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The genetic underpinnings of right-wing authoritarianism and social dominance orientation explain political attitudes beyond Big Five personality

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Abstract

Objective: Political attitudes are predicted by the key ideological variables of right-wing authoritarianism (RWA) and social dominance orientation (SDO), as well as some of the Big Five personality traits. Past research indicates that personality and ideological traits are correlated for genetic reasons. A question that has yet to be tested concerns whether the genetic variation underlying the ideological traits of RWA and SDO has distinct contributions to political attitudes, or if genetic variation in political attitudes is subsumed under the genetic variation underlying standard Big Five personality traits.

Method: We use data from a sample of 1987 Norwegian twins to assess the genetic and environmental relationships between the Big Five personality traits, RWA, SDO, and their separate contributions to political policy attitudes.

Results: RWA and SDO exhibit very high genetic correlation ($r = 0.78$) with each other and some genetic overlap with the personality traits of openness and agreeableness. Importantly, they share a larger genetic substrate with political attitudes (e.g., deporting an ethnic minority) than do Big Five personality traits, a relationship that persists even when controlling for the genetic foundations underlying personality traits.

Conclusion: Our results suggest that the genetic foundations of ideological traits and political attitudes are largely non-overlapping with the genetic foundations of Big Five personality traits.

KEYWORDS

authoritarianism, behavior genetics, Big Five, evolution, personality, political attitudes, social dominance

1 | INTRODUCTION

The current state-of-the-art suggests that right-wing authoritarianism (RWA) and social dominance orientation (SDO) form complementary hierarchical orientations that exhibit personality-like features while undergirding intergroup attitudes and political behavior (even in its most extreme forms such as violence, see Duckitt, 2001; Duckitt & Sibley, 2010; Ho et al., 2012; Sidanius et al., 2016; Sidanius & Pratto, 1999; Thomsen et al., 2008).

Indeed, the idea that SDO and RWA may constitute dispositional traits akin to personality is in line with arguments that political and prejudicial attitudes express fundamental aspects of human nature—such as desires for hierarchies between (SDO, see Sidanius & Pratto, 1999) and within groups (RWA, see Thomsen, 2010; Thomsen et al., 2008), that also vary systematically between individuals and across nations (Henry et al., 2005; Kunst et al., 2017; Pratto et al., 2013; Sidanius et al., 2000; Sidanius & Pratto, 1999). Such an account of the origins of individual differences in these two key ideological orientations suggests that they address a separate set of adaptive problems to the more established traits revealed by the "Big Five" personality construct (Goldberg, 1993). Indeed, we posit that they may form their own functional set of "hierarchy-related traits."

However, basic Big Five personality traits can also be used to predict political attitudes and prejudice in the critical evolutionary arena of one's wider social and societal life. Indeed, factor analyses often show that a generalized prejudice factor accounts for 50% to 60% of the variance in specific forms of prejudice and that this factor covaries systematically with personality (Akrami et al., 2011). Consistent with this observation, popular accounts for the role of SDO and RWA in shaping political attitudes, such as the dual process model of ideology and prejudice, position these ideological traits as downstream mediators of the impact of more upstream, underlying personality traits (Duckitt & Sibley, 2010; Ekehammar et al., 2004; Hodson et al., 2009).

Comparing correlational patterns between identical and fraternal twins allows for the testing of different theoretical models against observed data to investigate any genetic or non-genetic effects on the covariation between traits, including any potential sex differences in the impact of the genetic and environmental factors. Addressing this, here we use multivariate twin modeling for the first time to directly test the relationship between SDO, RWA, Big Five personality traits, and downstream intergroup policy attitudes.

1.1 | The role of heritability and childhood socialization in shaping RWA and SDO

Building on classic work on the authoritarian predisposition (Adorno et al., 1950), modern formulations of RWA focus on three core facets that tend to covary: authoritarian submission, authoritarian aggression, and conventionalism (Altemeyer, 1981; Caprara & Vecchione, 2013). People high in RWA tend to submit uncritically to authority, have aggressive feelings toward those who deviate from group norms, and conform rigidly to conventional values (Caprara & Vecchione, 2013). These tendencies in RWA are argued to be driven by perceived threats and a belief that the world is a dangerous place, thus cohering toward the goals of security, control, and order (Duckitt, 2001).

In the 1990s, another key measurement of human political personality emerged: SDO. Here, the emphasis lies on individual differences in one's preferences for hierarchy versus equality in intergroup relations (Pratto et al., 1994; Sidanius & Pratto, 1999). Although this construct is on the surface very different from RWA, it was found to be a powerful predictor of similar outcomes: attraction to right-wing politics, nationalism, and a tough, authoritarian government (Henry et al., 2005; Kleppestø et al., 2020; Pratto et al., 2013; Sidanius, 1993; Sidanius et al., 2016; Sidanius & Pratto, 1999). Considered together, both RWA and SDO are powerful and independent predictors of political orientation and prejudice (Baron et al., 2023; Heaven et al., 2006), across time (Osborne et al., 2020; Thomsen et al., 2010), and nations (Duriez et al., 2005; Kunst et al., 2017; Tybur et al., 2016). Their consistently observed stability and broad predictive power (e.g. Bratt et al., 2016; Kteily et al., 2012; Levin, 2004; Ludeke & Krueger, 2013; Sidanius et al., 2000; Sidanius & Pratto, 1999; Thomsen et al., 2010) has lent credence to the early theorizing of them as personality traits (Altemeyer, 1981, 1988; Pratto et al., 1994).

