

# Answering Unresolved Questions About the Relationship Between Cognitive Ability and Prejudice

Mark J. Brandt<sup>1</sup> and Jarret T. Crawford<sup>2</sup>

Social Psychological and  
Personality Science  
1-9

© The Author(s) 2016  
Reprints and permission:  
sagepub.com/journalsPermissions.nav  
DOI: 10.1177/1948550616660592  
spps.sagepub.com



## Abstract

Previous research finds that lower cognitive ability predicts greater prejudice. We test two unresolved questions about this association using a heterogeneous set of target groups and data from a representative sample of the United States ( $N = 5,914$ ). First, we test “who are the targets of prejudice?” We replicate prior negative associations between cognitive ability and prejudice for groups who are perceived as liberal, unconventional, and having lower levels of choice over group membership. We find the opposite (i.e., positive associations), however, for groups perceived as conservative, conventional, and having higher levels of choice over group membership. Second, we test “who shows intergroup bias?” and find that people with both relatively higher and lower levels of cognitive ability show approximately equal levels of intergroup bias but toward different sets of groups.

## Keywords

individual differences, prejudice/stereotyping, cognitive ability, group characteristics

Individual differences that predict prejudice have interested social and personality psychologists since at least Allport (Adorno, Frenkel-Brunswik, Levinson, & Sanford, 1950; Allport, 1929, 1954) and research has established the association between a variety of individual differences and prejudice (Akrami, Ekehammar, & Bergh, 2011; Ekehammar & Akrami, 2007; Hodson & Dhont, 2015; Roets & Van Hiel, 2011; Sibley & Duckitt, 2008). One such individual difference is (low) cognitive ability (Bobo & Licari, 1989; Deary, Batty, & Gale, 2008; Hello, Scheepers, & Sleegers, 2006; Hodson & Busseri, 2012; Keiller, 2010; Schoon, Cheng, Gale, Batty, & Deary, 2010; for a meta-analysis, see Onraet et al., 2015), with new theoretical models developed to account for the social and psychological factors that mediate its association with prejudice (Dhont & Hodson, 2014; Hodson & Dhont, 2015). These theoretical perspectives predict that people with lower levels of cognitive ability are more sensitive to threat, which leads to more socially conservative/right-wing political attitudes, and subsequently more prejudice. We expand on this line of work to provide answers to two outstanding questions.

ethnocentrism (Meeusen, de Vroome, & Hooghe, 2013). The focus on low-status groups is consistent with much of the research on prejudice in social psychology, which sometimes defines and often operationalizes prejudice as unjustified or unjust negative affect toward low-status or low-power groups (e.g., Hodson & Dhont, 2015; Sampson, 1999).

We take a different approach. Following Crandall, Eshleman, and O’Brien colleagues (2002), we define prejudice as “a negative evaluation of a group or of an individual on the basis of group membership” (p. 359, see also Brandt & Proulx, 2016; Brown, 2010; Crandall, Ferguson, & Bahns, 2013; Stangor, 2009). This definition focuses on the psychological phenomenon behind prejudice (i.e., negative affect) and removes value judgments such as whether or not the prejudice is unjustified or unjust. These latter criteria are difficult to prove decisively and likely differ depending on the perceiver’s social context and time in history (Brown, 2010; Crandall et al., 2013). By using an expanded and inclusive definition of prejudice, we open up new questions about the association between cognitive ability and prejudice.

## Question 1: Who Are the Targets?

Research linking cognitive ability and prejudice focuses on target groups who have low power and low status. A recent meta-analysis (Onraet et al., 2015) included studies assessing racism (Hodson & Busseri, 2012), prejudice toward ethnic minorities (Hello et al., 2006), prejudice toward foreigners (Stülpnagel & Steffens, 2010), sexual prejudice (Keiller, 2010), and

<sup>1</sup>Department of Social Psychology, Tilburg University, Tilburg, the Netherlands

<sup>2</sup>The College of New Jersey, Ewing, NJ, USA

## Corresponding Author:

Mark J. Brandt, Department of Social Psychology, Tilburg University, P.O. Box 90153, Tilburg, 5000 LE, the Netherlands.  
Email: m.j.brandt@tilburguniversity.edu

Specifically, who are the targets of prejudice? Past work suggests that the groups who are the targets of prejudice by people with low levels of cognitive ability are groups with low status and low power. Groups who fit these characteristics are often the targets of prejudice in studies on cognitive ability and prejudice (e.g., Onraet et al., 2015). There are at least two other possible characteristics that are often confounded with low status and power that might be relevant. First, low-status groups tend to be more politically liberal/left-wing and vote for more politically liberal and left-wing political parties (Bartels, 2006; Gelman, 2009; Herek, Norton, Allen, & Sims, 2010). Because people with low levels of cognitive ability tend to be more socially conservative (Hodson & Busseri, 2012; Onraet et al., 2015), one mechanism of the association between cognitive ability and prejudice may be social and political dissimilarity with these particular targets rather than low status per se. This is consistent with the robust connection between attitudinal similarity and liking (e.g., Byrne, 1969; Wynn, 2016) and in-group/out-group biases (Hewstone, Rubin, & Willis, 2002). It also suggests that social conservatism will mediate the association between cognitive ability and prejudice toward groups who people with low cognitive ability derogate (consistent with past research, e.g., Hodson & Busseri, 2012) and the association between cognitive ability and prejudice toward groups who people with high cognitive ability derogate, but in the opposite direction.

Second, the low-status groups used in prior studies tend to be groups that people have relatively little choice about whether they belong to the group or not (e.g., demographic groups, such as low-status ethnic groups). Prejudice toward low-status groups is predicted by the perception that people have relatively little choice about whether they belong to the group or that the group has “essential” qualities that make it distinct from other groups (Bastian & Haslam, 2006; Haslam, Bastian, Bain, & Kashima, 2006; Keller, 2005; Levy, Stroessner, & Dweck, 1998). People with lower levels of cognitive ability may be more likely to rely on perceived group choice because such information provides clear boundaries between groups. Researchers have theorized that people with lower levels of cognitive ability prefer to maintain strict group boundaries (Dhont & Hodson, 2014), and this may be accomplished (psychologically) by expressing prejudice toward groups who are perceived to have lower levels of group choice. We test if target groups tend to be perceived as having low status, particular sociopolitical attitudes, or low choice over group membership, and how these perceptions might be associated with the size and direction of the cognitive ability–prejudice relationship.

