Personality and Social Psychology Bulletin
1–21
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DOI: 10.1177/0146167217697695
pspb.sagepub.com
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Cognitive and Interpersonal Features of Intellectual Humility

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Abstract

Four studies examined intellectual humility—the degree to which people recognize that their beliefs might be wrong. Using a new Intellectual Humility (IH) Scale, Study 1 showed that intellectual humility was associated with variables related to openness, curiosity, tolerance of ambiguity, and low dogmatism. Study 2 revealed that participants high in intellectual humility were less certain that their beliefs about religion were correct and judged people less on the basis of their religious opinions. In Study 3, participants high in intellectual humility were less inclined to think that politicians who changed their attitudes were "flip-flopping," and Study 4 showed that people high in intellectual humility were more attuned to the strength of persuasive arguments than those who were low. In addition to extending our understanding of intellectual humility, this research demonstrates that the IH Scale is a valid measure of the degree to which people recognize that their beliefs are fallible.

Keywords

intellectual humility, humility, openness to ideas, arrogance, belief certainty

Received March 15 2016; revision accepted February 10 2017

Much of what people believe to be true is incomplete, biased, or worse, totally incorrect (Gilovich & Griffin, 2010; Hilbert, 2012). Even so, people often have a great deal of confidence in the accuracy of their beliefs, often more than is warranted (Koehler, 1991; Moore & Healy, 2008). Although everyone overestimates the accuracy of their beliefs, people differ in the degree to which they accept that their beliefs and opinions might, in fact, be incorrect or unfounded. As we use the term here, intellectual humility is defined as *recognizing that a particular personal belief may be fallible, accompanied by an appropriate attentiveness to limitations in the evidentiary basis of that belief and to one's own limitations in obtaining and evaluating relevant information*.[1] As conceptualized, intellectual humility is relevant both for questions of fact (e.g., recognizing that one's memory of a past event or understanding of a scientific fact may be incorrect) and matters of opinion (e.g., recognizing that one's political attitudes, religious beliefs, or cultural values may be unfounded).

Although intellectual humility fundamentally reflects people's private assessments of their beliefs, it often manifests through an openness to other people's views and by a lack of rigidity and conceit regarding one's beliefs and opinions. In contrast, low intellectual humility is sometimes manifested by an unfounded insistence that one's own beliefs are correct and a disregard of people who hold different views. Thus, low intellectual humility is not merely a problem for the accuracy of people's beliefs but can also generate interpersonal conflict, strong reactions to differences of opinion, confident decisions based on incorrect information, and an unwillingness to negotiate or compromise. Although philosophers have discussed intellectual humility at length in the context of epistemic virtues (Baehr, 2011; Roberts & Wood, 2003; Whitcomb, Battaly, Baehr, & Howard-Snyder, 2015), the topic has received little attention from behavioral scientists (however, see Deffler, Leary, & Hoyle, 2016; Hopkin, Hoyle, & Toner, 2014; Hoyle, Davisson, Diebels, & Leary, 2016; Krumrei-Mancuso & Rouse, 2015; McElroy et al., 2014; for a review, see Hill & Laney, 2016).

To be useful as a psychological construct, intellectual humility must be distinguished from other reasons that people are and are not open to the possibility that their beliefs and

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attitudes might be wrong. Intellectual humility is related to, but conceptually and empirically distinct from, other constructs that involve a general tendency to be unjustifiably certain of one's beliefs, such as dogmatism, belief superiority, and low openness. Rokeach (1954) conceptualized dogmatism as a closed system of beliefs and disbeliefs that are organized around a central set of convictions about absolute authority that, together, underlie intolerance toward other beliefs and the people who hold them. Of course, people who are high in dogmatism are generally convinced that their beliefs are correct and, thus, low in intellectual humility. However, low intellectual humility does not imply an overarching belief system, nor an authoritarian approach to knowledge. Whereas dogmatic rigidity tends to be tied to specific beliefs, typically with political or religious content, one can manifest low intellectual humility in any domain, even incredibly trivial ones. And, whereas dogmatism involves a disdain for those who have other beliefs, intellectual humility may or may not be related to overt reactions to those who do not share one's views. Thus, although intellectual conceit is an aspect of dogmatism and intellectual humility should correlate negatively with dogmatism, they are not the same.

Intellectual humility is also related to belief superiority, the conviction that one's beliefs or attitudes are better or more correct than other viewpoints (Toner, Leary, Asher, & Jongman-Sereno, 2013). However, belief superiority goes beyond certainty that one's beliefs are correct to the conclusion that one's beliefs are better than all other beliefs. However, people can be reasonably certain of their beliefs or attitudes without necessarily thinking that their views are better than all other beliefs. For example, some open-minded religious individuals are certain their own beliefs are correct yet acknowledge that other belief systems might offer equally valid routes to spiritual insight (Hopkin et al., 2014). Likewise, people may be intellectually humble about beliefs that they think are currently better than alternative beliefs. For example, a physician might believe that his beliefs about treating a particular disease are superior to all alternative treatments (he is high in belief superiority) even while acknowledging that his favored treatment might not ultimately be the best one and being open to changing his beliefs should new evidence arise (he is high in intellectual humility).

Intellectual humility also resembles the trait of openness, but openness is a much broader construct that entails ways in which people approach many aspects of life, including relationships, attitudes, political activity, art, and personal experiences (McCrae & Sutin, 2009). Even so, openness to alternative ideas and values involves intellectual humility, and people who score high in openness tend to be more intellectually humble than people low in openness (Krumrei-Mancuso & Rouse, 2015; McElroy et al., 2014).

Intellectual humility is also distinct from (low) attitude correctness—the degree to which people believe that a particular attitude is correct, valid, or justified (Petrocelli, Tormala, & Rucker, 2007). Not only is attitude correctness an attitude-specific construct that applies to particular attitudes (whereas general intellectual humility is conceptualized here as a dispositional variable), but intellectual humility is relevant to beliefs, positions, perspectives, and viewpoints that do not involve attitudes per se. However, intellectual humility may be related to the degree to which people display attitude correctness with respect to specific attitudes.

Finally, intellectual humility is distinct from simply being uncertain about what one believes. For example, people who lack self-confidence might doubt their beliefs not because they are intellectually humble but rather because they evaluate their knowledge or intellectual ability unfavorably. Intellectual humility can be distinguished from uncertainty or low self-confidence by the degree to which people hold beliefs tentatively specifically because they are aware that the evidence on which those beliefs are based may be limited or flawed, that they lack important information, or that they may not have the expertise to understand or evaluate aspects of the evidence. The definition of intellectual humility presented at the outset of this article explicitly acknowledges this consideration.

The goal of the present research was to examine the cognitive, emotional, motivational, and interpersonal concomitants of high and low intellectual humility. To do so, we first developed a self-report measure of general intellectual humility. We use the modifier "general" to distinguish the tendency to display intellectual humility versus conceit across a wide array of domains and topics from intellectual humility and conceit with respect to specific, circumscribed topics (Hoyle et al., 2016). Even a person who is generally intellectually humble may be conceited with respect to his or her beliefs in a particular domain, such as religion, politics, or sports. Conversely, a person low in intellectual humility who generally believes that his or her beliefs are valid may nonetheless admit epistemic fallibility in certain circumscribed domains. Our interest in this article regards the general tendency to be low or high in intellectual humility, and we deal with domain-specific intellectual humility elsewhere (Hoyle et al., 2016).

Study 1: Scale Development and Personality Correlates

Our first goal was to develop a self-report measure of general intellectual humility with five criteria in mind. We wanted the measure to (a) be unidimensional; (b) be as brief as possible to allow use in contexts in which time is limited; (c) be based on a concrete, consensus conceptualization of intellectual humility (as described in Note 1); (d) assess intellectual humility without reference to particular beliefs or attitude domains; and (e) demonstrate discriminant validity with respect to other constructs that involve open- and closed-mindedness.

The only other validated self-report measure of general intellectual humility is the Comprehensive Intellectual Humility Scale (CIHS; Krumrei-Mancuso & Rouse, 2015),

which consists of 22 items that reflect four subscales—Independence of Intellect and Ego, Openness to Revising One's Viewpoints, Respect for Others' Viewpoints, and Lack of Intellectual Overconfidence.[2] The CIHS correlates appropriately with variables such as openness and dispositional humility, and it shows incremental validity in predicting such variables beyond other relevant constructs. However, because the CIHS assesses four distinct characteristics of intellectually humble people, only two of which are directly related to what we view as core features of intellectual humility, for our purposes, the measure sacrifices fidelity for bandwidth (Ozer & Reise, 1994). Furthermore, the four CIHS subscale factors differentially contribute to the higher order intellectual humility factor and scale score. A confirmatory factor analysis showed that total scores on the CIHS reflect mostly respect for other people's viewpoints (factor loading = .988) and that the factor most central to our conceptualization (labeled "lack of intellectual overconfidence") is least strongly related (factor loading = .259; Krumrei-Mancuso & Rouse, 2015). Because our research goals required a measure that was unidimensional, based on as few items as possible, not conflated with behavioral outcomes of intellectual humility, and consistent with a specific conceptualization of intellectual humility, we developed the measure described here to assess general intellectual humility.

Method

Item selection. To begin, we generated a large number of potential items from which we selected 23 that mapped onto the definition of intellectual humility offered earlier. Three hundred participants (110 men, 190 women), ranging in age from 18 to 71 (M = 30.75, SD = 10.03), were recruited from Amazon's Mechanical Turk (MTurk) to complete this set of items. Based on item analyses, we selected six items that demonstrated high communalities in a factor analysis of the items and represented the breadth of the definition.

The final six-item IH Scale is shown in Table 1. A principal axis factor analysis indicated that the six items loaded on a single factor that explained 54% of the common variance. The eigenvalue for the first factor was 3.20, and the next highest eigenvalue was 0.90. Corrected item-total correlations exceeded .43 for all items, and the highest item-total correlation was for the item that is most central to our conceptualization of intellectual humility—"I accept that my beliefs and attitudes may be wrong." Cronbach's alpha coefficient for the scale was .82, which is exceptional for such a brief measure.[3]

Measures. Two samples recruited from MTurk (*n*s = 202 and 200) completed the IH Scale in addition to measures that are relevant to its convergent and discriminant validity. (A sample size of 200 was more than sufficient to detect significant correlations > .20—the minimum magnitude that would be useful in assessing construct validity at an alpha level of .01.)

Table 1. Intellectual Humility Scale Items and Corrected Item-Total Correlations (Study 1).

	Item-total *r*
I question my own opinions, positions, and viewpoints because they could be wrong.	.49
I reconsider my opinions when presented with new evidence.	.63
I recognize the value in opinions that are different from my own.	.51
I accept that my beliefs and attitudes may be wrong.	.73
In the face of conflicting evidence, I am open to changing my opinions.	.73
I like finding out new information that differs from what I already think is true.	.44

Note. Participants responded to each item on a 5-point scale with endpoints labeled *not at all like me* and *very much like me*.

First, the short form of the Social Desirability Scale (Reynolds, 1982) was administered to ensure that scores are not contaminated by socially desirable responding; this 13-item scale uses a true-false response format. To assess the scale's relationship to the five domain-level personality traits, participants in one sample completed the Big Five Inventory (BFI; 44 items; John, Donahue, & Kentle, 1991), and those in the other sample completed subscales from the NEO Personality Inventory–Revised (NEO-PI-R) that assess three facets of openness reflecting openness to actions, ideas, and values (eight items per subscale; Costa & McCrae, 1992) Items from the BFI and NEO-PI-R were answered on 5-point scales (1 = *strongly disagree*, 5 = *strongly agree*).

Four measures assessed constructs that reflect the tendency to be open- versus closed-minded. Dogmatism, which reflects rigid and unchangeable conviction in one's beliefs, was assessed with both Rokeach's (1960) original Dogmatism Scale (40 items) and Altemeyer's (2002) measure (20 items). These measures operationalize dogmatism rather differently, so much so that questions may be raised regarding whether they assess the same construct. Even so, the item content of both scales is relevant to intellectual humility. Items on both measures were answered on 5-point scales (1 = *strongly disagree*, 5 = *strongly agree*).

