

The Higher Power of Religiosity over Personality on Political Ideology

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Abstract: Two streams of research, culture war and system justification, have proposed that religious orientations and personality, respectively, play critical roles in political orientations. There has been only limited work integrating these two streams. This integration is now of increased importance given the introduction of behavior-genetic frameworks into our understanding of why people differ politically. Extant research has largely considered the influence of personality as heritable and religiosity as social, but this view needs reconsideration as religiosity is also genetically influenced. Here we integrate these domains and conduct multivariate analyses on twin samples in the U.S. and Australia to identify the relative importance of genetic, environmental, and cultural influences. First, we find that religiosity's role on political attitudes is more heritable than social. Second, religiosity accounts for more genetic influence on political attitudes than personality. When including religiosity, personality's influence is greatly reduced. Our results suggest religion scholars and political psychologists are partially correct in their assessment of the "culture wars" – religiosity and ideology are closely linked, but their connection is grounded in genetic predispositions.

Keywords: Religion; Religiosity; Personality; Ideology; Attitudes; Genetics

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Political orientations emerge from the interaction of top-down societal processes and bottom-up individual differences, though most empirical research has focused on one or the other (see Federico & Malka 2018 for a review). In one view, contextual, familial, institutional, and elite influences are believed to drive the interest, motivations, identities, and information people learn, which in turn shape the attitudes they hold, and ideologies to which they ascribe. This is largely an environmental and socialized perspective. Alternatively, psychological schemas, physiological responses, brain structure and function, and genetic proclivities are believed to alter the environments individuals select and guide them to differentially perceive similar environments, thus shaping the attitudes they hold. This is largely a dispositional view.

Over the last several decades, two forces -- religion and personality -- have arguably emerged as among the most salient representations of these two umbrellas. Both have consistent relationships with and have been used to understand political ideology as part of individual-level and cultural explanations (e.g., system justification theory, see Jost, Federico, & Napier 2009). Religion has been intertwined with politics since organized religion was first documented. But, its role in aligning the public along ideological and partisan lines gained new life in modern domestic politics. Hunter's (1992) highly influential and debated book, *Culture Wars*, reflected the shift of religion's importance, particularly the movement of evangelical Christians toward political conservatism in the U.S. and other advanced democracies (Duriez, Luyten, Snauwaert, & Hutsebaut 2002; Fiorina, Abrams, & Pope 2005; Green, Guth, Smidt, & Kellstedt 1996; Layman & Carmines 1997; Wald & Calhoun-Brown 2014; Wuthnow 1988). Beginning in the 1980s and continuing until the present, it is difficult to find a discussion, academic or other, that does not recognize the empirical link between religiosity and ideology or religiosity's profound role in electoral outcomes through cultural indoctrination and socialization (Djupe, Neiheisel, & Sokhey 2018; Jelen 1991; Inglehart 1977, 1990; Miller &

Wattenberg 1984; Margolis 2018; Petrikios 2008; Putnam & Campbell 2010; Smidt, Kellstedt, & Guth 2009).

From the dispositional view, perhaps more than any other trait over the last decade, scholars have leveraged the explanatory power of personality to explain political orientations. Personality reflects the biologically-driven, multifaceted, and persisting internal psychological architecture that guides a person's perceptions, attitudes, and actions. The Big Five personality framework (McCrae & Costa 1987) has emerged as the consensus model and includes the dimensions of Openness to experience, Conscientiousness, Extraversion, Agreeableness, and Emotional stability (Neuroticism). Openness (-) and Conscientiousness (+) have been consistently found to be related to political conservatism (Gerber, Huber, Doherty, Dowling, & Ha 2010; Fatke 2017; Jost, Glaser, Kruglanski, & Sulloway, 2003; Malka 2014; Mondak 2010; Van Hiel, Pandelaere & Duriez 2004). These traits have also been linked to various measures of religiosity (Robbins, Francis, McIlroy, Clarke and Pritchard 2010; Francis 2010; Hills, Francis, Argyle, and Jackson 2004; Saroglou 2002).

These two research streams have remained largely independent of one another, and this is not surprising given that personality and religious measures have inconsistent relationships with each other (Saroglou 2014). This absence of research is also partly due to discipline/sub-field-focused research and limitations in method, leading to the study of religion-personality-politics in dyads, with the assumption of personality as the bedrock trait, and religion encountered next but before politics (for excellent research and reviews on personality and politics, see Caprara & Vecchione 2013; Mondak 2010 and for personality and religion, Saroglou 2014).

The recent introduction of behavioral genetic approaches in elucidating the nature of individual differences in ideology, however, calls for re-integrating these lines of research and challenging notions of causal order. Personality has long been conceived as an equal function of genetic and environmental factors (Eysenck 1967), and empirical research has verified these

assumptions (Bouchard, Lykken, McGue, Segal, & Tellegen 1990). However, contrary to traditional scholarship, recent behavioral genetic studies have also found that both religiosity and political attitudes are influenced by genetic factors as much and at times even more than personality (Bouchard 2004; Alford, Funk, & Hibbing 2005; Hatemi & Verhulst 2015). That is, the path connecting religiosity to political attitudes may not be exclusively cultural, but also a function of underlying dispositions, a relationship suggested in previous research, particularly as it relates to social but not economic issues (Friesen and Ksiazkiewicz 2015). These findings hint toward a potentially more nuanced relationship between personality, religiosity, and political ideologies.