The dual process model of ideology and prejudice (DPM, Duckitt, 2001; Duckitt et al., 2002) was developed to take advantage of the complementary nature of RWA and SDO in attempting to elucidate the underpinnings of prejudice. The DPM posits that both political beliefs and prejudices are expressions of these two fundamental traits working in complementary ways. Researchers in this tradition (Duckitt, 2001; Duckitt et al., 2002; Duckitt & Sibley, 2010; Perry et al., 2013) argue that RWA stems from a view that the world is a dangerous place, which is in turn rooted in childhood experiences with strict and punishing parents. SDO is posited to stem from a view that the world is a "competitive jungle", following the notion in social

dominance theory that links SDO and perceptions of zero-sum conflict (Sidanius & Pratto, 1999), and that such competitive worldviews are rooted in childhood experiences with uncaring parents (see Duckitt, 2006). The DPM thus conceptualizes SDO and RWA as rooted in different, albeit related, types of childhood socialization experiences in the family (cf. Duckitt, 2020; Osborne et al., 2020).

An alternative approach is that RWA and SDO are tapping into stable, partly heritable variation. Research applying behavioral genetic methods reveals that political personality traits are, in fact, heritable. Such methods are crucial for being able to determine the role, if any, of childhood socialization or parenting by controlling for genetic mediation of any within-family similarities (see Hart et al., 2021). Using the classic twin design, RWA has reliably been identified as heritable, with reported genetic contributions varying between 40% and 60% (Funk et al., 2013; Kandler et al., 2015; Lewis & Bates, 2014; Ludeke & Krueger, 2013). Genetics have also been found to account for most of the phenotypic stability in RWA over 15 years (Ludeke & Krueger, 2013).

In favor of an account of SDO as an evolved disposition in its own right, Kleppestø et al. (2019) observed moderate heritability in SDO among a sample of Norwegian twins (37% and 24% for each of its subdimensions), and a shared genetic substrate between SDO and endorsement of policies that serve to monopolize resources and territory. The finding of SDO as moderately heritable differed from a previous study conducted with smaller samples (Kandler et al., 2016) that found very little heritability of SDO, but this estimate was based on an SDO score where common variance with RWA was partially out. In fact, the heritability of SDO when not corrected for RWA in this sample showed a low-to-moderate heritability of 20% (Kandler, 2015). Moderate heritability for SDO has since been further corroborated by subsequent research (de Vries et al., 2022).

In summary, research indicates that both RWA and SDO are stable and heritable traits. Further, the underlying genetics in both RWA and SDO seem to be highly similar, as genetic correlation estimates between them have been reported to be high (de Vries et al., 2022; Nacke & Riemann, 2023).

1.2 | Authoritarianism and social dominance as arising from personality

Just as authoritarianism and social dominance are found to robustly predict prejudice and political behavior, so personality traits have been posited to play an upstream role in political psychology. For instance, personality predicts the strength of partisanship and ideology (Gerber et al., 2012), as well as political participation (Gerber et al., 2011; Vecchione & Caprara, 2009). For variation in political beliefs, data consistently identify that high openness (curiosity, novelty-seeking) is associated with identifying as a political liberal, whereas individuals with higher conscientiousness (orderly, conventional, organized) are more likely to identify as political conservatives (Carney et al., 2008; Gerber et al., 2010; Hufer et al., 2020; Jonason, 2014; Jost et al., 2003). On the contrary, the Big Five personality traits most relevant for generalized prejudice are low openness to experience and low agreeableness (Akrami et al., 2011; Caprara & Vecchione, 2013), and the honesty-humility domain from the HEXACO personality inventory has also shown associations with prejudice (Sibley et al., 2010). The covariance between personality and political attitudes seems to be mostly due to shared genetic effects (Verhulst et al., 2010).

This then raises the intriguing question as to the relationship between Big Five personality traits, in contrast, and the core ideological orientations of RWA and SDO, on the other. A meta-analysis of the few studies investigating the relationship between the Big Five traits, RWA, and SDO found that SDO was robustly related to lower agreeableness ($r = -0.29$), and somewhat to lower openness to experience (-0.16), whereas RWA was most strongly related to lower openness to experience ($r = -0.36$), and, to a lesser extent, higher conscientiousness ($r = 0.15$) (Sibley & Duckitt, 2008). Disagreeableness then, with its emphasis on a competitive attitude and increased self-interest, overlaps with SDO more than any other of the Big Five traits, according to meta-analytical estimates. Low openness, on the contray, perhaps due to its association with a desire for clear and unambiguous moral rules, overlaps with RWA (Perry & Sibley, 2012).

Importantly, the dual process model assigns a particular causal positioning to personality and ideological traits when it comes to ideology and prejudice: It posits that personality traits indirectly affect political attitudes and prejudice *through* their effects on RWA and SDO (Duckitt, 2001; Duckitt et al., 2002; Duckitt & Sibley, 2010). Specifically, it holds that a "socially conforming" personality (equivalent to low openness to experience) leads one to view the world as dangerous (vs. safe); a "tough-minded" personality (equivalent to low agreeableness) leads one to view the world as competitive (vs. cooperative—see Duckitt, 2006). These dangerous and competitive worldviews then lead to the emergence of RWA and SDO, respectively, at which point RWA and SDO go on to shape political and intergroup attitudes (Duckitt & Sibley, 2010). This suggests that RWA and SDO are downstream consequences of personality that mediate its effect on intergroup attitudes.

Although the dual process model has had a substantial influence on social and personality psychology, its claims are not uncontested. In particular, the claim that

personality is a more fundamental, upstream predictor of SDO has been challenged by longitudinal research. Sidanius et al. (2013) found that over time the relationship between SDO and one facet of agreeableness, trait empathic concern, was reciprocal. Importantly, they found that SDO had a stronger over time predictive path toward empathy than the reverse, challenging the causal pathway put forward by the DPM.

Another challenge to the notion that SDO and RWA arise from personality dispositions that in turn emerge from early life experiences comes from behavioral genetics research that uses a multivariate design. Building on findings that Big Five personality traits have a substantial genetic component (Jang et al., 1996), multivariate twin analyses have found a *common genetic* component underlying the association between personality on the contrary and RWA (Lewis & Bates, 2014), and both RWA and SDO (de Vries et al., 2022), on the other.