The Social Vigilantism Scale (14 items; Saucier & Webster, 2010) assesses the degree to which people indicate that they make an effort to correct other people's "ignorant" beliefs and opinions by propagating their own views (e.g., I feel as if it is my duty to enlighten other people; There are a lot of ignorant people in society). The 5-point response scale ranges from *strongly disagree* to *strongly agree*. The Existential Quest Scale (nine items; Van Pachterbeke, Keller, & Saroglou, 2012) measures the degree to which people are open to questioning and changing their existential beliefs and worldviews (e.g., My attitude toward religion/spirituality is likely to change according to my life experiences; Years

go by but my way of seeing the world doesn't change). Items are answered on 5-point scales where 1 = *not at all true* and 5 = *completely true*.

Three measures assessed characteristics that might predispose people to be particularly high or low in intellectual humility. Need for cognition—the tendency to engage in and enjoy effortful cognitive activities—was measured with the short version of the Need for Cognition Scale (18 items; Cacioppo, Petty, & Kao, 1984). People who enjoy thinking may score higher in intellectual humility because they regard complex or conflicting information as interesting rather than threatening. The response format for the Need for Cognition Scale ranged from 1 (*not at all characteristic of me*) to 5 (*extremely characteristic of me*). Similarly, people who are high in epistemic curiosity—whose desire for knowledge motivates them to pursue new ideas, address holes in their knowledge, and enjoy intellectual problems—should score higher on intellectual humility. The Epistemic Curiosity Scale (10 items, Litman & Spielberger, 2003) includes items, answered on 5-point scales (1 = *strongly disagree*, 5 = *strongly agree*), that assess the degree to which people desire knowledge because they have high intrinsic interest (the Interest subscale) and because they are troubled when they lack information (the Deprivation subscale). Conversely, being unable to tolerate ambiguity may be negatively related to intellectual humility because people who dislike ambiguity are reluctant to revisit decisions that they have made (Furnham & Ribchester, 1995); we used J. G. Martin and Westie's (1959) measure to assess intolerance of ambiguity (eight items; 1 = *strongly agree*, 5 = *strongly agree*; see C. L. Martin & Parker, 1995).

To test whether low intellectual humility is related to self-aggrandizement and arrogance, participants completed the Narcissistic Personality Inventory, choosing between pairs of statements that reflect narcissistic and nonnarcissistic sentiments (25 items; Raskin & Terry, 1988) and the Self-Righteousness Scale (seven items; Falbo & Belk, 1985) on which participants rate their agreement with statements that reflect self-righteousness (1 = *strongly disagree*, 5 = *strongly agree*).

To examine the relationship between intellectual humility and other intellectual virtues (Baehr, 2011), participants rated the extent to which nine qualities, each listed along with its definition, described them. The virtues and their accompanying definitions, adapted from Baehr (2014), were *curiosity* (a disposition to wonder, ponder, and ask why; involves a thirst for understanding and a desire to explore), *intellectual autonomy* (a capacity for active, self-directed thinking; an ability to think and reason for oneself; also involves knowing when to trust and rely on others in a learning context), *attentiveness* (a disposition to stay focused and on task when careful thought is required; zeroes in on important details and nuances of meaning), *intellectual carefulness* (an awareness of and sensitivity to the requirements of good thinking and learning; quick to note and avoid pitfalls and mistakes), *intellectual thoroughness* (a willingness to look for and provide deeper meaning and explanations; discontent with mere appearances or easy answers), *open-mindedness* (an ability to "think outside the box"; gives a fair and honest hearing "to the other side"; involves thinking in creative and original ways), *intellectual courage* (a disposition to persist in thinking, inquiring, discussion, and similar activities despite the presence of some threat or fear, including fear of embarrassment or failure), *intellectual tenacity* (doesn't give up; embraces intellectual challenges and the need for rigorous thought); participants also rated a one-item measure of *intellectual humility* (an awareness of one's own intellectual limits; a lack of concern with intellectual superiority and status). Ratings were on a 5-point scale (1 = *not at all*, 5 = *very much*).

Results and Discussion

To begin, we examined the latent structure of the IH Scale using exploratory and confirmatory factor analysis on the combined data for the two samples (n = 402). A principal axis factoring strongly supported a single-factor model. The first eigenvalue was 2.32 and the second and third eigenvalues were 0.20 and 0.08, respectively. Estimation of a single-factor model using maximum likelihood confirmatory factor analysis produced values of .91 for the comparative fit index (CFI) and .05 for the standardized root mean square residual (SRMR). The SRMR value suggests excellent fit, and the CFI value falls between the traditional cutoff of .90 and more rigorous recommendations of a .95 criterion (Hu & Bentler, 1999). An examination of residuals suggested minor unaccounted-for correlations between three pairs of uniquenesses that could be attributed to similar wording in those items (e.g., from Item 1, "could be wrong"; from Item 4, "may be wrong"). Including any one of these parameters in the model increased the value of CFI to .95. Given the modest values of these extraneous parameters (rs < .30), the impressive value of SRMR, the acceptable value of CFI, and the results of the exploratory factor analysis, we conclude that the IH Scale is unidimensional.

Table 2 provides Cronbach's alpha coefficients, means, and standard deviations for all multi-item measures, along with correlations between each measure and scores on the IH Scale. Given the large number of correlations, only those that are significant at an alpha level of .01 or less are of primary focus.

Intellectual humility scores were not correlated with scores on the brief Social Desirability Scale (r = .03), indicating that the scale is free of contamination by social desirability response bias. Intellectual humility correlated significantly with two of the big five personality domains as measured by the BFI—openness (r = .33) and agreeableness (r = .15). Examining specific facets of openness showed significant correlations between intellectual humility and openness to ideas (r = .40), values (r = .39), and actions (r = .24), as expected.

Scores on the IH Scale correlated negatively with both Rokeach's (1960) and Altemeyer's (2002) dogmatism measures

Table 2. Descriptive Statistics and Correlations with Intellectual Humility (Study 1).

	Sample[a]	α	*M*	*SD*	Correlation with intellectual humility
Intellectual humility	1	.82	3.87	.68	—
Intellectual humility	2	.73	3.85	.59	—
Social desirability	1	.76	1.48	.24	.03
BFI extraversion	2	.90	2.80	.94	−.11
BFI agreeableness	2	.84	3.81	.69	.15*
BFI conscientiousness	2	.87	3.80	.73	.05
BFI neuroticism	2	.91	2.66	.96	−.01
BFI openness	2	.86	3.65	.70	.33**
Openness—ideas	1	.89	3.80	.73	.40**
Openness—values	1	.82	3.90	.73	.39**
Openness—actions	1	.67	3.10	.61	.24**
Dogmatism (Rokeach, 1960)	1	.91	2.79	.56	−.20**
Dogmatism (Altemeyer, 2002)	1	.93	2.25	.71	−.49**
Social vigilantism	1	.86	3.03	.66	.02
Epistemic curiosity—interest	2	.87	4.24	.70	.35**
Epistemic curiosity—deprivation	2	.87	3.48	.84	.27**
Existential quest	1	.82	3.47	.76	.35**
Need for cognition	1	.82	3.38	.62	.34**
Intolerance of ambiguity	1	.83	2.36	.78	−.32**
Narcissism	1	.84	1.33	.20	−.04
Self-righteousness	2	.53	1.21	.34	−.35**

Note. BFI = Big Five Inventory.
[a]Sample 1, $n = 202$; Sample 2, $n = 200$.
*$p < .01$. **$p < .001$.

(*r*s = −.20 and −.49, respectively). These measures of dogmatism are somewhat different in their focus and, in fact, correlated only .55 with one another, which would normally not be considered evidence of convergent validity for two scales that purport to measure the same construct. Even so, both operationalizations of dogmatism would predict negative correlations with intellectual humility, which were obtained. Low intellectual humility appears to be one aspect of dogmatism.

The positive correlation with need for cognition ($r = .34$) supports the idea that people who enjoy thinking expose themselves to more information, which they consider in greater detail. Thinking deeply about the evidentiary basis of one's beliefs may reveal possible shortcomings in the evidence and lead people high in need for cognition to hold their views more tentatively. In addition, people high in need for cognition may find ambiguous and conflicting information to be interesting and take pride in their nuanced understanding of complex issues.

In contrast, the negative correlation with intolerance of ambiguity ($r = -.32$) suggests that people who dislike ambiguity may have difficulty suspending belief in ways that promote intellectual humility; indeed, desiring certainty may be inimical to accepting that one's beliefs are incorrect. Intellectual humility also correlated with both Epistemic Curiosity subscales, indicating that people who are high in intellectual humility may be more curious both because of intrinsic interest ($r = .35$) and because they are troubled by lack of information ($r = .27$).

Given that people who score high in narcissism tend to evaluate their intellectual ability highly (Gabriel, Critelli, & Ee, 1994), one might expect intellectual humility to correlate negatively with narcissism. However, IH scores did not correlate significantly with narcissism ($r = -.04$) although they did correlate with self-righteousness ($r = -.35$). Clearly, narcissistic people are low in general humility, but the relationship between narcissism and intellectual humility is complicated by the fact that, as Tangney (2000) observed, "an absence of narcissism can [not] be equated with the presence of humility" (p. 75). Consistent with our results, Landrum (2011) also found no correlation between a self-report measure of general humility and narcissism. In contrast, the items on the Self-Righteousness Scale (Falbo & Belk, 1985) focus on believing that one's beliefs and ideas are correct and useful (e.g., I can benefit other people by telling them the right way to live). Thus, intellectual humility appears to be negatively related to arrogance about one's beliefs but not necessarily to general arrogance about oneself.

The lack of a correlation with social vigilantism (Saucier & Webster, 2010) was surprising given that social vigilantism might seem to involve low intellectual humility combined with the conviction that one should correct other people's incorrect opinions. Apparently, the primary

Table 3. Correlations With Intellectual Virtues (Study 1).

Intellectual virtues	Intellectual humility	Partialing IH item
Intellectual humility	.37**	—
Open-mindedness	.43**	.35**
Curiosity	.27**	.24**
Autonomy	.31**	.24**
Attentiveness	.20**	.19*
Carefulness	.24**	.17*
Thoroughness	.27**	.23**
Courage	.30**	.24**
Tenacity	.23**	.20*

Note. IH = intellectual humility.
*$p < .01$. **$p < .001$.

characteristics that distinguish people who score high in social vigilantism are a misanthropic view of other people's stupidity and the motive to correct others' beliefs rather than low intellectual humility per se; people who are low in intellectual humility do not appear compelled to rectify others' erroneous beliefs. In contrast, the correlation between intellectual humility and scores on the Existential Quest Scale ($r = .35$) was consistent with expectations.

Table 3 shows zero-order correlations between scores on the IH Scale and the one-item ratings of the nine intellectual virtues, as well as partial correlations between IH scores and the virtues with the one-item rating of intellectual humility partialed out. Scores on the IH Scale not only correlated most highly with participants' ratings of their intellectual humility and open-mindedness but also correlated with the other intellectual virtues, albeit more weakly.

In brief, Study 1 generally confirmed our hypotheses about the personological correlates of intellectual humility and supported the construct validity of the IH Scale as a measure of the degree to which people recognize that their beliefs may be incorrect. As expected, intellectual humility correlated positively with openness, epistemic curiosity, existential quest, and need for cognition, and negatively with dogmatism, intolerance of ambiguity, and self-righteousness. Neither narcissism nor social vigilantism correlated with intellectual humility.

Study 2: Reactions to Positions and People With Whom One Disagrees

Having demonstrated that scores on the IH Scale correlate as expected with a broad array of psychological constructs, three experiments were conducted to explore the psychological concomitants of intellectual humility. Study 2 examined how intellectual humility relates to people's reactions to viewpoints with which they disagree and to people who espouse such views.