Here we explore how these three domains intersect, by leveraging behavioral genetic methods to understand the nature and source of covariance between traits, whether and how much they reside at environmental and genetic levels. It is important to clarify that this is not another paper to simply estimate the heritability of social attitudes or behaviors. We wish to integrate the domains of personality, religion, and politics in order to contribute to the discussion of the mechanisms at work in some of the “culture wars” dividing democracies, paying special attention to *both* genetic and unique environmental effects. Though we do not have longitudinal data to examine these effects over time, we rely on behavioral genetic analyses of two unique twin studies, with different age cohorts, conducted in the United States and Australia to provide a novel way to address these competing theoretical positions.

Because we are bringing together research on personality and politics, personality and religion, religion and politics, behavioral genetics, and the U.S. and Australian contexts, it is nearly impossible to provide a comprehensive literature review in each of these rich areas of scholarship. Wherever possible, we point the readers to experts in these sub-fields/subjects and focus our argument at the intersection of these spheres. In the end, we hope to provide an integrated theoretical and empirical look into the intersection of personality, religion, and political attitudes.

Our findings suggest that religiosity's role on political attitudes is more heritable than socialized across two different national contexts, and that religiosity accounts for more genetic influence on political attitudes than personality. We conclude that religion scholars and political psychologists are partially correct in their assessment of the “culture wars” – religiosity and ideology are closely linked, but their connection is driven by common underlying genetic predispositions rather than being the exclusive product of socialization.

Genetic and Environmental Sources of Variance on Religion and Personality and Politics

Examining the sources of variance, be that genetic or environmental, for religiosity, political attitudes, and personality traits has proven important for understanding how orientations develop and ultimately affect social behavior and group life. Behavioral genetic research has challenged the traditional view that political attitudes and behaviors only result from purposive socialization (Alford, Funk, & Hibbing 2005; Fowler, Baker, & Dawes 2008; Hatemi et al. 2014). That is, political orientations are also partly accounted for by genetic predispositions, akin to many other psychological traits (Martin et al. 1986; Bouchard et al. 1990). In light of these findings, scholars have become increasingly interested in how behavioral genetics can help us better understand the nature of covariation between political, social, and other psychological traits. Behavioral genetics studies have explicated the relationships between political attitudes and fear (Hatemi, McDermott, Eaves, Kendler, & Neale 2013), aggression (McDermott & Hatemi 2016) and morality (Koenig & Bouchard 2006; Smith, Alford, Hibbing, Martin, & Hatemi 2016; for a review, see Hatemi & McDermott 2012 and Hibbing, Smith, & Alford 2014).

Of particular interest is the nature of the relationship between personality traits, religious beliefs and behaviors, and political attitudes – three domains examined extensively in genetically-informed samples but rarely all three together. Extant research indicates the vast majority of genetic influences on political attitudes are unique and not shared with personality traits, but whatever

covariation does exist between these variables, resides largely at a genetic level (Eaves & Eysenck 1974; Hatemi & Verhulst 2015). It remains a widespread view that personality must have a causal role on political attitudes. In this perspective, the assumption was that individuals are exposed to the political world later in their lives – as compared to religion or personality development -- so politics must be downstream from these other predispositions (e.g., Smith et al. 2011).

This view has been challenged by longitudinal studies of genetically informative samples, providing evidence that changes in personality, such as Openness, do not account for changes in political attitudes, and that political attitudes are at least as stable as personality traits. Rather than finding a causal pathway from personality to politics, it has been suggested that genetic influences on political attitudes may actually account for some of the variation in personality traits (Hatemi & Verhulst 2015). This view is supported by research that finds differences in political attitudes predicted how individuals self-reported their personality traits (Ludeke, Reifen Tagar, & DeYoung 2016). At the very least, the evidence points toward the correlation between personality traits and political attitudes influenced by a shared genetic path, rather than personality mediating the effect of genes on political attitudes. In other words, personality and political temperament constitute predispositions that develop concurrently because they are under some of the same (as yet unknown) genetic influences. This view is consistent with psychological frameworks that consider political orientations part of an individual's disposition, such as the specific facet of Openness labeled "liberal thinking" or "political values" (McCrae & Costa 1997), but also challenges the political science view of personality as independent of and preceding political attitudes (Mondak, Hibbing, Canache, Seligson, & Anderson 2010). Regardless of the mechanisms involved, some personality traits seem to covary with political orientations at least in part through shared genetic influences.

Research exploring the source of the relationship between religious beliefs and political orientations find both common genetic and environmental factors explain the covariation (Friesen & Ksiazkiewicz 2015; Koenig & Bouchard 2006; Bouchard 2009; Ludeke, Johnson, & Bouchard 2013). These findings provide evidence that social attitudes, general preferences for organizing group life, and a religious worldview derive, in part, from a common underlying predisposition toward processing and understanding one's environment in particular ways. Saroglou (2015, 803) indicates religious orientations, similar to the Big Five traits of Conscientiousness and Agreeableness, "constitute a higher-order factor denoting personal and interpersonal stability." This assumption is not tested but suggests that the heritability of religiosity might be mediated through these stability traits. For example, those high in Conscientiousness and Agreeableness may be more likely to remain religious into adulthood if they are exposed to religious environments and ideas as children; whereas, those who exhibit high Openness may be more likely to leave the family's religious nest. It is also possible that religious and political orientations change over one's life course; for example, Margolis (2018) finds that partisanship and parenthood combine to influence religious commitment. In addition, studies of religiosity in adolescence reveals larger environmental rather than genetic effects, suggesting that socialization is at work early in one's life course (Eaves et al. 2008). We do not have the longitudinal data to test life cycle effects of the environment and heritability of personality, politics, and religiosity, but by accounting for individual differences in these domains in the same model, we hope to create a foundation for future research to explore causal ordering and change over time.

