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Cognitive ability is a powerful predictor of political tolerance

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Abstract

Objectives: Despite the broad appeal of abstract notions of political tolerance, people vary in the degree to which they support the political rights of groups they dislike. Prior research highlighted the relevance of individual differences in the cognitive domain, claiming the application of general tolerance ideals to specific situations is a cognitively demanding task. Curiously, this work has overwhelmingly focused on differences in cognitive style, largely neglecting differences in cognitive ability, despite compelling conceptual linkages. We remedy this shortcoming.

Methods: We explore diverse predictors of tolerance using survey data in two large samples from Denmark ($N = 805$) and the United States ($N = 1,603$).

Results: Cognitive ability was the single strongest predictor of political tolerance, with larger effects than education, openness to experience, ideology, and threat. The cognitively demanding nature of tolerance judgments was further supported by results showing cognitive ability predicted tolerance best when extending such tolerance was hardest. Additional small-sample panel results demonstrated substantial 4-year stability of political tolerance, informing future work on the origins of political tolerance.

Conclusions: Our observation of a potent role for cognitive ability in tolerance supports cognitively oriented accounts of tolerance judgments and highlights the need for further exploration of cognitive ability within the political domain.

KEYWORDS

cognitive ability, political psychology, political tolerance

1 | INTRODUCTION

Citizen support for the rights and liberties of even those political groups that they dislike, commonly termed political tolerance, is an important element of liberal democracy. Most citizens of advanced democracies endorse political tolerance, at least as a broad and general principle (Gibson, 2011). Applying that broad principle into toleration for the political rights of a specific disliked group, however, comes more readily to some than to others (Sullivan et al., 1982). Previous research has identified a range of individual differences that predict whether or not a person is likely to be tolerant. Some of these are themselves political such as social ideology,

authoritarianism, belief in general democratic values, and perceived sociotropic threat. Others are apolitical, including self-esteem, Openness to Experience, Dogmatism, education, age, and gender (Sullivan & Hendriks, 2009).

Many of these predictors either fall directly within the cognitive domain (e.g., Openness to Experience, Dogmatism) or are significantly linked with it (e.g., education, social ideology, authoritarianism). However, accounts of political tolerance have offered a highly circumscribed role for cognitive influences, focusing overwhelmingly on differences in cognitive style—that is, how one typically tends to think, perceive, and remember information. Largely omitted from the conversation, by contrast, is cognitive ability—also called

intelligence, and which reflects the individuals' maximal (rather than typical) performance when understanding and solving complex problems and ideas. The lack of attention to this domain is unjustified. Cognitive ability has proven successful in the rare instances when considered as a predictor of phenomena within the political domain (e.g., Choma & Hanoch, 2017; Deary et al., 2008; Onraet et al., 2015), and we argue below that a stronger conceptual logic ties cognitive ability to political tolerance than to some other political characteristics. We remedy the deficit using two large samples ($N = 805$ and 1,603) to explore whether and when cognitive ability predicts political tolerance. We supplement these contributions with initial work (limited by available statistical power in our panel subset) regarding the long-term stability of political tolerance, a topic that has never been explored.

1.1 | Cognitive ability and tolerance

Cognitive ability is often overlooked in studies of political characteristics. A handful of studies have connected it to social trust (Deary et al., 2008a; Schoon et al., 2010) and political participation (Deary et al., 2008b), while a larger body of literature (meta-analyzed by Onraet et al., 2015) has explored its connections to prejudice. Within the political sphere, intelligence has been incorporated most substantially into the study of ideology, where meta-analysis indicates intelligence is as potent of a predictor as any other objectively assessed psychologic characteristic (Onraet et al., 2015; Van Hiel et al., 2010). The predictive success of intelligence in these domains is noteworthy given the limited conceptual ties intelligence shares with them: It is not, for example, entirely obvious how a given view on capital gains taxes or drug policies represents a cognitive failure.

By contrast, a stronger conceptual logic connects cognitive ability and political tolerance, as shown by argumentation previously used to motivate explorations of cognitive style (McClosky, 1964; Prothro & Grigg, 1960). As noted above, citizens of advanced Western democracies nearly universally endorse high levels of *general* political tolerance (Gibson, 2011). Applying one's general political tolerance to tolerance for specific tolerance for a given disliked group can nevertheless be a cognitively demanding task—one claimed to benefit from a deliberative, careful approach to reasoning (Sniderman et al., 1989). When a citizen of an advanced Western democracy indicates low political tolerance for a specific group, then, this may represent a cognitive failure, in which the respondent failed to successfully apply a broader principle to a specific instance. Given the role of cognitive ability in facilitating complex thought (Gottfredson, 1997), high levels of cognitive ability should thus be expected to help the individual apply their general democratic principles to the specific situation of endorsing tolerance for a particular disliked group.

In characterizing intelligence as having stronger conceptual ties with tolerance than with ideology, we have hopefully identified plausible effect sizes for our association of interest. A substantial body of research has explored associations between intelligence and ideology, with a meta-analytic correlation of $r = .20$ (Onraet et al., 2015), though this effect size is nontrivially affected by the nature and quality of the measure of both intelligence (Ludeke et al., 2017; Onraet et al., 2015) and ideology (Carl, 2014; Ludeke & Rasmussen, 2018; Onraet et al., 2015). Nevertheless, associations between intelligence and tolerance might be expected to be closer to moderate ($r = .30$) than modest ($r = .10$) and may be stronger than those observed between intelligence and ideology in the same sample.

