

Fear as a Disposition and an Emotional State: A Genetic and Environmental Approach to Out-Group Political Preferences

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Abstract: Fear is a pervasive aspect of political life and is often explored as a transient emotional state manipulated by events or exploited by elites for political purposes. The psychological and psychiatric literatures, however, have also established fear as a genetically informed trait, and people differ in their underlying fear dispositions. Here we propose these differences hold important implications for political preferences, particularly toward out-groups. Using a large sample of related individuals, we find that individuals with a higher degree of social fear have more negative out-group opinions, which, in this study, manifest as anti-immigration and pro-segregation attitudes. We decompose the covariation between social fear and attitudes and find the principal pathway by which the two are related is through a shared genetic foundation. Our findings present a novel mechanism explicating how fear manifests as out-group attitudes, and accounts for some portion of the genetic influences on political attitudes.

Fear makes man unwise in the three great departments of human conduct: his dealings with nature, his dealings with other men, and his dealings with himself. Until you have admitted your own fears to yourself, and have guarded yourself by a difficult effort of will against their myth-making power, you cannot hope to think truly about many matters of great importance ...

Unpopular Essays (1950), "Outline of Intellectual Rubbish" Bertrand Russell

Much work in political science has investigated the way in which fear drives the public to support policies toward out-groups (Abramson et al. 2007; Witte and Allen 2000), including the elite's and media's use of fear to manipulate the mass publics through the invocation of threats, anxiety, and other negative emotions (Ansolabehere and Iyengar 1995; Brader 2005; Lupia and Menning 2009). In this way, fear is conceptualized as an activated state of emotion triggered by a variety of stimuli. For example, Skitka, Bauman and Mullen (2004) found that in response to 9/11, individuals who were angry but not fearful supported expanding the war beyond Afghanistan, while fearful but not angry individuals supported deporting Arab Americans and first generation immigrants. On the other hand, a separate stream of research has demonstrated that people also differ in their underlying fear disposition (Kendler, Myers and Prescott 2002; Kolassa et al. 2008; Neale and Fulker 1984). These differences are partly due to genetic factors which help account for individual differences in perception of an event, and predict racial and out-group bias absent particular fear-triggering stimuli (Balter 2010; Meyer-Lindenberg, Mervis and Faith Berman 2006; Olsson et al. 2005; Santos, Meyer-Lindenberg and Deruelle 2010). In this way, fear constitutes both a genetically informed, stable, but malleable trait-based disposition, as well as a transitory state-based response that can be elicited or manipulated by environmental conditions. However, the inclusion of trait-based fear dispositions to elucidate out-group political preferences has so far remained largely absent from the political behavior

literature. Such integration appears especially significant in light of the role that genetic and other biological factors have on attitude formation, including out-groups (Hatemi, Gillespie, et al. 2011; Kaplan, Freedman and Iacoboni 2007; Oxley et al. 2008; Schreiber and Iacoboni 2012). Here we seek to fill this lacuna by examining the trait component of fear dispositions, and exploring how these dispositions influence out-group attitudes through a developmental and genetic pathway.

We rely upon psychological theories of attachment to provide a foundation for the relationship between fear dispositions and out-group attitudes. These developmental theories suggest that people who are naturally more prone to insecure attachments to others, and thus disproportionately fear the loss of such attachments, are also more prone to being anxious of new people and novel situations that might threaten those relationships. This social fear influences other evaluative domains, including attitudes toward out-groups. We then embed behavioral genetic approaches that have demonstrated that genetics plays a role in the transmission of both fear and attitudes, within developmental theory, to explicate the link between baseline levels of fear and out-group attitudes. In sum, we tie dispositional differences in social fear to political preferences through genetic mechanisms embedded within processes of attachment and exclusion (Santos, Meyer-Lindenberg and Deruelle 2010).

Synthesizing these literatures, we hypothesize that individual differences in fear dispositions, particularly social fear, help account for differences in political attitudes toward out-groups. Such fear dispositions are part of one's genetically informed psychological architecture, which, in concert with processes of social development, can either instigate or ameliorate fear of unfamiliar people and uncertain situations, among other things.

This study differs from previous work on the political impact of fear in several critical

ways. First, rather than concentrate on the state based, environmentally contingent, socially conditioned response component, this study focuses on the trait component of fear. We argue that individuals differ not only in their transitory reactions to particular stimuli, but also in their underlying fear disposition. This disposition, in turn, guides the environments people select into, how they process information, and their emotional and cognitive state; these responses ultimately affect their attitudes toward out-groups. While it has been critically important to identify those environmental factors that are most likely to stimulate or manipulate fear in state-based conditions, the delineation of such trigger mechanisms provides little information regarding underlying dispositional differences in fear that may have a critical role that guides individuals to select into particular experiences and environments. Second, the introduction of a trait-based, genetically-informed perspective on fear could help illuminate the role of biology in explaining political attitudes. Genetic influences on complex behaviors operate only through interdependent environmental and biological mechanisms that are moderated, instantiated and dependent upon developmental processes that are constantly modified throughout the life course (for a more complete description of this process see Hatemi, Byrne and McDermott 2012). Specifically, individual differences in fear dispositions and response may account for some portion of the genetic influence on political attitudes.

This manuscript proceeds as follows. We first elaborate our theoretical argument that integrates theories of attachment, defensive exclusion and social fear to explain individual differences in out-group attitudes. Our empirical analyses follow, and rely on a large U.S. population based sample of related individuals who self-reported their general phobic fear dispositions and political attitudes, along with a subset who were assessed for social-fear by a health professional. The sample includes both parents and offspring, thus allowing for a limited

exploration of parent-child relationships in fear dispositions and attitudes. The sample also includes monozygotic and dizygotic twin pairs. Thus, we investigate the extent to which the relationship between fear dispositions and attitudes derive from shared genetic and environmental variance. In so doing, we provide evidence that people do possess different baseline propensities to experience fear, and these differences are predictive of out-group attitudes. We conclude by discussing the mechanism by which fear and out-group attitudes are related. We suggest that people are not expected to be more fearful because they are conservative; rather, individuals who are more fearful tend to espouse less supportive policies toward out-groups, and this process operates through a common genetic pathway.

Psychological Approaches to Fear

Fear anxiety does not represent a preference. Rather, fear response is preferentially and automatically activated by aversive contexts. This process often remains outside of conscious mental control, but its degree widely varies, and is dependent upon one's disposition (Öhman and Mineka 2001). Genetic influences account for up to 50% of individual variation in adult phobic-fear dispositions (Kendler et al. 2001; Neale and Fulker 1984). These dispositional fear differences are embedded within the psychological architecture of the individual, and exert influence throughout one's life, including downstream preferences, and alter how one selects into and experiences specific environments. They emerge in varying contexts, particularly when confronting uncertainty (Kagan, Reznick and Snidman 1988).