There are multiple measures of religiosity, but behavioral genetics research has been more focused on religious salience – or the importance of religion in one's life – because it is more consistently linked to genetic effects, as compared to religious behaviors (Bouchard, McGue, Lykken, & Tellegen 1999; Bradshaw & Ellison 2008; Friesen & Ksiazkiewicz 2015). This inward

orientation toward religion seems to reflect dispositions over social influences (Bradshaw & Ellison 2008), is not culturally dependent or religion-specific, and lines up with political attitude formation to satisfy psychological needs related to system justification (Friesen & Ksiazkiewicz 2015; Jost et al. 2003). In this way, personality traits thought to be the “first movers” could influence both religious and political beliefs. It is also possible to think of religiosity as a separate, non-mediated, aspect of personality from the Big Five schema (Friesen & Ksiazkiewicz 2015; Mondak 2010; Saucier & Goldberg 1998).

Because of the complicated relationship between personality, religion, and politics, the dearth of datasets that include measures in each domain, and perhaps the interests of extant scholars, these phenomena are mostly studied in dyads, particularly when understanding the American culture wars (see Friesen 2019). In one view, the Big Five’s Openness to experience explains why some individuals favor same-sex marriage, ethnic diversity, and non-traditional families while those on the other end of that scale prefer traditional social structures and “resistance to change” (Jost 2006; Kandler, Bleidorn, & Riemann 2012). Thus, an individual’s level of Openness, influenced by genetics, leads them to seek or justify a political policy or system that fits with their worldview.

In the religion and politics field, the environmental influences of religious belief (Layman 2001; Smidt et al. 2009) and social group belonging (Campbell 2002; Djupe & Gilbert 2009; Wald & Calhoun-Brown 2014) explain the culture wars (Green et al. 1996; Hunter 1992; Wuthnow 1988). Individuals hold religious beliefs taught in their houses of worship and homes, and he or she will form political attitudes that fit with these teachings. Alternatively, belonging to a religious group could lead to preferring a set of policies or attachment to a political party. For example, white American evangelicals and African-American Protestants may share many theological beliefs, but group membership leads to different party affiliations (Calhoun-Brown 1998). Recent research has

also suggested a reverse order – that politics can influence religious behavior and belonging (Campbell, Layman, Green, and Sumaktoyo 2018; Djupe, Neiheisel, & Sokhey 2018; Margolis 2018; Petrikos 2008). Many of these measures in religion and politics research have been examined in genetically-informed samples, with scholars concluding there are heritability effects for religious beliefs, some behaviors, and their overlap with political orientations as we detail in the next section (Bradshaw & Ellison 2008; Hatemi et al. 2014).

The above elements help explain how individuals and groups have lined up against one another in the culture wars, but these analyses have largely focused on one trait independent of the other. What remains unexamined is what happens when these orientations are measured altogether. In addition, the majority of extant research has been conducted in single samples, which limits the ability to draw broader conclusions about whether these dispositions are more universal. Studies of religio-political orientations in the U.S. context may simply be uncovering a relationship unique to Americans; therefore, we extend our analyses to cover two contexts.

Cultural Context

American citizens are generally considered more religious – on nearly every measure – than many of their peers in other democracies (Gin 2012; Putnam & Campbell 2010; Wald & Calhoun-Brown 2014). Thus, it may not be surprising that religious and political beliefs not only correlate but share a genetic path in this context (Friesen & Ksiazkiewicz 2015; Ludeke et al. 2013). Fazekas and Littvay (2015) demonstrated that the heritability of U.S. partisanship shifts depending on the political context at the time of the study – in time periods where ideology maps more closely to party identification, the latter shows genetic effects. Similarly, a shared genetic path between religion and politics could be dependent on how closely religiosity lines up within a political system/culture. Many religious and political beliefs encompass preferences for societal organization and treatment of individuals, but the language and frameworks will vary by culture. For example, McFarland (1998)

discovered Communist party orientations and prejudice in the USSR mirrored the relationship found between religious orientations and prejudice in the United States.

To explore the possible cultural differences in the intersection of personality, religion, and political ideology, we extend our analysis to a common comparative case -- the United States and Australia. These nations share a number of characteristics (e.g. Anglophone, predominantly Christian nations with similar life expectancy, education rates, democratic/freedom scores, etc.) but differ in their level of religiosity. The 2011/2012 World Values Survey indicates 66.3% of Americans reported belonging to a religious denomination compared to 53.6% of Australians.¹ In addition, 66.3% of Americans, but only 28.8% of Australians, indicate they pray to God more than once per week. Even more striking, 88.8% of Americans believe in God and 71.7% in hell, compared to 65.3% and 34.0% of Australians, respectively. On our variable of interest – religious salience or importance – their data show that 68.9% of Americans report “considering religion important” compared to 32.2% of Australians. These findings parallel the descriptive data in our sample (detailed below).

Australia’s elected leaders have used more religious rhetoric in recent years (Maddox 2005; Warhurst 2007), and there has been “increasingly organized efforts of an American-style religious right to gain a foothold in Australia’s historically much more secular democratic institutions” (Maddox 2005, xi). Yet, as indicated above, Australia lags behind the United States in its citizens’ religiosity, including measures of weekly religious service attendance and orthodox Christian beliefs “such as having born again experiences and belief in the Bible as the literal word of God” (Gin 2012, 320; Kirk et al. 1999). Of interest to our study, a comparative twin study revealed that though

¹ Data from the World Values Survey and reported by The Association of Religious Data Archives: <http://www.thearda.com/internationalData/MultiCompare.asp?c=234,%2014>. Accessed November 29, 2016.

the U.S. cohort reported attending church at higher rates than their Australian peers, genetic and shared environment effects were significant in explaining the variance in both samples, though the size of the effects and maternal and paternal influence differed between countries (Kirk et al. 1999). There is also extensive evidence of the heritability of political attitudes, orientations, and behaviors in the Australian context, similar to that of the U.S. (Hatemi, Medland, Morley, Heath, & Martin 2007; Hatemi, Smith, Alford, Martin, & Hibbing 2015).