The question of “who are the targets of prejudice” presents the distinct possibility that people with higher levels of cognitive ability may also show prejudice, but toward different groups. Whereas people with lower cognitive ability may express more prejudice toward low-status, politically liberal, or low-choice groups compared to people with higher cognitive ability (consistent with previous findings), people with higher cognitive ability may express more prejudice toward

high-status, politically conservative, or high-choice groups compared to people with lower cognitive ability. This possibility does not say anything about the justifiability, appropriateness, or morality of these responses. Rather, by understanding the characteristics of groups who face prejudice by people with differing levels of cognitive ability, we can better understand the breadth and limits of the cognitive ability–prejudice association.

### Question 2: Who Shows Intergroup Bias?

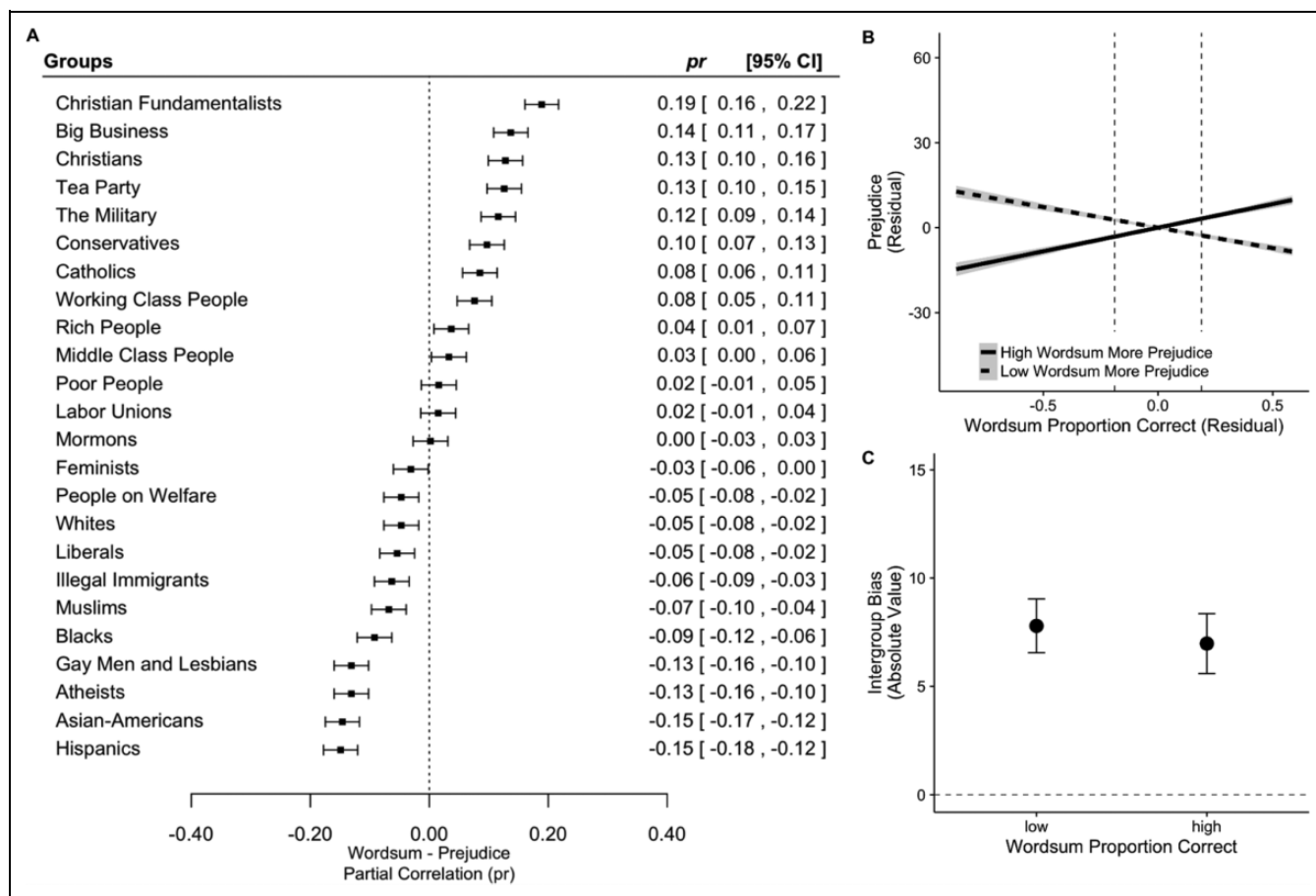
The possibility that cognitive ability is negatively associated with prejudice toward some groups but positively associated with prejudice toward other groups inspires our second question, as such an observation is consistent with two different overall patterns of data.

First, positive and negative correlations are consistent with a “spreading interaction,” where people lower in cognitive ability express significantly more prejudice toward some groups compared to others (i.e., intergroup bias), but people higher in cognitive ability do not. This pattern implies that there is something in particular about people with lower levels of cognitive ability that lead them to show an intergroup bias. There are multiple possible explanations for such a gap, including differences in perspective taking (Hodson & Busseri, 2012), cognitive style (Dhont & Hodson, 2014), or other cognitive processes that lead people with lower levels of cognitive ability to be more concerned about maintaining group boundaries compared to people with higher levels of cognitive ability. If people with lower cognitive ability are more concerned with group boundaries, then they should show larger intergroup biases than people with higher levels of cognitive ability.