Several theoretical approaches have attempted to capture this dynamic. The most prominent approaches relevant to the development of political dispositions in relation to fear, concentrate specifically on the consequences of espousing an overall conservative political ideology. Because this approach is well known in the political science literature (Brader 2005;

Jost et al. 2003; Jost et al. 2007; Lupia and Menning 2009), we only summarize key aspects of it here, and instead concentrate below on those aspects of the attachment literature central to our study. In the forefront of this line of thinking, Jost et al. (2007) suggest that people become politically conservative because conservatism serves as a coping mechanism that allows individuals to manage their uncertainty and fear (for an earlier application see Wilson 1973). This argument rests on findings that conservatives are more likely to perceive the world as a dangerous place and thus remain more fearful. Accordingly, threat and uncertainty in the environment leads to increased fear and anxiety, which in turn heightens aversive motivations. In support of this argument, Jost et al. (2003) report that conservatives possess a greater fear of crime, terrorism, and death, and hold more prejudicial attitudes toward members of deviant (perceived) or stigmatized groups, at least in part because of their chronically elevated levels of threat. In this way, conservatism is understood as constituting a broadly motivated social belief that operates to manage uncertainty, control a sense of threat and exert mastery over fear.

Less included in political science explorations are developmental approaches that examine effects from conception to old age. These approaches are largely compatible with the current literature we noted above. From a developmental perspective, acute fears and phobias lead to increases in psychological discomfort, which in turn influences preferences and behaviors. Historically, developmental perspectives have focused more on general social emotions, attachment, perception, relationships and interactions without explicitly incorporating political content, although the applications to political topics appear evident. Explorations of out-group bias have obvious implications for political policies regarding immigrants and minorities, and we explicitly delineate that extension in this study.

With regard to out-group bias, two theoretical foundations emerge pertinent to this study:

psychological attachment and defensive exclusion. Attachment theory illuminates the relationship between anxiety and behavior in light of the trade-off between affiliative and exploratory motivations (Ainsworth and Bowlby 1991).¹ Children manifest individual differences in the balance they display between fear and sociability when confronting unfamiliar situations and individuals. Children who have insecure attachments experience more fear, and, in turn, more aversion to novel people and situations throughout their lives (Mikulincer, Gillath and Shaver 2002; Mikulincer and Shaver 2001). In this way, fear of unknown others and out-groups spawn threats to in-group attachment. These insecure attachments are measured by early infant responses, and are believed to result from the combination of innate and environmental factors, such as genetic, epigenetic, in-utero, physiological and social mechanisms that are part of early-life development (Kendler et al. 2008; Olsson et al. 2005). Indeed, children from healthy families' exhibit differing degrees of social fear. However, negative social support in childhood would almost certainly have a role in manifestations of social fear.

Those with greater fear dispositions will experience greater discomfort toward novel social situations or unfamiliar others, and as a result prove less willing to interact with new people or environments. Even those individuals with only slightly elevated social fear dispositions are more likely to avoid novel situations, strangers and unlike others. This may lead predisposed individuals to espouse more exclusionary or segregationist policy preferences toward out-groups and dissimilar others. For example, Antony et al. (2005) found that adults with a higher degree of social anxiety and increased fear of novel social situations have a higher threshold for perceived similarity and in-group affiliation, and are less likely to compare

¹ There are some differences in the ways that clinical, social and political psychologists conceptualize fear and anxiety, and whether these phenomena are viewed as dispositions, basic emotions or pathological symptoms; we acknowledge the validity of all three established positions.

themselves positively to dissimilar others. Furthermore, threat and in-group attachment constitute key factors that can precipitate exclusionary out-group and affiliative in-group reactions. Conversely, making people feel secure and accepted by others exerted a greater effect on reducing negative reactions to out-groups than inducing positive affect, even in the presence of threat (Mikulincer, Gillath and Shaver 2002; Mikulincer and Shaver 2001).

The second key innovation that emerged from the developmental work on attachment revolves around the notion of defensive exclusion, whereby fear prevents an individual from fully assimilating new information (MacLeod and Mathews 1991). In a state of fearful sensory overload, a person will unconsciously defend against additional cognitive demands. Social processes related to attachment, and their associated feelings of exposure, risk of rejection or injury, and vulnerability, remain particularly susceptible to defensive exclusion, especially among those who are insecurely attached (Mikulincer and Shaver 2001). Defensive exclusion is most likely to become activated under conditions of loss, or perceived threat of loss (Ainsworth and Bowlby 1991). When confronted by the perceived threat of loss, individuals remain less comfortable around strangers, and less willing to subject themselves to new situations precisely because such environments raise fear anxiety. Loss need not be personal to be experienced as salient and relevant; its representation can easily exist on a conceptual or symbolic plane. Regarding political attitudes, for example, it is easy to imagine that many people might perceive immigration as constituting a threat of job loss (Lapinski et al. 1997), even if that may not actually be the case. In this way, fear anxiety prevents an individual from fully or properly assimilating input which seems especially socially threatening (Garcia and Koelling 1966).

Defensive exclusion also prevents individuals from entering situations where they might learn that such novelty need not necessarily prove threatening, as when new experiences or

greater education might expose a person to unfamiliar people or events in a context of safety or reward. When fear is not triggered because a person only selects into environments with which they are familiar, their avoidance behavior becomes reinforced and encouraged.

Connecting Fear Dispositions to Political Preferences through Genetic Mechanisms

In summarizing the combined psychological and political science literatures above, we conclude that individuals with higher levels of social fear maintain a higher baseline bias against out-groups (Antony et al. 2005). The applicability of this model to political preferences in a western context is most profitably explored by examining people's views on political out-groups. Therefore, we expect levels of social phobia, which refers to discomfort with novel social situations, reflects a threshold for comfort with unfamiliarity or dissimilar others. This fear trait then influence political attitudes toward out-groups, such as immigrants or ethnic minorities, because these groups represent precisely those kind of stimuli that more fearful people would be expected to find most threatening. This intuitive aversion should manifest itself either in promulgation of punitive policies directed against out-groups, such as support for anti-immigration policies, or protection of the in-group by exclusionist policies such as segregation.

The hypotheses above however, represent only one layer in the explication of the relationship between social fear and out-group attitudes. A growing amount of evidence indicates that political orientations are genetically influenced (for a review see Hatemi and McDermott 2012), and neurobiologically² linked to emotions such as threat and fear of loss (Kaplan, Freedman and Iacoboni 2007; Oxley et al. 2008; Schreiber et al. 2009). Specifically, it has been proposed that genetic influences on out-group stereotyping operate through a

² Here we use “neurobiological” to refer to the pathway that connects genetic disposition and expression with hormone release, neurological and physiological function and cognitive and emotive responses.

psychological mechanism of social fear (Santos, Meyer-Lindenberg and Deruelle 2010).

