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Dual Evolutionary Foundations of Political Ideology Predict Divergent Responses to COVID-19

Kyle Fischer^{1*} , Ananish Chaudhuri^{2,3}  and Quentin D. Atkinson^{1,4} 

¹School of Psychology, University of Auckland, Auckland, New Zealand, ²Department of Economics, University of Auckland, Auckland, New Zealand, ³Behavioral Economics area, CESifo, Munich, Germany and ⁴School of Anthropology and Museum Ethnography, University of Oxford, Oxford, UK

*Corresponding author. E-mail: afis699@aucklanduni.ac.nz

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Abstract

Political conservatives' opposition to COVID-19 restrictions is puzzling given the well-documented links between conservatism and conformity, threat sensitivity, and pathogen aversion. We propose a resolution based on the Dual Foundations Theory of ideology, which holds that ideology comprises two dimensions, one reflecting trade-offs between threat-driven conformity and individualism, and another reflecting trade-offs between empathy-driven cooperation and competition. We test predictions derived from this theory in a UK sample using individuals' responses to COVID-19 and widely-used measures of the two dimensions – 'right-wing authoritarianism' (RWA) and 'social dominance orientation' (SDO), respectively. Consistent with our predictions, we show that RWA, but not SDO, increased following the pandemic and that high-RWA conservatives do display more concerned, conformist, pro-lockdown attitudes, while high-SDO conservatives display less empathic, cooperative attitudes and are anti-lockdown. This helps explain paradoxical prior results and highlights how a focus on unidimensional ideology can mask divergent motives across the ideological landscape.

Keywords: COVID-19 pandemic; political ideology; longitudinal; right-wing authoritarianism; social dominance orientation; threat

In the wake of the COVID-19 pandemic, a popular view that gained ground was that political progressives were in favour of government-imposed restrictions to prevent the spread of the virus while the conservative focus was on resuming normal activities to prevent an economic downturn. This is supported by many studies that show an association between conservatism and reduced concern about COVID-19 and reduced compliance with pandemic prevention measures (Allcott et al. 2020; Burkova et al. 2021; Calvillo et al. 2020; Christensen et al. 2020; Clinton et al. 2021; Collins, Mandel, and Schywiola 2021; Conway et al. 2021; Gadarian, Goodman, and Pepinsky 2021; Gollwitzer et al. 2020; Painter and Qiu 2021; Pennycook et al. 2022; Stroebe et al. 2021). This variation in responses to COVID-19 has been attributed to partisanship, the polarizing rhetoric of political elites, and variation in trust of and exposure to different information sources (Calvillo et al. 2020; Gollwitzer et al. 2020; Graham et al. 2020; Motta, Stecula, and Farhart 2020; Painter and Qiu 2021; Pennycook et al. 2022; Ruisch et al. 2021; Samore et al. 2021; Sloan et al. 2021; Stroebe et al. 2021). For example, conservatives in the USA were inclined to follow and believe Donald Trump's anti-lockdown rhetoric and conservative news sources. Conservatives in the UK may also have taken cues from their prime minister, Boris Johnson, who, initially, was relatively slow in his response to the pandemic but later urged people to

physically distance themselves and stay home. However, the above accounts do not elucidate what, if any, psychological mechanisms underpin the observed differences in COVID-19 responses across the political spectrum. Moreover, they appear inconsistent with work in political psychology linking conservatism to increased threat sensitivity, including pathogen aversion (Hibbing, Smith, and Alford 2014; Jost et al. 2017) and progressivism, to decreased compliance and decreased conformity (Jost et al. 2018). They also do not explain why conservatives in some countries, and some conservative populations, were concerned about COVID-19 and pro-lockdowns (Brouard, Vasilopoulos, and Becher 2020; Chen, Frey, and Presidente 2021; Choma et al. 2021; Dryhurst et al. 2020; Gelfand et al. 2021; Mula et al. 2022; Pavlovic, Todosijevic, and Stanojevic 2020).

Here, we argue that these apparent contradictions arise from the assumption that political ideology¹ is one-dimensional (that is, conservative v. progressive). As highlighted in a recent review article, a unidimensional view of political ideology is, if not incorrect, then certainly incomplete (Claessens et al. 2020). Scales measuring unidimensional ideology often have low external validity and produce more than one latent variable in factor analyses (Duckitt and Sibley 2009; Treier and Hillygus 2009). In contrast, over the last few decades, many scholars using a diverse range of methodologies and theoretical frameworks have identified two basic dimensions of political ideology (Claessens et al. 2020; Duckitt and Sibley 2009; Federico et al. 2013; Feldman and Johnston 2014; Johnston and Ollerenshaw 2020). The first dimension, linked to measures like ‘social dominance orientation’ (SDO) and hierarchy v. egalitarianism (Claessens et al. 2020; Duckitt and Sibley 2009; Pratto et al. 1994), predicts views on issues such as inequality, taxation, and social welfare – people high in SDO, for example, tend to be on the political right and hold economically conservative views (Duriez and Van Hiel 2002; Lönnqvist and Kivikangas 2019; Perry and Sibley 2013; Pratto et al. 1994). The second dimension is linked to measures like ‘right-wing authoritarianism’ (RWA), cultural tightness v. looseness, and collectivism v. individualism (Claessens et al. 2020; Duckitt and Sibley 2009; Gelfand et al. 2011; Triandis and Gelfand 1998), which predicts views on issues like same-sex marriage, abortion, and other traditional or religious values. People high in RWA are also part of the political right and hold socially conservative views (Cizmar et al. 2014; Duckitt et al. 2010; Duriez and Van Hiel 2002; Passini 2020).

Synthesizing the above work on two-dimensional ideology with relevant work in primatology and evolutionary anthropology on the evolution of human social life, the recently proposed Dual Foundations Theory of political ideology provides an ultimate, evolutionary explanation for the existence and nature of the two dimensions (Claessens et al. 2020). The theory also elucidates and makes precise predictions regarding the psychological and socio-environmental antecedents of the two dimensions that are directly relevant to the COVID-19 pandemic. Rising to the call for more theory-driven inference in the social sciences (Muthukrishna and Henrich 2019), here we derive and test predictions from the Dual Foundations Theory regarding how two-dimensional ideology will (a) relate to responses to COVID-19 and (b) be affected by the threat of COVID-19. We focus our predictions on SDO and RWA because they are among the most widely used measures of the two dimensions of ideology, they have good psychometric properties, and they have been shown to predict a range of political behaviours and attitudes (Duckitt and Sibley 2009; Duckitt and Sibley 2017; Johnston and Ollerenshaw 2020; Stangor and Leary 2006)².