Despite these advances, what so far has not been attempted is a multivariate behavioral genetic analysis in which the relationships among RWA, SDO, and political attitudes are considered when Big Five personality variation is accounted for. To conduct such an analysis is crucial because the genetic factors influencing RWA/SDO might also affect political attitudes independently from standard Big Five personality. If this is the case, it would reinforce the notion of humans as *political animals*.

1.3 | Present study

Here, we apply multivariate behavioral genetic methods to shed light on what underlies the relationship between personality, the core ideological traits of authoritarianism and social dominance, and attitudes toward contested political policies. By investigating the strength of genotypic and phenotypic associations between RWA and SDO and Big Five personality traits, we can examine if the Big Five personality are substantially different from the notion of a political personality, or is best regarded as the same phenomenon (see also de Vries et al., 2022). Sex differences in the mean levels of both personality and political traits are well-documented (McDonald et al., 2012; Schmitt & Realo, 2008). This does not necessarily mean that the impact of genetic and environmental factors on trait *variation* will differ between the sexes, but we test for this possibility by also including "sex limitation" models (see Neale et al., 2006).

Going further, we can investigate the crucial question of whether the genetic foundations of RWA and SDO have influences on political attitudes independently from Big Five personality. By answering the question of whether the two most widely studied ideological orientations in social psychology are genetically independent of other traits, consistent with their standing as basic aspects of human personality (Adorno et al., 1950; Kleppestø et al., 2019; Sidanius, 1993), genetically sensitive analyses can provide critical insights into the architecture of human political nature and the human personality system generally.

2 | METHOD

2.1 | Sample

A sample of twins was recruited through the Norwegian twin registry (NTR), consisting of several cohorts of twins (Nilsen et al., 2013). The cohort used consists of randomly drawn same-sex twins born between 1945 and 1960. The mean age of the whole sample was 65.16 ($SD = 4.49$) when the measurements were made in 2016. In total, 708 complete twin pairs responded, as well as 571 additional single responders (64% of the invited participants, total $N = 1987$). We determined zygosity with a questionnaire shown to correctly classify above 97% of twins (Magnus et al., 1983).

2.2 | Measures

2.2.1 | Big Five personality traits

The participants completed a Norwegian translation of the Big Five Inventory (BFI) (Engvik & Føllesdal, 2005; John & Srivastava, 1999). The scale ranges from 1 (strongly disagree) to 5 (strongly agree). All 44 items start with the statement "I see myself as someone", which is followed by items such as "who is talkative", and "can be cold and aloof." The Cronbach's α for the scales was: Openness $\alpha = 0.78$; Conscientiousness $\alpha = 0.74$; Extraversion $\alpha = 0.81$; Agreeableness $\alpha = 0.73$; Neuroticism $\alpha = 0.83$.

2.2.2 | Social dominance orientation

The participants completed a Norwegian translation of the SDO-7 scale (Ho et al., 2015). It consists of 16 items, for example, "Some groups of people must be kept in their place," rated on a 7-point Likert scale ranging from 1 (*strongly oppose*) to 7 (*strongly favor*). Some items were reversed, such that all were protrayed on their respective subdimensions (for intergroup dominance or intergroup equality, respectively), heeding methodological warnings that respondents might not reliably process and respond to negative-worded items (Roszkowski & Soven, 2010) which would be amplified by having two opposing

negatively-worded sets of items (against group dominance and group equality, respectively). In this paper, we use SDO as a unitary scale, and not the two subscales. A meta-analytical investigation of the SDO subscales does not support that these are meaningfully different (Berry, 2022). Cronbach's α for the scale was 0.85.

2.2.3 | Right-wing authoritarianism

The participants completed a 15-item version of RWA (Zakrisson, 2005). The items were rated on 7-item Likert scales ranging from 1 (*strongly disagree*) to 7 (*strongly agree*). Example items include "The old-fashioned values still show the best way to live" or "Our country needs free thinkers, who will have the courage to stand up against traditional ways, even if this upsets many people" (reverse-scored). Cronbach's α for the scale was 0.75.

2.2.4 | In-group monopolization of territory and resources

Our measure of political policy attitudes is an index of four items tapping support for policies that impede the sharing of national resources and territory with non-nationals. Each is measured on a 7-point Likert scale, ranging from −3 (*against*) to +3 (*support*). The four variables are "Deport the Roma", "Reduced aid for developing countries", "Accept more asylum seekers" (reversed), and "Strict immigration control." These attitudes were selected from a pool of eight attitudes. See Table S11 for correlations between all these items. We did not include attitudes irrelevant to national territory and resource control (such as "Stronger workers' unions"). In this sample, the scale had a Cronbach's alpha of 0.77, suggesting it is a reliable measure of the preference for monopolizing territory and resources.

2.3 | Analyses

The classical twin method makes it possible to decompose the variance of a trait into three components, A, C, and E, by comparing the correlation between monozygotic (MZ) twins and dizygotic (DZ) twins (Neale & Maes, 2004). "A" here denotes additive genetic influences, that is, genetic influences that sum to make twins within a pair more similar; "C" denotes shared environmental influences, that is environmental influences that make twins within a pair more similar; "E" denotes unique environmental influences, meaning environmental influences that make each member of a twin pair less similar. As MZ twins are genetically identical, and DZ twins share on average half their segregating genes, greater similarity between MZ twins and DZ twins can be attributed to the influence of A.

Furthermore, multivariate ACE models enable us to decompose covariation between traits into genetic and environmental correlations. Such correlations quantify the extent to which variance in the traits can be attributed to overlapping genetic (rA), shared environmental (rC), or unique environmental (rE) factors. For example, if a genetic correlation between two heritable traits is zero, it means that the genetic influence on one phenotype is independent of the genetic influences on the other. If rA is one, it means that the genetic influences on one trait are completely overlapping with those on the other. The classical twin model assumes that genetic variance is additive (genetic effects are independent), that there are no gene–environment interaction or correlation, that MZ and DZ twins have the same degree of shared environmental effects, and that mating is random. If any of these assumptions are false, it could have important consequences for the interpretation of the results.