In sum, our interest lies in examining the explained genetic variance in political ideology, personality, *and* religiosity. Rather than examining these domains separately or in dyads, we wish to combine them in an effort to more fully understand the genetic and environmental structure of political attitudes, and possibly illuminate more fronts in the culture wars.

Sample and Methods

The data include two genetically informative twin studies designed and implemented together. The first twin sample was collected by the Minnesota Center for Twin and Family Research in 2008-2009 (for a detailed description of the sample, see Smith et al. 2012, data available at <http://www.unl.edu/polphyslab/data>). This U.S. sample ($N \sim 1321$) consisted of middle-aged adults (average age of 56) who had been previously recruited based on state birth records. It is generally representative of Minnesota for its birth cohort (1947 to 1955), but we expect its variance for political attitudes and religiosity to be somewhat constrained compared to a sample of the nation as a whole due to the greater environmental homogeneity in the population -- offering optimal conditions to decompose heritability. The second study was a 2008-2012 two-wave study conducted at the Queensland Institute of Medical Research (see Hatemi et al., 2015). To maximize the number of observations in the study, we used the first response provided by each participant to each question (i.e., in the first wave if available, otherwise in the second wave if available). This Australian sample ($N \sim 546$) is comprised of younger individuals, aged 18 to 36, where beliefs are less

crystalized; in addition, the sample overweighed for dizygotic twins with the purpose of providing greater power to detect shared environmental effects (see Coventry & Keller 2005). This combination of samples allows us the unique ability to compare our results across cultures; that is, how religion, personality, and politics intersect in different contexts and at the same time provides optimal conditions to identify the shared covariance of genetic and shared environmental influences (for more information on the assumptions behind twin modeling, see Medland & Hatemi 2009). Though we cannot test life cycle effects without longitudinal data on our variables of interest, it is helpful that one of our samples includes middle-aged individuals, and the other, much younger adults.

Measures

In the U.S. sample, religiosity was measured by combining two items. The first item asks: “How often do you attend religious services?” Responses resided on a six-point scale ranging from “More than once a week” to “Never” (Kendler and Myers 2009; Truett et al. 1992; Vance et al. 2010). The second item measures religious importance: “Whether or not you attend services, how much do you consider religion to be an important part of your life? Would you say your religious beliefs provide”, with responses on a four-point scale, ranging from “A great deal of guidance in your day-to-day living” to “Are not an important part of your life.” (Bouchard, McGue, Lykken, & Tellegen 1999; Bradshaw & Ellison 2008). These items correlated at 0.58 (Cronbach’s alpha = 0.70). The Americans in our sample were predominantly Christian, with a large majority identifying as either Protestant (44.3%) or Catholic (35.5%) and a majority of those who selected “Other” (13.9%) indicated a Christian denomination in an open-ended question; 5.5% indicated no religious affiliation and a small minority identified as Jewish (0.8%). Of those who identified as either Protestant or Other, a minority (32.1%) identified as “Evangelical or “born again” Christians”

(18.7% of the total sample). The proportion of religious identifiers is higher than in the American public in general, likely because the sample is older than average.

In the Australian sample, religiosity was measured by factor analyzing four religiosity items and extracting the first factor. These items cover the general attendance of religious services and the importance of religion in one's life (as in the American sample) as well as the frequency of prayer before meals and belief in heaven and hell (see Online Appendix for full question wording).² The Cronbach's alpha for these four items was 0.82, and the first factor accounted for 67.5% of the variance.³ The plurality of Australians in our sample identified as Christian (46.7% with 30.3% Catholic, 11.4% Non-evangelical protestant, and 5.0% evangelical protestant), with an additional 13.0% selecting "Other" but also indicating that they attend "a church or synagogue or mosque" at least on some occasions (only three respondents identified as Jewish and no respondents identified as Muslim; see Online Appendix for further information on the religious distribution in both samples). On average, the American sample rated religion as more important in their lives than the Australian sample (0.64 and 0.33, respectively, scaled 0-1) in keeping with cross-national differences in religiosity.

It is important to note here that we recognize that religious attitudes and behaviors are distinct constructs. Nonetheless, we argue that there is a latent religiosity that is being reflected in these distinct manifestations, which can be measured with less error by combining these measures so as to focus on the variance that is shared between attitudes and behaviors. This is born out in the

² The substantive results in the Australian sample are unchanged if we instead only combine the importance and attendance items. This approach accounts for more of the genetic component of social ideology and less of the unique environment component. Nonetheless, by extracting the common factor that underlies all four of these variables, we get closer to a general trait of religiosity and abstract away from the factors that contribute uniquely to each of these four constructs.

³ To maximize the sample size, we rely on Wave 1 data where available and supplement Wave 2 scores only for respondents who did not complete Wave 1. See the discussion section for the limitations this creates.

data, in which the twin models generally indicate that there is less measurement error in the combined religiosity measure than in its individual components.