¹The term ‘ideology’ is used in many, sometimes contradictory ways (Converse 2006; Jost 2006; Jost, Federico, and Napier 2009), even within political science (Gerring 1997). Here, we build on prior work that considers political ideology in the psychological sense as ‘an interrelated set of moral and political attitudes that possesses cognitive, affective, and motivational components’ (Jost 2006, 653).

²We conceptualize SDO and RWA as proxies for the two dimensions of ideology. Researchers have identified numerous pairs of scales measuring what appear to be the same two underlying ideological dimensions (Claessens et al. 2020; Duckitt and Sibley 2009). The scales can vary in the extent to which they focus on abstract values and attitudes (e.g. traditionalism and egalitarianism) versus more concrete policy preferences (e.g. social and economic conservatism) and the SDO and RWA scales that fall somewhere in between. In introducing the Dual Process Model that was a precursor to the Dual Foundations Theory, Duckitt and Sibley (2009) reject a characterisation of SDO and RWA as personality measures, describing them as an

Our findings provide a deeper understanding of the psychological and evolutionary origins of divergent pandemic responses, helping to explain the abovementioned paradoxical results that political scientists and others have found among politically progressive v. conservative individuals and populations.

The Dual Evolutionary Foundations of Political Ideology

Claessens et al. (2020) argue that the two repeatedly and independently identified dimensions of ideology can be understood as the product of two basic tensions inherent to the evolution of human group living (Tomasello et al. 2012). SDO and related constructs concern the trade-off between cooperation for the common good v. individual self-interest and competition. RWA and related constructs concern the trade-off between threat-driven group conformity and social control v. individual autonomy and open-mindedness. Strategic responses to these dual challenges of group living are argued to give rise to contemporary variations in political attitudes, values, and policy preferences. This variation within populations is maintained by a combination of (1) fluctuating selection on heritable biological predispositions, (2) social learning, and (3) evolved species-typical responses to socio-environmental triggers – known as ‘behavioural plasticity’.

Under this Dual Foundations Theory, SDO can be explained as underpinned by a competitive, self-interested motivation for dominance, driven by a view of the world as a ‘competitive jungle’ versus a more cooperative, other-regarding orientation motivated by empathic and egalitarian preferences. Consistent with this, people low in SDO and similar measures show greater empathic concern and cooperative behaviour in economic games, while those high in SDO score higher on traits such as Machiavellianism and display more competitive behaviour (Chiao et al. 2009; Fischer, Atkinson, and Chaudhuri 2021; Jones and Figueredo 2013; Sidanius et al. 2013).

In contrast, the Dual Foundations Theory conceptualizes RWA as underpinned by drives for ingroup conformity and norm enforcement that promote group cohesion in the face of threats to group viability. In addition, perceived threats and uncertainty in the environment are expected to act as a trigger, increasing norm-enforcing conformity and, in turn, RWA (Claessens et al. 2020). Consistent with this, people high in RWA (versus low) tend to be more conformist, punitive, prejudiced against norm-violators, and sensitive to threatening/disgusting stimuli (Feldman 2003; Fischer et al. 2023; Hunsberger 1996; McKee and Feather 2008; Shaffer and Duckitt 2013). Moreover, increased experimentally induced or real threats (for example, group conflict or disease) are associated with increased conformity (Murray and Schaller 2012), norm enforcement (Sääksvuori, Mappes, and Puurtinen 2011), and RWA (Asbrock and Fritsche 2013; Duckitt and Fisher 2003). Others have also identified population-level correlations between levels of threat (for example, warfare or disease) and RWA or related variables (Gelfand et al. 2011; Lindén, Björklund, and Bäckström 2018; Terrizzi, Shook, and McDaniel 2013; Tybur et al. 2016).

Based on the Dual Foundations Theory, we make three key predictions regarding (1) how SDO and RWA will differentially relate to cooperative/other-regarding and conformist/norm-enforcing responses to COVID-19, (2) how SDO and RWA will differentially relate to concern about COVID-19, and (3) how the threats associated with COVID-19 will affect (or not affect) SDO and RWA scores.

Prediction 1: Low-SDO progressives will support cooperative/other-regarding responses to COVID-19; high-RWA conservatives will support conformist/norm-enforcing responses to COVID-19.

ideological response that is the product of an interaction between personality and environmental context. Consistent with this, SDO and RWA scales are widely used as measures of ‘ideology’ in psychology, and they correlate highly with, and factor together with, attitudinal measures of economic and social conservatism, respectively (Duckitt and Sibley 2009; Duckitt and Sibley 2017; Johnston and Ollerenshaw 2020; Stangor and Leary 2006).

As noted above, studies on unidimensional ideology and the COVID-19 pandemic have mostly linked political conservatism to reduced cooperation and compliance (Allcott et al. 2020; Burkova et al. 2021; Calvillo et al. 2020; Christensen et al. 2020; Clinton et al. 2021; Collins, Mandel, and Schywiola 2021; Conway et al. 2021; Gadarian, Goodman, and Pepinsky 2021; Gollwitzer et al. 2020; Painter and Qiu 2021; Pennycook et al. 2022; Stroebe et al. 2021). According to the Dual Foundations Theory, this may be driven by high-SDO conservatives' reduced cooperation, and it may mask a link between high-RWA conservatism and conformity. However, this remains an open question because studies of how ideology relates to COVID-19 do not tend to distinguish between cooperative/empathic and conformist/norm-enforcing responses to COVID-19 or control for shared variance between the two dimensions of ideology. The latter is important because the two dimensions often covary and influence each other's effects on other variables (Costello and Lilienfeld 2021). For example, a study that does not control for RWA may find an association between SDO and support for uncooperative responses but, given that high-SDO individuals are very often also higher in RWA, it is difficult to tell whether the result is driven by SDO and not RWA. Suggestive evidence supporting Prediction 1 comes from a study on COVID-19 in the UK, which found that only low-SDO progressives display prosocial attitudes (Politi et al. 2021) and another finding that only authoritarians display punitive attitudes towards rule-breakers (Mellon, Bailey, and Prosser 2021).