Compared with people who are low in intellectual humility, people who are high in intellectual humility should be more willing to entertain beliefs that differ from their own, and they should also judge people whose views differ from theirs less negatively. In contrast, low intellectual humility may be accompanied by an insistence that one's own views are correct and by a disregard for people who hold different beliefs. We also predicted that people who are high in intellectual humility should prefer balanced perspectives that acknowledge both sides of a position more than people who are low in intellectual humility. Although they have their own preferred beliefs and attitudes, intellectually humble people should recognize that few issues are black-and-white and that reasonable arguments can be made on both sides of many debates.

To test these hypotheses, Study 2 examined how people who are low versus high in intellectual humility react to beliefs about religion with which they disagree. After completing a measure of religiosity, participants read an essay that expressed attitudes in favor of religion, opposed to religion, or was balanced in offering both proreligion and antireligion sentiments. They then rated their reactions to the essay and the person who wrote it.

Method

Participants. One hundred eighty-eight participants (94 men, 94 women) were recruited by Qualtrics Panels, a national survey company that recruits respondents with particular demographic characteristics for online studies. To obtain variability in religiosity, the sample was selected to include people who identified as religious ($n = 94$) and not religious ($n = 94$) in response to the question, "Do you consider yourself to be a religious person?" (*yes, no*). Most of the sample identified their religious affiliation as Christian ($n = 125$); atheist, agnostic, or none ($n = 39$); or Jewish ($n = 14$), with smaller numbers indicating Muslim ($n = 2$), Buddhist ($n = 2$), and other ($n = 6$). (There were no Hindu or Pagan/Wiccan participants.) The majority of the participants were White ($n = 167$), with smaller numbers indicating that they were Black or African American ($n = 13$), American Indian or Alaska Native ($n = 5$), or Asian ($n = 4$). Participants received US$2.00 for their participation.

Procedure. Participants completed the IH Scale and the Duke University religion index (DUREL), a five-item measure of religiosity that was developed for use in large cross-sectional and longitudinal studies (Koenig & Büssing, 2010). The DUREL assesses three primary dimensions of religiosity: organizational religious activity (attending church or other religious meetings), nonorganizational religious activity (prayer, meditation, or studying religious texts), and intrinsic religiosity (being guided by one's religion in daily life). Participants also rated how much more correct their views about religion are than other views (1 = *no more correct than other viewpoints*, 5 = *totally correct, mine is the only correct view*).

Participants were randomly assigned to read one of three essays that dealt with the effects of religion on individuals and society. Participants in the *proreligion condition* read an essay that described positive effects of religion, including giving people hope and meaning, providing fundamental truths about human existence, helping people think about the big questions of life, leading people to treat others with kindness and compassion, and fighting discrimination and oppression. Participants in the *antireligion condition* read an essay arguing that religion has many negative effects such as giving people unrealistic hope, promoting myths about human existence as if they were true, discouraging people from thinking deeply about the big questions of life, leading people to judge and condemn others who do not share their views, and promoting discrimination and oppression. The pro- and antireligion essays were matched in length and in the issues that they raised to support their claims, with the proreligion essay pointing to positive effects and the antireligion essay pointing to negative effects on the same dimensions. In a third, *balanced* condition, participants read an essay that offered a balanced analysis of the beneficial and detrimental effects of religion by combining the major points from the proreligion and antireligion essays. By necessity, the balanced essay was longer than the other two.

Participants rated the degree to which they agreed or disagreed with the writer's views about religion (1 = *strongly disagree*, 7 = *strongly agree*), the accuracy of the beliefs that were expressed (1 = *not at all*, 5 = *extremely*), and how they felt while reading the essay on the adjectives, calm, tense, irritated, frustrated, defensive, annoyed, content, satisfied, angry, fed up, happy, and sad (1 = *not at all*, 5 = *extremely*). They also rated their impression of the essay's writer on nine 7-point bipolar scales: Unintelligent-Intelligent, Warm-Cold, Competent-Incompetent, Immoral-Moral, Ethical-Unethical, Informed-Uninformed, Caring-Uncaring, Honest-Dishonest, and Likable-Unlikable. Finally, participants answered the question, "In your view, does religion (in general) have mostly positive or negative effects on society?" by selecting one of seven responses (1 = *all of religion's effects are negative*, 4 = *religion's effects are equally positive and negative*, 7 = *all of religion's effects are positive*) and indicated how certain they were that their personal views about religion are correct (1 = *not at all*, 6 = *totally certain*).

Results

Cronbach's alpha coefficient was .87 for the IH Scale and .89 for the DUREL measure of religiosity. DUREL scores ranged from 5 to 27 (possible range = 5-30), with a mean of 15.5 (*SD* = 6.69), and the median also fell between 15 and 16. Thus, as hoped, our participants displayed considerable heterogeneity in religiosity. Intellectual humility and religiosity were uncorrelated ($r = -.06$), and no hint of a curvilinear relationship was observed. As expected, intellectual humility correlated with the degree to which participants indicated that their views about religion were more correct than other views ($r = -.21$, $p = .004$).

Multiple regression analyses were conducted in which intellectual humility scores (mean-centered), religiosity scores (mean-centered), essay condition (proreligion, antireligion, balanced; dummy coded), and all two- and three-way interactions were used as predictors. Each effect was tested while controlling for effects of equal and lower order.

Agreement and accuracy. Overall, intellectual humility was associated with greater agreement with the essay's expressed attitude about religion, $b = .064$, 95% confidence interval (CI) = [.004, .124], $t(186) = 2.10$, $p = .037$, $sr^2 = .022$. This effect was obtained with religiosity controlled and was not qualified by an interaction with essay condition, suggesting that participants who were high in intellectual humility agreed more with all three perspectives than participants low in intellectual humility.

Intellectual humility also predicted participants' ratings of the accuracy of the beliefs expressed in the essay without respect to which essay they read, again showing that people high in intellectual humility are more inclined to view others' beliefs charitably than people low in intellectual humility, $b = .037$, 95% CI = [.003, .072], $t(186) = 2.14$, $p = .034$, $sr^2 = .024$. However, this effect was qualified by an interaction of intellectual humility and essay condition, $F(2, 178) = 3.23$, $p = .042$, $\Delta R^2 = .026$. Probing the interaction in Figure 1 revealed that the simple slopes for intellectual humility were significantly positive in the antireligion condition, $b = .065$, 95% CI = [.017, .112], $t(178) = 2.67$, $p = .008$, and the balanced condition, $b = .09$, 95% CI = [.03, .15], $t(178) = 2.99$, $p = .003$, but not in the proreligion condition, $b = -.007$, 95% CI = [−.062, .047], $t(178) = -0.26$, $p = .79$. Thus, intellectual humility was associated with higher ratings of the accuracy of the antireligious and balanced essays, and the highest accuracy ratings were among intellectually humble participants who read the balanced essay.

Ratings of the person. Three composite scores were calculated for ratings of the essay writer's competence (competent, intelligent, informed; $\alpha = .83$), warmth (caring, likable, genuine; $\alpha = .86$), and ethics (ethical, moral, dishonest; $\alpha = .86$). The interaction of intellectual humility and condition was significant for all three ratings: competence, $F(2, 178) = 3.00$, $p = .050$, $\Delta R^2 = .02$; warmth, $F(2, 178) = 3.18$, $p = .040$, $\Delta R^2 = .02$; and ethics, $F(2, 178) = 6.63$, $p = .002$, $\Delta R^2 = .05$. As seen in Figures 2 to 4, the patterns were similar across the three ratings.

Overall, participants rated the writer of the antireligion essay lowest on all three attributes. Yet, participants who were higher in intellectual humility consistently rated the antireligious writer more favorably than did participants who were low in intellectual humility. Among participants who read the antireligion essay, the simple slope for intellectual humility was significant for ratings of competence, $b = .32$,

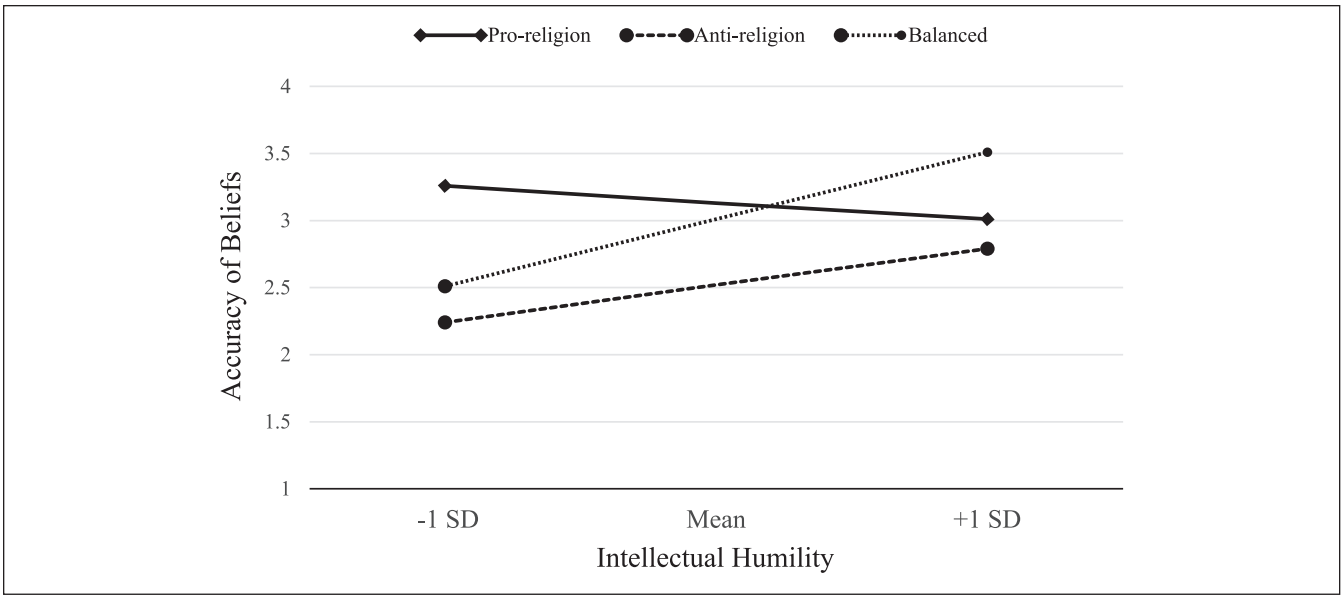

Figure 1. Ratings of accuracy of beliefs (Study 2).