Conceptualizing manifestations of low tolerance for a specific group as a cognitive failure may carry a further testable implication, namely that cognitive ability should not predict tolerance for all groups equally. If cognitive ability is predicting tolerance because it predicts successful application of a general principle to specific instances, its relationship with tolerance should be most evident when the test is the hardest—that is, when the group to be tolerated is comparatively extreme and generally subject to political intolerance.

1.2 | Conceptualizing and measuring tolerance

Prior research gives some grounds for evaluating the expectations outlined above, but their contribution cannot be fully evaluated without first clarifying the conceptualization and measurement of political tolerance. Assessments of group-specific tolerance, at least as operationalized within contemporary political science research, require several features (Gibson, 2013; Sullivan et al., 1982). First, questions of tolerance concern whether one thinks a group's fundamental rights (particularly pertaining to expression) should or should not be protected. This is, conceptually, not the same as asking whether one *likes* or has a positive affect for the group in question, although some psychological studies appear to treat it as such. (Studies of affective response toward groups are undoubtedly important, of course; they are simply studying something different from political tolerance as classically conceived.)

To say that questions of affect and tolerance are different is not to say they are entirely separable. The relationship between these domains in fact represents the second key element to operationalizing tolerance. Specifically, tolerance only meaningfully applies to groups that one might be motivated to restrict—that is, those one dislikes or otherwise opposes (Gibson, 2013; Sullivan et al., 1982). Table 1 illustrates this idea. Two hypothetical participants, each presented with four groups, were asked how much they (a) like the group and

TABLE 1 Hypothetical illustration of tolerance scoring

	Participant 1		Participant 2	
	Liking	Protect rights	Liking	Protect rights
Neo-Nazis	−3	−1	−3	1
Christian fundamentalists	−2	−1	−2	1
Socialists	3	4	−1	1
Communists	2	4	−2	1
Total		−2 (6)		4 (4)

Note: Hypothetical responses to liking and protect rights provided on −4 to 4 scale. The total score listed outside the parentheses represent the individual's tolerance as classically conceived: Responses regarding protecting the rights of a given group are incorporated only for those groups disliked by the individual. Simply looking at which individual is more keen to protect the rights of all listed groups (which gives the score within the parenthesis) would misidentify the individual showing more true tolerance.

(b) would protect the group's rights. Answers for each question range from −4 (greatly dislike/would not at all protect rights, respectively) to 4 (greatly like/would strongly protect rights, respectively). If tolerance were operationalized as the simple average of the "protect rights" column, we would find Participant 2 to have shown some tolerance (average = 1), with Participant 1 showing more (average = 1.5). But these average tolerance values are clearly misleading in the present case: Participant 1's higher average "tolerance" entirely reflects that they like (and, presumably as a result, would strongly protect the rights of) two of the groups assessed. Following conventional practice and instead of computing tolerance scores using only those groups, the respondent dislikes show that Participant 2 (still with average = 1) is more tolerant than Participant 2 (now with average = −1). Thus, tolerance is not merely different from liking or approval: It can only be meaningfully manifested *in the absence* of such liking or approval.[1]

A third element related to assessing tolerance is that the frequently observed discrepancy between an individual's generalized commitments to tolerance and the tolerance they endorse for specific groups makes the assessment of tolerance a distinctively complicated task (Gibson, 2013). A once-common approach to tolerance assessment was similar to the hypothetical example we provided just above, with each participant providing tolerance ratings across a fixed set of groups. But this assessment approach is not only generally challenged (Sullivan et al., 1982) but also is particularly problematic in the context of studying the intersection of cognitive differences and tolerance. When multiple different groups are assessed, tolerance responses appear to be affected, showing comparatively limited correlations with other approaches to assessing tolerance (Gibson, 2013). These effects may themselves problematically depend in part on individual differences in preferences and cognitive capacity for consistency. In our hypothetical scenario, Participant 1 had positive feelings for a group (Communists) that they likely recognize is not always well tolerated by others. The

tolerance ratings they provide for other groups may thus depend on whether or not they have yet been presented with a group they like. These effects are plausibly stronger for some individuals than others—for example, the tolerance responses from a person prioritizing consistency may be particularly affected by this issue. The dominant approach to escaping these limitations involves assessing not a fixed set of groups but instead the individual's "least-liked" groups (Sullivan et al., 1982). However, this approach would not suffice for all research questions, including our own, in which (as discussed below) we require many individuals to respond to the same group. In such a situation, random assignment to individual groups is preferable (Petersen et al., 2011).

1.3 | Prior work connecting cognitive ability to tolerance and related constructs

No existing study has explored how intelligence connects to tolerance as just described. Recent intriguing studies focused on questions of ideologic asymmetry in prejudice have explored how intelligence predicts negative affect for one group or another (Brandt & Crawford, 2016; Ganzach & Schul, 2021). Beyond the crucial conceptual distinction noted above between liking and tolerance, however, De Keersmaecker et al. (2021) provided reasons to believe liking and tolerance will show predictably divergent relationships with intelligence. Specifically, while De Keersmaecker et al. (2021) confirmed prior observations that higher intelligence was associated with liking some groups and disliking others, they found intelligence nevertheless positively predicted the endorsement of freedom of speech for *all* groups, even those for whom intelligence negatively predicted affect. This is certainly suggestive of a positive role for intelligence in predicting tolerance, but unfortunately De Keersmaecker et al.'s (2021) analyses were limited by the second and third considerations noted above. That is, when analyzing free speech endorsement, De Keersmaecker et al. (2021) did

not exclude responses from those who liked a given group; and they assessed attitudes regarding a number of groups simultaneously. How intelligence predicts true tolerance, and does so absent contamination from responses regarding other groups, can thus not be readily inferred from their results.