Prediction 2: High-RWA conservatives will be concerned about the pandemic in general and the many threats associated with it (that is, not only familiar and unfamiliar others' health but also their health and finances and the economy); low-SDO progressives will be concerned about the pandemic in general and, specifically, about threats that trigger empathic concern (that is, familiar and unfamiliar others' health).

Most existing studies link concern about COVID-19 to political progressivism or related variables (Burkova et al. 2021; Calvillo et al. 2020; Clinton et al. 2021; Collins, Mandel, and Schywiola 2021; Gadarian, Goodman, and Pepinsky 2021; Pennycook et al. 2022; Stroebe et al. 2021) but some studies link concern about COVID-19 to political conservatism (Dryhurst et al. 2020; Mula et al. 2022; Pavlovic, Todosijevic, and Stanojevic 2020). The Dual Foundations Theory predicts that the former relationship is driven by low-SDO progressives' empathic concern while the latter relationship is driven by high-RWA conservatives' threat sensitivity. Consistent with this, a study on COVID-19 in the US, that controls for shared variance between the two dimensions of ideology, links both economic progressivism and social conservatism to precautionary behaviours but does not measure different kinds of threats (Samore et al. 2021).

Prediction 3: RWA but not SDO will significantly increase in response to threats posed by COVID-19.

Longitudinal studies find weak or inconsistent support for a link between pandemic threats and increased unidimensional conservatism (Beall, Hofer, and Schaller 2016; Golec de Zavala et al. 2020; Inbar et al. 2016; Rosenfeld and Tomiyama 2021; Tiokhin and Hruschka 2017). However, several longitudinal studies (Golec de Zavala et al. 2020; Karwowski et al. 2020; Pazhoohi and Kingstone 2021; Rosenfeld and Tomiyama 2021) and an experimental study (Karwowski et al. 2020) finds at least some support for a link between COVID-19 and increased RWA or social conservatism. The only longitudinal study that we are aware of that examines both dimensions of ideology found that scores on the RWA, but not on the SDO scale, increased in a Polish sample (Golec de Zavala et al. 2020) There was no attempt to link this increase to actual or perceived exposure to COVID-19 threats.

Here, we test the above predictions using longitudinal data on SDO and RWA from a large UK sample, as well as data on empathic concern, a broad array of attitudes about cooperative/other-regarding and conformist/norm-enforcing responses to COVID-19, and perceived concern

about and actual exposure to COVID-19 threats. We control for (1) demographic variables, (2) shared variance between SDO and RWA to tease apart their separate effects, and (3) unidimensional left-right political affiliation (a composite of political orientation and party affiliation) to show that the effects of SDO and RWA are not somehow merely an artefact of political identity.

Methods

Participants and Procedure

We sampled participants in the UK in three waves using Prolific's online recruitment service (<https://www.prolific.co/>)³. First, between 8 October and 7 November 2019 for another study (unpublished) where we measured SDO and RWA. This was approximately three months before the pandemic began (the first confirmed coronavirus case in the UK was on 31 January 2020). Second, between 18 April and 28 April 2020, where we measured SDO and RWA again, as well as a broad array of experiences of and responses to the pandemic. This was during the first lockdown in the UK and the first spike of COVID-19 cases (Supplementary Figure S1), and only a few weeks after the prime minister of the UK at the time, Boris Johnson, tested positive for coronavirus and urged people with symptoms like his to stay home. Third, between 15 June and 28 June 2020 – towards the end of the first spike of COVID-19 cases (Figure S1) – where we measured empathic concern.

For the first wave of data collection in late 2019, we recruited 553 participants (the survey was open to all Prolific participants who were over eighteen years old and lived in the UK). For the second wave, we approached these same participants. After excluding participants who did not meet our pre-registered exclusion criteria (<https://aspredicted.org/blind.php?x=xs6jm8>) or who, in the first wave, took under eight or over ninety minutes to complete the session, gave the same response to more than two-thirds of Likert scale items, or incorrectly answered at least one of two attention checks, we were left with 433 participants (age: 18–72, mean 37; sex: 285 female; race: 44 non-white; political affiliation: left = 226, centre = 57, right = 97, other or unknown = 53). For the third wave of data collection, we were able to recruit 368 of the same participants from the second wave, of whom some were excluded due to exclusion criteria from the first two waves and having completion times outside of three standard deviations of the mean for the third wave, leaving 357 participants for analyses involving empathic concern (age: 18–72, mean 38; sex: 235 female; race: 41 non-white; political affiliation: left = 188, centre = 46, right = 78, other = 45). However, we lost observations for certain analyses because some participants did not respond to every question and, for analyses where we controlled for left-right political affiliation, we removed data from six participants who gave conflicting information regarding this variable (that is, they indicated that they voted for the Tory Party but identified as left-wing or indicated that they voted for the Labour or Green Party but identified as right-wing). Nonetheless, the minimum number of observations for any analyses not involving empathic concern was 374, and for analyses involving empathic concern it was 308. Analyses using G*Power suggest that we need 175 participants to detect a correlation effect size of $r = 0.21$ for eighty per cent power and 289 participants for ninety-five per cent power. Our sample size is comfortably above this threshold. Considering that most of the UK population is white and on the political left (Burton and Tunnicliffe 2022) our sample also appears sufficiently diverse. There were no significant differences between participants from the first and second waves and participants who dropped out from these waves in terms of SDO, RWA, political affiliation, socioeconomic status, and sex, but there were differences in age and a slight difference in race for participants from the second wave (see Section 1 in the supplementary material). These differences cannot explain the longitudinal trends we observe, since our first- and second-wave comparison was within subjects.

³We chose Prolific over MTurk because comparisons indicate it has superior data quality and sample diversity (Palan and Schitter 2018; Peer et al. 2017; Peer et al. 2022).