Thus, we also expect that a critical pathway by which political out-group attitudes are linked with social fear is through a shared genetic mechanism. Such complex relationships are often studied in the context of extreme behavior. Perhaps the most extreme example suggesting a genetic link connecting fear and out-groups revolves around individuals with Williams Syndrome, a genetic disorder that, among other conditions, results in the lack of a normal perception of social threat or sense of fear. Typically, young children develop strong racial and sexual stereotypes by age 3, but children with Williams's syndrome do not develop racial and out-group stereotypes, although they do develop standard sexual stereotypes. These "socially fearless" children do not manifest the kind of out-group discrimination that typically characterizes normal subjects; rather, they maintain an unusually cheerful demeanor and an incredible ease with strangers. The findings from this extreme condition suggest that social fear derives, at least in part, from a biologically informed mechanism by which normal variation may arise in a healthy population. In this way, the process by which fear emerges and is maintained is in part genetically influenced, but the target group to which fear is directed is likely completely social in identification. Society, family, culture, experience and exposure determine who the out-group is, and a genetically informed social fear disposition has some role in regulating the level of anxiety and sensitivity to the out-group threat. By extension, the underlying mechanism that connects social fear with out-group bias should also be expressed more subtly within normal populations which vary in their genetic liability, and manifest in an observable way through everyday political attitudes (e.g., toward immigration).

If the hypothesis of genetic variation in the population is correct, social fear and out-group attitudes might each represent different manifestations of a single underlying common

genetic factor, albeit expressed in different domains. These dispositions might then influence individual differences in such areas as discomfort around novel situations and people, expressed as either social phobic-fear or political attitudes, depending on the domain. In this way, social fear provides a measure of the anxiety individuals experience toward unfamiliar others, and this fear and negative attitudes toward political out-groups covary because they share a common genetic origin. Note that genetic factors do not exist independent of the developmental processes related to attachment and defensive avoidance; rather, they are part of the overall developmental pathway. We explicitly test these hypotheses below.

Data, Methods and Results

The full sample consists of 29,682 kinships (8,636 families), including twins (14,753), non-twin siblings (3,184), parents (2,362), offspring spouses (4,390) and other relatives (4,993). This constellation of relatives has been particularly useful in identifying modes of transmission for complex traits (Eaves et al. 1999). The sample was initially derived from a population registry that originated in the late 1970s when Virginia Commonwealth University, in collaboration with the Virginia's Vital Records Office, established the Virginia Twin and Family Registry (VTR) by accessing all birth records in the state. The sample was increased by a national mailer sent to the American Association of Retired Persons, which account for 60% the original sample. In the 1990s, the North Carolina Population Registry (NCTR), which was developed by accessing automated birth records from the North Carolina Department of Environment, Health, and Natural Resources, was merged with the VTR. The VTR and NCTR, along with birth records from the South Carolina Department of Health and Environmental Control, are now named the Mid Atlantic Twin Registry (MATR). A large questionnaire on "Health and Life Styles" (HLQ) was first administered to the MATR in the late 1980s. The

sample is nearly all Caucasian (> 99%), but includes demographic measures such as income, marital status and education, as well as political attitudes, and a self-reported phobic-fear scale, which assessed discomfort experienced due to fear *in the last 30 days*.

Numerous studies utilizing the population followed, mostly focusing on health traits. Of particular interest, Kendler, Myers and Prescott (2002) assessed over 7,500 individuals, including 3,000 complete twin pairs, for a *lifetime* history of 5 categories of phobic-fears using a clinician-administered adaptation of the Phobic Disorders section of the Diagnostic Interview Schedule III-A (Kendler et al. 1992). Approximately 2,970 of the 7,500 twins assessed in the clinical sample were a subsample of the original population of 29,682 from the HLQ; the other half was newly ascertained. Once combined, the data used in the current study is comprised of a very large population of relatives (29,300) who completed a *self-report phobic-fear* index (SRP), and a subset of 2,970 twins with clinical assessments (CAP) of 5 phobic-fears, all of which include self-reports of political attitudes taken during the initial HLQ (see Web Appendix 1 for sample demographics). We only included cases where respondents or interviewers answered or reported on 80% or more of the questions in each scale. Due to item missingness, sample sizes for the analyses ranged from 24,964- 29,300 in the SRP population and 2,753-2,970 in the CAP population. In order to ensure that the subsample was not biased in comparison to the population sample, we compared the means and standard deviations between the samples for relevant traits in the study (see Web Appendix 2). Due to the selection criteria for the CAP, there was a significant difference in age between the groups. However, differences in other demographics, attitudes and self-reported phobic-fear were not significant. For the overall population, initial response rates were 70% for the twins and 45% for first-degree relatives (Truett et al. 1994). For the CAP subsample, the response rate was 76%. More details on the ascertainment and other

metrics are reported elsewhere (Lake et al. 2000). Because the sample includes relatives, appropriate statistical corrections (e.g., clustering by family) were included in the analyses.

Political Attitudes

Political attitudes were measured by a 28-item Wilson and Patterson (1968) attitude index (see Web Appendix 3 for specific question and attitudes). This type of measure is more common in psychological studies than political science ones. The design allows for a quick assessment of the multidimensionality of ideological issue positions. A single *conservatism-liberalism* measure can be derived from the scale and has been used in previous analyses of this population and many others (Bouchard et al. 1990; Hatemi et al. 2010; Martin et al. 1986). We removed items not commonly defined as political (Modern Art, Astrology, and Divorce) and those that convoluted partisanship with attitudes (Democrats, Republicans, and Liberals). Our confirmatory factor analysis using the 22 political items yielded a single factor model with a root mean squared error of approximation of .057, which suggests that our model accurately accounts for the covariances between the measures. The factor is unimodal, and normally distributed (see Web Appendix 4 for a comparison to the more commonly used self-placed ideology measure). A lower score is more conservative, and a higher score is more liberal. Based upon the literature, research questions and subsequent hypotheses described above, we focus on those attitudes where *out-groups* are explicitly addressed. Therefore, we reduced the attitudes to create a scale named *out-groups*, measured by the raw sum scores of two attitudes, Immigration and Segregation. A score of 0 represents the most conservative score and a score of 4 the most liberal score. We include the general *conservatism-liberalism* score in the analyses for comparison.