Bobo and Licari (1989) come closest to demonstrating a role for intelligence in tolerance. Although widely used in other fields, the study has been overlooked by psychological research on tolerance, perhaps reflecting that Bobo and Licari (1989) characterize their intelligence measure—the same vocabulary measure used in many other recent psychological studies—as reflecting "cognitive sophistication." Nevertheless, Bobo and Licari's (1989) results were consistent with our expectations, as they found that intelligence positively predicted political tolerance, *even* when limiting analyses to those who disliked the group in question.

Two limitations of Bobo and Licari (1989) are most germane for present purposes. First, they rely on tolerance data collected across a fixed set of groups (rather than with the favored "least-liked" or single randomly assigned group paradigms); the interpretive challenges of such data, especially in the context of cognitively oriented studies, are already discussed above. Second, Bobo and Licari (1989) do not include any measures of cognitive *style* as a covariate. Cognitive ability and cognitive style are substantially connected (DeYoung et al., 2012), and because cognitive style (as indicated by, e.g., Openness to Experience: Marcus et al., 1995) is thought to predict political tolerance, the most effective demonstration of either domain as a predictor of tolerance will include measures of both. We describe below how we remedy both of these limitations.

1.4 | Other contributors to tolerance

As indicated by the above consideration of cognitive style, effectively demonstrating a meaningful connection between intelligence and the political tolerance requires including potential confounding predictors. Intelligence has demonstrated associations with many such potential confounders, such as education, and ideology. Previous studies have found that these characteristics as well as cognitive style can predict political tolerance (Marcus et al., 1995; Sniderman, 1975; Sullivan & Hendriks, 2009; Sullivan et al., 1981), but these findings may benefit from reexamination from a study also including intelligence. Conceivably, their predictive success is more accurately attributable to their associations with intelligence.

Finally, a consistently observed contributor to political tolerance is the degree to which the group in question is viewed as threatening (Marcus et al., 1995; Stouffer, 1955; Sullivan et al., 1982). In particular, sociotropic threats—that is, collective threats aimed at society or groups, rather than

egocentric threats relevant to one's individual safety and well-being—represent a robust predictor of tolerance ratings (Davis & Silver, 2004; Gibson & Gouws, 2003). Including this covariate is thus merited, though given its as-yet unknown relationship to intelligence, the effect of its inclusion is uncertain.

1.5 | The present study

We explore the link between intelligence and political tolerance using large samples collected for this purpose from Denmark and the United States. Within the highly studied WEIRD countries (Henrich et al., 2010), Denmark and the United States might be considered "most different" political systems (Klemmensen, Hatemi, et al., 2012): Relative to the U.S.'s ethnic fragmentation (Alesina & Glaeser, 2004), individualism (Lipset, 1996), and vertical orientation (Nelson & Shavitt, 2002), Denmark is considerably more homogeneous and horizontal, resulting in dramatic differences in policies and attitudes regarding issues such as the welfare state (Esping-Andersen, 1990). Findings that generalize across the two contexts might thus be hoped to generalize to less different contexts.

2 | MATERIALS AND METHODS

2.1 | Samples

Both samples analyzed here were collected for the purposes of the present study.

2.1.1 | Denmark

Our Danish sample was selected using a registry of military draftees, which has been in operation since 2006. We drew our sample from the subset of the registry which had taken a cognitive ability test. All Danish men are required to take this assessment (except for the 5%–15% of the men exempted from the exam due to medical or other reasons; Teasdale et al., 2011), as are women who self-select into the armed forces. In April 2012, we invited 4,000 of these individuals (2,000 women) to participate in our study, using a lottery for an iPhone to incentivize participation. The response rate was 28% ($N = 1,072$). Both men and women proved to be highly representative of the general population in terms of demographics and personality traits (see Supporting Information 2).

A total of 805 responders answered all questions relevant to our analysis and were not eliminated on grounds of sympathy with the rated group (described below). These

individuals constitute our primary Danish sample and were additionally recontacted for a follow-up study 4 years later (February 2016). Twenty-one percentage ($N = 170$) of these provided full data for the key analyses at this second wave. Eighty-eight of these received a different target group compared with their first assessment, whereas 82 received the same group; after dropping individuals who did not dislike their assigned group, 78 and 75 were available from each group for analysis, respectively. Respondents rating a different target group were used to study whether intelligence also moderates the target group effect when using a within-subject design, whereas those rating the same target group were used to study the stability of tolerance. Descriptive statistics for tolerance and sympathy in the follow-up sample can be found in Appendix S.3.5 and S.3.6 (see https://osf.io/b9mf8/). Second-wave respondents and nonrespondents scored highly similarly on the cognitive ability measure ($M = 0.59$, $SD = 0.14$ in the full sample and $M = 0.61$, $SD = 0.13$ in those who responded).

2.1.2 | United States

For our American sample, 2,766 respondents completed our survey using MTurk in September and October 2014. Although MTurk samples tend to be comparatively young and left-wing (Berinsky et al., 2012; Mason & Suri, 2012), this need not have any effect on the research results presented here: For both MTurk users in particular and internet users in general, the correlation between basic psychological dispositions and political characteristics closely matches that of representative samples (Clifford et al., 2015; Vitriol et al., 2019).

2.2 | Measures

All variables except age and gender are recoded to range from 0 to 1 to make effect sizes comparable. Full question wording, descriptive statistics, and correlations between all variables appear in Supporting Information 1.