In all waves of data collection, participants were directed from Prolific to a Qualtrics survey where they provided informed consent. In the first wave, participants completed SDO and RWA scales as well as other items and tasks not related to the current study. In the second wave, participants completed the same SDO and RWA scales as well as items on COVID-19 (COVID-19 items were separated into different blocks based on the method of response, with block order randomized). In both waves, the SDO and RWA items were randomized in the same block and this block appeared in random order with other blocks. In the third and final wave of data collection, participants answered several scales for another study (blocks and items within each block were randomized), of which we used only empathic concern here.

Materials

Unless stated otherwise all the below items were answered on Likert scale from 1 (strongly disagree) to 7 (strongly agree).

Explanatory variables

We measured SDO with the sixteen-item SDO₇ Scale (Ho et al. 2015) and RWA with the thirty-six-item Authoritarianism-Conservatism-Traditionalism Scale (Duckitt et al. 2010). We also measured empathic concern with the items (answered on a Likert scale, 1 = does not describe me well, 5 = describes me very well) related to this from the Interpersonal Reactivity Index (Davis 1983). Cronbach's alpha reliability was 0.92 for SDO, 0.96 for RWA, and 0.86 for empathic concern.

Outcome variables⁴

(A) Cooperative/other-regarding responses to COVID-19. We used the mean of three items for cooperative, other-regarding responses to COVID-19: (1) 'The government should waive all insurance costs and hospital fees for testing and treating COVID-19', (2) 'Paid leave should be granted to anyone diagnosed with COVID-19', and (3) 'I am very concerned about those most vulnerable to COVID-19' (Pfattheicher et al. 2020).⁵

(B) Conformist/norm-enforcing responses to COVID-19. We used the mean of the items in Table 1 in our main analyses. Example items include the following, which we adapted from another study unrelated to COVID-19 (Stamkou et al. 2019): 'Imagine a person, 'K', who does not feel sick and so ignores the rules and goes out without a facemask and does not try at all to keep a safe two-metre distance from other people. To what extent does K's behaviour make you feel outraged?' and 'Finally, how do you think K should be treated?' (answered on a Likert scale: 1 = 'very leniently', 7 = 'very harshly').

(C) Concern about COVID-19. We measured concern by asking participants how worried they are about the COVID-19 pandemic, their health, the health of familiar others (family and friends), the health of unfamiliar others, the economy, and their finances (see Section 2 of the supplementary material for the exact wording of these items). These were answered on a sliding scale from 1 ('not at all worried') to 7 ('extremely worried').

(D) Experiences of and exposure to COVID-19 threats. We asked participants various questions (see Section 2 of the supplementary material for a full list) that we put into a composite measure of exposure to COVID-19 threats (set to 1 if participants responded 'Yes' to one or more items, and 0 otherwise). For example, we asked participants the following: 'Has anyone you personally know tested positive for COVID-19?' [Yes, No, Not sure] (Everett et al. 2020), and 'Has COVID-19 impacted you negatively from a financial point of view?' [Yes, No, Not sure], which was adapted from a recent study (Conway, Woodward, and Zubrod 2020).

⁴Participants also answered some questions on COVID-19 not reported here.

⁵The wording of the first item was a combination of two items from a recent study (Gadarian, Goodman, and Pepinsky 2021): 'The government should waive insurance costs and hospital fees for treating COVID-19' and 'Make all testing for COVID-19 free for all Americans'.

Table 1. Summary of principal components analysis results for the conformist/norm-enforcement items ($n=425$) including pattern matrix, eigenvalues, proportion of variance, and Cronbach's alpha for each principal component

	Oblimin rotated factor loadings (<i>Pattern matrix</i>)			
	PC1: Support lockdown rules	PC2: Moral emotions towards rule breakers	PC3: Support strict border control	PC4: Support severe enforcement
1 'It is important to follow the UK government's rules regarding COVID-19'	0.85	0.04	0.08	-0.15
2 'Because of COVID-19, it is very important that others take physical distancing very seriously and limit all social contact'	0.81	0.18	0.06	-0.25
3 'I support government measures to restrict the movement of UK citizens to limit the spread of COVID-19'	0.87	0.00	0.06	0.03
4 'It makes me angry that the government would tell me where I can go and what I can do, even when there is a crisis such as COVID-19' [reverse coded]	0.85	-0.05	-0.12	0.15
5 'I am upset at the thought that my government would force people to stay home against their will' [reverse coded]	0.75	-0.07	-0.08	0.32
6 'It is vital right now that the government strongly enforces social distancing measures'	0.73	0.06	0.05	0.19
7 'All citizens of China should be banned from entering the UK while the COVID-19 pandemic is ongoing'	-0.14	-0.01	0.92	0.07
8 'All citizens of the USA should be banned from entering the UK while the COVID-19 pandemic is ongoing'	0.01	0.00	0.88	0.06
9 'Strict entry restrictions should be imposed at all borders while the COVID-19 pandemic is ongoing'	0.26	-0.02	0.74	-0.12
10 'I want my government to severely punish those who violate orders to stay home'	0.14	0.22	0.17	0.67
11 'The army should be mobilized to enforce quarantines and rules regarding COVID-19'	0.19	0.09	0.18	0.67
12 'To what extent does K's behaviour make you feel...'	0.04	0.89	0.00	0.02
12.1 '... anger?'				
12.2 '... disgust?'	-0.03	0.88	0.00	0.05
12.3 '... contempt?'	0.10	0.77	-0.02	-0.25
12.4 '... outrage?'	-0.03	0.91	-0.01	0.08
12.5 'Finally, how do you think K should be treated?'	0.01	0.55	0.05	0.45
Eigenvalues	4.34	3.61	2.38	1.66
Proportion of variance	0.27	0.23	0.15	0.10
α	0.89	0.89	0.81	0.77

Notes: Factor loadings over 0.40 appear in bold. Items 3–6 and 10 were adapted from a recent study on COVID-19 (Conway, Woodward, and Zubrod 2020) and item 12 (12.1–12.5) was adapted from a study not related to COVID-19 (Stamkou et al. 2019).