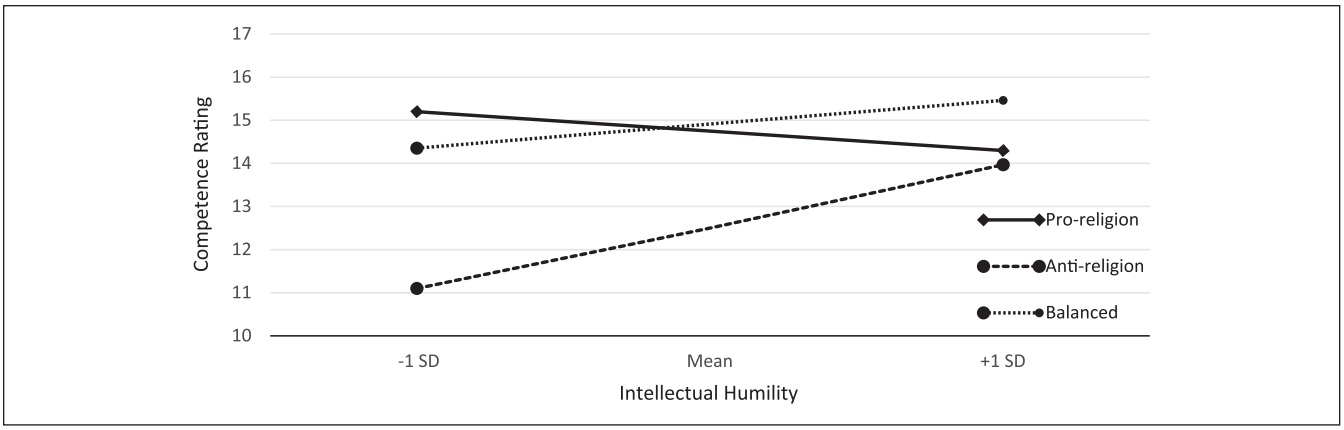

Figure 2. Ratings of the essay writer (Study 2): Ratings of competence.
Note. Simple effects tests between pairs of essay conditions. At low IH (−1 *SD*): proreligion vs. antireligion, $b = -4.08$, $t(119) = -3.52$, $p = .0006$; proreligion vs. balanced, $b = -.72$, $t(122) = -1.39$, $p = .17$; antireligion vs. balanced, $b = 3.43$, $t(120) = 3.05$, $p = .0008$. At high IH (+1 *SD*): proreligion vs. antireligion, $b = -.35$, $t(119) = -.30$, $p = .77$; proreligion vs. balanced, $b = .72$, $t(122) = 1.39$, $p = .17$; antireligion vs. balanced, $b = 1.39$, $t(120) = 1.39$, $p = .17$. IH = intellectual humility.

95% CI = [.15, .50], $t(178) = 3.36$, $p < .001$, ethics, $b = .36$, 95% CI = [.20, .52], $t(178) = 4.46$, $p < .001$, and warmth, $b = .23$, 95% CI = [.05, .38], $t(178) = 2.55$, $p = .01$. Intellectual humility was not significantly related to ratings of competence, ethics, or warmth in either the proreligion or balanced conditions, all ps > .10.

Furthermore, as shown in Figures 2 to 4, participants who were low in intellectual humility rated the writers of the three essays differently, whereas participants high in intellectual humility generally did not. (Tests of the simple effects of essay condition for low vs. high IH participants are presented in Figures 2 to 4.) In particular, participants low in intellectual humility consistently derogated writers who expressed antireligious sentiments relative to writers of proreligion and balanced essays and relative to participants high in intellectual humility.

Affect. A factor analysis of the emotion ratings revealed two factors, which reflected positive affect (calm, content, satisfied, happy) and negative affect (tense, irritated, frustrated, defensive, annoyed, angry, fed up, sad). For positive affect, a significant interaction of intellectual humility and condition was obtained, $F(2, 178) = 2.98$, $p = .053$, $\Delta R^2 = .028$. Whereas intellectual humility significantly predicted positive affect when the essay offered a balanced perspective, $b = .33$, 95% CI = [.06, .61], $t(178) = 2.37$, $p = .019$, it was unrelated to

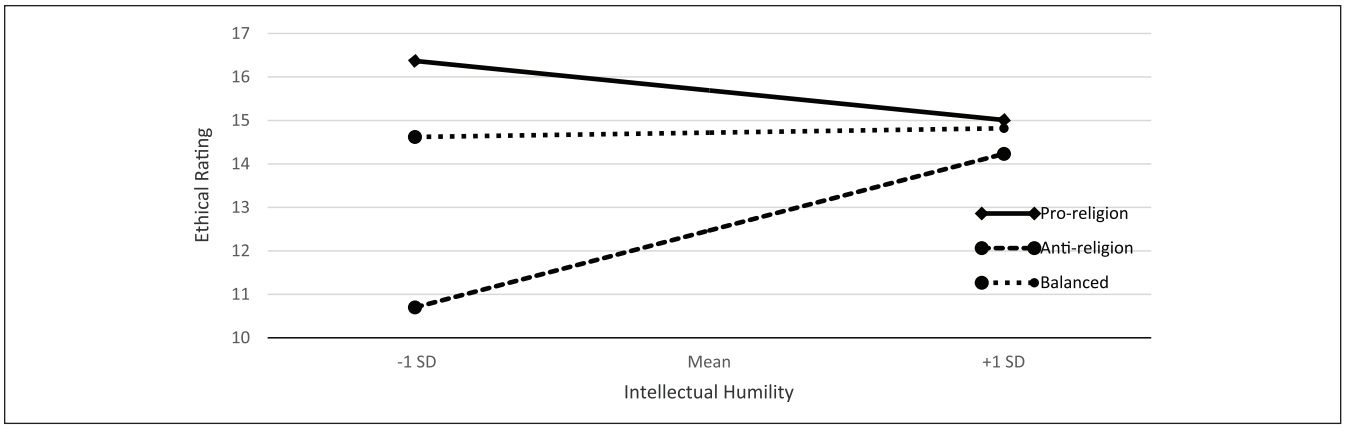

Figure 3. Ratings of the essay writer (Study 2): Ratings of ethics.
Note. Simple effects tests between pairs of essay conditions. At low IH (−1 *SD*): proreligion vs. antireligion, $b = -5.58$, $t(119) = -5.40$, $p < .0001$; proreligion vs. balanced, $b = -1.10$, $t(122) = -2.35$, $p = .02$; antireligion vs. balanced, $b = 3.92$, $t(120) = 4.51$, $p < .0001$. At high IH (+1 *SD*): proreligion vs. antireligion, $b = -.86$, $t(119) = -.82$, $p = .41$; proreligion vs. balanced, $b = .02$, $t(122) = .04$, $p = .97$; antireligion vs. balanced, $b = .60$, $t(120) = .67$, $p = .49$. IH = intellectual humility.

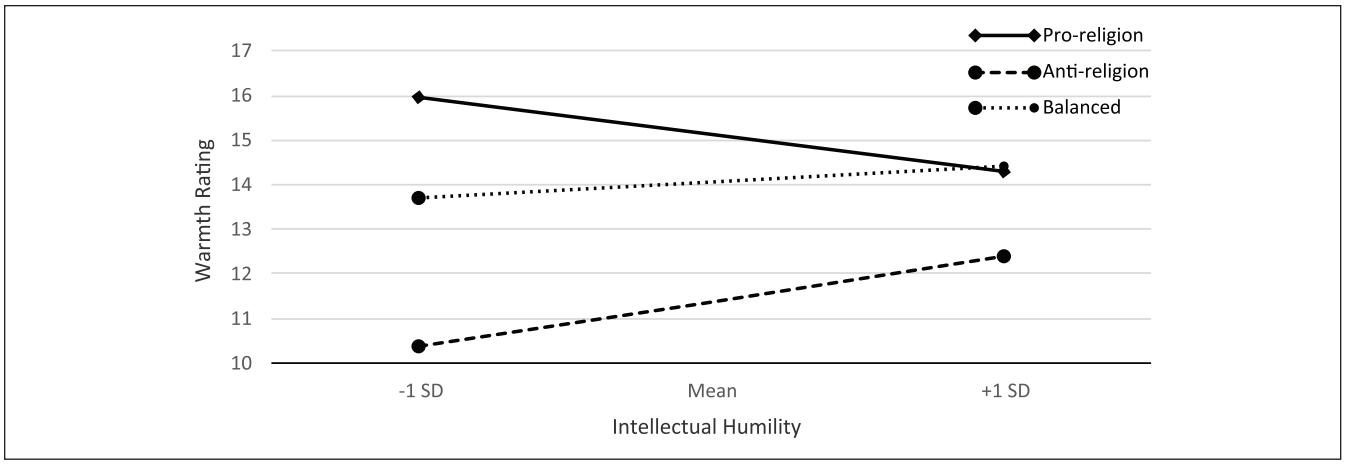

Figure 4. Ratings of the essay writer (Study 2): Ratings of warmth.
Note. Simple effects tests between pairs of essay conditions. At low IH (−1 *SD*): proreligion vs. antireligion, $b = -5.47$, $t(119) = -5.03$, $p < .0001$; proreligion vs. balanced, $b = -1.36$, $t(122) = -2.86$, $p = .006$; antireligion vs. balanced, $b = 3.37$, $t(120) = 3.68$, $p = .0004$. At high IH (+1 *SD*): proreligion vs. antireligion, $b = -1.98$, $t(119) = -1.81$, $p = .07$; proreligion vs. balanced, $b = .15$, $t(122) = .31$, $p = .76$; antireligion vs. balanced, $b = 2.02$, $t(120) = 2.20$, $p = .03$. IH = intellectual humility.

positive affect in the proreligion condition, $b = -.11$, 95% CI = [−.37, .14], $t(178) = -88$, $p = .38$, and antireligion condition, $b = .18$, 95% CI = [−.04, .41], $t(178) = 1.65$, $p = .10$.

Attitude extremity. IH scores did not predict answers to the question, "In your view, does religion (in general) have mostly positive or negative effects on society?" $b = .007$, 95% CI = [−.02, .04], $t(178) = .40$, $p = .69$. To test the hypothesis that people who are high in intellectual humility tend to hold less extreme positions than those who are low, responses to this question were recoded to a 4-point scale such that more extreme responses in either a positive or negative direction received higher scores. Specifically, ratings of 1 and 7 were recoded as 3, ratings of 2 and 6 were recoded as 2, ratings of 3 and 5 were recoded as 1, and ratings of 4 (*religion's effects are equally positive and negative*) were recoded as 0. Although intellectual humility did not predict the valence of participants' attitudes toward religion, it significantly predicted less extreme responses, $b = -.046$, 95% CI = [−.07, −.02], $t(185) = -3.24$, $p = .001$, $sr^2 = .05$.

Certainty. Not surprisingly, participants scoring higher in religiosity were more certain that their views about religion were totally correct, $b = .11$, 95% CI = [.079, .135], $t(184) = 7.50$, $p < .001$, $sr^2 = .22$, and participants who scored low on the IH Scale expressed greater certainty in their views than those who scored higher, $b = -.07$, 95% CI = [−.11, −.03], $t(184) = -3.68$, $p < .001$, $sr^2 = .052$. In addition, these two main effects were qualified by an interaction of intellectual humility and religiosity, $b = -.006$, 95% CI = [−.011, −.001],

$t(181) = 2.25$, $p = .025$, $sr^2 = .02$. This interaction showed that intellectual humility was inversely related to certainty among participants who were high (+ 1 *SD*) in religiosity, $b = -.11$, 95% CI = [−.19, −.03], $t(183) = -4.36$, $p < .0001$, but among those low in religiosity, intellectual humility and certainty were not related, $b = -.03$, 95% CI = [−.12, .05], $t(181) = -.73$, $p = .47$.

Discussion

Study 2 provides five primary insights into the psychological dynamics of intellectual humility. First, intellectual humility was inversely related to participants' certainty that their religious views are correct and to the degree to which they believed that their views are superior to alternative viewpoints. Although ratings of certainty and belief superiority were correlated ($r = .60$), they involve somewhat different aspects of people's epistemic stances. People who are high in intellectual humility are both less certain that their views are correct as well as less inclined to think that their views are better than other views.

Second, participants higher in intellectual humility rated the beliefs expressed in the antireligion and balanced essays as more accurate than participants lower in intellectual humility did. We suspect that this effect was obtained only for the antireligion and balanced essays because participants were less likely to share those views than the view that religion has mostly positive effects. Whereas 23% of the participants disagreed with the proreligion essay, 51% disagreed with the antireligion essay; even self-reported "nonreligious" participants tended to disagree with the notion that religion has mostly undesirable effects. Obviously, intellectual humility is less relevant the more one agrees with the position at hand, and most participants agreed that religion has positive effects, irrespective of their level of intellectual humility. However, humble participants were more receptive to the essays that expressed less positive views.

Third, participants who were high in intellectual humility preferred balanced perspectives as opposed to arguments that were one-sided. Not only did they rate essays that acknowledged both sides of the issue as more accurate than participants who were low in intellectual humility, but they also reported higher positive affect after reading the balanced essay.