Self-Report Phobic-Fear Dispositions

Self-Report Phobic Fear was assessed with an abbreviated Symptom Checklist 90 (SCL90) measure, which at the time was a widely used instrument of self-reported psychopathologies (Mattsson and al. 1969). The SCL90 included a phobic-fear anxiety dimension. There are many uses of the word anxiety, from colloquial to technical. We rely on the definition of phobic-fear anxiety as “a persistent fear response to a specific person, place, object, or situation—that is irrational or disproportionate to the stimulus and leads to avoidance or escape behavior” (Derogatis 1993, 9). This definition is not to be confused with general anxiety disorder, or other versions of anxiety. However, we note constructs of fear anxiety, phobic dispositions, social anxiety and general anxiety are correlated, share a common theoretical foundation and are similarly measured to varying degrees. Higher scores on the *self-report* phobic-fear measure (SRP) are typically associated with marked avoidant behavior. SRP is a blend of phobias and has reliability (alpha) of .85 (see Web Appendix 5 for specific questions, histogram and metrics). Respondents rated themselves on a 5 point scale (“Not at all” to “Extremely”) regarding how much discomfort they experienced *in the last 30 days* due to: “Feeling afraid to travel on buses or trains; Having to avoid things that frighten you; Feeling uneasy in crowds; Feeling nervous when left alone; and Feeling afraid in open spaces or on the streets”. The scale ranges from 0-20, with higher scores indicating greater phobic-fear anxiety. Importantly, 40% of the large (SRP) population reported at least some level of fear discomfort. The distribution is consistent with other large studies on phobic anxiety (see Web Appendix 6). Thus, the vast majority of the population does not suffer from phobic anxiety disorders that would require treatment. Rather, they represent the normal public who has at least some level of fear discomfort in varying domains, and we seek to use this variation to explore the relationship between this feature and political attitudes.

Clinically Diagnosed Social Phobic-Fear Disposition

Clinical diagnostic interviews were conducted on a subset of the population to provide a more in-depth assessment of the degree to which individuals were affected by *social* phobia. A *lifetime* history of phobic-fear was assessed with an adaptation of the phobic disorders section of the Diagnostic Interview Schedule (DIS) Version III, which is designed to measure the objective impact of fear on respondent behavior. In contrast to the DIS, where the respondent makes the judgment about fear-associated interference, in our study, the interviewer made this assessment. The clinical interviewer had at least a master's degree in a mental health related discipline or a bachelor's degree with at least 2 years of clinical experience. Members of a twin pair were interviewed by different interviewers unaware of clinical information about the co-twin. Details of the in-person interviews and diagnostic processes are reported in Kendler et al. (2001). Participants were scored using an algorithm with a 1 or 0 on fear of meeting new people, fear of giving a speech, fear of using public bathrooms, and fear of eating in public. Similar to most clinical traits, both the self-report fear and clinically evaluated social phobic-fear have a distribution where most people are relatively unaffected, followed by a skewed distribution of decreasing numbers of people as the level of phobic-fear increases (Web Appendix 6).

We reiterate one important distinction between the self-report measure and the clinician-assessed population; the CAP is a *lifetime* measure, while the SRP focuses on the *last 30 days*. It is likely that individuals in the SRP assessment have been experiencing discomfort due to these factors for a period longer than the last month. However, the SRP measure comes closer to assessing a state-based condition than the lifelong CAP assessment, which likely includes a higher proportion of individuals with trait-based tendencies potentiating chronic levels of social fear. We would expect the relationships to be stronger with the lifelong measures for this

reason. This difference in measurement may explain some of the differences between outcomes that we find in the analyses that follow.

The Relationship between Attitudes and Phobic-Fears

The relationships between *conservatism-liberalism* and *self-report* phobic-fear, and *out-group* attitudes and *social* phobia are all significant (Table 1). While we report all correlations for transparency, the relationship between *out-group* attitudes and *social* phobia remains the central focus of the paper as explicated in the hypotheses above.³ *Self-report* phobic-fear (last 30 days) appears significantly related to greater conservative attitudes in general (.08); however, the correlation between higher lifetime *social* phobia and negative *out-group* attitudes was far greater (.22).

(Table 1 about here)

Figures 1 and 2 provide locally weighted robust scatter plot smoothing with confidence intervals (Cleveland 1979) for these two pairings. Neither relationship is linear, though both maintain a consistent direction. However, there are important differences. Noting Figure 1, for overall *conservatism-liberalism*, small increases in *self-report* phobic-fear had only a modest influence on being more conservative; the slope is marginal until phobic disposition reaches a score of 13, about 65% of the maximum score of *self-report* phobic-fear. At this point the slope has a much more pronounced downward (more conservative) trend. Yet, there are very few individuals in this extreme phobic range (~0.3%) and there are only a handful of cases where people with elevated phobic dispositions are more liberal. Overall, the loess plot reflects the

³ The substantive relationships and significance of the remaining variables (SRP and out groups, social phobia and a general liberal-conservative measure) were nearly identical to the analyses presented. The variance decomposition was also only marginally different. In every case the majority of the variance was due to shared genetic covariation.

natural cut-point or threshold for phobic fear and only those in a “clinical range” display a substantial difference in *conservatism-liberalism*.

Concerning *out-group* attitudes (Figure 2), as the lifetime measure of *social* phobic disposition rises, it has an increasingly stronger relationship with more negative out-group positions. The confidence intervals provide reassurance that the slope is significantly different as social fear moves away from zero. The effect levels-off in the middle range, but continues on a greater downward slope (toward more negative out-group positions) once *social* phobia is at its highest value. This relationship differs from the relationship between general phobic fear and *conservatism-liberalism*. In sum, it requires an almost extreme phobic disposition to have a substantial influence on one’s overall conservative-liberal views. However, only a one-increment increase of *social* phobic-fear results in a near 25% shift on opinions toward *out-groups*.

(Figures 1 and 2 about here)

However, we caution not to over interpret these results. The difference in measurement and sample size may account for some of this disparity. The data are also heteroskedastic, and most individuals do not have an extreme phobic disposition while attitudes are normally distributed. Thus, in order to test the veracity of the correlations and further assess the significance of phobic dispositions on overall *conservatism-liberalism* and *out-group* attitudes, multivariate robust regression analyses (Huber-White) with covariates (*sex, age, religiosity, education, marital status, and income*) were conducted (see Table 2)⁴. Since the population is Caucasian, ethnicity was not included in the analyses. The relationship between *self-report* phobic-fear and *conservatism-liberalism* is significant, but meager ($\beta=-0.07$); rather, *education* ($\beta=0.23$) and *religiosity* ($\beta=-0.23$) were the best predictors of *conservatism-liberalism*. On the

⁴ Additional regressions with quadratic and cubic terms are presented in Web Appendix 7.

other hand, *social phobic-fear* ($\beta=-0.39$) was one of the strongest indicators of *out-group* attitudes; *education* ($\beta=0.32$), remains equally important.