Pre-Registration and Data Analysis

We pre-registered our predictions and analyses after the survey had been uploaded to and advertised via Prolific, but before we had downloaded and accessed any data (<https://aspredicted.org/blind.php?x=xs6jm8>). We pre-registered Predictions 1 and 3 mentioned in the introduction. Prediction 2 was based on support for Predictions 1 and 3 as we began to analyse the data, which is, therefore, presented as an exploratory analysis.

Regarding statistical analyses, we pre-registered that we would (1) use paired-samples t-tests to determine whether RWA or SDO increased following the onset of the pandemic, (2) use

structural equation modelling (SEM) if fit indices support this or, if not, use standard regression analyses applied to scale means, with SDO and RWA (both measured before the pandemic) together in the models predicting the mean of either of our cooperative/other-regarding or conformist/norm-enforcing responses to COVID-19. We decided to include both SDO and RWA in the models to control for shared variance between them and thereby tease apart their separate effects, as recommended by a recent study (Costello and Lilienfeld 2021). We also pre-registered that we would control for COVID-19 experiences/exposure, age, sex, race, socioeconomic status, and political affiliation. We adhered to this plan, but we also performed some additional exploratory analyses (see below and the results section for details). We did not use SEM because model fit assumptions for this were not met (for example, the RMSEA fit index for RWA was 0.12). We explored whether we could improve SEM performance by removing scale items, but this required removing many items, which compromised their coverage (the items are counterbalanced and selected to cover the different subcomponents of SDO and RWA). Consequently, we opted to retain the scales in their entirety and use average SDO and RWA scores in multiple regression analyses.

We used standardized beta estimates to measure effect sizes. We incorporated pre-registered covariates in the above regressions using our abovementioned composite measure of exposure to COVID-19 threats, as well as data provided by Prolific for age, sex, race (white v. non-white), socioeconomic status (indicated on a ladder from 1 = lowest to 10 = highest), and political affiliation. Prolific provides two sources of political affiliation data, neither of which is complete for all participants – one indicating which party they voted for and one indicating whether they identify as left-wing, centrist, or right-wing. To maximize data coverage, we combined information from these variables such that participants were classified as (1) left-wing if they voted for the Labour or Green Party or identified as left-wing (we excluded data for three participants who voted for one of these parties but identified as right-wing), (2) right-wing if they voted for the Tory Party or UK Independence Party or identified as right-wing (we excluded data for three participants who voted for the Tory Party but identified as left-wing), and (3) centrist if they identified as centrist. To test whether our interpretation of our results is contingent on the inclusion of the political affiliation covariate, we also reran all our analyses with this variable removed and reported these results, which generally did not meaningfully change, in the supplementary material (Section 5). Assumption checks revealed no significant problems with multicollinearity, non-linearity, heteroscedasticity, outliers, or non-independence of errors. However, most error distributions showed some departure from normality. To account for this, we report bootstrapped confidence intervals (standardized). We performed all analyses in R Statistical Software (R Core Team 2021).

Results

In Section 3 of the supplementary material, we provide means, standard deviations, and histograms for, and correlations between, all relevant variables.

Our first pre-registered prediction was that low-SDO progressives will support cooperative/other-regarding responses to COVID-19 whereas high-RWA conservatives will support conformist/norm-enforcing responses. In line with this, SDO was a significant negative predictor of the mean of all cooperative/other-regarding attitudes (RWA was unrelated to this), whereas RWA was a significant positive predictor of the mean of all conformist/norm-enforcing attitudes (Fig. 1; Supplementary Table S3). While we did not pre-register a prediction for SDO and conformist/norm-enforcing attitudes, we found that SDO was a weak (significant at the $p < 0.1$ level) negative predictor of conformist/norm-enforcing attitudes (Fig. 1; Supplementary Table S3).

To better understand these relationships, we ran a principal component analysis with oblique rotation (Oblimin) on all the conformist/norm-enforcing items. The Kaiser–Meyer–Olkin

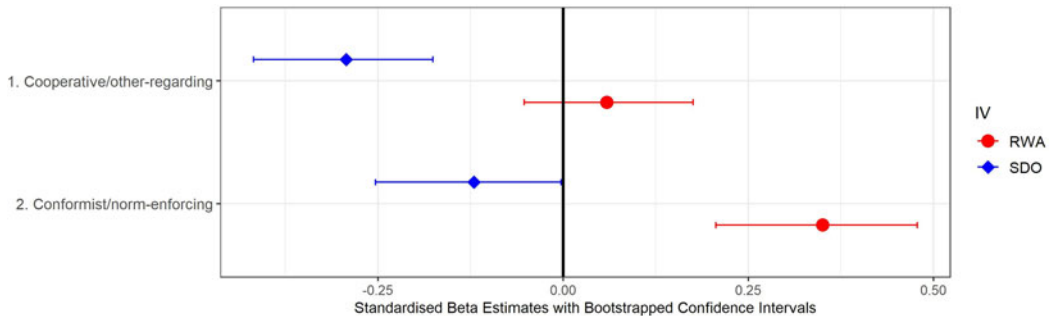


Figure 1. Results for linear regressions with social dominance orientation (SDO) and right-wing authoritarianism (RWA) controlling for each other, predicting cooperative/other-regarding and conformist/norm-enforcing attitudes about COVID-19.

Notes: We control for age, sex, race, socioeconomic status, left-right political affiliation, and pandemic threat exposure in all models. See supplementary Table S3 for more detailed results, including covariate effects.

measure verified the sampling adequacy for the analysis: KMO = 0.89, considered ‘great’ (Hutcheson and Sofroniou 1999), and all KMO values for individual items were >0.72 (well above the acceptable limit of 0.5). Bartlett’s test of sphericity, $\chi^2(120) = 4,613.34$, $p < 0.001$, indicated that correlations between items were sufficiently large for principal component analysis. Four components had eigenvalues over Kaiser’s criterion of 1 (Kaiser 1960) and in combination explained seventy-five per cent of the variance, with high internal reliabilities (Table 1). Interpretation of the factor loadings in Table 1 suggests that the first component (PC1) captures support for lockdown rules, the second (PC2) captures moral emotions towards rule breakers, the third (PC3) captures support for strict border control, and the fourth (PC4) captures support for severe government and military enforcement of lockdown rules.