Fourth, ratings of the essay writer differed less across conditions among participants who were higher in intellectual humility. Although the effect was strongest for ratings of the writer's ethics, morality, and honesty, the pattern was obtained for ratings of competence and warmth as well. Apparently, people higher in intellectual humility are less inclined to judge people based on the views they express.

Finally, intellectual humility was inversely related to the extremity of participants' views about religion. People who recognize that their beliefs are fallible may maintain less extreme positions both because they realize that most issues are not incontrovertible and because they believe that extreme positions are, in general, less likely to be correct than moderate positions.

Study 3: Reactions to People Who Change Their Attitudes

People high in intellectual humility are open to the possibility that their beliefs are incorrect and, thus, acknowledge that their views might change in the light of new evidence or arguments. Given their openness to changing their own beliefs and attitudes as needed, we predicted that people high in intellectual humility believe that other discerning people should change their views from time to time and thus evaluate people who change their beliefs more positively than those low in intellectual humility do.

Study 3 tested this hypothesis in the context of evaluations of a political candidate who changed his position on an important issue. Accusations of "flip-flopping" are often levied against politicians who change their positions, typically with the implication that the change reflects an effort to garner votes rather than genuine attitude conversion based on new information or reconsideration of the evidence (Tomz & Van Houweling, 2016). Although voters are often justified in their skepticism of politicians who change their views, people high in intellectual humility should be more open to the possibility that such changes reflect a reasoned decision rather than pandering to the electorate.

Method

Participants. Two hundred five adults (102 male, 103 female), ranging in age from 19 to 79 ($M = 51.93$, $SD = 13.16$), were recruited by Qualtrics Panels. The sample was selected to include roughly equal numbers of people who identified themselves as Democrats ($n = 71$), Republicans ($n = 67$), and Independents ($n = 67$) based on answers to the question, "With which political party do you most closely identify?" The majority of the participants identified themselves as White ($n = 178$), with smaller numbers of respondents indicating that they were Black or African American ($n = 16$), American Indian or Alaska Native ($n = 6$), or Asian ($n = 5$). Participants received US$2.00 for their participation.

Procedure. Participants provided demographic information, reported their political affiliation, and completed the IH Scale. They then read about a political candidate for Congress who previously supported a particular position on the environment but who now supports the opposite view. (Neither the particular environmental issue nor the candidate's position was specified.) The scenario elaborated that

> When asked about this change, the candidate explained that he has learned more about the issue in the past few years, which showed him that his earlier position was wrong. But his opponent accuses the candidate of "flip-flopping" just to get elected.

For half of the participants (randomly assigned), the candidate was described as a Republican, and for half, he was described as a Democrat.

Participants rated the candidate on nine 7-point bipolar adjectives: unintelligent-intelligent, warm-cold, competent-incompetent, immoral-moral, ethical-unethical, informed-uninformed, caring-uncaring, honest-dishonest, and likable-unlikable. They then indicated whether the fact that the candidate changed his mind about this issue made them more likely or less likely to vote for him (1 = *much less likely to vote for him*, 4 = *no effect*, 7 = *much more likely to vote for him*). Finally, participants were asked whether they thought that the candidate was "flip-flopping on the issue just to get elected" (1 = *absolutely not flip-flopping*, 2 = *probably not flip-flopping*, 3 = *I don't know*, 4 = *probably flip-flopping*, 5 = *absolutely flip-flopping*).

Results

Cronbach's alpha coefficient for the IH Scale was .82. An analysis of variance revealed that intellectual humility scores did not differ among Republicans, Democrats, and Independents, $F(2, 201) = .09$, $p = .91$. Multiple regression analyses were conducted in which intellectual humility scores (mean-centered), self-reported political affiliation (Republican, Democrat, Independent; dummy coded), candidate party (Republican, Democrat; dummy coded), and all two- and three-way interactions were used as predictors. Each effect was tested while controlling for effects of equal and lower order.

Voting and ascriptions of flip-flopping. Consistent with expectations, participants who were high in intellectual humility indicated that they were more likely to vote for a candidate who had changed his position than participants who were low in intellectual humility, $b = .32$, 95% CI = [.04, .60], $F(1, 199) = 5.10$, $p = .025$, $sr^2 = .024$. This effect was qualified by a significant interaction of intellectual humility and participants' own political affiliation as shown in Figure 5, $F(2, 197) = 4.96$, $p = .008$, $\Delta R^2 = .046$. Tests of simple slopes showed that the relationship between intellectual humility and the likelihood of voting for the candidate was significant for participants who identified themselves as Republicans, $b = 1.26$, 95% CI = [.61, 1.90], $t(194) = 3.82$, $p = .0002$, but was not significant for Democrats, $b = .19$, 95% CI = [−.26, .65], $t(194) = .85$, $p = .40$, or Independents, $b = .14$, 95% CI = [−.43, .71], $t(194) = .49$, $p = .62$.

A significant intellectual humility by political affiliation interaction was also obtained on the question asking whether participants thought that the candidate was flip-flopping on the issue to get elected, $F(2, 194) = 6.08$, $p = .003$, $\Delta R^2 = .057$ (see Figure 6). The simple slopes for the relationship between intellectual humility and ratings of flip-flopping were significant for Republicans, $b = -.66$, 95% CI = [−1.13, −.18], $t(194) = 2.73$, $p = .007$, but not for Democrats, $b = .25$, 95% CI = [−.07, .59], $t(194) = 1.54$, $p = .13$, or Independents, $b = .11$, 95% CI = [−.31, .52], $t(194) = 0.52$, $p = .60$. Among Republicans, higher intellectual humility was associated with lower attributions of flip-flopping.

Ratings of the candidate. Three composite scores were calculated by averaging ratings for competence (intelligent, competent, informed), ethics (ethical, moral, honest), and warmth (likeable, caring, genuine). Hierarchical regression analyses revealed that intellectual humility predicted ratings of the candidate's competence across conditions, $b = .31$, 95% CI = [.03, .58], $t(200) = 2.21$, $p = .028$, $R^2 = .024$. A political affiliation by candidate affiliation interaction was also obtained,

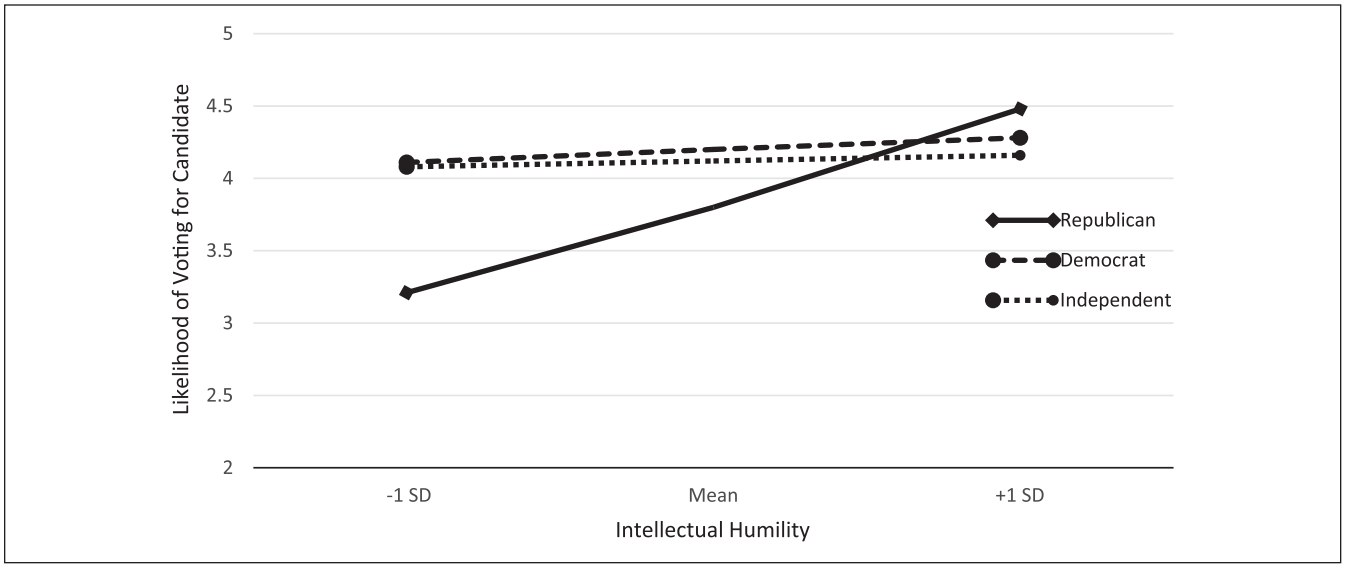

Figure 5. Likelihood of voting for candidate who changed position (Study 3).

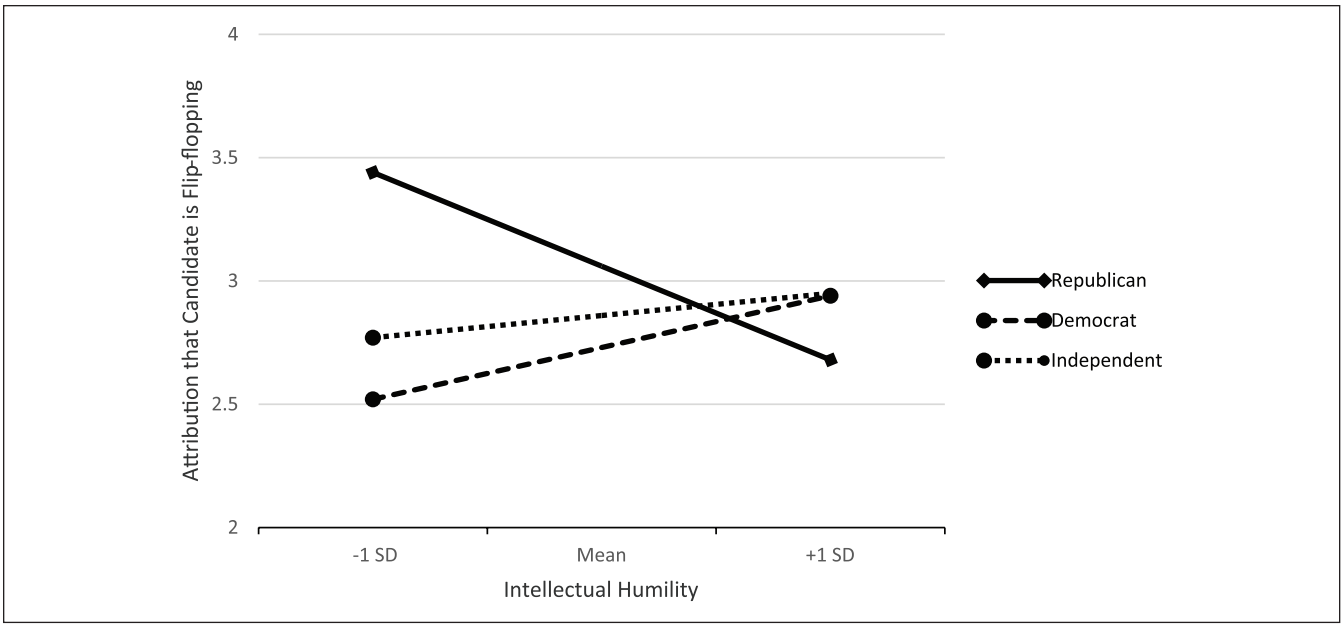

Figure 6. Attribution of flip-flopping (Study 3).

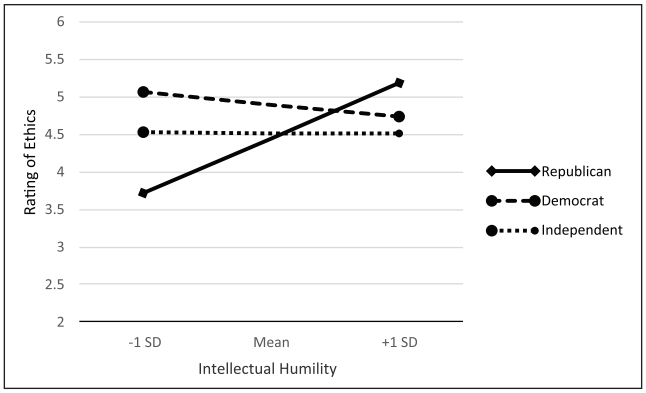

Figure 7. Ratings of the candidate's ethics (Study 3).