Political ideology was measured using a Wilson-Patterson (1968) inventory with questions adapted to each national context. This measure is one of operational political ideology (Ellis and Stimson 2011) that estimates political orientations based on issue positions, rather than an identity-based measure that asks respondents whether they adopt a particular political label. From this inventory, we extracted a 10-item subscale of operational social ideology in the U.S. ($\alpha = 0.80$) and a 10-item subscale in Australia ($\alpha = 0.76$). Explicitly religious items (e.g., support for school prayer) were excluded so as to not conflate the religiosity and social ideology measures. On average, the American sample was socially moderate (0.48, scaled 0-1 with higher values indicating greater conservatism), and the Australian sample was more socially progressive (0.32), consistent with their respective general publics.

In the U.S. sample and in the first wave of the Australian sample, personality was measured with a 44-item Big Five inventory developed by John, Donahue, and Kentle (1991). We also calculated the 10-facet scale from Soto and John (2009), though we should note that these facets may differ from what others label “aspects” of the Big Five (DeYoung, Quilty, & Peterson 2007; Hirsh, DeYoung, Xu, & Peterson 2010). Wave 2 of the Australian data only contained the 10-item personality inventory. Thus, all analyses in the Australian data that utilize the facet scores rely on Wave 1 respondents only. Analyses of the Big Five factors use Wave 1 data where available and supplement Wave 2 scores only for respondents who did not complete Wave 1. The American sample was somewhat higher than the Australian sample in Agreeableness (0.79 vs. 0.67, scaled 0-1) and Conscientiousness (0.80 vs. 0.69), consistent with life course effects related to aging (Caspi, Roberts, & Shiner 2005), but was similar on the other Big Five traits. Further details on these measures are included in the supporting information.

Table 1 presents the descriptive statistics for standard demographics and our primary variables of interest in the United States and Australia: operational social ideology, religiosity, and the Big Five traits (a table including the facets of the Big Five and greater detail on gender differences for all variables is available in the supporting information, Table S1). As noted previously, the American sample is considerably older than the Australian sample (mean age 56.2 and 24.9, respectively) as well as more conservative and placing higher importance on religion. The American sample is somewhat higher in Agreeableness and Conscientiousness, in keeping with the life course effects on these variables (Roberts, Walton, & Viechtbauer 2006), but differs very little with the Australian sample on Extraversion, Neuroticism, and Openness.

Analytic Strategy

To address the relative import of religiosity and personality on ideology, we conduct four sets of analyses. First, we begin by displaying the phenotypic correlations (i.e., correlations among the observed traits) and conducting simple linear regressions to identify the relative contributions of both traits on the variance of operational social ideology. Second, we present the results of univariate ACE models of each of our key traits of interest for both samples. These models estimate the relative contribution of genetic, shared environment, and unique environment influences on variation in each trait separately. That is, in each of the two populations considered here, these models consider where variation in those traits originates. This estimation is accomplished by use of structural equation models in which these three sources of variation are latent (i.e., unobserved) variables, but whose effect can be inferred from the differences in the correlations among monozygotic and dizygotic twins on the observed variables (i.e., the traits in question). For example, if the cross-twin, within-trait MZ correlation is greater than the analogous DZ correlation, this implies that genetic factors contribute to variation in the trait, and the model will provide an estimate of the size of the effect of this latent genetic variable (Medland & Hatemi 2009).

Third, we present the results of bivariate ACE models of religiosity and personality traits with operational social ideology. These models estimate the relative contribution of genetic, shared environment, and unique environment influences on variation in each of two traits simultaneously. These models also estimate the relative contribution of genetic, shared environment, and unique environment influences on covariation between the two traits. This component of the analysis allows an estimate of the extent to which *covariation* between the two traits is driven by each of these sources. Equivalently, it allows an estimate of the extent to which the latent variables that influence each trait are correlated (e.g., whether the latent genetic variable that explains variation in one trait is correlated with the latent genetic variable that explains variation in the other trait). The analysis of the covariation relies on a comparison of the cross-twin, cross-trait correlations for MZ and DZ twin pairs and follows a similar logic to the cross-twin, same-trait analyses in the univariate models.

An alternative way to think about the bivariate analysis is by analogy to a linear regression model. Each of our bivariate analyses is specified such that social ideology is the final outcome variable (in this case, the second variable). The analysis allows us to ask: controlling for the genetic and environmental influences that are shared with the first variable (either religiosity or personality traits), how much residual variation in operational social ideology remains, and how is that residual variation divided between genetic and environmental sources?

Finally, we conduct two trivariate Cholesky decomposition models that encompass religiosity, personality, and ideology simultaneously. Both models specify operational social ideology as the final outcome variable, and they differ in whether they specify religiosity as the first variable and personality traits as the second or vice versa. In other words, the control variable was specified as the first variable in the model, with the variable of interest as the second variable, and social ideology as the third. In this specification, the covariation between the control and social ideology is partialled out (by the pathways from the latent genetic and environmental components of the control

to social ideology). Then, the pathways from the latent genetic and environmental factors underlying the variable of interest to social ideology were interpreted as the relationship between the variable of interest and social ideology having controlled for the first variable in the model. When religiosity is specified as the first variable, the model lets us ask: controlling for the covariation between religiosity and social ideology, do personality traits account for residual variance in social ideology and, if so, what are the sources of this residual covariation with social ideology? When personality is specified as the first variable, we ask whether controlling for the covariation between personality traits and social ideology results in religiosity accounting for residual variance in social ideology and what are the sources of this variance. By comparing these two models, our approach identifies how much genetic and environmental variance in social ideology is shared with personality and religiosity, controlling for each other and under different assumptions of primacy.

