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Predictors and consequences of intellectual humility

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in press

Nature Reviews Psychology

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I.G. conceived the article idea. The authors contributed equally to the conceptual development of the article. T. P., A. E., T. S. and I.G. wrote the first draft. All authors revised and approved the final version of the manuscript.

To cite this paper:

Porter, T, Elnakouri, A., Meyers, E. A., Shibayama, T., Jayawickreme, E. & Grossmann, I. (2022). Predictors and consequences of intellectual humility. *Nature Reviews Psychology.* DOI: 10.1038/s44159-022-00081-9

The present pre-print a pre-proof, not edited version of the article. For the final copy of the article, please see https://doi.org/10.1038/s44159-022-00081-9

Abstract

In a time of societal acrimony, psychological scientists have turned to a possible antidote – intellectual humility. Interest in intellectual humility comes from diverse research areas, including researchers studying leadership and organizational behavior, personality science, positive psychology, judgment and decision-making, education, culture, and intergroup and interpersonal relationships. In this Review, we synthesize empirical approaches to studying intellectual humility. We critically examine diverse approaches to defining and measuring intellectual humility and identify the common core: a meta-cognitive ability to recognize the limitations of one's beliefs and knowledge. After reviewing the validity of different measurement approaches, we highlight the role of factors that influence intellectual humility, from relationship security to social coordination. Furthermore, we review empirical evidence concerning benefits and drawbacks of intellectual humility for personal decision-making, interpersonal relationships, scientific enterprise, and society writ large. We conclude by outlining initial attempts to boost intellectual humility, foreshadowing possible scalable interventions that can turn intellectual humility into a core interpersonal, institutional, and cultural value.

Keywords: beliefs, polarization, social conflict, metacognition, wisdom

Predictors and consequences of intellectual humility

Intellectual humility involves recognizing that there are gaps in one's knowledge and that one's current beliefs might be incorrect. For instance, someone might think that it is raining, but acknowledge that they have not looked outside and the sun might be out. Research on intellectual humility offers an intriguing proposition when facing human errors and biases: while we cannot rid ourselves of our limitations altogether, recognition of the limitations of one's knowledge may help to safeguard us from some of our more authoritarian, dogmatic, and biased proclivities.

Although acknowledging the limits of one's insights might be easy to do in low-stakes situations, people are less likely to exhibit intellectual humility when the stakes are high. For instance, people are unlikely to act in an intellectually humble manner when motivated by strong convictions, or when their political, religious, or ethical values seem challenged [1,2]. Under such circumstances, many people hold tightly to existing beliefs and fail to appreciate and acknowledge the viewpoints of others[3–6]. These social phenomena have troubled scholars and policymakers for decades [3] Consequently, interest in cultivating intellectual humility has come from multiple research areas and sub-fields in psychology, including social-personality, cognitive, clinical, educational, and leadership and organizational behavior [7–11]. Cumulatively, scholars suggest that intellectual humility can decrease polarization, extremism, and susceptibility to conspiracy beliefs as well as increase learning and discovery, and foster scientific credibility[12–15].

The growing interdisciplinary interest in intellectual humility has led to multiple definitions and assessments, raising a question about commonality across definitions in the growing field. Claims about the concept's presumed societal and individual benefits further raise the question about the strength of evidence that supports these claims.

In this Review, we provide an overview of empirical intellectual humility research. We first examine approaches for defining and measuring intellectual humility across various sub-fields in psychology, synthesizing the common thread across seemingly disparate definitions. We next describe how individual, interpersonal, and cultural factors can work for or against intellectual humility. We conclude by highlighting the importance of intellectual humility and intervention approaches.

Defining intellectual humility

Intellectual humility is conceptually distinct from general humility, modesty, perspective-taking, and open-mindedness [9]. Whereas general humility involves how people think about both their shortcomings and strengths across domains, intellectual humility is chiefly concerned with epistemic limitations [16]. In a similar vein, modesty emphasizes increased social awareness and not wanting to monopolize the spotlight or draw too much attention to one's accomplishments, whereas intellectual humility focuses on recognizing one's ignorance and intellectual fallibility [17]. General humility and modesty are also psychometrically distinct from intellectual humility [18,19].

There are subtle differences between intellectual humility and perspective-taking. Perspective-taking is the ability to recognize and understand alternative points of view [20]. By contrast, intellectual humility is the ability to recognize shortcomings or potential limitations in one's own point of view. Building on perspective-taking, open-mindedness refers to unbiased or fair consideration of different views regardless of one's beliefs [21]. Although open-mindedness is theoretically and empirically related to intellectual humility, being open-minded does not always

involve considering the limitations of one's knowledge or beliefs [22,23]. Though distinct from these related phenomena, intellectual humility has multiple definitions reflecting its use in different fields.