Second, positive and negative correlations are consistent with a “crossover interaction,” where people both lower and higher in cognitive ability express intergroup bias, but toward different sets of groups. This implies that there is a similar psychological mechanism for people higher and lower in cognitive ability, such as the effects of attitude dissimilarity or in-group/out-group distinctions on prejudice (Byrne, 1969; Hewstone et al., 2002; Wynn, 2016). For similar reasoning about these two possible patterns of effects in the domain of religious fundamentalism, see Brandt and van Tongeren (in press).

### The Current Study

We aim to provide initial answers to the two questions posed earlier. We analyze nationally representative data from the United States that includes a measure of verbal ability and prejudice toward 24 different groups. We assessed cognitive ability with a measure of verbal ability, the wordsum test. Similar comprehensive knowledge–based tests had the strongest associations with prejudice in past research compared to other types of measures (Onraet et al., 2015).<sup>1</sup> Although this measure is not a comprehensive cognitive ability measure, nor perfect (especially for assessing generational changes, see, e.g., Roivainen, 2013), it represents a key cognitive ability domain with which to answer



**Figure 1.** (A) Partial correlations (*pr*) between wordsum and prejudice, and their 95% confidence intervals (CIs) for each of the target groups, adjusting for all of the covariates. (B) Association between wordsum and prejudice, after adjusting for the influence of the covariates, for the six groups where high wordsum is associated with more prejudice and for the six groups where low wordsum is associated with more prejudice. The gray regions are the 95% CI. The vertical dashed lines are  $\pm 1$  SD. (C) Absolute value of the intergroup bias estimates for people  $\pm 1$  SD the wordsum mean. Error bars are 95% CIs.

our two questions. To test how the perceived characteristics of these groups are associated with the cognitive ability–prejudice effect size (Question 1), we collected perceptions of the groups’ status, political beliefs, conventionalism, and membership choice from a separate community sample.

**Method**

*American National Election Studies (ANES)*

Our primary data source is the 2012 Time Series of the ANES ( $M_{age} = 49.4, SD = 16.8; 3,069$  female, 2,845 male).<sup>2</sup> The large sample gives us  $>.99$  power to detect the meta-analytic effect size between cognitive ability and prejudice ( $r = -.19$ ; Onraet et al., 2015). The survey consists of U.S.-eligible voters using a combination of face-to-face interviews and web-based questionnaires. All analyses use all of the available data for measures included.

Cognitive ability was measured with the wordsum, a measure of verbal ability included in the ANES for the first time in 2012.<sup>3</sup> This 10-item vocabulary test, developed by

Thorndike (1942), has been associated with general intelligence (Wolfe, 1980), and verbal ability, and often shares the most variance with general intelligence (Kan, Wicherts, Dolan, & van der Maas, 2013; see Caplan & Miller, 2010; Gooch, 2015; of Menie, Fernandes, Figueredo, & Meisenberg, 2015, for further justification; see the Supplemental Materials for additional checks on the measure in our data). For each item, participants are asked to select the word (out of five choices) “that comes closest to the meaning” of the target word. We used the proportion of correct answers as our primary predictor variable ( $\alpha = .75$ ). To demonstrate that our findings are robust to different methods of combining items (e.g., Malhotra, Krosnick, & Haertel, 2007), the Supplemental Materials contain all of the analyses using factor scores (DiStefano, Zhu, & Mindrila, 2009). Conclusions are identical.

Prejudice was measured with feeling thermometers toward 24 different target groups (see Figure 1A), which are 1-item measures of affective prejudice (0 = unfavorable and very cold, 100 = very warm and favorable; reversed scored, so that higher scores indicate more prejudice/negative feelings). In prior work, these items have correlated well with other

measures of prejudice, such as social distance (Brandt, Chambers, Crawford, Wetherell, & Reyna, 2015; Crawford, 2014).

We included covariates to adjust for demographic and socioeconomic differences. In all of our primary analyses, we adjusted for income, education, self-reported age, gender, and three contrast codes for race/ethnicity (see Supplemental Materials for more information). These are similar to the covariates used in other studies of cognitive ability and prejudice (e.g., Hodson & Busseri, 2012). We also adjusted for survey modality (face-to-face vs. Internet).<sup>4</sup> All analyses and analytic decisions are repeated without covariates and are reported in the Supplemental Materials. We focus on the analyses with covariates (see Hodson & Busseri, 2012, for justification for employing covariates such as education and socioeconomic status in examining correlates with cognitive ability, and for a critique of past work that did not include such covariates).

One possible mechanism linking cognitive ability to prejudice is socially conservative political values, so we included a 2-item measure of traditionalism (e.g., Brandt & Reyna, 2014) to test this possible mediation. The 2 items read, “The newer lifestyles are contributing to the breakdown of our society” and “This country would have many fewer problems if there were more emphasis on traditional family ties.” They were measured on 1 (*agree strongly*) to a 5 (*disagree strongly*) scale, rescored so that higher scores represented more traditionalism, and were averaged,  $r(5,479) = .58$ .

### MechanicalTurk Sample

We collected an additional sample on Amazon.com’s MechanicalTurk to rate the perceived status, ideology, conventionalism, and group choice of each target group. The aim was to recruit at least 100 participants because in our experience this results in relatively stable mean estimates. To account for possible missing data, we opened the human intelligence task on MechanicalTurk for 150 participants. After excluding participants who did not currently live in the United States, 146 participants remained ( $M_{\text{age}} = 35.9$ ,  $SD = 12.7$ ; 66 female, 80 male). Participants rated the perceived social status, political ideology, conventionalism, and group choice for each of the target groups based on measures found in the literature (Brandt et al., 2015; Chambers, Schlenker, & Collisson, 2013; Fiske, Cuddy, Glick, & Xu, 2002; Haslam & Levy, 2006). Each measure was on a 0–100 scale with higher scores indicating groups perceived as more conservative, conventional, high status, and high choice. The exact wording is in the Supplemental Materials. Each measure was completed in a random order and the groups were presented in a random order for each measure. Intra-class correlations (ICCs) of the ratings were high (ideology ICC = .99, conventionalism ICC = .99, status ICC = .99, choice = .99).