$F(2, 197) = 3.67$, $p = .027$, $\Delta R^2 = .035$. Not surprisingly, Republicans rated Republican candidates who changed their position as more competent ($M = 5.23$, $SD = 1.08$) than Democrats who changed their position ($M = 4.56$, $SD = 1.36$), whereas Democrats rated position-changing Democrats ($M = 5.28$, $SD = 1.36$) more highly than Republicans who changed their position ($M = 4.75$, $SD = 1.27$), $ps < .05$.

Ratings of the candidate's ethics revealed an intellectual humility by political affiliation interaction, $F(2, 194) = 8.43$, $p < .001$, $sr^2 = .074$. As seen in Figure 7, intellectual humility was positively related to ratings of the candidate's ethics among Republicans, $b = 1.14$, 95% CI = [.54, 1.73], $t(194) = 3.74$, $p = .0002$. However, tests of simple slopes did not approach significance for either Democrats, $b = -0.20$, 95% CI = [−.62, .22], $t(194) = -.92$, $p = .36$, or Independents, $b = -.08$, 95% CI = [−.60, .22], $t(194) = -.29$, $p = .77$.

The effect for ratings of the candidate's warmth was virtually identical to that for ethics. Examination of the intellectual humility by political affiliation interaction, $F(2, 194) = 6.18$, $p < .001$, $sr^2 = .057$, showed that intellectual humility positively predicted ratings of warmth among participants who identified themselves as Republican, $b = 1.11$, 95% CI = [.44, 1.77], $t(194) = 3.27$, $p = .001$. However, intellectual humility was not related to ratings of warmth among Democrats, $b = -0.16$, 95% CI = [−.66, .27], $t(194) = -.85$, $p = .41$, or Independents, $b = -.02$, 95% CI = [−.59, .61], $t(194) = -.08$, $p = .94$.

Discussion

The results of Study 3 showed that intellectual humility was associated with a greater willingness to believe and vote for a candidate who changed his position on an issue. Being open to the possibility of changing their own beliefs, people higher in intellectual humility view such behaviors more positively when observed in others.

Interestingly, however, the effect was obtained only for participants who identified themselves as Republicans even though intellectual humility scores did not differ among Republicans, Democrats, and Independents. One explanation for this pattern is that Republicans tend to react especially negatively to candidates who change their positions. Not only is conservative ideology, by definition, less accepting of change than liberal ideology (Jost, Glaser, Kruglanski, & Sulloway, 2003), but conservatives appear to prefer candidates who are less open and more forceful than liberals (Caprara & Zimbardo, 2004; Roets & Van Hiel, 2009). In addition, compared with Democrats, Republicans report that changing one's position over time is a more undesirable characteristic for a candidate (Carroll, 2007), and ancillary analyses of our data showed that Republicans indicated that they were marginally less likely to vote for a candidate who changed his mind than

Democrats (*M*s = 3.8 and 4.2 for Republicans and Democrats, respectively, $p = .10$). Furthermore, ratings of whether the candidate was flip-flopping correlated more highly with negative evaluations of the candidate's ethics and warmth among Republicans (*r*s = −.74 and −.76 for ethics and warmth, respectively) than among Democrats (*r*s = −.47 and −.53) or Independents (*r*s = −.40 and −.42), all *p*s < .01. Against this general backdrop of disdain for candidates who change their positions, only Republicans who scored high in intellectual humility viewed the candidate's change of position as not likely to reflect flip-flopping, regarded him as more ethical and warm, and were more willing to vote for him. The fact that intellectual humility related to reactions to the candidate differently among participants with different political leanings suggests that the effects of intellectual humility can be moderated by other aspects of people's personalities and beliefs that deserve additional attention.

Study 4: Distinguishing Strong From Weak Arguments

According to our conceptualization, people who are high in intellectual humility not only recognize that their personal beliefs may be incorrect but are also attentive to the quality of the evidence on which their beliefs are based. Knowing that their beliefs are fallible, intellectually humble people should pay greater attention to evidence that bears on their beliefs than people who are low in intellectual humility. Attending to the strength of evidence should lead people who are high in intellectual humility to maintain more accurate views and to correct beliefs that might be based on insufficient or incorrect evidence.

To test the hypothesis that individual differences in intellectual humility moderate the degree to which people distinguish strong from weak evidence, Study 4 relied upon a method that has been employed in research on people's sensitivity to the quality of persuasive arguments. In this paradigm, which has often been used to study the elaboration likelihood model (ELM; Petty & Cacioppo, 1986), participants are presented with strong or weak arguments in favor of a particular position and their reactions assessed. Because many of the topics that have been used in previous studies of college students—such as arguments for raising tuition at the participant's university or instituting comprehensive exams—were not relevant to our sample of adults, we based our procedure on a study by Updegraff, Sherman, Luyster, and Mann (2007) that examined reactions to an essay that advocated dental flossing. One version of this essay offered strong, scientific arguments for flossing, whereas the other version offered weak, anecdotal, and vacuous arguments. Our central hypothesis was that participants high in intellectual humility would distinguish strong from weak arguments for flossing more clearly than participants low in intellectual humility.

However, we reasoned that this difference should be more pronounced among people who floss rarely, if at all, than among those who floss regularly. Presumably, people who floss regularly believe that flossing is beneficial and, thus, are unlikely to attend as carefully to the quality of the arguments offered in favor of flossing. In the language of the ELM, they should be less motivated to elaborate on arguments in favor of flossing than people who do not floss because proflossing arguments are less personally relevant to them (Petty & Cacioppo, 1979).

A secondary goal of Study 4 was to examine the discriminant validity of intellectual humility vis-à-vis need for cognitive closure—the degree to which people desire definitive answers to questions and decisions as opposed to uncertainty or ambiguity (Kruglanski & Webster, 1996). Because people who dislike ambiguity are reluctant to revisit decisions that they have made (Frenkel-Brunswick, 1949; Furnham & Ribchester, 1995), being unable to tolerate ambiguity may lead people to cling to their existing beliefs and choices, manifesting as low intellectual humility. Indeed, Study 1 showed that intellectual humility correlated negatively ($r = -.32$) with intolerance of ambiguity. Thus, need for cognitive closure (Webster & Kruglanski, 1994) shares features of intellectual humility, raising the question of whether intellectual humility is merely the inverse of need for cognitive closure. To address this question, Study 4 controlled for need for cognitive closure as it examined the relationship between intellectual humility and reactions to strong and weak arguments.

To preview, after completing the IH Scale and the Need for Closure (NFC) Scale (Webster & Kruglanski, 1994) and reporting how often they flossed, participants read essays that offered strong or weak arguments that advocated dental flossing. Participants then rated the quality of the evidence, the effect of the essay on their views about flossing, the persuasiveness of various reasons to floss, and their intention to floss in the future.

Method

Participants. Three hundred ninety-six participants (207 men, 192 women) were recruited from MTurk. They ranged in age from 18 to 84 ($M = 35.94$, $SD = 11.33$) and identified mostly as White ($n = 338$), Black ($n = 34$), and Asian ($n = 27$). They received US$1.00 in Amazon credit for participating, which took most participants less than 20 min.

Procedure. The research was described as a study of how people react to information and recommendations in magazine articles. After completing informed consent, participants provided demographic information and completed the IH Scale and the Brief Need for Closure (BNFC) Scale (Roets & Van Hiel, 2011). The BNFC Scale is a 15-item version of Webster and Kruglanski's (1994) 42-item NFC Scale that correlates .95 with the original measure and has been shown to be a reliable and valid measure of need for cognitive closure (Roets & Van Hiel, 2011). Sample items include, "I dislike questions that could be answered in many different ways," "I would quickly become impatient and irritated if I would not find a solution to a problem immediately," and "When I have made a decision, I feel relieved."

To provide an index of how frequently they floss their teeth, participants rated how often they engaged in each of seven behaviors during the past week (1 = *never*, 2 = *once*, 3 = *2 or 3 times*, 4 = *4 or 5 times*, 5 = *every day or almost every day*, 6 = *more than once each day*), one of which was "flossing," which was embedded among filler activities such as "watched a TV news broadcast," "exercised," and "attended a religious service."

Participants were randomly assigned to read one of two brief essays about flossing, each approximately 440 words, that were modeled after those used by Updegraff et al. (2007).[4] Both essays advocated that people should floss regularly and provided instructions for how to floss properly, but one essay offered strong, evidence-based arguments from dental experts, whereas the other essay offered weaker, anecdotal arguments from ordinary people. The essays were formatted to appear as if they were an article taken from a magazine, complete with pictures of healthy gums and of a person flossing. The software paused on the article for 60 s before proceeding, thereby increasing the likelihood that participants would read the article fully.

After reading the article, participants rated the quality of the evidence presented in the article on three 9-point bipolar scales: Strong-Weak, Convincing-Unconvincing, and Scientific-Unscientific. Participants then indicated what effect, if any, the article had on their attitudes about flossing on a 7-point scale ranging from *it made me view flossing much less positively* to *it made me view flossing much more positively*, with the midpoint labeled *it did not change my views about flossing*.

Participants then rated each of eight reasons that people should floss. The instructions stated "If you wanted to convince someone to start flossing, how good do you think each of the following reasons would be in persuading them?" They then rated eight reasons that were presented in one or both of the articles on a 5-point scale (1 = *very weak reason to floss*, 5 = *very strong reason to floss*). The eight reasons were that flossing (a) decreases bad breath, (b) prevents tooth decay, (c) makes your mouth feel fresher, (d) strengthens your fingers, (e) lowers the likelihood of gum disease, (f) helps to prevent tooth loss, (g) is recommended by dentists, and (h) is recommended by people who floss. Participants then indicated how many times they intended to floss in the next 7 days on a scale ranging from 0 to 8+.

Results

Cronbach's alpha coefficient was .87 for the IH Scale (M = 21.39, SD = 5.06) and .91 for the BNFC Scale (M = 60.23, SD = 13.67), showing that both possessed high internal consistency. As expected, IH and NFC were negatively correlated, but only weakly, $r = -0.14$, $p = .007$. As hoped, participants showed considerable variability in the frequency with which they flossed in the previous week: never (31.6%), once (10.0%), two or three times (17.3%), four or five times (10.3%), every day or almost every day (22.1%), more than once each day (8.0%). The mean rating was 3.05 (SD = 1.76), which corresponded to flossing two or three times during the previous week.

The primary analyses involved moderated hierarchical multiple regression analyses in which argument quality (dummy coded), IH scores (mean-centered), and frequency of flossing (mean-centered), along with all two- and three-way interactions were used as predictors. The three main effects were entered on Step 1, the two-way interactions were entered on Step 2, and the three-way interaction was entered on Step 3. Then, to determine whether any of the obtained effects were due to the relationship between IH and NFC, the analyses were run a second time while controlling for scores on the BNFC Scale.

Three participants were excluded from all analyses—one who reported wearing dentures (and, thus, had no need to floss), one who owned a dental clinic, and one whose pattern of responses clearly reflected random responding. A few participants were also lost due to missing data, and occasional outliers were deleted on particular analyses as described below.

Quality of the evidence. The three ratings of the quality of the evidence presented in the article (i.e., strong, convincing, scientific) were highly related ($\alpha = .92$), so they were summed to create an index of perceived evidence quality. After deleting one additional outlier, the multiple regression analysis revealed a significant main effect of argument quality that provided a check on the experimental manipulation: Participants who read the article with strong arguments for flossing (M = 17.43, SD = 3.46) rated the evidence more highly than participants who read the article with weak arguments (M = 14.46, SD = 4.54), b = 3.01, 95% CI = [2.24, 3.79], $t(386)$ = 7.68, $p < .0001$, $\Delta R^2 = .127$. In addition, frequency of flossing predicted higher ratings of argument quality, $b = .49$, 95% CI = [.14, .77], $t(390) = 4.38$, $p < .0001$, $\Delta R^2 = .04$. Not surprisingly, people who floss regularly believe that arguments in favor of flossing are stronger and more convincing than people who floss less often.