Intellectual humility has a wide range of philosophical roots [24–27]. Some philosophical accounts focus on attributes of people who frequently exhibit intellectually humble thoughts and behavior (such as the tendency to frequently recognize one's fallibility and owning one's limitations)[28]. Most accounts define intellectual humility as a virtuous balance between intellectual arrogance (overly valuing one's beliefs) and intellectual diffidence (undervaluing one's beliefs)[28–30]. The latter definition has its roots in the Aristotelian ideal of the Golden Mean –a calibration of particular virtues to the demands of the situation at hand[30,31]. Because situations vary in their demands, a logical consequence of the Aristotelian approach is that intellectual humility is only virtuous as a dynamic, situation-sensitive construct[30–32]. Simultaneously, the Aristotelian approach means that the same psychological characteristics attributed to intellectual humility are unlikely to always be virtuous[32].

Psychological scientists also define intellectual humility in a myriad of ways. Some scholars approach intellectual humility as a form of metacognition, reflecting how people regulate and reflect on their beliefs and thoughts. This view emphasizes the inherent limitations of human knowledge and beliefs, such as recognizing that beliefs might be wrong and that opinions are based on partial information [9,29,33,34]. Other scholars approach intellectual humility as a multidimensional phenomenon, advocating that intellectual humility includes a combination of metacognition, valuing other people's beliefs, admitting one's ignorance or errors to other people, and being motivated by an intrinsic desire to seek the truth [35–37].

Scholars favoring broader accounts of intellectual humility argue that a strict focus on metacognition excludes appreciation for other people's insights, behavioral responses when one recognizes that they might be wrong or confused, and motives for thinking and acting. In turn, scholars who endorse a metacognitive account of intellectual humility argue that encumbering intellectual humility with multiple features weakens the ability to examine it with conceptual clarity and methodological rigor. For example, multidimensional instruments might be difficult to interpret because a person high in one dimension and low in another could receive the same intellectual humility score as someone with the opposite psychological profile.

Preference for these competing accounts of intellectual humility vary across sub-fields of psychology, linked to methodological preferences and historical emphasis on social and contextual factors. Cognitive psychologists tend to favor metacognitive accounts of intellectual humility that emphasize how people think about evidence, knowledge, and beliefs, without much attention to social contexts[13]. Conversely, developmental, educational, and clinical psychologists tend to favor a multidimensional account that considers how real world, cognitive, behavioral, and interpersonal factors come together to form intellectual humility[38–40]. Social and personality psychologists, including in applied organizational sciences, consider metacognitive and multidimensional accounts[9,33]. Rather than endorsing a single definition, these researchers call for a clear distinction when measuring unique features of intellectual humility to reveal how the distinctive features relate to and shape one another [41].

A cumulative science of intellectual humility benefits from clear definitions and explicit modeling of relationships between psychological processes and behavioral outcomes. Despite different conceptual approaches, most philosophers and psychologists agree that intellectual humility necessarily includes recognizing one's ignorance and intellectual fallibility [26]. Hence, we focus on the metacognitive features of intellectual humility because they have consensus

155 support from the scholarly community. Furthermore, these features are empirically plausible:
156 they are scientifically testable and hence falsifiable. Taking a middle ground between
157 metacognitive and multidimensional accounts, we argue that consideration of interpersonal
158 contexts is beneficial to understanding how intellectual humility manifests, what factors inhibit
159 and promote it, and how intellectual humility can be developed. At the same time, isolating the
160 metacognitive core of intellectual humility permits scholars to identify its contextual and
161 interpersonal correlates, and reduces the likelihood of mistakenly labeling different processes
162 and outcomes as intellectual humility (jingle fallacy) or providing distinct names to the same
163 family of metacognitive components of intellectual humility (jangle fallacy) [41]. Thus, we define
164 intellectual humility in terms of a metacognitive core comprised of recognizing the limits of
165 one's knowledge and awareness of one's fallibility (Fig. 1). This core is expressed by
166 demonstrations of intellectual humility through behaviour and valuing others' intellect.
167 *Figure 1.*
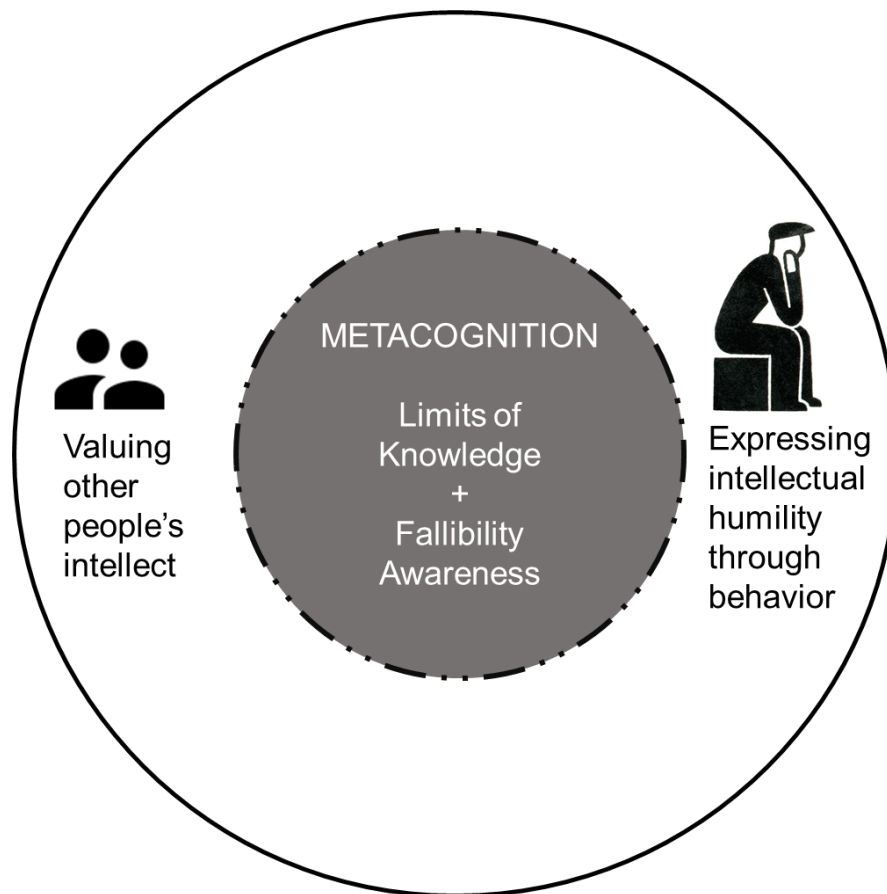
168
169 **Conceptual representation of intellectual humility** | Infographic depicting the metacognitive
170 core (shaded region) and the peripheral social and behavioral (light region) features of
171 intellectual humility with scholarly consensus. The core includes the metacognitive components
172 of recognizing the limits of one's knowledge and being aware of one's fallibility. The social and
173 behavioral regions include recognizing that other people may hold legitimate beliefs different
174 from one's own, and being willing to reveal ignorance and confusion in order to learn. The
175 boundaries of the core and the outer region are permeable, indicating mutual influence of
176 metacognitive features of intellectual humility for social and behavioral aspects of the construct
177 and vice versa.