## Results

As a first, exploratory step, we tested if cognitive ability was associated with prejudice toward all of the target groups. The

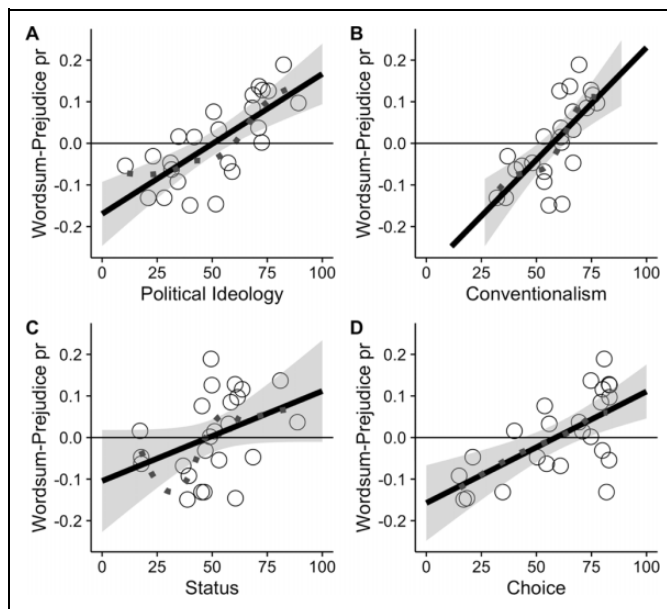
partial correlation ( $pr$ ) between cognitive ability and mean overall prejudice while adjusting for the covariates was small and was not different from 0,  $pr(4,473) = .01$ ,  $p = .42$ . The same association without adjusting for covariates is,  $r(4,874) = .10$ ,  $p < .001$ , suggesting that *higher* cognitive ability is associated with *greater* overall prejudice when demographic variables and specific target groups are not accounted for.

### Question 1: Who Are the Targets?

The null association between cognitive ability and prejudice does not, however, suggest that there is no relationship between cognitive ability and prejudice. Figure 1A shows the partial correlations between wordsum and prejudice toward the 24 groups while adjusting for covariates. The partial correlations range from small and negative to small and positive, suggesting that for some groups, people with lower cognitive ability express more prejudice and for other groups, people with higher cognitive ability express more prejudice. The negative correlations conceptually replicate the results of past work, suggesting that people with lower levels of cognitive ability express more prejudice toward ethnic minorities (e.g., Blacks, Hispanics, and Asian Americans) and gays and lesbians. There were several positive correlations, however, suggesting that people with higher levels of cognitive ability express more prejudice toward Christian fundamentalists, big business, Christians, the Tea Party, and the military.

To test how the perceived characteristics of the target groups were associated with the wordsum–prejudice associations, we correlated the wordsum–prejudice  $pr$  coefficients with mean levels of perceived status, political ideology, conventionalism, and choice. Scatterplots of these associations are in Figure 2. There was a positive correlation between the size of the wordsum–prejudice  $pr$  and perceived status,  $r(22) = .38$ ,  $p = .07$ ; political ideology,  $r(22) = .73$ ,  $p < .001$ ; conventionalism,  $r(22) = .71$ ,  $p < .001$ ; and choice,  $r(22) = .65$ ,  $p < .001$ , although the correlation was marginally significant for status.

Additional analyses regressed the wordsum–prejudice  $pr$  simultaneously on perceived status, political ideology, and choice (Model 1, adj.  $R^2 = .66$ ) and then again on perceived status, conventionalism, and choice (Model 2, adj.  $R^2 = .67$ ). Political ideology and conventionalism were highly correlated,  $r(22) = .85$ ,  $p < .001$ , and so were not included in the same model. The two regression models demonstrated that perceived political ideology (Model 1:  $b = .003$ ,  $SE = .001$ , 95% confidence interval [CI] = [.001, .004],  $\beta = .61$ ,  $p = .001$ ), conventionalism (Model 2:  $b = .003$ ,  $SE = .001$ , 95% CI [.001, .004],  $\beta = .59$ ,  $p = .001$ ), and choice (Model 1:  $b = .002$ ,  $SE = .001$ , 95% CI [.001, .003],  $\beta = .44$ ,  $p = .003$ ; Model 2:  $b = .002$ ,  $SE = .001$ , 95% CI [.001, .003],  $\beta = .47$ ,  $p = .002$ ) were significant predictors of the size of the wordsum–prejudice association, but that perceived status was not (Model 1:  $b = -.0004$ ,  $SE = .001$ , 95% CI [–.002, .001],  $\beta = -.07$ ,  $p = .63$ ; Model 2:  $b = -.0004$ ,  $SE = .001$ , 95% CI [–.002, .001],  $\beta = -.08$ ,  $p = .57$ ). The results of these analyses suggest that *both* perceived ideology or conventionalism *and* the



**Figure 2.** Correlations between mean perceived group characteristics of (A) political ideology, (B) conventionalism, (C) status, and (D) choice and the wordsum–prejudice partial correlation for each target group. The solid black line is the linear estimate and the gray shaded region is the 95% CI of this estimate. The dotted gray line is the smoothed regression estimate.

perceived choice over group membership are needed to understand which groups face prejudice from people high in cognitive ability and which groups face prejudice from people low in cognitive ability.