We used structural equation modeling to partition and model the variances and covariances of twins in terms of additive genetic effects (A), shared environment (C), and unique environment (E). We first tested models with the main variables: the Big Five traits, RWA and SDO. The best-fitting model (described below) with these variables included provides the basis for all the other analyses we report (for example the genetic correlation matrix where the political attitudes are included as well).

We tested 10 models in total (see Table 2). We examined these models to investigate whether there was evidence for all three variance components (A, C, and E), or if a model without one or more of these components was sufficient. We also included models that can check whether there were differences across sex in the contribution to the variance components. We first tested a full model, in which we allowed for quantitative sex differences and the influence of A, C, and E on the traits (model 1). Quantitative sex differences imply that, while the same genetic and environmental factors influence the outcome measures in males and females, they may do so to a different extent. This is modeled by estimating path loadings separately in males and females, but constraining the genetic (rA) and environmental (rC and rE) correlation matrices to be equal across sex (see Neale et al., 2006). In a subsequent set of models (model 2–6, labeled "prop eq" in Table 2), in addition to constraining the correlation, the proportion of variance that could be attributed to A, C, and E was also constrained to equality across sex, while allowing the overall variance to differ. In these models, the heritability of RWA, for example, can be equal in males and females, but the trait could have a higher phenotypic variance in

males. Estimates of A, C, and E for every variable from a full model (see Table S6), suggested the presence of a strong and statistically significant C effect for RWA, and a smaller C effect for openness. We therefore included a model with one general C effect for all seven variables, and a model with a C effect specific to RWA (Models 3 and 4, respectively). For models 5 and 6 we fixed the C and the A parameters to zero, respectively, in order to check whether these more parsimonious models were sufficient. In the last set of models (7–10), path coefficients were constrained to equality across sexes, such that the scalar testing for variance differences between sexes was not allowed to vary.

We never constrained E to zero, because it contains all the residual variance in the phenotype not attributable to A and C, and hence also includes measurement error.

All model parameters were estimated using the R package OpenMx (Neale et al., 2016). We used full information maximum likelihood (FIML) to estimate the parameters, and we used Akaike's Information Criterion (AIC) to select the overall best-fitting model (Akaike, 1987). Low AIC indicates a better fit.

3 | RESULTS

Descriptive statistics for all variables across zygosity and sex can be found in Table S1. The biggest phenotypic correlations between personality and ideological traits are between RWA and Openness ($r = -0.27$), SDO and Openness ($r = -0.16$), and SDO and Agreeableness (−0.10). All of them are significant at the 0.05 level. The phenotypic correlations (including confidence intervals) between all the variables can be found in Table 1.

3.1 | Twin correlations

All traits had a greater correlation between the MZ twins compared to the DZ twins, indicating heritability (see Tables S2–S5). This trend had one exception: the twin correlations between RWA were similar across MZ and DZ for women, possibly indicating influence from the shared environment (C).

3.2 | Genetic modeling

Our best-fitting model according to the Akaike Information Criterion (AIC) was an AE Cholesky model without sex limitation, with one unique C factor with moderate loading on RWA only (Model 4 in Table 2). This model was run with the Big Five variables, RWA and SDO, and also served as the basis for later results with the political attitude index included.

The phenotypic correlations (see Table 1) indicated that Agreeableness was negatively correlated with SDO (but not RWA), and Openness was negatively related to RWA (and also to some lesser degree to SDO). Neuroticism also had a small positive relationship with RWA. The

TABLE 1 Phenotypic correlations between Big Five traits, RWA, SDO, and IMTR.

	E	A	C	N	O	RWA	SDO
A	0.31 (0.25, 0.37)						
C	0.33 (0.27, 0.38)	0.48 (0.43, 0.53)					
N	−0.43 (−0.48, −0.37)	−0.45 (−0.50, −0.40)	−0.42 (−0.47, −0.37)				
O	0.34 (0.28, 0.39)	0.20 (0.14, 0.26)	0.16 (0.10, 0.22)	−0.23 (−0.29, −0.17)			
RWA	0.03 (−0.03, 0.09)	0.05 (−0.01, 0.12)	0.09 (0.02, 0.15)	0.06 (−0.00, 0.13)	−0.27 (−0.33, −0.21)		
SDO	0.01 (−0.05, 0.08)	−0.10 (−0.16, −0.03)	−0.06 (−0.12, 0.01)	−0.00 (−0.07, 0.06)	−0.16 (−0.22, −0.10)	0.30 (0.24, 0.36)	
IMTR	−0.00 (−0.07, 0.06)	−0.01 (−0.07, 0.06)	0.09 (0.02, 0.15)	0.02 (−0.05, 0.08)	−0.22 (−0.28, −0.16)	0.43 (0.38, 0.48)	0.36 (0.30, 0.41)

Note: Phenotypic correlations based on the mean for the whole sample.

Abbreviations: A, agreeableness; C, conscientiousness; E, extraversion; IMTR, ingroup monopolization of territory and resources; N, neuroticism; O, openness; RWA, right-wing authoritarianism; SDO, social dominance orientation.

TABLE 2 Model fit statistics for multivariate models of Big Five personality traits, right-wing authoritarianism (RWA), and social dominance orientation (SDO).

