share friends (Kendler and Gardner 1998). Numerous studies have investigated the validity of the equality of twin pair environments using a variety of measures, including perceived zygosity versus true zygosity, twin and parent self-report of childhood treatment, ratings of physical similarity, and specific environmental measures to name a few (Kendler et al 1994; Mitchell et al 2007).

However, unlike social attitudes, personality, political preferences, and a host of other social and psychological traits, there is little research on the equality of twin environments for gender. Indeed, we consider the possibility, particularly for Childhood Gender Nonconformity, that greater MZ similarity could be partially influenced by more similar childhood experiences imposed upon them. While it would be extremely bizarre if not impossible for parents to socialize MZ twin pairs in a more similar manner and DZ twin pairs in a less similar manner on political traits, we consider the possibility that unequal environments may be influencing behavior differently for MZ and DZ twins. Hatemi et al (2009) explored a longitudinal set of twins aged 9-19 every two years and found no difference in MZ DZ co –twin similarity for political traits. While no measures on gender have previously been explored, in studies of personality, which presumably function in a similar manner to gender identity, unequal environments have been found to have little effect on MZ co-twin similarity (Bouchard et al 1990). In this sample, we also found no evidence that unequal environments influenced co-twin similarity. Reviewing Table 7, the unlike sex twin correlations are not unlike many of the same-sex DZ twin correlations. If unequal environments were significantly influencing the different twin groups in different manners, we would expect to find great differences between the unlike sex DZ twins and same sex twins. In addition, means and variances were not significantly different between twin groups of the same sex. Taking every precaution to ensure we account for the potential of environmental dissimilarity, we modeled the means and variances separately for each zygosity group in the structural analyses. Without specific, yet to be determined, environmental measures regarding gender influences, we cannot definitely rule out that some portion (however small or large) of increased MZ correlation is due to an imposed environment specific to being an MZ twin. However, based on the extant literature, modeling techniques used, means and variances for each group, and the twin pair correlations, this concern is severely diminished.

Finally, twin modeling only provides a rough estimate and the extremely important first step in identifying whether genes influence a trait, to what degree, and what other factors share genetic variance with the trait. DNA analyses, neurological studies, and hormonal assays, which measure the influence of specific genetic markers, and hormonal influences, offer more precise measures. It is only to this preliminary step that we undertake this initial study of gender.

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