Participants from a given sample were randomly assigned to one of the two target groups. Neo-Nazis represented the more extreme group for both samples; prior work shows that they are among the most disliked and least tolerated groups (Gibson, 2008; Petersen et al., 2011). For the less extreme group, we used the Far Right in Denmark and Christian Fundamentalists in the United States; Appendix Tables S.3.4 and S.3.8 confirm that these groups are more tolerated and less disliked than Neo-Nazis in our samples. Whereas "Far Right" represents a commonly discussed political grouping in the Danish context, when creating the MTurk survey in 2014 we perceived the term to be less

meaningful in an American context, and saw "Christian Fundamentalists" as the closest American equivalent (Gibson, 2008). Potential drawbacks to this choice are considered in the discussion.

For power considerations, we sought to have only two groups assessed in each sample, one more extreme and one less extreme. We sought groups who represented the same side of the ideologic spectrum so that different effects for the groups was not plausibly attributed to their representing different ideologic poles (one left and one right), given the established links between intelligence and left-wing views (Onraet et al., 2015). Selecting two right-wing (rather than left-wing) groups was preferred for much the same reason: If intelligence was more strongly predictive of tolerance for an extreme rather than a more moderate left-wing group, this might be argued to reflect effects of intelligence on ideology. Using right-wing groups thus represents a stronger test case for our hypothesis.

2.2.1 | Sympathy

Respondents indicate how much they liked the group in question using a 0 to 10 scale anchored by "like/dislike the group very much," with an unnumbered option for "Don't Know" in the Danish sample. Favorable responses (here, those below the midpoint), as well as noncommittal answers (the 159 Danish respondents selecting Don't Know), were excluded prior to any analyses. Among Danish respondents, 67 (out of 528) assigned to the Nazi condition and 167 (out of 544) assigned to the Far Right condition were therefore excluded. Among Americans, 46 (out of 1,072) assigned to the Nazi condition and 409 (out of 1,084) assigned to the Christian Fundamentalist condition were excluded. Changing the threshold to a lower level—requiring comparatively severe disliking—does not alter the findings regarding cognitive ability.

2.2.2 | Sociotropic threat

Participants then responded to our "sociotropic threat" item, in which they indicated the degree to which they perceived the group in question as representing a threat to Danish or American society, using a 0–10 scale anchored by "Not threatening at all" and "Very large threat," again with an unnumbered option for Don't Know.

2.2.3 | Tolerance

Later in the survey, participants responded to four questions concerning political tolerance for the group in question,

taken from Petersen et al. (2011). The items assessed the participant's view of whether the group or its representatives should be allowed (a) to participate in public debates, (b) to hold demonstrations, (c) to speak at a high school, and if (d) the police ought to have better opportunities to wiretap the groups' phones (reversed). Alpha reliability of these items was 0.81/0.76 in Denmark/United States, respectively. Respondents had strongly diverging opinions on tolerance for each group: For both groups in both samples, responses at both theoretical extremes (complete tolerance and complete intolerance) were observed. This can be found in Appendix 3 in Tables S.3.3–S.3.8, where the mean and standard deviation are presented for each group separately for both sympathy and tolerance. Full descriptives based on summative scores across tolerance items are presented in Tables S.3.4 and S.3.8 for Danish and American samples, respectively.

2.2.4 | Intelligence

Børge Priens Prøve
The Danish Draftee Board administered the Børge Priens Prøve (BPP; Kousgaard, 2003) to the draftee sample. This 78-item test has a correlation of .82 with the full Wechsler Adult Intelligence Scale (Mortensen et al., 1989). We have access only to the composite BPP score, but a study of its four subtests demonstrated that Cronbach's alpha for the four tests, composed of verbal analogies, number sequences, letter matrices, and geometric figures, ranged from 0.72 to 0.82 (Hartmann & Teasdale, 2005).

International cognitive ability resource
MTurk participants completed the 16-item International Cognitive Ability Resource measure (Condon & Revelle, 2014). Alpha reliability was high (0.80), and strong convergent validity has been reported for the test (such as a correlation of 0.81 with the Shipley-2 measure of cognitive abilities: Condon & Revelle, 2014).

2.2.5 | Personality

NEO five-factor inventory
Danish participants completed the Danish version of the 60-item NEO Five-Factor Inventory (NEO FFI; Costa et al., 2003), which uses 12 items for each of the Big Five traits.

Big Five inventory
American participants completed the 44-item Big Five Inventory (BFI; John et al., 2008), which uses between 8 and 10 items for each Big Five trait. Alpha reliabilities exceeded 0.70 for all traits for both the NEO FFI and the BFI.

2.2.6 | Ideology

In the American sample, we used three items (alpha = 0.50) from the American National Election Studies (ANES) measure of social ideology, which assesses attitudes toward adoption by same-sex parents, abortion, and gender equality (Feldman & Johnston, 2014). In the Danish sample, we used six items (alpha = 0.71) drawn from Klemmensen, Hobolt et al.'s (2012) measure of social ideology on environmentalism, crime, sexual minorities, and national traditions. To facilitate identification of the direction of effects in the results, we discuss the scales as "social liberalism."

2.2.7 | Education

Education in the American sample is assessed using the categorization from the U.S. Census Bureau to create the continuous education variable. Reflecting both the young age of the draftees and the educational tracking employed in Denmark, we created a continuous variable that reflects the total years of education by combining two questions: One concerning schooling up to high school (which is optional in Denmark) and one concerning further education.

2.2.8 | Age and gender

Information about age and gender in the Danish sample was extracted by using the respondents' Danish civil registration number. Reflecting the nature of the sampling procedure, the sample was quite young ($M = 22.97$, $SD = 1.93$) and balanced between males and females.