We then ran regression analyses to examine whether SDO and RWA predicted these four principal components. We found that RWA positively predicted all of them while SDO significantly negatively predicted only PC1 (Fig. 2; Supplementary Table S4).

To investigate whether the putatively conformist/norm-enforcing responses of those low in SDO could plausibly reflect support for these measures among those with stronger empathic/other-regarding preferences, we also examined which of the conformist/norm-enforcing responses were predicted by our measure of empathic concern (controlling for RWA and covariates). We found that empathic concern showed the same pattern as low SDO; that is, predicting only PC1, albeit weakly (significant at the $p < 0.1$ level; Supplementary Table S5). In addition, analyses using the ‘Mediation’ package in R (Tingley et al. 2014) showed that this relationship was mediated by SDO (Supplementary Figure S3). Thus, the negative relationship between SDO and the mean of conformist/norm-enforcing responses appears to be explained by low-SDO progressives’ empathy-driven support for lockdown rules (PC1).

We also explored whether the effects of SDO on support for cooperative/other-regarding or conformist/norm-enforcing attitudes would become stronger as RWA increases, and vice versa, by including interaction terms for SDO and RWA in the relevant models. We found no significant interactions between SDO and RWA (Supplementary Tables S6 & S7).

Our second prediction was that high-RWA conservatives will show concern about the pandemic in general, including threats to the self, others, personal finances, and the economy, while low-SDO progressives will be concerned about the pandemic to the extent that threats trigger empathic concern; that is, the health of others. As expected, RWA significantly positively predicted all our measures of concern about COVID-19 (Fig. 3; Supplementary Table S8). Also, as expected, we find that SDO weakly (statistically significant at the $p < 0.1$ level) and negatively predicted worrying about the pandemic in general (Model 1 in Fig. 3), but specifically about the

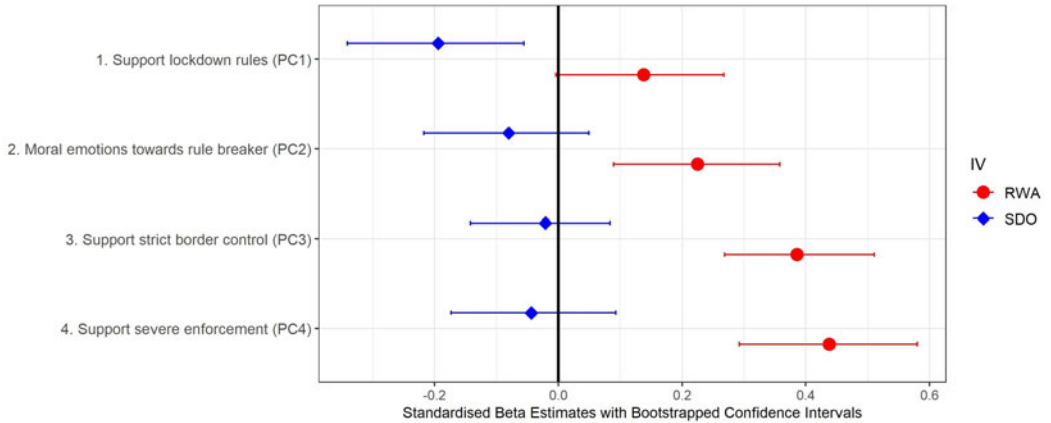


Figure 2. Results for linear regressions with social dominance orientation (SDO) and right-wing authoritarianism (RWA), controlling for each other, predicting different types of conformist/norm-enforcing attitudes revealed by principal components analysis (PC1–4 = Principal Component 1–4).

Notes: We control for age, sex, race, socioeconomic status, left-right political affiliation, and pandemic threat exposure in all models. See supplementary Table S4 for more detailed results, including covariate effects.

health of unfamiliar others (Model 4 in Fig. 3) and, to a lesser degree, the health of familiar others (Model 3 in Fig. 3; statistically significant at the $p < 0.1$ level; see Supplementary Table S8).

We also included interaction terms for SDO and RWA in the relevant above models to explore whether the effects of SDO/RWA on concern about COVID-19 threats would become stronger as

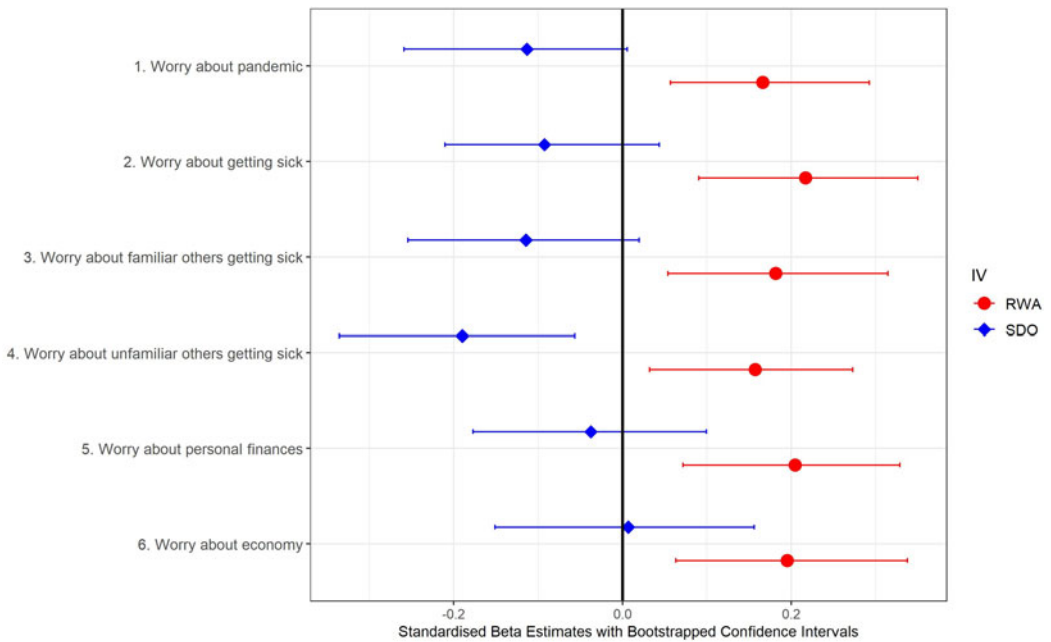


Figure 3. Results for linear regressions with social dominance orientation (SDO) and right-wing authoritarianism (RWA) controlling for each other, predicting concerned/threat-sensitive attitudes about COVID-19.