Model	EP	−2LL	*df*	Δ −2LL	Δ *df*	AIC	*p*
(1) SL Cholesky ACE	182	21,239.18	13,222	NA		−4972.27	
(2) NS Cholesky ACE (prop eq.)	105	21,270.51	13,236	31.33289	14	−5201.49	0.005
(3) NS AE, 1C (prop eq.)	84	21,270.51	13,257	31.33289	35	−5241.03	0.646
(4) NS AE, UC (prop eq.)	**78**	**21,280.80**	**13,263**	**41.61484**	**41**	**−5245.20**	**0.443**
(5) NS AE (prop eq.)	77	21,291.22	13,264	52.03672	42	−5236.78	0.137
(6) NS CE (prop eq.)	77	21,381.75	13,264	142.57122	42	−5146.25	0.00
(7) NS ACE	98	21,317.52	13,243	78.34181	21	−5168.48	0.00
(8) NS AE1C	77	21,319.66	13,264	80.48193	42	−5208.34	0.00
(9) NS AE	70	21,337.10	13,271	97.92398	49	−5204.90	0.00
(10) NS CE	70	21,431.60	13,271	192.42083	49	−5110.40	0.00

Note: Best-fitting model is indicated in bold. A is additive genetics, C, shared environment (1C meaning one C factor that loads on all variables, UC one unique C factor for RWA), and E, unique environment; Prop eq. = proportions equal, meaning that all the standardized path coefficients are equal across sex, but the phenotypic variances across sexes are allowed to be different. In models 7–10 (without prop. eq.) both the phenotypic variances across sex, as well as the proportions attributable to A, C, and E, are constrained to be equal.

Abbreviations: AIC, Akaike's Information Criterion; *df*, degrees of freedom; EP, number of parameters; LL, LogLikelihood; NS, no sex limitation; *p*, *p*-values from test of difference from base model; SL, Sex Limitation; Δ, difference to base model;

genetic and environmental correlations are presented in Figure 1. Here, the consistent pattern is that the relationships between the variables were mostly accounted for by additive genetic effects. The environmental correlations, in contrast, did not reveal any shared environmental variance between personality and ideological traits (for the genetic and environmental correlations between all variables with 95% CI, see Table S8). The genetic and environmental correlations are estimated based on a "correlated factor solution" model. For a visualization of this model, see Figure S1.

In sum, the phenotypic relationships between ideological traits and Big Five personality traits can mostly be attributed to shared additive genetic influences.

The next question concerns the grounding of correlations between the personality and ideological traits and policy attitudes. The policy attitudes are heritable at 38% (see Table S6 for contributions for A, C, and E estimates for every variable). In Figure 2 the proportions of the phenotypic correlations between personality traits, RWA, and SDO with the policy attitudes are visualized. The phenotypic correlations in Figure 2 are derived from the best-fitting model where the sexes were allowed to have different means. The phenotypic correlations in Figure 2 that are close to zero therefore have slight differences from the ones reported in Table 1, which are based on the mean for the whole sample. In Figure 2 a clear pattern emerges, where RWA and SDO have a much higher phenotypic and genetic relationship with attitudes related to monopolization of territory and resources than has Big Five personality, suggesting that SDO and RWA matter most for these attitudes. For all of the phenotypic correlations between in-group monopolization of territory and resources (IMTR), Big Five, RWA, and SDO with 95% CI included, see Table 1.

The genetic and unique environmental variance of our index of political policy attitudes is visualized in Figure 3. Here, the proportions of the genetic and unique environmental variance in IMTR that is shared with Big Five personality traits, SDO (to the left), and RWA (to the right), are provided. The figure shows that the genetic variance in political policy attitudes that is shared with both SDO and RWA is substantial, even when the genetic variance that SDO and RWA share with Big Five personality traits is controlled for. In addition, there is a smaller, but not insignificant, amount of genetic overlap between political policy attitudes and Big Five personality, controlling for SDO and RWA (see Tables S9 and S10 for the numbers underlying this figure and Figure S1 for a visualization of the "Cholesky model" where the numbers were derived).

4 | DISCUSSION

We conducted genetically informative analyses on a sample of twins to assess the relative influence of genes, shared environment, and unique environment on the covariation between RWA, SDO, Big Five personality traits, and political policy attitudes related to maintaining (vs. sharing)

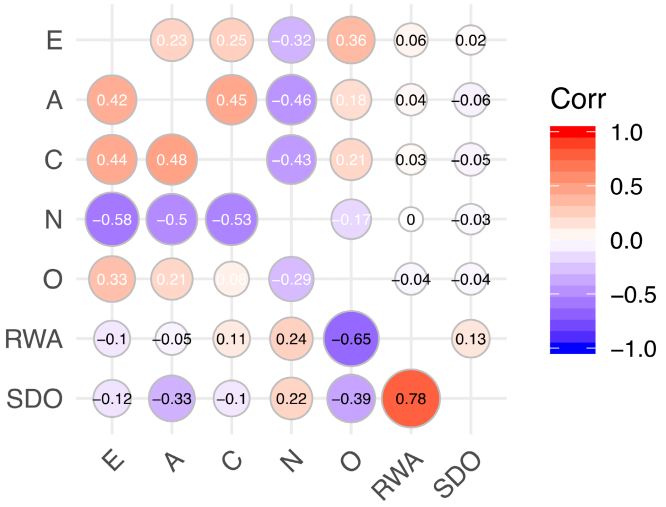

FIGURE 1 Genetic (below diagonal) and unique environmental (above diagonal) correlation matrix between Big Five and RWA and SDO. The genetic and environmental correlations between RWA, SDO, and the Big Five traits. See Table S8 for confidence intervals for all these estimates. The genetic correlations of interest are shown in black (we do not focus on the genetic and environmental correlations among the Big Five personality traits in this paper. But for the sake of completion, we show them here with white coefficients). A, agreeableness; C, conscientiousness; E, extraversion; N, neuroticism; O, openness to experience; RWA, right-wing Authoritarianism; SDO, social dominance orientation.