For the U.S. sample, self-report measures of age and gender were employed. The sample was older ($M = 35.55$, $SD = 11.41$) and slightly more females ($M = 0.39$ for our male variable). Males are coded as 1 and females as 0 and the gender variable is in the analyses, therefore, termed "Male."

2.3 | Analysis

All models are estimated in the statistical software Mplus, version 7 using the MLR estimator that assumes multivariate normality and provides robust standard errors. We use full information maximum likelihood to deal with item nonresponse for all assessments except for sympathy, where as noted above answers of Don't Know (possible only in the Danish sample) were grounds for exclusion. This technique only requires the assumption of missing at random, that is, the missing values on the dependent variable are unrelated to the values on the dependent variable conditional on observables (Enders, 2010). All scales were created using factor

scores from a series of confirmatory factor analyses (Muthén & Muthén, 2018).

If we take the meta-analytic correlation between intelligence and ideology ($r = .20$) as a conservative estimate of the correlation between intelligence and tolerance, then to detect effects at a significance level of .05, each sample has a power of above .999, as computed using the pwr package in R for correlations (Champely, 2020).

3 | RESULTS

3.1 | Intelligence as a predictor of tolerance

Correlational results for the core study variables are presented in Table 2. For Neo-Nazis and the Far Right, results closely align with past work: Tolerance was positively correlated with education, Openness, and left-wing ideology and negatively correlated with a threat. Tolerance for Christian Fundamentalists differed somewhat: All associations were in the same direction as for other groups, but only the correlation with education was statistically significant. Our results also align with past findings with significant associations between intelligence and ideology: The meta-analytic correlation across the two samples (all of which are presented in Table S.1.3 in Supporting Information) was $r = .15$, in line with if slightly smaller than what is typically observed (Onraet et al., 2015).

Of greatest interest, intelligence showed the expected positive association with tolerance ($\underline{r}$ values between .11 and .28, all $p < .01$). Meta-analytic values across the two countries indicate intelligence correlated .27 with tolerance for Neo-Nazis and .21 for the less extreme groups (Far Right and Christian Fundamentalists).

Regression analyses (see Model A results in Table 3) show that the effect of intelligence could not be accounted for by its relationship with other variables of interest. Intelligence retained its predictive power in both the Danish (0.203, $p = .001$) and the American (0.323, $p < .001$) samples even when all covariates were included as predictors. This was no marginal relationship: In the pooled sample,[2] intelligence (0.299; $p < .001$) was the single-most powerful predictor of tolerance, despite the presence of a range of well-established predictors of tolerance which have their own substantial connections to intelligence.

Other results from Model A were highly comparable between samples and matched expectations, with one point worthy of note. Education was no longer a significant predictor in the Danish sample and only exerted a quite small effect in the pooled sample. Regression results in Supporting Information Table S.3.2 showed that rather than the diminished effect of education being solely attributable to any single covariate, the effect of education on tolerance shared its predictive power primarily with intelligence and social liberalism.

3.2 | Moderation by group extremity

Model B results in Table 3 confirmed our prediction regarding the particular utility of intelligence in predicting wtolerance for particularly intolerable groups.[3] In both the Danish and the American samples, intelligence was particularly useful for predicting tolerance of Nazis. As shown in Figure 1, the consequence is that those with greater cognitive ability were comparatively less likely to preferentially tolerate the less versus the more extreme group.

That is, those who were high in intelligence were not only likely to be more tolerant but to endorse tolerance equally, regardless of the extremity of the group in question. This moderation was substantial, with the tolerance levels from those at the lowest levels of cognitive ability more than twice as affected by the extremity of the target group than were tolerance ratings from those at the highest levels of cognitive ability.

While Figure 1 uses a between-subjects approach to show how high intelligence leads to political tolerance that is indifferent to the extremity of the group in question, Figure 2 approaches the same question using within-subjects analysis of the subset of Danish participants who also completed the follow-up assessment ($N = 78$) and had a different target group at the second wave. To assess whether intelligence still moderates the relationship, we use a classic diff-in-diff design (Angrist & Pischke, 2008). That is, we compare people before and after the change in the two target groups and then compare the differences before and after the change. The only addition is that we let the estimated treatment effect (diff-in-diff) vary by intelligence, that is, a three-way interaction, which was significant ($p = .019$). Full model output can be found in Supporting Information Table S.3.1.

3.3 | Stability of tolerance

The 75 Danish Time 2 participants who (via random assignment) had received the same target group at both assessments were used to explore the 4-year stability of tolerance. The observed stability in political tolerance between these two assessments was substantial: $r = .67$ [0.38; 0.84] for the Far Right and 0.60 [0.38; 0.75] for the Neo-Nazis, though given the low number of participants, these estimates have wide confidence intervals.