The Relationship between Religiosity, Personality, and Ideology

Table 2 presents the bivariate correlations for social ideology, religiosity, and Big Five traits. The relationship between operational social ideology and religiosity is strong in both the United States ($r = 0.535$) and Australia ($r = 0.581$). Of the Big Five traits, only Openness has a correlation above 0.10 with political ideology in both national contexts; Agreeableness is correlated with political ideology in Australia, but not the United States, and it cannot share genetic variance with political ideology as Agreeableness has negligible heritability in that context, so it is not considered further below. Next, we ran an ordinary least squares regression of social ideology on the Big Five traits, religiosity, and standard demographics (age, sex, income, and education). In both the U.S. and Australia, Openness and religiosity significantly predict social ideology; no other personality trait is a significant predictor in both countries when these other controls are in the model (in the United States, Agreeableness and Neuroticism also significantly predict greater social liberalism; see Table 3 for full results and Table S2 in the supporting information for results with Big Five facets).

The univariate behavior-genetic variance decompositions (i.e., twin models) for operational social ideology, religiosity, and Openness suggest that variation in each of these variables has a significant heritable component and a significant unique environment component (see Online Appendix Table S3 for MZ and DZ correlations by variable, Tables S4A and S4B for model fit, and S5A and S5B for parameter estimates). This means that, consistent with past research, both genetic and environmental factors account for variation in these traits. The best fitting model in each case is an AE model (where the common environment, C, component is fixed to 0). The AE model does not fit significantly worse than a saturated model and does not fit significantly worse than an ACE model, so it is preferred for parsimony. The fit of the AE model implies that the common environment is a negligible influence on these traits -- also consistent with other research. This does not mean that socialization does not influence individual differences in these traits; it may be that the effect of these environmental influences is conditional on genetic predispositions, in which case MZ twins would react more similarly to these socialization experiences than DZ twins and these effects would be appropriately captured under the genetic component of variance, or that socialization has a greater impact earlier in the life course (e.g., in adolescence) and that this effect dissipates later in life as people have more control over their own environments. In short, the univariate AE results presented in Tables S5A and S5B show that more than half of the variation in operational social ideology and religiosity arise from genetic predispositions in the U.S. and Australian samples, whereas somewhat less of the variation in Openness is genetic.⁴

⁴ At a reviewer's request, we also examined the univariate results separately by religious tradition, focusing on the two largest groups in each sample (i.e., Catholics and Protestants). Model fit is presented in Tables S10A and S11; the results are in Tables S12 and S13. In general, we find a pattern of genetic and unique environmental effects similar to those from the full sample. The one exception is religiosity in the sample of Catholic Australians, where the shared environment comes out as significant component. We approach all of these results cautiously, as our statistical power is too limited to draw strong conclusions about differences between religious traditions; we did not estimate the more complex bivariate and trivariate models on these subsamples due to these same

As noted above, religiosity and Openness are correlated with operational social ideology in both samples. The bivariate models decompose this covariation to consider the sources of the relationship between religiosity and social ideology and between Openness and social ideology. Once again, the best fitting bivariate models are AE models (see Tables S6A and S6B). These models suggest that, insofar as each pair of observed variables is correlated (i.e., correlated phenotypically in Table 2), this correlation is primarily a result of shared genetic influences. Genetics account for the large majority of the covariation between religiosity and social ideology in the United States and Australia – 78.8% (95% CI: 63.2-89.0) and 94.2% (95% CI: 78.3-99.6), respectively – and between Openness and social ideology - 85.0% (95% CI: 29.5 - 99.1) and 94.9% (95% CI: 0.3 - 100.0), respectively (see Tables S7A and S7B for full estimates). In other words, the bivariate models suggest that the covariation between each of these pairs of traits is driven primarily by genetic influences that are shared between the traits more than by unique environmental influences (i.e., life experiences unshared across twins). Nonetheless, there are also significant unique environmental correlations (with the exception of Openness and social ideology in Australia). It is important to note that most of the variance in social ideology remains unexplained by either religiosity or Openness, and there are both genetic and unique environmental components to this residual variance.

The trivariate Cholesky models examine whether the genetic relationship between religiosity and operational social ideology is fully accounted for by personality traits. We focus on those personality traits that have a significant heritable component and share genetic variance with social

power limitations. Nonetheless, future research should examine how the components of these traits vary not just across countries, but also across religious traditions. In particular, these future efforts would benefit from including questions regarding childhood religious socialization and adult religious conversion or estrangement, which would ensure that subgroup analyses can capture the range of adult religiosity and potentially provide some insights into the recent increase of “nones” (those with no religious affiliation).

ideology (i.e., Openness in both the United States and Australia; see Tables 2, S5A, and S5B). For these trivariate models, we report the results of the best fitting models (which are AE models that constrain C to 0; see Tables S8A and S8B for model fit). The results of these models are presented in Figures 1 and 2 (full results for the AE models are available in Tables S9A and S9B).

Looking first at religiosity, its genetic component accounts for a proportion of the variance in operational social ideology in both the U.S. (23.3%) and Australia (33.2%), while the unique environmental component accounts for a smaller but still significant proportion (6.1% and 2.1%, respectively; see Figures 1b and 2b). When we control for Openness in the trivariate models (i.e., when the covariation between Openness and social ideology is partialled out), the genetic effect of religiosity is only slightly muted (20.8%, 28.8%), and the unique environment effect is unchanged (6.2%, 2.2%; see Figures 1a and 2a). In both countries, religiosity has a large relationship with social ideology that is driven primarily by genetic factors and only modestly attenuated when controlling for Openness.