(Table 2 about here)

Based on the correlations, loess plots and regression results, individual differences in general phobic-fear dispositions have at best a marginal influence on overall *conservatism-liberalism*. However, relying on imperfect data, and accepting the limitations in our statistical models, the relationships between *social phobic-fear* and *out-group* attitudes appear robust. The findings provide support for the hypothesis that a higher degree of social phobic disposition, which in a general sense involves a fear of unfamiliarity, and in our measures include a sense that social contexts can be dangerous, including fear of social exposure, of being awkward, and of feeling humiliated in social contexts, results in more negative positions toward *out-groups*.

The fear measures we used here were designed to diagnose or identify phobic-fear anxiety and are limited in many ways. Nonetheless, the measures show some predictive power because the diagnostic criteria for measuring social-fear address social contact with people or events that are unfamiliar to them. Thus, we can use the measure effectively in the current study. Ideally, this recognition will encourage the development of measures specifically tailored to identify social fear anxiety relevant to out-groups. Just as other clinical measures demonstrated validity when employed in normal populations (e.g., personality), we start with a measure designed to assess social fear, and employ it for its utility in assessing a constituent aspect, discomfort with unfamiliar persons and social situations, expressed as social attitudes.

The Nature of the Relationship between Phobic-Fears and Political Attitudes

Not everyone will react the same way to identical stimuli, at least partly because not everyone starts from the same baseline level of fear anxiety; and, as we have demonstrated,

individual differences in fear dispositions exist, and these differences account for variance on political attitudes. Earlier we identified an approach that suggests that the mechanism by which social fear manifests as out-group bias operates through a shared genetic factor (Olsson et al. 2005; Santos, Meyer-Lindenberg and Deruelle 2010). Therefore, we test whether such an association may exist in political domains as well. Individual differences in these dispositional tendencies would be expected to lead to greater or lesser support for political positions that appear to “protect” the individual from perceived harm by reducing exposure to unfamiliar peoples (e.g., exclusionist positions on immigration, etc.).

As a first step to exploring the mutual transmission of fear and attitudes, we explore the parent-child relationships between *conservatism-liberalism* and *self-report* phobic-fear and *out-group attitudes* and *self-report* phobic-fear. Unfortunately, we did not have enough cases where the professionally assessed measures of *social fear* and attitudes were collected on combinations of parents and children.

First, we find no relationship whatsoever between parents’ *conservatism-liberalism* or *out-group attitudes* and their offspring’s *self-report* phobic-fear (over the last 30 days). No correlations were significant and all approached zero. Parents who are more conservative do not appear to have offspring with a greater fear disposition. What of the reverse? Do parents with a greater fear disposition have offspring that are more conservative in general? To a modest degree, it first appeared so (Web Appendix 8). If one or both parents have higher levels of *self-report* phobic-fear, there is a significant, but modest correlation with more conservative offspring attitudes (up to 0.11 for both parents) and lesser but significant correlation with out-group attitudes (0.07). When controlling for education, the relationship between parental fear and general left-right attitudes is modestly attenuated (0.09). However, the correlation between

parental fear and out-group attitudes is substantially reduced when controlling for education (0.04) and no longer significant. These finding provides some hint that the causal path operates through fear and not through attitudes; yet education of the parents has an important role in mediating fear of out-groups. In addition, the findings also hint at the potential for passive gene-environment covariation, where the parents create a specific home environment influenced by their own genetic characteristics, which may be competing (e.g., education vs. fear). However, because we do not have the combination of social fear and attitudes in the parent-child dyads, we do not know if such findings hold true for social phobic fear.

Sources of Covariance

Central to our exploration is the insight gained by identifying the sources of covariation between political attitudes and fear dispositions, with a specific focus on out-group attitudes and social fear. Based on the loess and regression analyses above, we note the relationship between phobic fear and *conservatism-liberalism* is tenuous. Indeed, we find little evidence that conservatives in general are more phobic or fearful and whatever relationship exists is driven by those individuals in the most extreme phobic range. Nevertheless, we include the relationship between a general phobic fear measure and *conservatism-liberalism* in the following analyses for consistency.

In our sample, the familial correlations for attitudes are quite high (0.3-0.6), and are reported elsewhere in the literature (Eaves et al. 2011, also see Web Appendix 9). For *self-report* phobic-fear (SRP), husband-wife pairs and non-twin siblings are significantly correlated (ranging from 0.12-0.13, see Web Appendix 10). For both attitudes and SRP, the monozygotic twin pair correlations are much larger than the dizygotic twin pair correlations, which more closely resemble that of non-twin sibling pairs. Such patterns provide a strong reason to suspect

genes play some role in both traits and are consistent with the literature regarding phobic dispositions and out-group bias.

We next formally identify what proportions of the relationships between attitudes and phobic-fear dispositions are due to mutual genetic and environmental influences. The classical twin design decomposes variance into additive genetic (A), shared (common) environmental (C), and specific (unique) environmental (E) variance. A univariate genetic model can be represented by the following linear equations:

$$\begin{aligned} 1) P_i &= aA_i + cC_i + eE_i \\ 2) V_P &= a^2 + c^2 + e^2 \end{aligned}$$

where P is the phenotype of the i th individual, scaled as a deviation from zero. A , C , and E can be conceived of as uncorrelated latent factors with zero mean and unit variance. a , c , and e are factor loadings of the observed variable on the latent factors and V_P is the phenotypic (trait) variance. Squaring of the factor loadings yields the different components of variance.

Correlations between the latent additive genetic factors were set to 1 for monozygotic twins (MZ), who share their chromosomal sequence, and 0.50 for dizygotic twins (DZ), who share on average 0.50 of their genetic heritage. Correlations between the latent common environment factors were set to 1 in both MZ and DZ twin pairs, as it is assumed that no systematic differences by zygosity are present with regard to familial rearing that influence attitudes or fear dispositions. Unique environment is a free parameter. Similar models used to explore the genetic influence on political attitudes and voting behaviors have become increasingly common (for a review see Hatemi, Dawes, et al. 2011). An explanation of the methods tailored to political scientists was presented by (Medland and Hatemi 2009). Extension to a bivariate analysis, named Cholesky decomposition, allows for exploration of the source of the covariance between two or more phenotypes (for more detail see Neale and Cardon 1992).