These effects were qualified by a significant interaction of argument quality, IH, and frequency of flossing, $b = -.11$, 95% CI = [−.20, −.03], $t(389) = -2.65$, $p = .008$, $\Delta R^2 = .015$. The pattern of the interaction, shown in Figure 8, is consistent with the hypothesis that people high in intellectual humility are more attuned to argument quality than people low in intellectual humility when the message is personally relevant. Among participants who flossed rarely, if at all (i.e., those 1 SD below the mean of flossing frequency), the simple interaction of argument quality and intellectual humility was significant, $b = .30$, 95% CI = [.08, .53], $t(386) = 2.71$, $p = .007$. The pattern of this simple interaction (portrayed by the two solid lines in Figure 8) showed that, whereas participants low in IH did not rate weak and strong arguments significantly differently, $b = 1.31$, 95% CI = [−.30,

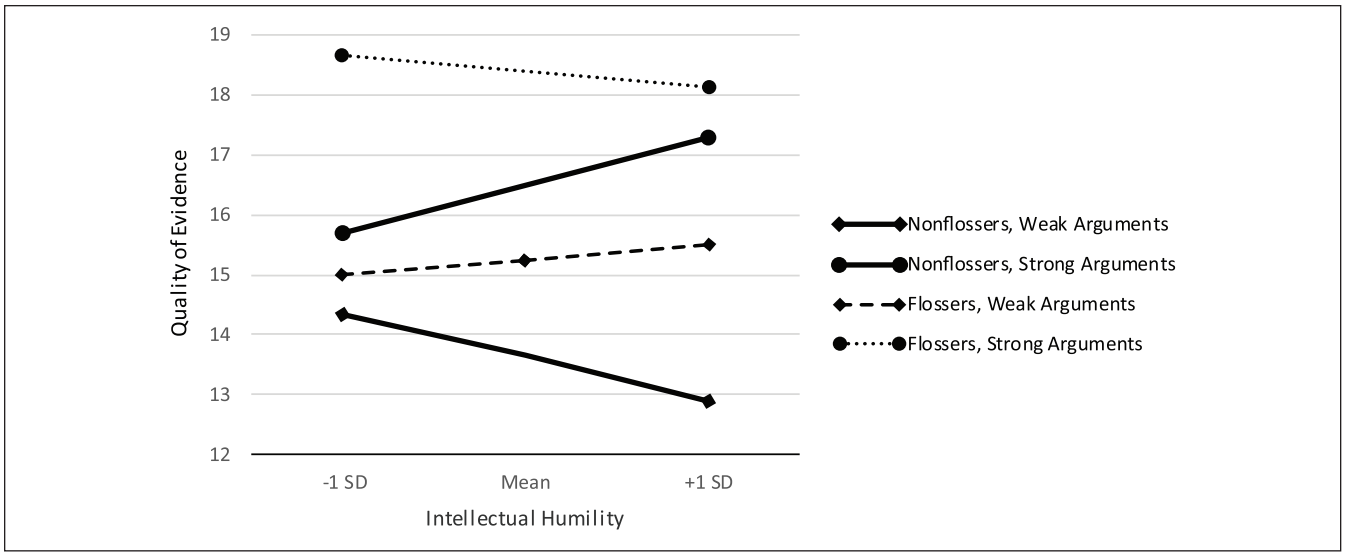

Figure 8. Ratings of evidence quality (Study 4).

2.92], $t(386) = 1.60$, $p = .11$, participants high in IH rated strong arguments significantly more positively than weak arguments, $b = 4.38$, 95% CI = [2.87, 5.90], $t(386) = 5.70$, $p < .0001$.

Furthermore, the positive slope of the line for low-frequency flossers (−1 *SD*) who read strong arguments shows that participants high in intellectual humility rated strong arguments more positively than those low in humility did; $b = .16$, 95% CI = [.009, .307], $t(386) = 2.08$, $p = .038$. In addition, highs tended to rate weak arguments less positively than lows did, although the effect was marginal, $b = -.15$, 95% CI = [−.31, .02], $t(386) = -1.77$, $p = .077$.

As expected, the simple interaction of IH and argument quality (shown by the two dotted lines in Figure 8) was not significant for participants who flossed regularly (i.e., +1 *SD*), $b = -.10$, 95% CI = [−.31, .11], $t(386) = -.95$, $p = .34$. Instead, frequent flossers rated strong arguments consistently higher than weak arguments regardless of their level of intellectual humility.

To test whether the effects of IH in Figure 8 are due to the association between IH and NFC, the analysis was rerun while controlling for scores on the BNFC Scale. Although NFC predicted ratings of the evidence overall, $b = .05$, 95% CI = [.02, .07], $t(390) = 3.08$, $p = .002$. $sr^2 = .02$, the three-way interaction shown in Figure 8 remained essentially unchanged, $b = -.12$, 95% CI = [−.20, −.03], $t(386) = -2.70$, $p = .007$, $\Delta R^2 = .015$, showing that the effects of IH were not due to its association with NFC.

Effect on attitudes toward flossing. Two outliers were excluded from the analysis of participants' ratings of the degree to which the article affected their views about flossing. The regression analysis revealed a significant main effect of argument strength in which participants who read strong arguments ($M = 5.37$, $SD = 3.46$) indicated that their views changed more than participants who read weak arguments ($M = 4.97$, $SD = 1.20$), $b = .43$, 95% CI = [.19, .67], $t(385) = 3.51$, $p < .001$.

This effect was qualified by the interaction of argument quality, IH, and flossing frequency, $b = -.04$, 95% CI = [−.06, −.008], $t(385) = -2.55$, $p = .01$. The simple interaction of argument quality by IH was significant for low-frequency flossers, $b = .08$, 95% CI = [.005, .14], $t(385) = 2.12$, $p = .035$, but not for high frequency flossers, $b = -.05$, 95% CI = [−.11, .02], $t(386) = -1.43$, $p = .152$. As on ratings of the quality of the evidence, the simple interaction for low-frequency flossers (depicted by the two solid lines in Figure 9) showed that participants who were high in IH reported being more influenced by strong than weak arguments, $b = .051$, 95% CI = [.004, .098], $t(385) = 2.14$, $p = .033$, whereas participants low in IH were not differentially affected, $b = -.025$, 95% CI = [−.075, .027], $t(385) = -.91$, $p = .362$. Furthermore, the slope of the line for low-frequency flossers who read strong arguments indicated that participants high in IH were affected by strong arguments more than low IH participants, $b = .05$, 95% CI = [.004, .098], $t(385) = 2.15$, $p = .03$.

As before, the analysis was rerun while controlling for scores on the BNFC Scale. NFC significantly predicted ratings of the degree to which participants' views toward flossing had changed, $b = .01$, 95% CI = [.003, .020], $t(384) = 2.53$, $p = .01$, but the critical three-way interaction in Figure 9 remained essentially unchanged, $b = -.03$, 95% CI = [−.06, −.008], $t(384) = -2.55$, $p = .01$, $\Delta R^2 = .016$.

Reasons for flossing. Based on mean ratings of the eight reasons for flossing, the reasons were divided into two sets: One set was consensually regarded as good, persuasive reasons for flossing with mean ratings greater than 4.0 (e.g., flossing lowers the likelihood of gum disease, flossing prevents tooth

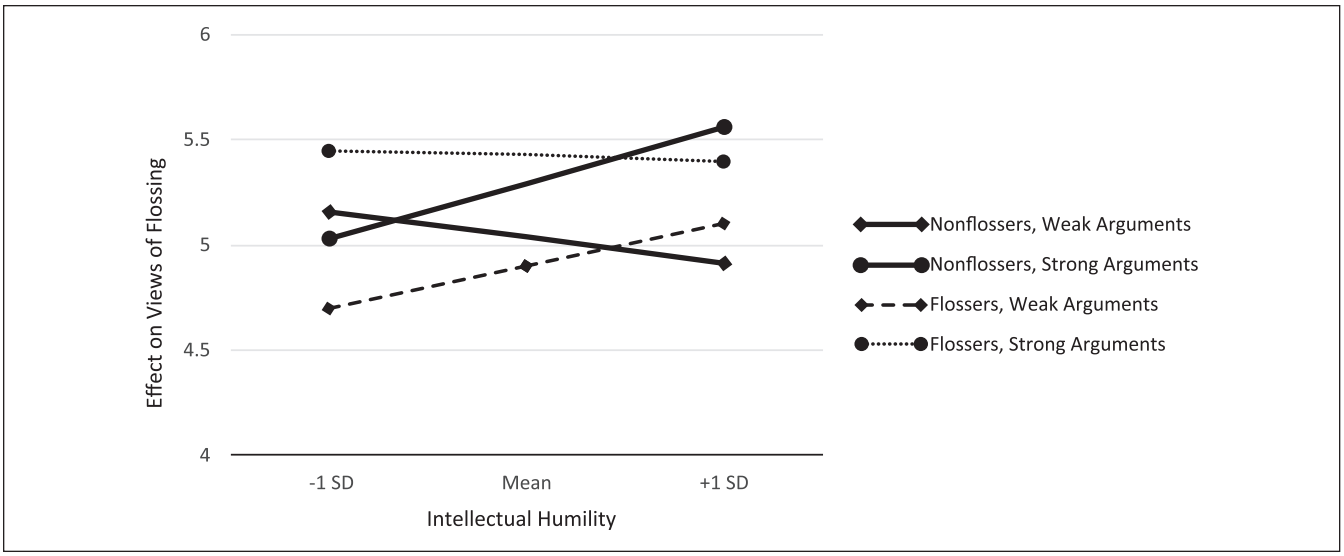

Figure 9. Perceived attitude change (Study 4).

decay) and the other set involved less persuasive reasons with mean ratings lower than 4.0 (e.g., flossing makes your mouth feel fresher, people who floss recommend it). The mean of the weaker reasons was subtracted from the mean of the stronger reasons to create an index that reflects the degree to which participants distinguished reasons that were consensually viewed as stronger from those that were consensually viewed as weaker.

As predicted, the multiple regression analysis showed that IH was associated with larger differences between ratings of the weaker and stronger reasons, b = .08, 95% CI = [.023, .145], $t(185) = 2.71$, $p = .007$, $sr^2 = .018$. In addition, flossing frequency was negatively related to distinguishing stronger from weaker reasons to floss, $b = -.18$, 95% CI = [−.353, −.005], $t(385) = 2.03$, $p = .04$, $sr^2 = .01$, and participants in the strong argument condition distinguished good and bad reasons to floss more than participants who read weak arguments (Ms = 6.1 and 4.8 for the strong and weak argument conditions, respectively), $b = 1.25$, 95% CI = [.64, 1.86], $t(385) = 4.00$, $p < .001$, $\Delta R^2 = .039$. Adding NFC to the analysis showed that it predicted independent variance in distinguishing weak from strong reasons to floss, $b = .023$, 95% CI = [.001, .046], $t(384) = 2.04$, $p = .04$, but the effect for IH was unchanged.

Intent to floss. The item asking participants how many times they intended to floss during the next week revealed only an effect of flossing frequency, $b = 1.07$, 95% CI = [.96, 1.17], $t(386) = 19.76$, $p < .001$, $sr^2 = .48$.