Notes: We control for age, sex, race, socioeconomic status, left-right political affiliation, and pandemic threat exposure in all models. See supplementary Table S8 for more detailed results, including covariate effects.

RWA/SDO increased. We found no significant interactions between SDO and RWA (Supplementary Table S9).

Our third and final prediction was that RWA, but not SDO, will significantly increase in response to threats posed by COVID-19. In line with this pre-registered prediction, there was a significant increase in mean RWA measured during the pandemic compared to before the pandemic (before: $M = 3.517$, $SE = 0.054$; during: $M = 3.576$, $SE = 0.057$; $t(432) = 2.837$, $p = 0.002^*$) with a small effect size ($r^2 = 0.018$) while SDO remained unchanged (before: $M = 2.471$, $SE = 0.049$; during: $M = 2.480$, $SE = 0.053$; $t(432) = 0.311$, $p = 0.756$, $r^2 = 0$).

To investigate this further, we used regression analyses to examine whether the change in RWA was predicted by the perceived COVID-19 threat (Item C.1 in Section 2 of the supplementary material measuring general concern about the pandemic) or exposure to COVID-19 threats (a composite of Items D.1–6 in Section 2 of the supplementary material), controlling for demographic variables and left-right political affiliation. We found that perceived threat – concern about the pandemic – had a significant positive effect on the change in RWA ($\beta = 0.13$, $SE = 0.05$, $p = 0.012^*$, bootstrapped 95 per cent CI: [0.06, 0.28]). However, self-reported exposure to COVID-19 threats did not significantly predict the change in RWA ($\beta = -0.06$, $SE = 0.12$, $p = 0.629$, bootstrapped 95 per cent CI [-0.33, 0.24]). See Supplementary Table S10 for full model descriptions.

Discussion

We found support for each of our three basic predictions, derived from the dual evolutionary foundations of political ideology, regarding the divergent effects of SDO and RWA on responses to COVID-19. First, we found that SDO negatively predicted support for cooperative/other-regarding responses to the pandemic while RWA positively predicted support for all the conformist/norm-enforcing responses that we measured. Second, RWA positively predicted concern across different domains of pandemic threats while SDO showed a negative association with concern specifically about others (that is, empathic concern). Third, RWA (and not SDO) increased following the outbreak of the pandemic and the magnitude of this effect was predicted by the perceived pandemic threat (concern about the pandemic). These effects persist after accounting for a range of covariates. Below, we discuss each finding in turn.

(1) Cooperative/other-regarding and conformist/norm-enforcing attitudes about COVID-19.

As expected, people low in SDO were more likely to display cooperative/other-regarding COVID-19 attitudes and policy preferences, while RWA was unrelated to these measures. By contrast, RWA positively predicted support for conformist/norm-enforcing responses to the pandemic. This relationship held across all types of conformist/norm-enforcing responses, including responses that relate most obviously to the social control and group viability concerns, theorized to underlie RWA (and social conservatism generally) – that is, moralistic and punitive attitudes towards rule violators and support for severe government and military enforcement of lockdown rules and strict border control. These relationships held when controlling for left-wing v. right-wing political affiliation, indicating that they are likely not simply an artefact of left-right political polarisation or partisan politics. Hence, as predicted by the Dual Foundations Theory, people low in SDO support COVID-19 responses that appeal to their cooperative/other-regarding preferences to protect the vulnerable while people high in RWA support measures to stop the spread of the virus that is consistent with their general support for social control.

We also found that people low in SDO were likely to support conformist/norm-enforcing responses. However, our follow-up analyses revealed that (1) this related only to support for lockdown rules, which was the only type of conformist/norm-enforcing attitude that was also linked

to empathic concern, and (2) SDO mediated the relationship between empathic concern and support for lockdown rules.

(2) Concern about COVID-19.

Our findings regarding concern about the pandemic are also in accordance with the Dual Foundations Theory, confirming an association between RWA and threat sensitivity: RWA predicted increased concern about all the COVID-19 threats that we measured. Thus, while some prior research emphasized that RWA and social conservatism are related to specific domains of threat such as violence or dangerous out-groups (Brandt et al. 2021; Duckitt and Fisher 2003; Sinn 2019) or disease threats (Murray and Schaller 2012; Terrizzi, Shook, and McDaniel 2013), our results suggest that RWA may be related to more domain-general threat sensitivity. However, this should be interpreted with caution since all the threats we measured are at least indirectly pandemic-related.

The Dual Foundations Theory predicts that SDO should be unrelated to most threats but, in contrast to high-RWA individuals, the greater empathic concern of low-SDO individuals should make them concerned about threats to others. We found some support for this in that people low in SDO tended to be concerned about the pandemic in general and, specifically, the health of others (especially unfamiliar others) rather than threats to their own health and finances or the economy. This suggests that prior work linking political progressivism to concern about the pandemic (Burkova et al. 2021; Calvillo et al. 2020; Clinton et al. 2021; Collins, Mandel, and Schywiola 2021; Gadarian, Goodman, and Pepinsky 2021; Pennycook et al. 2022; Stroebe et al. 2021) likely reflects empathic concern (more than general threat sensitivity) among low-SDO progressives.

(3) Change in ideology as a result of COVID-19 threats.

While a small effect, the increase in RWA that we observed following the onset of COVID-19 is consistent with our pre-registered prediction based on the Dual Foundations Theory. It is also consistent with previous longitudinal studies that have also found small shifts, specifically towards authoritarian and socially conservative views in the wake of terrorist attacks in Spanish and Swedish samples (Echebarria-Echabe and Fernández-Guede 2006; Lindén, Björklund, and Bäckström 2018), and the COVID-19 pandemic in Polish and US samples (Golec de Zavala et al. 2020; Pazhoohi and Kingstone 2021). Our findings replicate and extend this work, demonstrating that the effect of a threat on RWA (and the lack of an effect on SDO) generalizes to the UK political context. In addition, our finding that concern about the pandemic (rather than actual exposure to COVID-19 threats) predicted the magnitude of participants' change in RWA suggests that a psychological mechanism driving the shift towards higher RWA is a perceived COVID-19 threat.