The effect of Openness on operational social ideology is much smaller than the effect of religiosity (see Figures 1a and 2a). In the U.S., its genetic covariation with social ideology accounts for 4.6% of the variation and its unique environmental component accounts for only 0.8%. In Australia, the comparable figures are 4.7% and 0.2% (the latter is not significantly different from zero). Controlling for religiosity (see Figures 1b and 2b), the genetic effects in the U.S. and Australia are further reduced (to 2.0% and a no-longer-significant 0.3%), and the unique environment effects are unchanged. In both countries, Openness has a modest relationship with social ideology, driven primarily by genetic factors but this is greatly reduced or eliminated when controlling for religiosity. In sum, both samples show a robust genetic relationship between religiosity and social ideology, controlling for relevant aspects of personality. However, Openness explains only an additional 2.9%

of the variance in the U.S. and none in the Australian data, when controlling for religiosity. The main relationships of interest are summarized in an alternative graphical format in Figure 3.

Finally, for completeness we also estimated models that put religiosity in the final position of the trivariate model (see Online Appendix Tables S9A and S9B Models 3 and 4). The substantive conclusions from these models are similar. Without controls, both Openness and operational social ideology account for variance in religiosity. Controlling for Openness, social ideology still accounts for unique variance in religiosity in both samples. Controlling for social ideology, Openness does not account for any unique variance in religiosity.

Discussion

There are several main contributions from this study. First, we find that the only personality trait that is consistently related to social issue preferences across these two national contexts is Openness. Moreover, by including both religiosity and personality in a behavior-genetic context, Openness' independent effect on social ideology is severely reduced in the American sample and completely accounted for by religiosity in the Australian sample. This finding provides an important reconciliation in an inconsistent literature surrounding the significance of personality traits on ideology. Agreeableness, Extraversion, and Neuroticism are sometimes related to liberalism and sometimes related to conservatism (for a review, see Sibley, Osborne, & Duckitt 2012). We do not find a relationship with these traits and operational social ideology. The role of Conscientiousness, one of two personality traits typically associated with ideology, is also not consistently related to political ideology in either of our samples.

Second, we find that religiosity shares unique genetic variance in social ideology when controlling for the personality trait most strongly related to political ideology, Openness to experience, in two cultural contexts. The relationship between Openness and social ideology is much weaker than the relationship between religiosity and social ideology in both countries, and the effect

of Openness is reduced to non-significant levels controlling for religiosity. This is particularly true in the Australian context, despite using a relatively more reliable measure of Openness than religiosity (10-item versus four-item). Beyond Openness, when we control for each of the Big Five personality traits, none of the traits fully (or even mostly) account for the relationship between religiosity and ideology in either national context. Taken together, these findings suggest that future research should devote more effort to examining religiosity as a potential mediator between genes and politics and that the “culture wars” may be built upon deep-seated differences. For example, Malka, Soto, Cohen, and Miller (2011) suggest that religiosity may be a pathway to a more general conservative identity, and Ellis and Stimson (2011) find individuals may be using religion as symbolic ideology – leading to inconsistencies in self-reported political ideology and issue preferences. Unpacking the role of gene-environment interaction and covariation appear important next steps. Identifying how religion alters the environments into which people select, which modify the expression of genetic proclivities, could answer many questions on how values become instantiated.

Third, the environmental effects of religiosity and Openness on ideology are entirely independent. That is, even when accounting for the other, they each share a distinct unique environmental component with ideology. We can only speculate on the importance of this finding, given that the environmental variance on twin models is conflated with measurement error. However, this challenges the theory that personality influences ideology through genetics (Mondak et al. 2010). That is, personality’s unique role on ideology (i.e., net of shared variance with religiosity) could largely be through environmental influences and not shared dispositions. Haidt’s (2012) Moral Foundations framework suggests that variation in individual-level traits is influenced by individualist or group-centered communities and cultures: Alternately, group membership and political contexts can interrupt the relationship between personality and social ideology (Fatke 2017; Gerber et al. 2010).

Finally, we also integrated a behavioral genetics model of personality and religiosity as they relate to political ideology as a helpful first step in understanding how individuals develop predispositions and preferences in these domains. By extending this analysis across two cultures, we suggest that the strong relationship between religious salience and social ideology in Western nations persists regardless of the relative level of religious belief and behavior of the citizen aggregate. The shared genetic component of this relationship also supports the socialization literature that finds political attitudes tied to religious beliefs are more successfully transmitted (Jennings, Stoker, & Bowers 2009; Tedin 1974), and our evidence demonstrates this has much to do with heritability. For those interested in taking up future directions, we encourage examining personality-religion-politics within twin pairs across the life course. This type of data could further test whether personality's effect on social ideology is strongest in early adulthood and wanes as individuals age and whether there is a curvilinear effect for religion. That is, shared environment is more influential at younger ages and results in closer ties between religion and social ideology; whereas genetic influences are stronger in middle and older age, resulting in similar correlations between these two traits.

Here, we contribute to the psychology of religion and political psychology literature that has examined personality traits across these domains. When accounting for personality, which has been tied to social issue attitudes, the role of religion is largely unaffected and still explains a fair amount of variance in social ideology. By leveraging the explanatory power of genetic and environmental effects, we suggest that religion scholars and political psychologists are both partially correct in their assessment of the “culture wars” – religion seems to be the driving force, but its influence resides in dispositional mechanisms as much as it does socially. Personality is often considered the first mover or foundational, stable element to an individual's personal orientation. The data show this may not be accurate. When it comes to politics, a desire for religious guidance accounts for far more of the variance, even when controlling for personality.