Discussion

Consistent with our conceptualization of intellectual humility, the results clearly showed that participants high in intellectual humility were more attentive to the evidentiary basis of their beliefs than were those low in intellectual humility. They more clearly distinguished strong from weak arguments for flossing—those that were based on scientific evidence and expert testimony from those that were based on trivial considerations, anecdotal evidence, or recommendations by laypeople—and they also reported that their views of flossing were more affected by stronger arguments. Viewed from the perspective of the ELM (Petty & Cacioppo, 1986), people high in intellectual humility appear to put cognitive effort into analyzing the quality of the arguments they hear, presumably out of awareness of their intellectual fallibility and their desire to avoid holding views that are not sound. Importantly, this effect was obtained only for participants for whom the arguments were personally relevant—those who did not floss frequently, for whom the articles might change their flossing habits. In contrast, the profflossing articles were largely irrelevant to regular flossers whose current views toward flossing were not likely to be affected one way or the other.

The results revealed no evidence that the relationship between IH and the outcomes of Study 4 were due to need for cognitive closure. Although NFC includes features that also characterize people who are low in intellectual humility, scores on the BNFC Scale correlated only weakly with intellectual humility, and controlling for NFC had virtually no effect of the results. Thus, the evidence shows that IH has good discriminant validity vis-à-vis NFC.

Although intellectual humility moderated reactions to strong and weak arguments, it was unrelated to the intention to floss in the coming week. In fact, stronger arguments did not increase intentions to floss more than weak arguments overall, even among participants who indicated that they had

not flossed at all in the previous week (n = 126), p = .94. Interestingly, however, nonflossing participants in both conditions indicated that they intended to floss more in the next week (M = 2.3, SD = 2.38) than they had flossed in the previous week (M = 0.0), suggesting that both articles may have increased intention-to-floss regardless of argument quality.

Finally, the results of Study 4 contribute to our understanding of characteristics that are associated with susceptibility to social influence and offer new directions for research on this topic. Most work on individual differences in susceptibility to influence has proceeded along one of two lines. Some work has focused on attitudinal or behavioral change that arises either from a desire to conform to the expectations of another person or group (normative influence) or the use of others' attitudes and behavior as information (informational influence; e.g., Bearden, Netemeyer, & Teel, 1989; B. Martin, Wentzel, & Tomczak, 2008). Other work has considered psychological and cognitive variables that involve reception of persuasive messages (e.g., attention, comprehension), depth of cognitive elaboration, and the tendency to modify one's attitudes and beliefs (e.g., Crano & Schroder, 1967; Eagly, 1981; McGuire, 1968; Nezlek & Smith, 2016; Petty & Cacioppo, 1986; Rhodes & Wood, 1992). Intellectual humility appears to be an important variable that is related to how people think about persuasive messages and, thus, moderates susceptibility to social influence.

General Discussion

These four studies offer numerous insights into the psychological characteristics of people who differ in intellectual humility and demonstrate the usefulness of the construct for several topics in social and personality psychology. In addition to exploring the nomological net of constructs in which intellectual humility is embedded (Study 1), the studies showed the relevance of intellectual humility for reactions to other people's beliefs (Study 2), judgments of people who change their views (Study 3), and sensitivity to weak and strong arguments (Study 4). Along the way, the research also validated the IH Scale as a psychometrically sound instrument with broad usefulness for research on intellectual humility and conceit. Although these studies provide only initial explorations of each of these areas, they markedly advance what is known regarding general intellectual humility (Deffler et al., 2016; Krumrei-Mancuso & Rouse, 2015; McElroy et al., 2014) and suggest avenues for future work.

The pattern of correlations with other constructs in Study 1 offers hints regarding the psychological underpinnings of intellectual humility and factors that might promote high versus low intellectual humility. For example, the trait of openness may provide a strong basis for high intellectual humility (see also Krumrei-Mancuso & Rouse, 2015). People who are low in openness to ideas and values are unlikely to be intellectually humble, but being high in openness per se might not be sufficient. High intellectual humility may also require a high degree of both epistemic curiosity (Litman & Spielberger, 2003) and need for cognition (Cacioppo et al., 1984), characteristics that lead people to enjoy the pursuit of knowledge. It might also require an ability to tolerate ambiguity because people who greatly desire certainty are troubled when their beliefs are tentative and uncertain (Furnham & Ribchester, 1995). Interestingly, our findings suggest that high intellectual humility reflects an epistemological stance aimed at knowing the truth more than a lack of hubris regarding one's personal knowledge; as the results showed, intellectual humility was unrelated to narcissism (Landrum, 2011).

Although scores on the IH Scale correlated with both of the measures of dogmatism (Altemeyer, 2002; Rokeach, 1960), intellectual humility is conceptually and empirically distinct from dogmatism as described earlier. Even so, we think that low intellectual humility is a central feature of dogmatism. Indeed, we find it impossible to imagine a dogmatic person who scored high in intellectual humility. When intellectually conceited people adopt and invest themselves in a broad, coherent system of beliefs that provides structure to their worldview, if not their lives, they show the telltale signs of dogmatism (Duckitt, 2009).

Scores on the IH Scale were unrelated to both religiosity (Study 2) and political affiliation (Study 3). Although people who are religiously or politically conservative (by American definitions of these terms) are often viewed as more convinced of and entrenched in their views (Altemeyer, 1998; Caprara & Zimbardo, 2004), our results are consistent with research showing that both liberals and conservatives vary greatly in their confidence in their views and that some members of both persuasions are convinced that their views are not only correct but also superior to other views (Morgan, Mullen, & Skitka, 2010; Toner et al., 2013). The specific attitudes on which liberals and conservatives are intellectually conceited may differ (Schkade, Sunstein, & Hastie, 2010; Toner et al., 2013), but *general* intellectual humility and conceit do not appear unique to highly religious people or to political conservatives. This fact enhances the usefulness of the IH Scale for research on political and religious attitudes because it ensures that obtained results do not reflect an inherent confound between intellectual humility and ideology.

Even though intellectual humility did not correlate with religiosity or political orientation, it did moderate how people differing in religious and political views responded to the experimental manipulations. These findings suggest that incorporating the IH Scale into studies of beliefs and attitudes may help us to understand the reactions of people who endorse various positions to attitude-discrepant messages and communicators.

Many of the effect sizes for intellectual humility were relatively small, which could be interpreted as an indictment of general intellectual humility as a construct. However, people's reactions to beliefs, attitudes, and people with which they disagree are undoubtedly moderated by myriad variables, of which intellectual humility is only one. Furthermore,

although people differ in general intellectual humility, the degree to which they manifest intellectual humility or conceit can differ with respect to particular beliefs and attitudes (Hoyle et al., 2016). Most personality characteristics display substantial within-person variability across situations (Fleeson, 2004), with meager correlations between general measures of the trait and assessments of trait-relevant behaviors in any particular situation (Funder & Ozer, 1983; Mischel, 1968). Thus, participants' reactions in these studies likely reflected not only their general level of intellectual humility but also the degree to which they are intellectually humble in the specific domains studied here. These studies show that the IH Scale provides a reliable and valid measure of the degree to which people tend to respond in an intellectually humble manner, but complementary measures are needed to assess humility with respect to specific domains such as religion, politics, science, lifestyles, etiquette, music preferences, and so on. (See Hoyle et al., 2016, for an approach to assessing intellectual humility with respect to specific beliefs.)

Given the fledgling nature of research on intellectual humility (Hill & Laney, 2016), many questions call out for attention. Of particular interest are ways in which people who are high versus low in intellectual humility may differ in how they process information and think about their beliefs (see Deffler et al., 2016). Intellectual humility has an obvious metacognitive component that involves thinking about the accuracy of one's beliefs, the evidence on which those beliefs are based, and one's ability to evaluate relevant evidence. Research has identified a number of metacognitive variables that are related to memory, reasoning, introspection, judgment, and attitudes (e.g., Mata, Ferreira, & Sherman, 2013; Schmader, Forbes, Zhang, & Mendes, 2009; Verplanken, Friborg, Wang, Trafimow, & Woolf, 2007; Washburn, Smith, & Taglialatela, 2005), and investigations into the metacognitive aspects of intellectual humility are needed. Work on metacognitive elements of attitudes—such as certainty, clarity, and correctness (Petrocelli et al., 2007)—may be particularly informative as researchers examine people's thoughts about their beliefs, opinions, and viewpoints.

An intriguing—but as yet unexamined—question is whether intellectually humble people possess more accurate, nuanced, and useful knowledge than less intellectually humble people. Chronically considering the accuracy of one's views and the evidence for them should increase the likelihood that people will, over time, adopt balanced and nuanced views that account for the complexities of real life, weed out incorrect beliefs, and remain open to new evidence as it arises. However, ongoing consideration of particular beliefs could also lead to decreasing intellectual humility over time because cognitive elaboration leads to greater certainty (Barden & Petty, 2008), which may then reduce further elaboration (Tiedens & Linton, 2001). Although we can imagine this ironic effect of intellectual humility occurring on specific issues to which people have devoted considerable thought, we suspect that people who are dispositionally high in intellectual humility will remain generally cognizant that their beliefs are fallible.

The interpersonal and social implications of low and high intellectual humility also deserve additional attention. Presumably, intellectual humility has implications for how people handle differences of opinion, negotiate with others, and compromise versus stand their ground when disagreements arise. Furthermore, our results raise the possibility that promoting intellectual humility—both as a personal characteristic and as a societal value—might, over time, serve to reduce ideological tensions in society. Conflict among religious and political factions is exacerbated when people are unable or unwilling to consider the possibility that their personal views might be, if not incorrect, at least no better overall than other perspectives. Given that participants high in intellectual humility were more accepting of other viewpoints and the people who endorsed them, increasing intellectual humility should lower acrimony that is based on differences in beliefs and ideology. Understanding the psychology of intellectual humility opens the possibility of interventions that help people hold their beliefs with less conviction than they otherwise might (Baehr, 2011). We believe that intellectual humility shows promise as an important and interesting construct across many domains of social and behavioral science.

Authors' Note

Katrina P. Jongman-Sereno is currently affiliated with Harvard University. Kaitlin T. Raimi is currently affiliated with the University of Michigan. Samantha A. Deffler is currently affiliated with Rollins College

Acknowledgments

The authors thank Jason Baehr, Heather Battaly, Don Davis, Julie Exline, Peter Hill, Joshua Hook, Cameron Hopkin, Dan Howard-Snyder, Bradley Owens, Wade Rowatt, Steven Sandage, and Dennis Whitcomb for their conceptual and methodological contributions to this project.

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) disclosed receipt of the following financial support for the research, authorship, and/or publication of this article: This research was funded by a grant from the John Templeton Foundation to Mark Leary and Rick Hoyle.

Notes

1. This definition was developed after extended discussions among members of an interdisciplinary group that involved philosophers with expertise in intellectual virtues (Jason Baehr, Heather Battaly, Dan Howard-Snyder, Dennis Whitcomb) and social,

personality, clinical, counseling, and industrial-organizational psychologists with expertise in egotism and humility (Don Davis, Julie Exline, Peter Hill, Joshua Hook, Rick Hoyle, Mark Leary, Bradley Owens, Wade Rowatt, Steven Sandage).

2. The Comprehensive Intellectual Humility Scale (Krumrei-Mancuso & Rouse, 2015) was published after the present research was nearly completed.
3. As can be seen, all six items are worded in the direction of high intellectual humility. Despite repeated efforts to create items with reversed wording, reverse-coded items consistently failed to correlate adequately with the positively worded items. After several failed attempts, we concluded that items that are worded in the direction of low intellectual humility (such as "Once I've made up my mind about something, I'm not likely to be persuaded to change it by new information," "I am rarely wrong," and "It annoys me when people challenge my beliefs and opinions") typically reflect characteristics other than, or in addition to, intellectual humility, such as stubbornness, rigidity, narcissism, or defensiveness. Although these reactions sometimes accompany low intellectual humility, they are not central aspects of low intellectual humility.
4. We thank John Updegraff for providing the materials used in Updegraff, Sherman, Luyster, and Mann (2007).

Supplemental Material

The online supplemental material is available at http://pspb.sagepub.com/supplemental.

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