We applied a bivariate Cholesky structural equation model to the twin data in the statistical package Mx, to assess the magnitude of the genetic and environmental influence shared between phobic-fear and political preferences (for a recent example applied to voter preference see Hatemi et al. 2007). The bivariate Cholesky imposed a stratified structure on the latent factors hypothesized to determine the measured phenotypes, with one set of factors (A_1, C_1, E_1) influencing phobic-fear, and a second set (A_2, C_2, E_2) accounting for residual influences specific to political preferences. The cross paths (A_{12}, C_{12}, E_{12}) account for the shared covariance of each latent factor (Figure 3). Any variance accounted for by the second factor in the model (political attitudes) is anything left after variation is accounted for by the first factor (phobic-fears). This factor structure is modeled as a lower diagonal matrix (containing the path coefficients), multiplied by its transpose to produce the full factor model. This factor pattern is repeated for each of the three (ACE) concurrently modeled sources of variation.

(Figure 3 about here)

Based upon the measures in the study, the relationship between *conservatism-liberalism* and *self-report* phobic-fear utilized a continuous data model, and the relationship between *out-group* attitudes and *social* phobic-fear, utilized a threshold model. The Cholesky's ability to accurately estimate the nature of covariance between traits is improved when the correlations are not small and the sample is large. The correlation between *social* phobic-fear and *out-group* attitudes was -0.22, with a modest sample size of 2,708, while the sample size for *self-report* phobic-fear and *conservatism-liberalism* was very large (11,206), with a small correlation of -0.08. Regarding multivariate variance decomposition, relationships that are not substantially correlated are difficult to interpret. We report only the full ACE model estimates (additive genetic, common environment, unique environment). A general bivariate model with phobic-

fear was entered as the first variable and attitudes as the second variable were fit to the data. Latent factors were divided into environmental and genetic factors: 1) specific to fears; 2) common to fears and attitudes; and 3) specific to attitudes. Table 3 provides estimates on what part of the correlation between phobic-fears and political attitudes are accounted for by mutual genetic influence and mutual environmental influence. In both instances, the greater part of the covariation between the phobic-fears and attitudes, (62 and 75 percent), was due to a shared genetic influence. Four to nine percent of the covariance was accounted for by shared common environmental influences and 21 to 29 percent of the covariance was accounted for by shared unique environmental variance. While the relative proportion of the covariance is largely genetic, the total covariance is modest. Roughly, in our model, a common genetic factor accounts for a total correlation of 0.05 between fear and overall conservatism-liberalism, holding all other influences constant, while a common genetic factor accounts for a total correlation of 0.17 between social fear and out-group attitudes.

In summary, the evidence suggests that both lifetime and recent phobic dispositions and higher endorsement of out-groups attitudes share a latent genetic factor, though the results for recent phobic dispositions are tenuous. Theoretical and empirical contributions in the extant literature propose the genetic pathway regarding out-groups operates through social fear; however, the Cholesky decomposition used here cannot identify the causal direction. Determining the direction of causation remains an area of future research.

(Table 3 about here)

Limitations

While similar relationships between general out-group biases and social fear dispositions have been reported in the genetics, neuroscience, psychiatric and psychological literatures using different approaches (Antony et al. 2005; Faulkner et al. 2004; Inbar, Pizarro and Bloom 2012;

Meyer-Lindenberg et al. 2006; Mikulincer and Shaver 2001; Navarrete and Fessler 2006; Olsson et al. 2005; Santos, Meyer-Lindenberg and Deruelle 2010), it is premature to make a definitive generalization regarding our findings on political out-groups and social fear. Replication on additional populations, and in different cultures, contexts and political systems should be pursued. As we clarify through each step of the analyses, the data provide many benefits, but remain fallible. The *self-report* phobic-fears measures (over the last 30 days) are highly reliable ($\alpha=0.85$), but the clinician diagnosed lifetime measures were less reliable ($\alpha=0.60$) than political orientations ($\alpha=0.81$). The advantage of using Diagnostic and Statistical Manual of Mental Disorders criteria lies in their clinical relevance, and they are widely published and replicable. The disadvantage is that they are consensus based, and their classifications of a particular behavior or profile are tailored toward clinical diagnoses. Because these traits are often treated and managed, they do not uniformly manifest. The lower levels of test-retest reliability of the professionally assessed lifetime phobias in subsequent assessments are due to a combination of factors, including multiple raters, treatment, exposure (increased familiarity), variable memory, recall, salience, and social desirability, among many other factors. Our sample is large; nevertheless, the biases introduced from using an all-Caucasian population based study of kinships in the U.S., with the clinical measures taken on a subsample of the population in a second wave, are unknown. Kinship studies are not random by design, and it is possible the results only pertain to this population or sample. However, the availability of repeated measures to assess attitude stability, and the multiple measures of fear, both self-report focusing on the last 30 days, and a clinically-diagnosed lifetime measure of social fear, and the comparable relationship between ideology and partisanship in our sample with that of the American National Elections Studies for the same years (Web Appendix 4), as well as the similarity in the fear

response to those on numerous other populations, provide confidence to our results.

The theoretical and mathematical foundation of variance components modeling on twin pairs reared together has been widely discussed, together with its limitations (Hatemi, Alford, et al. 2009; Hatemi, Byrne and McDermott 2012; Kendler et al. 1993; Medland and Hatemi 2009). Of primary concern is a potential for unequal environmental sharing by zygosity type. Kendler et al. (1993) explored the potential for unequal environmental sharing on phobias, while Hatemi, Funk, et al. (2009) found no evidence of unequal environmental sharing on political attitudes in a longitudinal study of twins from childhood to adolescence. Littvay (2012) and Smith et al. (2012) found that similar treatment in childhood had no influence on political attitudes by zygosity type later in life, and Hatemi et al. (2010) found that for most attitudes, twin specific environments did not account for a significant portion of the variance. Taken together, these studies provide strong evidence that influences of political socialization are not unequally shared by zygosity type with regard to attitudes. Finally, it is important to note that twin models only provide a first step in explicating how genetic and social process work together to inform behavior. They provide broad estimates of latent influences. Our structural models do not estimate gene by environment interaction, gene-environment covariation, or account for epigenetic processes. Longitudinal, extended kinship, specific environmental measures, and molecular designs are required for such an undertaking, and offer important next steps to clarify the nature of the genetic relationship between social fear dispositions and out-group political attitudes.

Discussion

We merged approaches from developmental psychology, psychiatry, genetics and political science to provide an empirically supported theoretical foundation describing the

ontological basis for how fear dispositions can help account for out-group attitudes. Drawing on attachment theory, genetic disposition and fear of unfamiliarity and uncertainty, we suggest that one critical pathway by which people develop out-group attitudes is through the psychological trait of social phobic-fear.