Conclusion

Taken together, our results support the Dual Foundations Theory of political ideology (Claessens et al. 2020) and help to explain prior findings and resolve apparent contradictions in the literature. Our findings reveal a divergent pattern of support for COVID-19 responses between high-SDO and high-RWA conservatives, with increased concern about the pandemic and support for compliance with pandemic prevention measures associated with low SDO but high RWA. This alignment between low SDO and high RWA chimes with prior work showing that economic progressives (who tend to score lower on SDO) and social conservatives (who tend to score higher on RWA) are both concerned with protection as opposed to freedom (Federico and Malka 2018; Malka et al. 2014; Malka, Lelkes, and Soto 2019). Nevertheless, we show that support for protection, at least in the context of COVID-19, appears to reflect different psychological motives in the two groups. Our theoretical model and results indicate that while low SDO responses to the pandemic

are driven by empathy, high RWA responses are driven by a desire for conformity and norm enforcement (that is, social control) and protection of the self and in-group (threat sensitivity).

Our findings indicate that prior work linking progressive ideology on a unidimensional spectrum to increased support for a strong COVID-19 response (Allcott et al. 2020; Burkova et al. 2021; Calvillo et al. 2020; Christensen et al. 2020; Clinton et al. 2021; Collins, Mandel, and Schywiola 2021; Conway et al. 2021; Gadarian, Goodman, and Pepinsky 2021; Gollwitzer et al. 2020; Painter and Qiu 2021; Pennycook et al. 2022; Stroebe et al. 2021) reflects an association between low SDO (but not low RWA) and empathic concern for others. Our findings also suggest that, by placing high-RWA conservatives together with high-SDO conservatives (who may be more reluctant to make personal sacrifices and behavioural changes that they see as only benefiting others and negatively impacting the economy), many studies on unidimensional ideology may have masked threat-sensitive, pro-lockdown responses among high-RWA conservatives. The correlation between general support for COVID-19 responses and unidimensional ideology, then, is not a general feature of human psychology, but a product of the interplay between the different motives driving pandemic responses on the left and the right, and the local political context. This is supported by the fact that most studies on unidimensional ideology find less concern among conservatives than progressives in studies conducted in the US, with its unique political climate (for example, particularly strong polarization and Donald Trump who downplayed the threat). When we consider a more diverse sample of populations, the relationship is more mixed (Brouard, Vasilopoulos, and Becher 2020; Chen, Frey, and Presidente 2021; Choma et al. 2021; Dryhurst et al. 2020; Gelfand et al. 2021; Manson 2020; Mula et al. 2022; Passini 2022; Pavlovic, Todosijevic, and Stanojevic 2020; Pennycook et al. 2022; Samore et al. 2021).

Our findings are also consistent with prior work linking conservatism to general threat sensitivity (Feldman 2013; Hibbing, Smith, and Alford 2014; Shaffer and Duckitt 2013) and the observed strong COVID-19 response among right-leaning countries such as Saudi Arabia (Chen, Frey, and Presidente 2021; Gelfand et al. 2021). We find that RWA increased in the UK following the outbreak of COVID-19 and that support for government COVID-19 responses among conservatives is linked to a focus on conformity and norm enforcement among those high in RWA in particular. Similarly, national-level studies have tended to focus on measures of the conformist (social control) dimension of ideology, such as collectivism and cultural 'tightness' (Chen, Frey, and Presidente 2021; Gelfand et al. 2021). The inherent group focus of conformist ideology may also make it a particularly important predictor of response strategy at the national level.

While the size of the ideological effects we observe is at least as large as other demographic predictors of responses to the pandemic, it is worth noting that a considerable portion of the variance in responses remains unexplained in our models. Other factors, such as partisan politics and the fact that conservatives and progressives follow different leaders and sources of information undoubtedly also play a role (Calvillo et al. 2020; Gollwitzer et al. 2020; Graham et al. 2020; Motta, Stecula, and Farhart 2020; Painter and Qiu 2021; Pennycook et al. 2022; Ruisch et al. 2021; Samore et al. 2021; Sloan et al. 2021; Stroebe et al. 2021). Boris Johnson's initial minimisation of the outbreak, followed later by greater support for lockdowns and physical distancing after contracting the disease himself, was likely an important factor shaping views among Conservative voters, for example. However, this cannot account for the divergent effects we observe for SDO and RWA when controlling for political affiliation. Similarly, a recent US-based study found that factors such as lower trust in liberal/moderate/scientific sources of information and higher economic conservatism drove the lack of precautionary behaviours found among socially conservative Republicans and Independents (Samore et al. 2021). Crucially, however, when controlling for these factors, socially conservative views do predict greater precautionary behaviours among Republicans and Independents.

Beyond their implications for understanding political ideology, our findings are also likely to be of interest to politicians, policymakers, and communicators seeking to manage responses to pandemics like COVID-19. Effective collective response requires broad political support, which

can be undermined if responses become politically polarized. Our findings indicate that support for a strong response to COVID-19 can come from both the political left and right but it rests on two very different psychological drives that we all possess to some degree – a desire for cooperation motivated by empathic concern for others that is stronger among those low in SDO (who tend to be on the political left) and a desire for strict social control to mitigate threats to the self and the nation that is stronger among those high in RWA (who tend to be on the political right). Communicators seeking to generate bipartisan support need to acknowledge and appeal to both sets of concerns, as well as the values held by people high in SDO or low in RWA.

The basic human drives inherent to the way we respond to crises like COVID-19 have deep evolutionary roots – a trade-off between cooperation for the common good and self-interested competition, and a trade-off between group conformity and individual freedom. The dual evolutionary foundations of political ideology provide a principled framework with which to connect these basic social drives to the modern political landscape and individual responses to crises such as the COVID-19 pandemic, connections which we hope can help us unite in tackling the challenges they present.

Supplementary Material. Online appendices are available at <https://doi.org/10.1017/S000712342200076X>.

Data Availability Statement. Replication data for this article can be found in Harvard Dataverse at: <https://doi.org/10.7910/DVN/LUFHIS>.

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