### Question 2: Who Shows Intergroup Bias?

To test if only people lower cognitive ability show an intergroup bias or if people both higher and lower in cognitive ability show an intergroup bias (i.e., a spreading vs. a crossover interaction pattern), we estimated the association between wordsum and prejudice for target groups with the six most positive and the six most negative *prs*. These groupings satisfied two criteria: (1) there were equal numbers of groups and (2) each *pr* had a confidence interval that at least contained a small effect (i.e., *pr* CI > |.10|). The estimated linear regression lines are plotted in Figure 1B for the entire range of wordsum while adjusting for the covariates. These estimates reveal a crossover pattern that “crosses over” very near the mean of the wordsum (i.e., the zero point of the residual wordsum measure plotted on the *x*-axis that has been adjusted for the influence of the covariates). This pattern is consistent with the idea that people both high and low in cognitive ability express intergroup bias. For groups for which low cognitive ability predicts more prejudice, the size of the slope ( $b = -14.48$ ,  $SE = 1.15$ ,  $\beta = -.21$ ) is slightly smaller than for groups for which high cognitive ability predicts more prejudice ( $b = 16.53$ ,  $SE = 1.31$ ,  $\beta = .22$ ).<sup>5</sup>

It could be the case that both people lower and higher on wordsum show intergroup bias, but that the bias is larger for people lower on wordsum compared to higher on wordsum

(i.e., a spreading interaction). We tested this by first creating a difference score between groups for whom people with low wordsum express more prejudice and groups for whom people with high wordsum express more prejudice. We regressed this difference score on a wordsum measure that was centered either  $\pm 1SD$  the mean as well as on all of the mean-centered and contrast coded covariates. The intercept of these equations is the estimated difference between the two sets of groups for people 1 *SD* above ( $b = -6.97$ ,  $SE = .71$ ,  $p < .001$ ) or below ( $b = 7.79$ ,  $SE = .63$ ,  $p < .001$ ) the mean on wordsum. The difference in both cases was different from 0, but in opposite directions. Figure 1C shows the absolute values of these estimates of intergroup bias and their 95% CIs. It is clear that these two estimates are approximately the same size, and a *z*-test confirms this impression ( $z = 0.86$ ,  $p = .40$ ).<sup>6</sup>

### Mediation

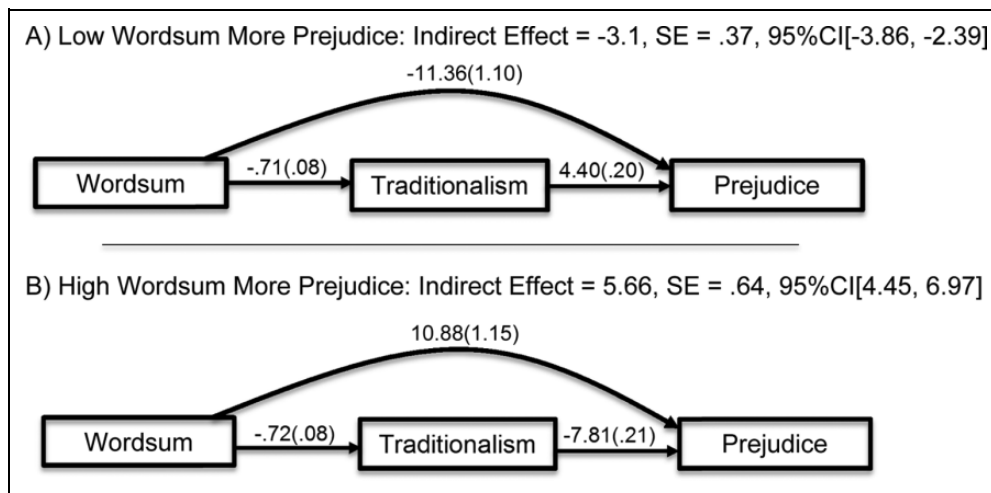
One possible mechanism linking cognitive ability to both more and less prejudice depending on the target groups is socially conservative political beliefs. As an initial examination of this mechanism, we tested if traditionalism mediated the association between cognitive ability and prejudice against the target groups with the six most positive and negative wordsum–prejudice associations (i.e., the groups making up the individual lines in Figure 1B), but in different directions. Consistent with predictions, traditionalism mediated the wordsum–prejudice association for both sets of groups, but the mediation effect was in opposite directions depending on the target groups (see Figure 3). Notably, after including traditionalism in the model, there was still a noticeable direct effect of wordsum on prejudice for both sets of groups, suggesting that other mechanisms may also play a role.

## Discussion

### Answering Question #1

We set out to answer, at least preliminarily, two outstanding questions about the relationship between cognitive ability and prejudice. Our first question asked, “Who are the targets?” Data from a large nationally representative U.S. sample and supplemented by a separate community sample suggest that lower levels of cognitive ability are associated with prejudice toward groups perceived as liberal/unconventional *and* as having less choice over their group membership. At the same time, the data also suggest that *higher* levels of cognitive ability are associated with prejudice toward groups perceived as conservative/conventional *and* as having more choice over their group membership. These findings suggest that the consensus in the literature that cognitive ability is associated with prejudice (see meta-analysis by Onraet et al., 2015) is a consequence of previous research primarily examining prejudice toward more liberal and low-choice groups and not conservative and high-choice groups.

The results suggest that both perceived ideology/conventionalism *and* perceived choice are important. Neither variable alone can describe the full pattern of results. With the full



**Figure 3.** Traditionalism mediates the association between wordsum and prejudice, but in opposite direction depending on the target groups. Analyses include all covariates. All paths are  $p < .001$ . Indirect effect is calculated using 5,000 bias-corrected and accelerated bootstrapped samples.

models estimated in Models 1 and 2,<sup>7</sup> we can predict the size and direction of the association between cognitive ability and prejudice toward novel groups. (For simplicity's sake, we focus on perceived ideology). For a novel group with average status (50.2), and the maximum perceived conservative ideology (89.1) and perceived choice (83.2) from our sample, the estimated wordsum–prejudice  $\hat{p}r$  is .15. For a novel group with average status, and the minimum perceived liberal ideology (10.5) and perceived lack of choice (14.9) from our sample, the wordsum–prejudice  $\hat{p}r$  is  $-.19$ . For groups who are a combination of low and high on perceived ideology and choice, the  $\hat{p}r$ s are smaller and closer to 0 (conservative/low choice  $\hat{p}r = .03$ , liberal/high choice  $\hat{p}r = -.07$ ).