Specifically, using measures for general and social phobia, we investigated how differences in these dispositions account for differences in political preferences, absent an immediate or proximal fear-triggering event. We found that, while the relationship between the general measure of fear and overall *conservative-liberal* views was statistically significant in some analyses, it was not meaningful unless individuals had an extreme phobic disposition. Thus, conservatives are not invariably phobic; instead, extremely fearful people -- those above the threshold for clinical diagnosis-- who are very rare (<0.3% of the sample), are almost always conservative. This makes sense because people who are phobic or suffer from anxiety tend to be more conservative in most other, non-political, domains.

Central to our exploration was the relationship between social phobia and out-group attitudes. In contrast to the findings on overall *conservatism-liberalism*, even the lowest amount of measured *social* phobia, of which 24% of the healthy (not clinically phobic) population reported, was related to substantially less positive *out-group* attitudes. In models that included education, sex, age, religiosity, and income, level of social phobia remained an important predictor of out-group attitudes.

We then explored the source of this relationship between fear dispositions and attitudes, and found that the vast majority of the covariation is due to a common latent genetic construct that influences both the degree of social fear and negative out-group attitudes. Thus, political preferences represent a manifestation of a genetic disposition expressed within the context of

modern circumstances. Some people are differentially predisposed to remain more or less primed to acquire fears in response to novel circumstances and more or less sensitive to such threats (Kendler et al. 2008). It is precisely because such fears emerge in response to strange situations involving unfamiliar people and contexts that social fear, which inspires avoidance in the face of unfamiliar social situations, could provide protection when out-groups members do intend harm. In this way, it becomes possible to hypothesize a unified underlying psychological construct that produces a continuum of fear in response to *out-groups* and a generally calibrated divergence across the ideological spectrum. Certain environmental circumstances would favor individuals who affiliate with unfamiliar others (cooperate) and explore (and thus risk threatening encounters), while other conditions would reward less cooperation, greater fearfulness and mistrust of others. It seems likely that these conditions continue to fluctuate across both time and place, which has maintained genetic variation in the population.

However, as noted at the outset, genetic influences are not independently determinative in expressing any particular trait or attitude. Nor do they operate through a direct mechanism or remain inflexible. While the statistical estimates often treat genetic and environmental influences as independent due to limitations in data and technology, the biometric theory, which undergirds such models, assume that they are interdependent. That is, outcomes of interest, such as out-group attitudes, represent the culmination and integration of all the innate processes, events, life experiences and environmental triggers experienced by individuals, each of whom remains biologically unique. Fear offers just one pathway by which non-inclusive beliefs or practices might emerge, and only one of the pathways by which genes influence the formation of out-group attitudes in any given context. A full description of all sources of individual differences is beyond the present study and involves numerous complex interactions. Perfectly

capturing such interactions remain more complex than any one statistical approach allows. However, previously distinct approaches that include the use of psychological experiments, family life, personal experiences, physiology, hormones, neurology and genetics to examine these relationships are now beginning to converge; each provides critical information regarding the pathways that influence behavior, and each informs the other. For example, threat perception has been found to mediate attitudes toward minorities (Canetti-Nisim et al. 2009), while social threat potentiates authoritarianism (Duckitt and Fisher 2003; Stenner 2005). Further, experimental designs focused on emotions find that hatred mediates fear (Halperin, Canetti-Nisim and Hirsch-Hoefler 2009), while other studies find that the hormone oxytocin regulates trust (Kosfeld et al. 2005), which in turn influences attachment and anxiety; and attachment and anxiety encompass the two critical mechanisms that form our theory of how social fear influences out-group perception.

The need to integrate multiple approaches is apparent, because an increasing amount of work has focused on the effect of fear on political outcomes of interest, yet does so without including the potential for dispositional differences in fear prior to the stimulus (e.g., Druckman and McDermott 2008). We suggest future research that systematically assesses individual differences in fear dispositions across time might help researchers to examine if differences in both intercept and slope are related to fear disposition. Adding this element may provide increased understanding of differential susceptibility to various environmental contingencies, including media and elite appeals, among other stimuli.

Although we find a common genetic disposition mutually influences social fear and out-group attitudes, the relationship between any specific gene, fear disposition and a particular social or political attitude is not likely to be hard-wired. Indeed, people may have divergent

dispositions to be fearful of unfamiliar others, but long-term exposure to the unfamiliar makes it unfamiliar no more. It is important to note that along with social phobia, education had as large an influence on *out-group* attitudes. More highly educated people displayed more supportive attitudes toward out-groups. In addition, education had a substantial mediating influence on the correlation between parental fear and offspring out-group attitudes. In this way, the definition of unfamiliar may shift across time and location based on experience and education, and a genetically informed fear disposition is hardly permanent or fixed. In this sample, at this time, fear of out-groups is expressed as opposition to immigration and support of segregation. In the future, it could manifest in entirely different ways. We in no way suggest that racism, for example, is inevitable or “genetic” or that such genetic influences cannot be changed by particular developmental or environmental circumstances.

Conclusion

Political pundits often talk about the impact of fear on the public mindset as though its dynamics were self-evident. Yet the nature of such effects is not transparent. Fear affects individuals in different ways, and people are not uniform in their initial fear disposition. Rather, individuals possess different fear dispositions and react to threatening or novel people and environments in diverse ways, based, in part, on genetic differences. These effects are conditioned along particular developmental pathways that profoundly affect patterns of attachment, and operate through genetic predilections that connect social fear to out-group attitudes. Here we have shown that differences in phobic-fear propensity, specifically *social* phobia, systematically relate to differences on *out-group* issues. Our findings identify an important mechanism by which genetic differences influence political attitudes and indicate that *social* fear might serve as a foundation for some part of the edifice of certain aspects of political

ideology, which helps explain one of the ways in which emotion undergirds more complex cognitive structures.