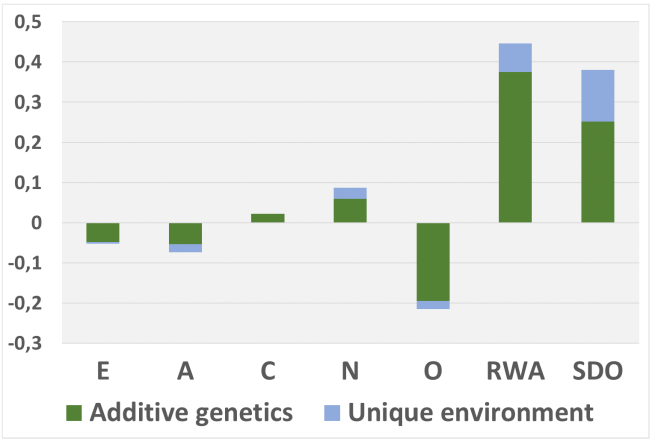

FIGURE 2 Sizes of the phenotypic correlations with "in-group monopolization of territory and resources" (IMTR) due to additive genetics and the unique environment. RWA and SDO have a much stronger relationships with policy attitudes than personality traits do, mostly due to genetic overlap. These phenotypic correlations are derived from the best-fitting model where the sexes were allowed to have different means. The confidence intervals of the raw phenotypic correlations are reported in Table 1. A, agreeableness; C, conscientiousness; E, extraversion; N, neuroticism; O, openness to experience; RWA, right-wing authoritarianism; SDO, social dominance orientation.

resources and territory by one's national ingroup. Our results revealed two important findings that advance our understanding of the link between personality and politics. First, RWA and SDO, despite having a modest phenotypic correlation, had a very large genetic correlation, which is in line with research suggesting that RWA and SDO are "two sides of the same coin" genetically speaking (Nacke & Riemann, 2023). Second, both RWA and SDO had substantially greater genetic (and phenotypic) correlations with political policy attitudes than did Big Five personality traits. Third, RWA and SDO (see Figure 3) together overlap genetically with political attitudes, *even when their genetic overlap with Big Five personality traits is controlled for.*

These findings are inconsistent with classical political science models that claim that the relationship between ideology and personality is grounded only in common socialization, primarily the family environment during childhood. For instance, Adorno et al. (1950) argued in their seminal work that authoritarian anti-democratic attitudes are due to strict and punitive parenting. Here we find that although authoritarian ideology may indeed have

some grounding in family experiences (as indicated by its significant shared environmental component), its connection to political attitudes does not. Proponents of the dual process model have argued that RWA stems from a view that the world is dangerous, which is again rooted in experiences with strict and punitive parents. SDO, on the contrary, is argued to stem from the view that the world is a competitive jungle, purportedly rooted in childhood experiences with uncaring parents (Duckitt, 2001, 2020; Osborne et al., 2020). The present findings are also inconsistent with proposals that SDO and RWA are but downstream consequences of more basic forms of personality traits (as mediated by dangerous and competitive worldviews, cf. Duckitt, 2006).

We provide a stronger test of these claims by using a genetically informed dataset to partition the covariances between traits into genetic, shared environmental, and unique environmental sources. We looked for evidence in favor of socialization models by exploring the role of the environment shared among twins in predicting variation in RWA, SDO, and Big Five personality traits. We found only one effect of the shared environment, namely on RWA (see also Eftedal et al., 2020; Kleppestø et al., 2020). By contrast, we did not find a shared environmental effect either on SDO or on any of the Big Five personality traits (see also Bouchard & McGue, 2003; de Vries et al., 2022; Kleppestø et al., 2019). Also, environmental correlations between Big Five personality traits and SDO and RWA were found to be essentially zero (shared or unique). That is, non-genetic sources of trait variation tend to be specific to the trait, and not cause covariation between them. A possible cause of this could be that intrinsic randomness causes individual-specific variation during development (Tikhodeyev & Shcherbakova, 2019). In any case, these results can inform and constrain new theorizing on the origins of individual differences in political personality, such as the influential dual process model of ideology and prejudice (see Duckitt & Sibley, 2010).

The finding of personality-independent genetic factors predicting variation in, and covariation between, SDO, RWA, and political policy attitudes supports an account of the biology of politics focused on the notion of an evolved disposition (or set of dispositions) for navigating within- and between-group hierarchy. The adaptive logic of this is grounded in the fact that the human mind evolved in a context of resource competition and frequent intergroup violence (Chagnon, 1988), such that it may