Calculating  $\hat{p}r$  for different combinations of perceived ideology and choice highlights the target groups that the model explains well and the target groups the model explains poorly (i.e., in regression terms, have large residuals). For example, a prototypical liberal group like “feminists” shows small associations with wordsum. This could be interpreted as a falsification of the role of perceived ideology; however, this interpretation ignores the additive role of choice and does not take into account the influence of *both* perceived ideology and choice. Such small correlations are *expected* by the model for groups perceived as liberal and high choice (e.g., feminists); feminists have the third smallest residual, behind Catholics and gay men and lesbians. The group with the largest residual is “Atheists.” This group is perceived as relatively liberal and relatively high choice, so the model predicts that it should have a small, negative correlation, but instead it has one of the largest negative correlations in the sample (although, still small in absolute terms). This larger residual suggests that other factors, not captured by the model, are playing a role in this association (e.g., the factors identified by Gervais, 2013). Although it is tempting to use just ideology or just choice to predict the size and direction of the wordsum–prejudice association, using just one variable does not capture the nuances of our data.

By highlighting the target groups, the model predicts well and poorly, we hope to inspire three responses. First, our model estimates should be used to predict the size and direction of cognitive ability–prejudice associations in future studies to see if the model makes accurate predictions in new samples, with other measures or groups. For example, some work suggests that measures of intolerance (denial of constitutional rights), rather than prejudice (negative affect), may show that people with low cognitive ability express more intolerance overall (Carl, 2014).<sup>8</sup> Moving beyond the question of *if* cognitive ability is associated with prejudice, future studies should iterate on the models we report to refine predictions about when cognitive ability will be associated with prejudice and in what direction. These future iterations may, for example, find that our models do poorly in cultural contexts where political ideology is not as polarizing as it is in the United States and the United Kingdom where a majority of the cognitive ability prejudice studies have occurred. This is a natural feature of model building and we hope the model is put to the test. The second response we hope to inspire is the search for group characteristics that are better at predicting the cognitive ability–prejudice association across a heterogeneous sample of groups. Third, the groups with larger residuals (such as Atheists) highlight groups that are not well understood by using perceived ideology and choice and so should direct attention to target groups that are not well understood by existing models.

### Answering Question #2

Our second question asked, “Who shows intergroup bias?” The data suggest that both people relatively low *and* high in cognitive ability show similar levels of intergroup bias, but that these biases are directed toward different groups. This result suggests that there is not necessarily anything unique about the psychological processes of people lower in cognitive ability when predicting prejudice and that a single process may be at

work for people higher and lower in cognitive ability. Less parsimonious interpretations can also be developed. For example, there may be some cognitive processes (e.g., lower perspective taking), motivational styles (e.g., need for closure), or perceptual sensitivities (e.g., threat sensitivity) that lead to prejudice for people lower in cognitive ability, but other process, such as more self-convincing justifications for prejudice (cf. Kahan, 2012), that lead to prejudice for people higher in cognitive ability. Regardless of people's preferred levels of parsimony, a key area of future research will be precisely delineating the mechanism or mechanisms that predict prejudice at both ends of the cognitive ability continuum.

### Links With Existing Research

The results do not negate conclusions from previous research (e.g., Hodson & Busseri, 2012; Onraet et al., 2015), but rather replicate and extend the original findings. The results are supportive of claims that cognitive ability predicts prejudice and that socially conservative views are a mediator—but with the important caveat that the association between low cognitive ability and prejudice is bounded by the type of group.

The recent meta-analysis on the cognitive ability prejudice link concludes, “The present meta-analysis reveals relationships of small-to-moderate strength between (lower) cognitive ability and right-wing ideology and prejudice” (Onraet et al., 2015, p. 20). The present work underscores the necessity to be more specific when drawing such conclusions. Lower cognitive ability *is* associated with prejudice, *but* only toward a specific subset of possible groups in society; toward other groups, the relationship disappears or even reverses itself. Although researchers have been moving toward a broader definition of prejudice that focuses on negative affect (Brandt & Proulx, 2016; Brown, 2010; Crandall, Eshleman, & O'Brien, 2002; Crandall et al., 2013; Stangor, 2009), the present work underscores the necessity to be specific about which groups are the recipients of prejudice from people with lower levels of cognitive ability.

### Conclusion

As additional work further articulates the link between cognitive ability and prejudice, we recommend that researchers attempt to explain prejudice that is expressed toward a large number of groups to see where the models we present make accurate or inaccurate predictions. It will also be generative to include multiple measures of cognitive ability, direct measures of hypothesized cognitive mechanisms (e.g., sensitivity to threat, perspective taking), and longitudinal designs. From our perspective, the work presented here simultaneously confirms past work while expanding on it, showing that the cognitive ability–prejudice association depends on features of the target group, in particular the groups' perceived ideology and level of choice in group membership. Writ large, prejudice does not appear related to cognitive ability.

### Declaration of Conflicting Interests

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

### Funding

The author(s) received no financial support for the research, authorship, and/or publication of this article.

### Supplemental Material

The online data supplements are available at <http://spps.sagepub.com/supplemental>.

### Notes

1. The same meta-analysis (Onraet et al., 2015) did not find that the type of cognitive ability measure was a significant moderator; however, the effect for comprehension knowledge ( $r = -.26$ , 95% CI  $[-.32, -.19]$ ) was approximately 55% larger than the next largest effect of fluid intelligence ( $r = -.15$ , 95% CI  $[-.21, -.08]$ ). Wordsum was classified as a comprehension-knowledge test.
2. For the data and codebooks of the American National Election Studies (ANES) visit <http://www.electionstudies.org/>. For the remaining data and code visit: <https://osf.io/hvs9t/wiki/home/>.
3. The wordsum is not available in any other versions of the ANES. It is available in several waves of the General Social Survey (<http://gss.norc.org/>) but does not include prejudice measures toward heterogeneous targets. This is the only data set to our knowledge that includes both a measure of cognitive ability and measures of prejudice toward heterogeneous targets.
4. A reviewer pointed out that the Internet sample could plausibly cheat on the wordsum, and we further reasoned that testing on the Internet (compared to face-to-face) causes less text anxiety and more freedom to express prejudice (i.e., less desirability concerns). Analyses (see Supplemental Materials) suggest that this is possible and so we adjusted for survey modality.
5. These slopes are statistically significant ( $p < .001$ ), but these  $p$  values cannot be interpreted meaningfully, as the target groups in the measures were picked because of their size, direction, and significance.
6. Although the analyses *without covariates* find that people scoring higher on wordsum express *more* prejudice overall, when conducting the analyses without covariates, the intergroup bias effect was noticeably larger for participants scoring low on wordsum compared to participants scoring high on wordsum (Figures S4C and S7C; both groups showed significant intergroup bias effects).
7. Model 1 :  $y = -0.231279 - 0.000406 \times \text{status} + 0.002804 \times \text{ideology} + 0.001842 \times \text{choice}$ ;  
Model 2 :  $y = -0.392687 - 0.000622 \times \text{status} + 0.00501 \times \text{conventionalism} + 0.002273 \times \text{choice}$
8. Carl (2014) reported a negative wordsum–intolerance association for communists, racists (a person wanted to make a speech in your community claiming that blacks are inferior), and militarists (a person who advocates doing away with elections and letting the military run the country). These latter two estimates appear inconsistent with our model if we assume these groups are conservative. This could be due to measurement differences, but it seems