There are some limitations to this study, particularly related to data. Because the American sample is older than the Australian sample, cross-national differences are confounded with age. This is ameliorated somewhat given that the core findings replicate across contexts, but samples of young Americans and older Australians with similar measures would be desirable. A second limitation pertains to the Australian data specifically. As we noted in the measures, to maximize the sample size, we relied on Wave 1 data where available and supplemented Wave 2 scores for respondents who did not complete Wave 1. If we restrict our analyses to Wave 1 only, the results are substantively similar to those above. However, if we restrict our analyses to Wave 2 only (or even only to the Wave 1 respondents who answered Wave 2), they show a much larger role for the common environment in religiosity. This pattern of results is consistent with the view that the sources of variance in behavioral and attitudinal phenotypes can fluctuate as a function of contextual effects (Fazekas and Littvay 2015), though identifying the specific contextual factors driving this fluctuation in the Australian data is beyond the scope of this paper. A third limitation is simply a call for future research to test the robustness and limits of these findings across contexts (e.g., countries or demographic groups within countries) and measures (e.g., operational and identity-based measures of ideology; general measures of religiosity as well as focusing on specific beliefs or practices; and self- and peer-reports of personality).

Future research on religiosity, personality, and politics are needed to address the mediation versus pleiotropy debate. These data are equally compatible with the interpretation that there are common genetic influences that lead to the co-emergence of aspects of religiosity and social ideology and other genetic influences that lead to the co-emergence of personality and social ideology, following the alternative model of correlation and not causation (Hatemi & Verhulst 2015; Verhulst, Eaves, & Hatemi 2012). For example, there is some evidence that religion shapes personality traits, especially among adolescents (Hardy, Pratt, Pancer, Olsen, & Lawford 2011;

Huuskes, Ciarrochi, & Heaven 2013; Ludeke & Carey 2015; Saroglou 2014; Wink, Ciciolla, Dillon, & Tracy 2007). Our data cannot distinguish between these interpretations, as they are neither longitudinal nor large enough for a direction of causation model. In sum, we hope our tests of genetic and environmental influences of religiosity, personality, and social ideology across two age groups in two cultures will contribute to understanding across these domains and encourage more scholars to attempt integrated models of these measures.

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Table 1: Descriptive Statistics

	United States			Australia		
	N	Mean	SD	N	Mean	SD
Social ideology (no religion)	1321	0.48	0.19	546	0.32	0.20
Religiosity	1322	0.58	0.27	545	0.26	0.25
Agreeableness	1316	0.79	0.14	550	0.67	0.14
Agreeableness (Altruism)	1325	0.82	0.15	416	0.73	0.14
Agreeableness (Compliance)	1323	0.75	0.18	416	0.63	0.17
Conscientiousness	1319	0.80	0.14	550	0.69	0.15
Conscientiousness (Order)	1330	0.70	0.24	416	0.60	0.23
Conscientiousness (Self-discipline)	1326	0.81	0.15	416	0.68	0.15
Extraversion	1325	0.57	0.21	550	0.59	0.21
Extraversion (Activity)	1328	0.67	0.22	416	0.65	0.19
Extraversion (Assertiveness)	1328	0.52	0.24	416	0.56	0.21
Neuroticism	1317	0.39	0.20	550	0.41	0.18
Neuroticism (Anxiety)	1323	0.42	0.22	416	0.45	0.20
Neuroticism (Depression)	1327	0.32	0.26	416	0.38	0.21
Openness	1322	0.61	0.17	550	0.61	0.15
Openness (Aesthetics)	1327	0.56	0.23	416	0.54	0.20
Openness (Ideas)	1327	0.62	0.18	416	0.61	0.15
Income	1317	0.62	0.31	394	0.47	0.22
Education	1319	0.50	0.23	410	0.59	0.28
Age*	1349	56.21	2.49	560	24.94	3.18
Sex	1349	62.6% female		560	60.8% female	

All variables, except age and sex, scaled from 0 to 1 along the theoretical range of the scale.

* In the United States, age ranged from 57 to 65. In Australia, from 19 to 31.

Table 2: Correlations of social ideology, religiosity, and Big Five personality traits

	United States		Australia	
	Social Ideology	Religious importance	Social Ideology	Religious importance
Religiosity	0.535	1.000	0.581	1.000
Agreeableness	0.035	0.197	0.165	0.167
Conscientiousness	0.031	0.089	0.064	-0.053
Extraversion	-0.063	0.013	0.012	0.084
Neuroticism	-0.042	-0.099	-0.046	0.049
Openness	-0.214	-0.072	-0.169	-0.135

Bolded values are $|r| > 0.100$

Table 3: Regression of Social Ideology on Religiosity, Personality, and Demographics

	United States			Australia		
	Estimate	SD	p	Estimate	SD	p
Religious importance	0.546	0.025	0.000	0.580	0.052	0.000
Agreeableness	-0.062	0.028	0.025	0.086	0.051	0.091
Conscientiousness	0.034	0.026	0.198	0.015	0.042	0.729
Extraversion	-0.030	0.026	0.242	0.010	0.041	0.799
Neuroticism	-0.059	0.027	0.029	-0.036	0.045	0.430
Openness	-0.116	0.023	0.000	-0.154	0.041	0.000
Age	-0.063	0.024	0.008	-0.076	0.051	0.136
Income	0.027	0.024	0.255	0.021	0.049	0.665
Education	-0.238	0.026	0.000	-0.110	0.046	0.018
Sex	0.231	0.053	0.000	0.144	0.105	0.169
Constant	-0.086	0.032	0.007	-0.055	0.058	0.346
N	1263			394		

Higher values on the dependent variable are more socially conservative.

All values are mean centered and standardized, except sex (where 0 is female and 1 is male).

Bolded values are significant at $p < 0.05$