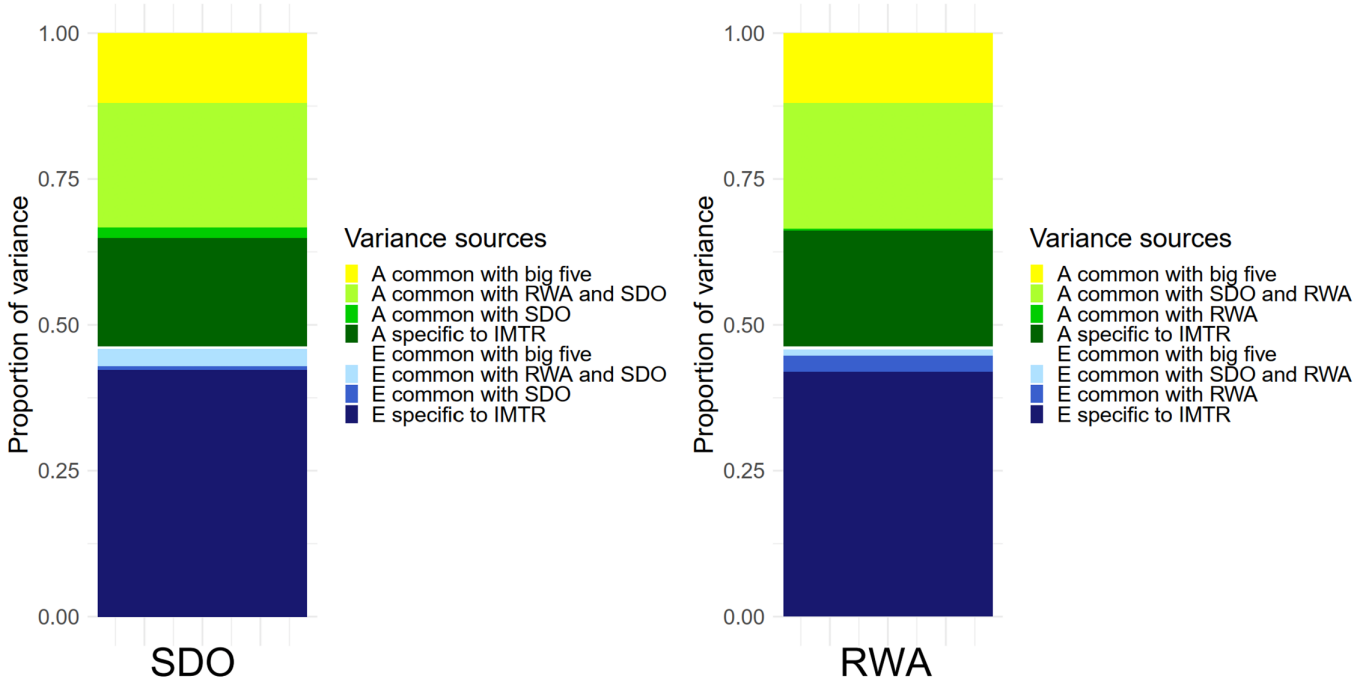

FIGURE 3 Genetic and environmental variance of "In-group monopolization of territory and resources" (IMTR), indicating proportions shared with SDO (left), and with RWA (right), when controlling for Big Five personality traits and a political trait. These two bars show the total genetic and environmental variance in political policy attitudes. The bar on the left shows the policy variance that is shared with SDO after controlling for Big Five and RWA. The bar on the right shows the policy variance that is shared with RWA after controlling for Big Five and SDO. These estimates are derived from two separate eight-variate Cholesky models. In the estimates to the left, the order of the variables was as follows: Big Five personality, RWA, SDO, and IMTR, and to the right: Big Five personality, SDO, RWA, and IMTR. A, agreeableness; C, conscientiousness; E, extraversion; N, neuroticism; O, openness to experience; RWA, right-wing authoritarianism; SDO, social dominance orientation.

be equipped with domain-specific adaptations designed to deal with coalition-building and resource competition (Pietraszewski et al., 2014; Sidanius & Pratto, 1999; Sinn & Hayes, 2017; Tooby & Cosmides, 2010; Wrangham, 1999). Adaptive strategies for navigating group-based social hierarchy may thus manifest as ideological orientations that function to bind the in-group for better cooperation (RWA) and to dominate other groups for access to fitness-relevant resources (SDO) (McDonald et al., 2012; Sinn & Hayes, 2017, 2018). Which of these is adaptive in a particular context will vary spatially and over longer time periods, such that the selection pressures of balancing selection may come into effect (Nettle, 2006, cf. also Kleppestø et al., 2019).

We also find that RWA and SDO correlate only moderately phenotypically ($r = 0.30$) but have a very high genetic correlation ($r = 0.78$), suggesting that their underlying genetic architecture is highly similar. This must be considered alongside the finding that RWA has a strong negative genetic correlation with openness to experience and that SDO is genetically correlated with agreeableness. Genetic variance that increases RWA/SDO tends to decrease Openness to experience (and to some extent agreeableness), and conversely, genetic variance that decreases RWA/SDO tends to increase openness to experience. This aligns with work documenting the phenotypic association of SDO with agreeableness, and of RWA with openness to experience (Sibley & Duckitt, 2008), in addition to research on generalized prejudice reporting that agreeableness and openness are related to the *common* factors in several prejudicial attitudes (Akrami et al., 2011). It is also a replication of the finding from genetically sensitive research that covariation in ideology and personality is due to genetic overlap (de Vries et al., 2022; Verhulst et al., 2010).

Why is it that SDO and RWA are bound together at the genetic level not only with policy attitudes, but also with two of the most relevant Big Five personality traits, agreeableness and openness to experience? We conjecture that the underlying reason for these patterns of results may be that the human selective context of resource competition likely affected fundamental personality variation (especially trait Openness), but also independent traits designed to deal with problems of hierarchy-navigation (RWA/SDO), and their downstream political correlates. We suspect that what has been selected genetically is a general orientation for (or against) hierarchy, where RWA and SDO best capture current genetic variation in this orientation. RWA and SDO seem to form complementary hierarchical orientations with high construct validity, as demonstrated by differentially being associated with intergroup attitudes above and beyond the Big Five. Thus, RWA/SDO may be best viewed as relatively autonomous domains in the human personality system.

Our data cannot address the question of *why* such substantial genetic variation is observed. A key challenge for future genetic and evolutionary work is then to explain why this genetic variation is maintained in the population, given that directional selection pressures usually ensure that non-optimal alleles are quickly removed from a population. The observed genetic variation could be maintained by balancing selection due to the adaptiveness of RWA/SDO changing over time and place (see also Kleppestø et al., 2019; Osborne et al., 2023). For instance, the fitness of genetic variants underlying political traits such as RWA and SDO could change during times of war as compared to peaceful eras. Alternatively, it could simply reflect differential mutation load between individuals (see Arslan & Penke, 2015; Penke et al., 2007; Penke & Jokela, 2016).