4 | DISCUSSION

A considerable body of previous work has shown that elements within the cognitive domain contribute to political tolerance (Marcus et al., 1995; Sullivan & Hendriks, 2009; Sullivan et al., 1982). This work has, however, conceptualized

TABLE 2 Correlational results in U.S. and Danish samples

	Tolerance Far Right/Christian Fundamentalists	Tolerance Neo-Nazis	Intelligence	Openness	Education	Social liberalism	Age	Male	Threat Far Right/Christian Fundamentalists	Threat Neo-Nazis
Tolerance Far Right/Christian Fundamentalists	1	–	0.11 [0.000;0.21]	0.15 [0.03;0.27]	0.23 [0.14;0.32]	0.37 [0.29;0.44]	0.04 [−0.07;0.15]	0.08 [−0.02;0.19]	−0.22 [−0.33;−0.1]	–
Tolerance Neo-Nazis	–	1	0.28 [0.19;0.38]	0.2 [0.1;0.26]	0.07 [−0.05;0.17]	0.28 [0.18;0.35]	−0.05 [−0.14;0.05]	0.23 [0.14;0.32]	–	−0.35 [−0.42;−0.27]
Intelligence	0.26 [0.19;0.33]	0.27 [0.21;0.33]	1	0.07 [0.01;0.15]	0.26 [0.18;0.32]	0.23 [0.17;0.29]	0.04 [−0.04;0.11]	0.01 [−0.07;0.08]	−0.08 [−0.19;0.03]	−0.13 [−0.21;−0.04]
Openness	0.05 [−0.02;0.13]	0.09 [0.02;0.16]	0.07 [0.02;0.12]	1	0.14 [0.07;0.2]	0.35 [0.27;0.42]	−0.03 [−0.1;0.04]	−0.04 [−0.11;0.02]	−0.01 [−0.14;0.11]	−0.02 [−0.12;0.07]
Education	0.15 [0.08;0.23]	0.13 [0.06;0.19]	0.2 [0.15;0.24]	0.04 [−0.01;0.09]	1	0.26 [0.2;0.32]	0.15 [0.08;0.23]	−0.03 [−0.09;0.04]	−0.04 [−0.15;0.06]	−0.05 [−0.16;0.07]
Social liberalism	0.09 [−0.01;0.18]	0.13 [0.06;0.19]	0.11 [0.06;0.16]	0.16 [0.11;0.21]	0.11 [0.06;0.16]	1	−0.04 [−0.1;0.03]	0.07 [0.000;0.13]	0.02 [−0.09;0.11]	−0.1 [−0.2;0.03]
Age	−0.18 [−0.25;−0.12]	−0.07 [−0.15;0.000]	−0.03 [−0.08;0.01]	−0.07 [−0.12;−0.02]	−0.09 [−0.13;−0.05]	0.14 [0.09;0.19]	1	−0.05 [−0.11;0.02]	0.05 [−0.07;0.18]	−0.03 [−0.12;0.07]
Male	0.13 [0.07;0.21]	0.2 [0.15;0.26]	0.07 [0.02;0.11]	−0.01 [−0.05;0.04]	−0.06 [−0.11;−0.01]	−0.11 [−0.16;−0.06]	0.02 [−0.03;0.07]	1	−0.1 [−0.19;0.01]	−0.23 [−0.33;−0.13]
Threat Far Right/Christian Fundamentalists	−0.04 [−0.11;0.04]	–	0.01 [−0.06;0.09]	0.15 [0.09;0.24]	0.06 [−0.01;0.14]	0.26 [0.18;0.33]	−0.04 [−0.11;0.03]	−0.11 [−0.18;−0.03]	1	–
Threat Neo-Nazis	–	−0.21 [−0.27;−0.15]	−0.12 [−0.17;−0.05]	0.08 [0.02;0.14]	−0.05 [−0.11;0.02]	−0.07 [−0.14;0.000]	−0.15 [−0.21;−0.09]	−0.18 [−0.25;−0.12]	–	1

Note: The less extreme group assessed in the Danish sample (upper right) was "Far Right." In the United States (bottom left), the corresponding group was "Christian Fundamentalists."

TABLE 3 Effect of cognitive ability on political tolerance in alternative model specifications

	Model A			Model B		
	Danish sample	U.S. sample	Pooled sample	Danish sample	U.S. sample	Pooled sample
Intelligence	0.203	0.323	0.299	0.037	0.241	0.171
	(0.064)**	(0.037)**	(0.032)**	(0.083)	(0.048)**	(0.042)**
Education	0.022	0.105	0.066	0.022	0.106	0.068
	(0.03)	(0.032)**	(0.022)**	(0.03)	(0.032)**	(0.022)**
Male	0.057	0.104	0.085	0.057	0.105	0.085
	(0.016)**	(0.015)**	(0.011)**	(0.016)**	(0.015)**	(0.011)**
Age	0.009	−0.185	−0.146	0.005	−0.187	−0.148
	(0.059)	(0.038)**	(0.031)**	(0.059)	(0.038)**	(0.031)**
Target group	−0.145	−0.233	−0.195	−0.327	−0.31	−0.321
	(0.016)**	(0.015)**	(0.011)**	(0.074)**	(0.043)**	(0.037)**
Openness	0.111	0.088	0.11	0.111	0.086	0.109
	(0.046)*	(0.044)*	(0.032)**	(0.045)*	(0.044)*	(0.032)**
Threat	−0.196	−0.138	−0.15	−0.193	−0.135	−0.148
	(0.027)**	(0.025)**	(0.018)**	(0.026)**	(0.025)**	(0.018)**
Social liberalism	0.277	0.174	0.206	0.273	0.171	0.202
	(0.041)**	(0.037)**	(0.027)**	(0.041)**	(0.037)**	(0.027)**
Target group × intelligence				0.308	0.143	0.224
				(0.119)**	(0.07)*	(0.061)**