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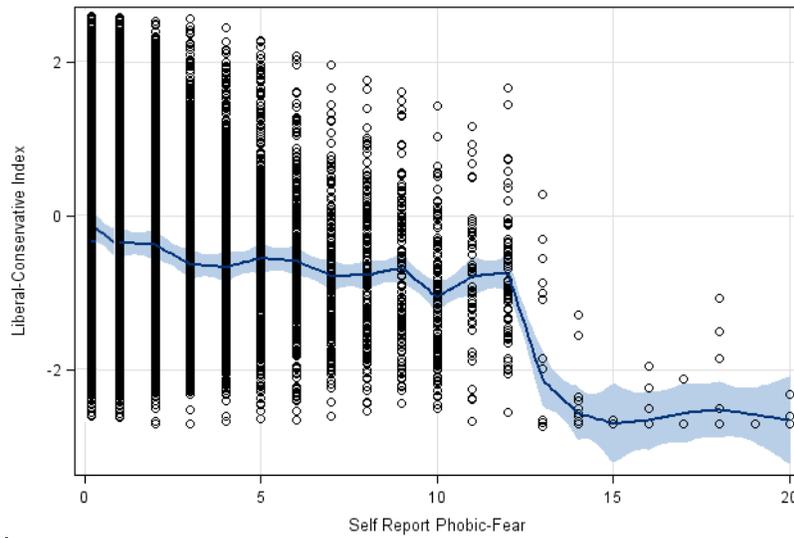
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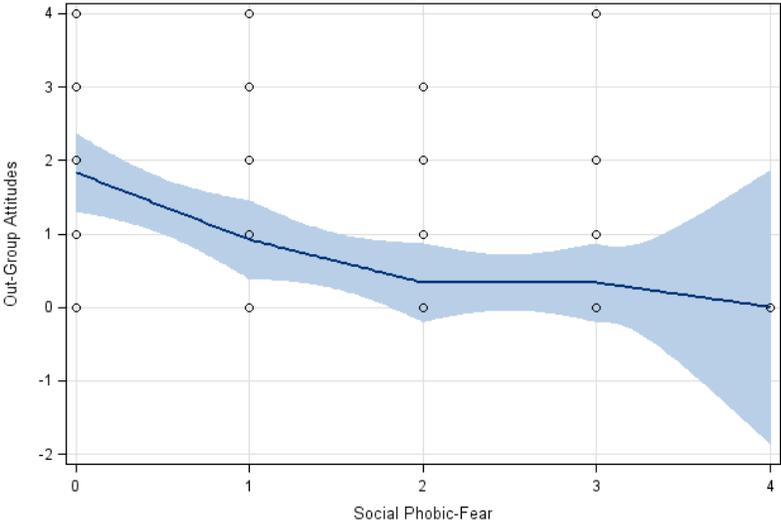
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Figure 1: Liberal-Conservative Index vs. Self-Report Phobic-Fear Loess Plot



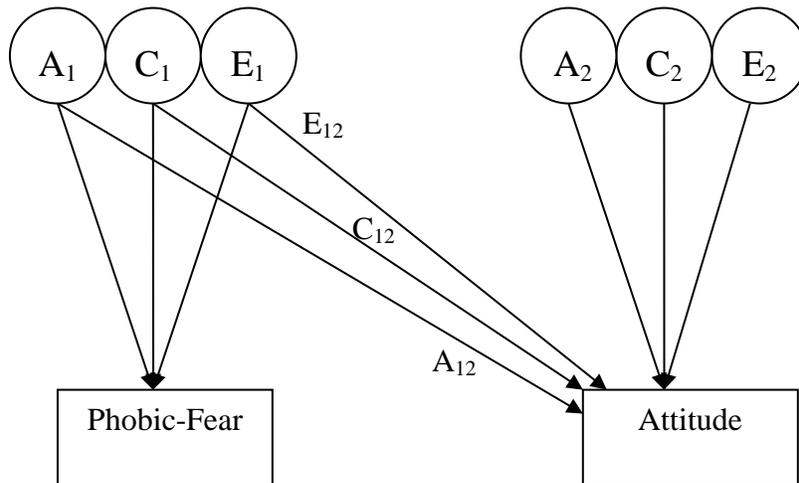
Notes: Figure contains the locally weighted robust scatter plot smoothing with confidence intervals, computed in SAS 9.2 (N=22,412). Higher scores on Phobic Fear indicate greater fear disposition, higher scores on Liberal-Conservative reflect attitudes that are more liberal.

Figure 2: Out-Group Attitudes vs. Social Phobic-Fear Loess Plot



Notes: Figure contains the locally weighted robust scatter plot smoothing with confidence intervals, computed in SAS 9.2 (N=2,708). Higher scores on Social Fear indicate greater fear disposition, higher scores on Out-Group attitudes reflect more supportive Out-Group policies.

Figure 3. Bivariate Cholesky



Notes: The observed phenotypes for twin 1 and twin 2 are shown in rectangles, and latent factors are shown in circles. Factor loadings of observed variables on the different latent factors are depicted beside the arrows. Correlations between the latent genetic factors in both models are 1 in MZ and 0.5 in DZ twins.

Table 1: Correlations between Phobic-Fears and Attitudes

	Conservative-Liberal Index	Out-Group Attitudes	N
Self-Report Fear	-0.08*** (-.09 , -.07)	-0.12*** (-.13, -.11)	22,412
Social Phobia	-0.08*** (-.12 , -.05)	-0.22*** (-.25, -.18)	2,708

Notes: *** p <.001, **= p<.01, *=p<.05. Self-Report Fear and Conservatism-Liberalism are continuous; the correlation is calculated by Pearson's r. Social Phobic-Fear and Out-Group Attitudes are ordinal measures, but are assumed to refle

Table 2: Regression Results: Attitudes on Phobic Fear Dispositions

	Conservative- Liberal Attitudes	Out-Group Attitudes
Intercept	-1.53 (0.05)***	1.92 (0.17)***
Self-Report General Fear	-0.07 (0.01)***	-
Clinician-Assessed Social Fear	-	-0.39 (0.06)***
Sex	0.18 (0.01)***	0.03 (0.04)
Age	-0.01 (0.00)***	-0.01 (0.00)
Religiosity	-0.23 (0.00)***	-0.03 (0.01)**
Education	0.23 (0.01)***	0.32 (0.02)***
Marital Status	-0.17 (0.01)***	-0.04 (0.05)
Income	-0.02 (0.01)***	-0.05 (0.02)*
R2	0.23	0.16
N	21,964	2,653

Notes: Standard errors in brackets (computed in SAS 9.2).

Table 3: Magnitude of the Different Sources of Covariance between Phobic-Fear and Political Attitudes (Standardized with 95% Confidence Intervals)

<u>Disposition</u>	<u>Attitudes</u>	Percent of Correlation due to Mutual:			N (pairs)
		Additive Genetic	Shared Environment	Unique Environment	
Self-Report Fear Index	Conservatism-Liberalism	0.62 (0.55-0.71)	.09 (.02-.14)	0.29 (0.16-0.44)	6,076
Social Phobia	Out-Group Attitudes	0.75 (0.59-0.97)	.04 (.00-.12)	0.21 (0.13-0.39)	1,354

Notes: Estimates obtained by the statistical package Mx (Neale et al 2003). Due to the combination of a normally distributed score for *conservatism-liberalism* and a 20-point index for *self-report fear* we also ran models which: 1) used the point biserial and asymptotic correlation matrices in a continuous model and 2) converted *conservatism-liberalism* into an ordinal measure for a threshold model. There were no substantive differences in the results from these models and the continuous raw data model.