more likely that these groups are seen as unconventional. Conventionalism was correlated with conservatism, but the correlation was not perfect. The Tea Party, for example, is the 3rd (of 24) most conservative group, but the 14th most conventional. We'd wager that racists and militarists (as described in Carl, 2014's measures) are perceived as more unconventional than the Tea Party.

## References

- Adorno, T. W., Frenkel-Brunswik, E., Levinson, D. J., & Sanford, R. N. (1950). *The authoritarian personality*. New York, NY: Harper-Row.
- Akrami, N., Ekehammar, B., & Bergh, R. (2011). Generalized prejudice: Common and specific components. *Psychological Science, 22*, 57–59.
- Allport, G. W. (1929). The composition of political attitudes. *American Journal of Sociology, 35*, 220–238.
- Allport, G. W. (1954). *The nature of prejudice*. Reading, MA: Addison-Wesley.
- Bartels, L. M. (2006). What's the matter with what's the matter with Kansas? *Quarterly Journal of Political Science, 1*, 201–226.
- Bastian, B., & Haslam, N. (2006). Psychological essentialism and stereotype endorsement. *Journal of Experimental Social Psychology, 42*, 228–235.
- Bobo, L., & Licari, F. C. (1989). Education and political tolerance testing the effects of cognitive sophistication and target group affect. *Public Opinion Quarterly, 53*, 285–308.
- Brandt, M. J., Chambers, J. R., Crawford, J. T., Wetherell, G., & Reyna, C. (2015). Bounded openness: The effect of openness to experience on intolerance is moderated by target group conventionality. *Journal of Personality and Social Psychology, 109*, 549–568.
- Brandt, M. J., & Proulx, T. (2016). Conceptual creep as a human (and scientific) goal. *Psychological Inquiry, 27*, 18–23.
- Brandt, M. J., & Reyna, C. (2014). To love or hate thy neighbor: The role of authoritarianism and traditionalism in explaining the link between fundamentalism and racial prejudice. *Political Psychology, 35*, 207–223.
- Brandt, M. J., & van Tongeren, D. R. (in press). People both high and low on religious fundamentalism are prejudiced towards dissimilar groups. *Journal of Personality and Social Psychology*.
- Brown, R. (2010). *Prejudice: Its social psychology* (2nd ed.). Malden, MA: Wiley-Blackwell.
- Byrne, D. (1969). Attitudes and attraction. *Advances in Experimental Social Psychology, 4*, 35–89.
- Caplan, B., & Miller, S. C. (2010). Intelligence makes people think like economists: Evidence from the general social survey. *Intelligence, 38*, 636–647.
- Carl, N. (2014). Verbal intelligence is correlated with socially and economically liberal beliefs. *Intelligence, 44*, 142–148.
- Chambers, J. R., Schlenker, B. R., & Collisson, B. (2013). Ideology and prejudice: The role of value conflicts. *Psychological Science, 24*, 140–149.
- Crandall, C. S., Eshleman, A., & O'Brien, L. (2002). Social norms and the expression and suppression of prejudice: The struggle for internalization. *Journal of Personality and Social Psychology, 82*, 359–378.
- Crandall, C. S., Ferguson, M. A., & Bahns, A. J. (2013). When we see prejudice: The normative window and social change. In C. Stangor & C. S. Crandall (Eds.), *Frontiers in stereotyping and prejudice* (pp. 53–70). New York, NY: Psychology Press.
- Crawford, J. T. (2014). Ideological symmetries and asymmetries in political intolerance and prejudice toward political activist groups. *Journal of Experimental Social Psychology, 55*, 284–298.
- Deary, I. J., Batty, G. D., & Gale, C. R. (2008). Bright children become enlightened adults. *Psychological Science, 19*, 1–6.
- Dhont, K., & Hodson, G. (2014). Does lower cognitive ability predict greater prejudice? *Current Directions in Psychological Science, 23*, 454–459.
- DiStefano, C., Zhu, M., & Mindrila, D. (2009). Understanding and using factor scores: Considerations for the applied researcher. *Practical Assessment, Research & Evaluation, 14*, 1–11.
- Ekehammar, B., & Akrami, N. (2007). Personality and prejudice: From big five personality factors to facets. *Journal of Personality, 75*, 899–926.
- Fiske, S. T., Cuddy, A. J., Glick, P., & Xu, J. (2002). A model of (often mixed) stereotype content: Competence and warmth respectively follow from perceived status and competition. *Journal of Personality and Social Psychology, 82*, 878–902.
- Gelman, A. (2009). *Red state, blue state, rich state, poor state: Why Americans vote the way they do*. Princeton, NJ: Princeton University Press.
- Gervais, W. M. (2013). In godlessness we distrust: Using social psychology to solve the puzzle of anti-atheist prejudice. *Social and Personality Psychology Compass, 7*, 366–377.
- Gooch, A. (2015). Measurements of cognitive skill by survey mode: Marginal differences and scaling similarities. *Research & Politics, 2*. doi:10.1177/2053168015590681
- Haslam, N., Bastian, B., Bain, P., & Kashima, Y. (2006). Psychological essentialism, implicit theories, and intergroup relations. *Group Processes & Intergroup Relations, 9*, 63–76.
- Haslam, N., & Levy, S. R. (2006). Essentialist beliefs about homosexuality: Structure and implications for prejudice. *Personality and Social Psychology Bulletin, 32*, 471–485.
- Hello, E., Scheepers, P., & Slegers, P. (2006). Why the more educated are less inclined to keep ethnic distance: An empirical test of four explanations. *Ethnic and Racial Studies, 29*, 959–985.
- Herek, G. M., Norton, A. T., Allen, T. J., & Sims, C. L. (2010). Demographic, psychological, and social characteristics of self-identified lesbian, gay, and bisexual adults in a US probability sample. *Sexuality Research and Social Policy, 7*, 176–200.
- Hewstone, M., Rubin, M., & Willis, H. (2002). Intergroup bias. *Annual Review of Psychology, 53*, 575–604.
- Hodson, G., & Busseri, M. A. (2012). Bright minds and dark attitudes: Lower cognitive ability predicts greater prejudice through right-wing ideology and low intergroup contact. *Psychological Science, 23*, 187–195.
- Hodson, G., & Dhont, K. (2015). The person-based nature of prejudice: Individual difference predictors of intergroup negativity. *European Review of Social Psychology, 26*, 1–42.
- Kahan, D. M. (2012). Ideology, motivated reasoning, and cognitive reflection: An experimental study. *Judgment and Decision Making, 8*, 407–424.