Note: Unstandardized estimates and SEs for model predicting political tolerance. In Supporting Information 2 (Table S.4.1), the same models are presented using standardized regression coefficients.
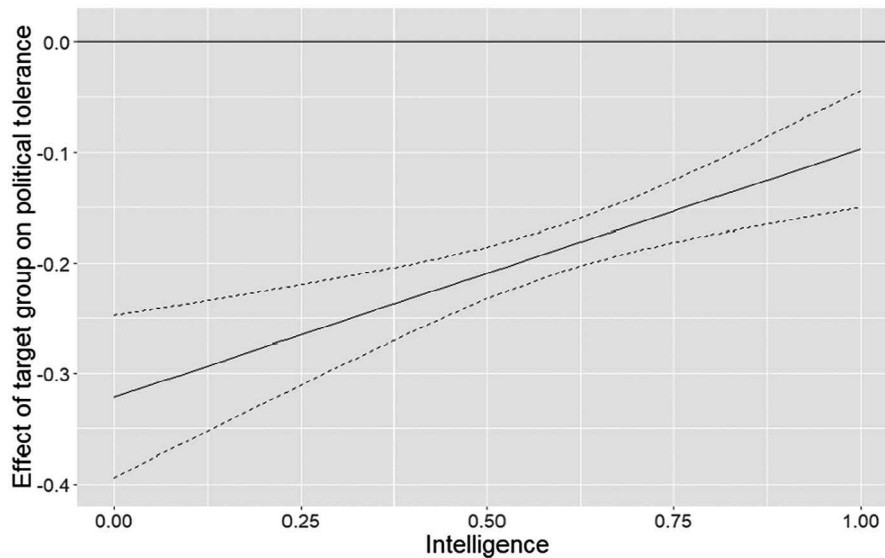
*p < .05; **p < .01.

FIGURE 1 Marginal Effect of Target Group Extremity on Political Tolerance. Negative *y* axis values indicate that the more extreme group (Nazis) received lower tolerance ratings than did the less extreme groups (Far Right and Christian Fundamentalists). The positive slope shows that group extremity was (substantially) less predictive of differences in tolerance among respondents with higher intelligence scores. 95% confidence bands are shown. In Supporting Information 3 (Figure S.3.1), we also illustrate the moderating effect of intelligence using predicted values separately for the two groups
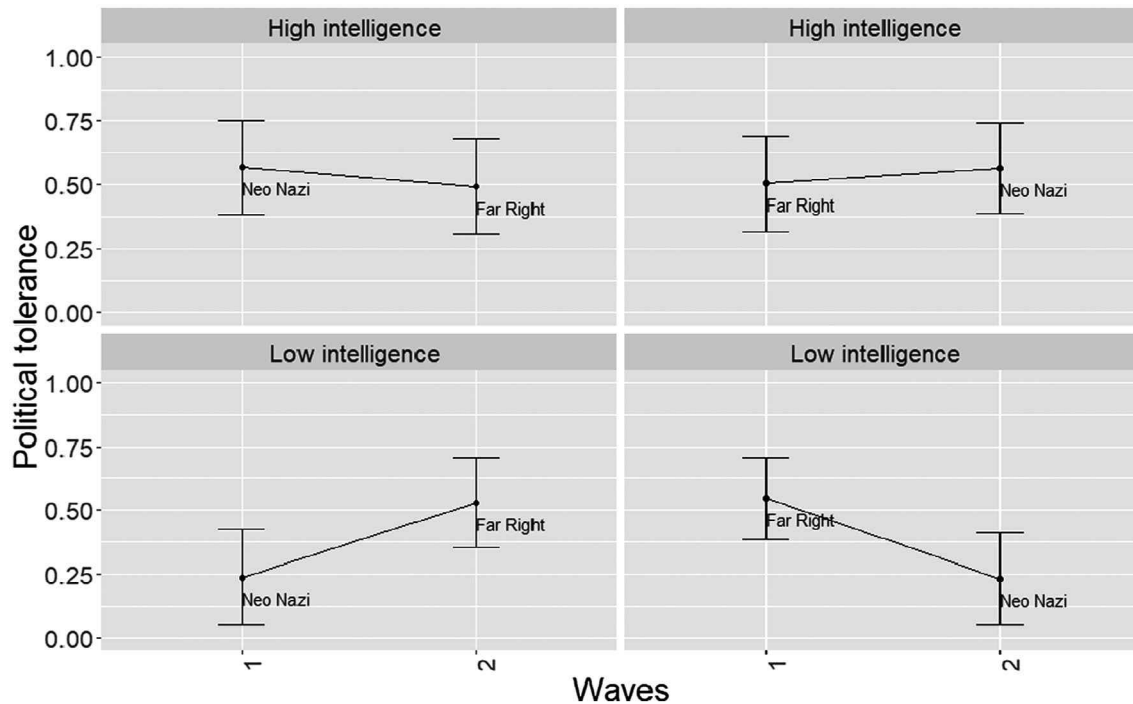
FIGURE 2 Marginal effect of target group on political tolerance among subset of Danish participants rating both groups ($N = 78$). Figure shows how respondents assessing both target groups at different time points ($N = 78$ Danes) and only showed different tolerance ratings for the groups when they scored lower in intelligence (formal analyses conducted via a difference-in-difference model using intelligence as a continuous variable, $p = .019$; see text and Table S.3.1). Results show 95% confidence bands around each estimate

the link as exclusively concerning elements of cognitive style. The present results suggest that in omitting cognitive ability, previous research has missed half of the story. Indeed, it may even be the more important half: In the pooled sample, the effects of cognitive ability were larger than that of any other predictor, with effects that were five times larger than that of education and roughly three times larger than that of Openness. The magnitude of the relationship is not merely noteworthy relative to predictors of political tolerance but also relative to other political correlates of cognitive ability. A substantial body of work highlighting intelligence as an important predictor of ideology (Onraet et al., 2015), but we found intelligence correlated with tolerance for the most extreme group nearly twice as much as with ideology.