Social dominance theory, while long positing an upstream role for SDO in shaping one's orientation toward novel political issues and the role of heritable factors therein, also predicted its malleability in the face of life experiences such as the position that one's group occupies in society (see also Levin, 2004; Sidanius & Pratto, 1999). Evidence for the sensitivity of SDO to other adaptively relevant characteristics such as physical formidability (Petersen & Dawes, 2017; Price et al., 2017) and wider societal resource distribution (Kunst et al., 2017) suggests that it behaves as a facultative adaption (see also Sheehy-Skeffington & Thomsen, 2020, 2023; Tooby & Cosmides, 1990). Note that the present new evidence for the genetic linkages between SDO, RWA, and political policy attitudes therefore does not preclude an important role for their flexible calibration in response to relevant socio-ecological input. For example, cues of external threat should shape an orientation toward hierarchy in the direction of RWA (see Stenner, 2005), while belonging to a dominant group of high rank, resources and military prowess should implement individual proclivities for hierarchy in the form of SDO, as demonstrated by decades of work in social dominance theory and the dual process model (Duckitt, 2001; Duckitt et al., 2002; Duckitt & Sibley, 2010; Pratto et al., 2006; Sidanius et al., 2016; Sidanius & Pratto, 1999).

4.1 | Strengths and limitations

Although we believe behavioral genetics techniques such as those used in the present paper can answer questions previously obscured by the analyses of phenotypic correlations between traits that dominate social and political psychology, it is important to note their

limitations. For example, twin data alone cannot shed light on the exact underlying mechanisms that generate the genetic and environmental effects. One important possibility that might contribute to the heritability of, and genetic correlations between, the hierarchy-related traits and their relevant personality traits is active gene–environment correlation (Lynch, 2017; Lynch & Bourrat, 2017; Penke et al., 2007; Penke & Jokela, 2016). That is, genetic variance shaping both RWA and SDO, as well as openness and agreeableness, nudges people to seek out different environments that in turn might reinforce their tendencies, such as what kind of friends one seeks out and what kind of education one is interested in, as classically proposed by social dominance theory (Sidanius & Pratto, 1999). For instance, high levels of SDO increase the likelihood of becoming a police officer as opposed to low SDO which is more related to professions such as social work (Gatto & Dambrun, 2012; Sidanius & Pratto, 1999). When active gene–environment correlation is present, it can increase heritability in classical twin studies. Political attitudes have higher heritability in young adults than in adolescents (Hufer et al., 2020), suggesting that initial genetic variance that influences general hierarchy-orientation nudges individuals toward certain environments that might reinforce their proclivities. Another limitation is that the presence of assortative/nonrandom mating may lead us to underestimate heritability. For example, the twin model assumes that the dizygotic twins share on average 50% of their segregating genes, which is based on random mating. However, if spouses choose each other partly based on their expressed heritable traits (such as personality and political values), parents will be genetically more similar than others in the population, and families will be more similar than expected by chance. In fact, political values exhibit the largest amount of assortative mating across all traits studied so far (Horwitz et al., 2023), which could bias twin studies, such as the current one, to underestimate the heritability of political traits (see Hatemi et al., 2010; Hufer et al., 2020). For example, Kandler and colleagues (2015) identified correlations between spouses for both RWA and SDO and their model indicated that these correlations were generated due to spouses selecting each other based on expressed trait levels (phenotypic assortment) and coming from similar social backgrounds (social homogamy). Different behavioral genetic techniques (e.g., extended family twin designs, or molecular genetic designs) can model more sources of variation, such as assortative mating and gene–environment correlations. Future work using different models will have different strengths and weaknesses, allowing for a triangulation of the genetic and environmental components underlying personality, political ideology, and policy attitudes.

The present research focused on five major personality traits that often have been investigated together with SDO and RWA. However, more recent work with the HEXACO model of personality shows that an additional personality trait, honesty-humility, is substantially negatively correlated with both types of ideologies (Ho et al., 2015; Leone et al., 2012), including in genetic studies (Bratko et al., 2021; de Vries et al., 2022). Future research may therefore aim to replicate the findings of the present research within the HEXACO framework of personality. Moreover, the political attitudes we included in this study were about deportation, border control, and aid to non-nationals and only included four items. These were all highly relevant to our research question, but future studies should aim to replicate our results with larger standardized measures of political attitudes and values, especially ones related to the control of resources and territories. Links to political attitudes should also be explored with other relevant variables. For example, the cognitive style "need for cognition" accounted for more genetic covariation with political ideology than openness to experience (Ksiazkiewicz et al., 2016).

Finally, it is important to note that our sample is restricted to Norwegian middle-aged adults. Obviously, this prevents us from generalizing to other cohorts in other countries. This matters in particular to the extent that the limited variability in life experiences within a culturally homogenous country without extreme socioeconomic differentiation may lead to an underestimation of the role of shared environmental influences (Uchiyama et al., 2022). That is, even if shared environmental influences explain little of the variance within certain populations, it could well be the case that they explain much of the variance between them. It is important that future work with more diverse samples engage in genetically informed studies to reveal the nature of the links between personality, hierarchy-related traits, and political attitudes that matter critically for society.

5 | CONCLUSION

Our results suggest that the two core ideological traits of RWA and SDO have a much higher (genetic and phenotypic) covariation with political policy attitudes than do Big Five personality traits. The covariation of such ideological traits with policy attitudes is best explained by genetic overlap as opposed to common socialization. These findings challenge key influential theories in social and political psychology and suggest instead that

hierarchy-related traits are not simply epiphenomena or downstream consequences of standard personality traits, but instead might form a dedicated and heritable package for navigating intergroup struggles over territory and resources.

AUTHOR CONTRIBUTIONS

T.H.K., N.O.C., J.S.-S., O.V., E.R., N.H.E., J.R.K., E.Y., and L.T. designed research; O.V. and E.R. performed research; T.H.K., N.O.C., and N.H.E. analyzed data; T.H.K., N.O.C., J.S.-S., and L.T. wrote the paper; and O.V., E.R., J.S.-S., and L.T. procured funding for research. All authors discussed the findings, and provided critical feedback to the manuscript.

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CONFLICT OF INTEREST STATEMENT

None.

DATA AVAILABILITY STATEMENT

Access to the data and materials used in this study can be applied at the Norwegian Twin Registry (NTR).

ETHICS APPROVAL STATEMENT

Our study was approved by the Regional Committee for Medical and Health Research Ethics of South-East Norway.

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