- Kan, K.-J., Wicherts, J. M., Dolan, C. V., & van der Maas, H. L. (2013). On the nature and nurture of intelligence and specific cognitive abilities: The more heritable, the more culture dependent. *Psychological Science, 24*, 2420–2428.
- Keiller, S. W. (2010). Abstract reasoning as a predictor of attitudes toward gay men. *Journal of Homosexuality, 57*, 914–927.
- Keller, J. (2005). In genes we trust: The biological component of psychological essentialism and its relationship to mechanisms of motivated social cognition. *Journal of Personality and Social Psychology, 88*, 686–702.
- Levy, S. R., Stroessner, S. J., & Dweck, C. S. (1998). Stereotype formation and endorsement: The role of implicit theories. *Journal of Personality and Social Psychology, 74*, 1421–1436.
- Malhotra, N., Krosnick, J. A., & Haertel, E. (2007). The psychometric properties of the GSS Wordsum vocabulary test. *GSS Methodological Report, 11*. Retrieved from <http://publicdata.norc.umd.edu/gss/documents/MTRT/MR1111%20The%20Psychometric%20Properties%20of%20the%20GSS%20Wordsum%20Vocabulary%20Test.pdf>
- Meeusen, C., de Vroome, T., & Hooghe, M. (2013). How does education have an impact on ethnocentrism? A structural equation analysis of cognitive, occupational status and network mechanisms. *International Journal of Intercultural Relations, 37*, 507–522.
- of Menie, M. A. W., Fernandes, H. B., Figueredo, A. J., & Meisenberg, G. (2015). By their words ye shall know them: Evidence of genetic selection against general intelligence and concurrent environmental enrichment in vocabulary usage since the mid-19th century. *Frontiers in Psychology, 6*. doi:10.3389/fpsyg.2015.00361
- Onraet, E., Van Hiel, A., Dhont, K., Hodson, G., Schittekatte, M., & De Pauw, S. (2015). The association of cognitive ability with right-wing ideological attitudes and prejudice: A meta-analytic review. *European Journal of Personality, 29*, 599–621.
- Roets, A., & Van Hiel, A. (2011). Allport's prejudiced personality today: Need for closure as the motivated cognitive basis of prejudice. *Current Directions in Psychological Science, 20*, 349–354.
- Roivainen, E. (2013). Changes in word usage frequency may hamper intergenerational comparisons of vocabulary skills: An Ngram analysis of wordsum, WAIS, and WISC test items. *Journal of Psychoeducational Assessment, 32*, 83–87.
- Sampson, E. E. (1999). *Dealing with differences: An introduction to the social psychology of prejudice*. Fort Worth, TX: Harcourt.
- Schoon, I., Cheng, H., Gale, C. R., Batty, G. D., & Deary, I. J. (2010). Social status, cognitive ability, and educational attainment as predictors of liberal social attitudes and political trust. *Intelligence, 38*, 144–150.
- Sibley, C. G., & Duckitt, J. (2008). Personality and prejudice: A meta-analysis and theoretical review. *Personality and Social Psychology Review, 12*, 248–279.
- Stangor, C. (2009). The study of stereotyping, prejudice, and discrimination within social psychology: A quick history of theory and research. In T. D. Nelson (Ed.), *Handbook of prejudice, stereotyping, and discrimination* (pp. 1–22). New York, NY: Psychology Press.
- Stülpmagel, R. V., & Steffens, M. C. (2010). Prejudiced or just smart? *Journal of Psychology, 218*, 51–53.
- Thorndike, R. L. (1942). Two screening tests of verbal intelligence. *Journal of Applied Psychology, 26*, 128–135.
- Wolfe, L. M. (1980). The enduring effects of education on verbal skills. *Sociology of Education, 53*, 104–114.
- Wynn, K. (2016). Origins of value conflict: Babies do not agree to disagree. *Trends in Cognitive Sciences, 20*, 3–5.

### Author Biographies

**Mark J. Brandt** is an assistant professor in the Department of Social Psychology at Tilburg University. He tries to understand ideological and moral beliefs—such as political ideology, religious fundamentalism, and moral conviction—and how they structure attitudes and behaviors, how they provide people with meaning, and why people adopt them in the first place.

**Jarret T. Crawford** is an associate professor of psychology at The College of New Jersey. He studies intergroup attitudes and beliefs and political psychology. His recent work examines people's attitudes and behaviors toward ideologically dissimilar others.

Handling Editor: Jesse Graham