The importance of these results extends beyond identifying an overlooked and comparatively large predictor of tolerance. They also help to reevaluate previously established predictors. Of greatest interest is the fact that even though education is one of the more commonly discussed putative contributors to tolerance (Sniderman et al., 1989; Sullivan & Hendriks, 2009), its associations were quite muted in our pooled sample and insignificant in the Danish sample.

We suggest that these results are not overly attributable to idiosyncratic features of our study design. For example, although the effects of personality traits are often understated due to the use of abbreviated measures (Bakker & Lelkes, 2018), our measures of Openness had 10–12 items compared with the 10 Openness items used in the long-form assessment studied by Bakker and Lelkes (2018). Of potentially greater concern is the comparatively young age of respondents in the Danish sample: With a mean age of 23, this plausibly reduced our ability to detect the full effect of education on tolerance. Nevertheless, even within the considerably older American sample (mean age = 36), the effect of education was still only a third of the effect of intelligence.

Of particular interest is that, as hypothesized, the association between cognitive ability and political tolerance was not indifferent to the target group. Instead, cognitive ability predicted the greatest degree of tolerance when that tolerance was most challenging—that is, when respondents were rating the extreme group (Nazis) rather than the more readily tolerated groups (the far right and religious fundamentalists). This held both when comparing between participants responding to different groups as well as within the subset of Danish participants who, via the follow-up study, had responded to both groups. This finding is broadly supportive of cognitively oriented accounts of political tolerance. Here, exhibiting specific political tolerance for individual groups is taken to represent a cognitively challenging task; successful performance of the task takes the form of applying one's abstract and generalized ideals regarding tolerance to a specific disliked group. The more intelligent members of these samples were more consistent in their tolerance levels between the groups, matching expectations that these

individuals would engage in more principled reasoning when providing tolerance ratings.

Future work should improve on our own for any further explorations of the effect of group extremity on tolerance judgements. First, Christian Fundamentalists may have been a poor target group to select as equivalent to the Danish Far Right. Christian Fundamentalists received quite high tolerance ratings, and the correlations between those tolerance ratings and various predictors were (unlike for Neo-Nazis and the Far Right) not statistically significant, even if coefficients were still in the same direction and occasionally just missing significance (e.g., $p = .056$ with ideology). Because Christian Fundamentalists represent a comparatively established and relatively mainstream force in the United States, it may be that they are perceived differently than more extreme and less-established groups, about whom questions of police surveillance and the prohibition of demonstrations are more commonly raised.

Future work should also explore whether these findings hold equally for other right-wing groups and for left-wing groups as well. Results from Bobo and Licari (1989), though limited by considerations noted in the introduction, indicate that it might well be expected to: intelligence positively predicted tolerance for both left-wing and right-wing groups. Similarly, De Keersmaecker et al. (2021) observed intelligence to predict support for freedom of speech for groups across the ideological spectrum. Still, further study using contemporary measurement of true political tolerance is warranted to verify the association between intelligence and tolerance across groups of various ideological persuasions.

A final noteworthy result concerned the apparent stability of tolerance. Among our limited subset of respondents who repeated two assessments, we found substantial stability in ratings provided for the same target group. This is the first longitudinal exploration of tolerance that we are aware of, though the results must be considered exploratory, given the modest sample size for this analysis.

Still, the apparent stability of tolerance ratings highlights the question of precisely how (and, relatedly, when) cognitive ability affects tolerance. Does cognitive ability affect political tolerance ratings in a comparatively proximate manner, affecting the deliberations made by participants at the time of survey completion? Or do these affects accumulate over time, such that cognitive ability affected respondent views on tolerance (and their tendencies to apply that tolerance equally to different groups) long before they completed our survey? The present data do not readily permit differentiation between these alternatives, but future work might do so by attempting to interfere with the respondent's ability to think via cognitive load or intoxication. To the extent that political tolerance represents a highly stable trait, we might expect such temporary cognitive impairments to have little effect on political tolerance judgments, which would indicate the effects of intelligence on tolerance were likely long-lasting rather than fleeting developments occurring at the time of survey completion.[4] Given the societal importance of political tolerance, and the apparently substantial role intelligence plays in influencing that tolerance, we hope that these and similar investigations will be pursued.

CONFLICT OF INTEREST

The authors have no conflicts of interest to report.

ETHICS APPROVAL STATEMENT

The data will be reported in an anonymized version such that it will not be possible to identify any individuals in the sample.

AUTHOR CONTRIBUTIONS

Stig Hebbelstrup Rye Rasmussen: Writing-Original Draft Preparation, Data Analysis, Conceptualization; Steven Ludeke: Writing-Original Draft Preparation, Conceptualization; Both authors: Writing-Review & Editing.

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ENDNOTES

[1] For this reason, information about whether one likes or sympathizes with a given group is utilized as a restrictive condition in political tolerance research (Gibson, 2013; Sullivan et al., 1982) rather than as a covariate.

[2] For the combined regression results, we use a multiple group approach in Mplus, where we constrain the regression coefficients to be equal across the two groups but let the variance vary across groups.

[3] In Supporting Information 3, Table S.3.9, we also show that the moderating effect of intelligence is robust to the inclusions of interactions with education, Openness, and Social Liberalism.

[4] Some work has suggested that even highly stable traits such as sociopolitical attitudes can be affected by situational manipulations of cognitive ability such as via distractions or intoxicants (Eidelman et al., 2012). However, these claims are based on problematically small samples and have not replicated (Yilmaz & Adil Saribay, 2016).

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SUPPORTING INFORMATION

Additional supporting information may be found online in the Supporting Information section.