Measuring intellectual humility

Psychological scientists have developed several measures of intellectual humility (Table 1). These measures can be organized in terms of purpose and type. In terms of purpose, some measures aim to capture intellectual humility as a trait – the degree to which people are intellectually humble in general – whereas others examine it as a state – the degree to which people are intellectually humble in specific contexts. In both cases, intellectual humility is measured along a continuum rather than in a binary all-or-nothing fashion.

One measurement type is to ask participants to self-report on their intellectual humility in a questionnaire[26]. Questionnaires are used to assess trait and state (including belief-specific) intellectual humility. Another measurement type relies on behavioral tasks designed to elicit meaningful differences in a particular kind of response. For example, a researcher might ask people to play a game where the goal is to answer questions correctly and see how often participants delegate questions to more knowledgeable peers—an indication that people realize their own knowledge is incomplete (this task has been used to measure intellectual humility in children[38]). Both of these types can contribute to estimates of trait and state intellectual humility.

Questionnaires. Questionnaires are often used to assess intellectual humility. A trait questionnaire might ask how much a person, '[Accepts] that [their] beliefs and attitudes may be wrong'[9]. A belief-specific questionnaire on the issue of gun control might ask how much a person '[recognizes] that [their] views about gun control are based on limited evidence'[33]. A state questionnaire might ask how intellectually humble a person feels in the moment or how much they 'searched actively for reasons why [their] beliefs might be wrong' during a recent disagreement or conflict [37]. A closely related self-report measure asks people indicate, for example, their attitude change or depth of understanding; these self-report tasks have also been used as indirect measures of intellectual humility[42].

Over the last decade, psychological scientists have developed many questionnaire measures of intellectual humility at the trait level [26]. The popularity of these measures is due to some level of predictive capacity and cost-effectiveness. People seem capable of reporting on their trait level of intellectual humility with some degree of accuracy, as supported by small-to-moderate, positive correlations between self-reported intellectual humility and peer-reported intellectual humility [9,11,19,43]. Scores on self-reported trait-level intellectual humility (across different measures) are also positively associated to scores on self-report measures of other epistemic traits, such as intellect and open-mindedness, and to concrete behaviors understood to be central to (or diagnostic of) intellectual humility, including information seeking, cognitive flexibility, acknowledgement of intellectual failings, and argument evaluation[9,11,19,43,44].

Nevertheless, trait-level questionnaires of intellectual humility have limitations. It may be difficult for people to report on how intellectually humble they are in general because doing so requires them to integrate a lot of information when forming an overall judgement about themselves. All questionnaires rely on subjective judgments and are therefore vulnerable to response biases, including not accurately recalling one's past experience, selecting positive responses on the measure by default, seeing oneself more positively than is warranted, and focusing on favorable group comparisons when evaluating one's behavior – but reporting on how intellectually humble one is in general provides numerous opportunities for error[45,46].

Finally, it is difficult to assess socially desirable constructs with self-report measures. Scores obtained via trait-style measures of intellectual humility positively correlate with social desirability bias. In situations where intellectual humility is desirable, like a job interview, self-report questionnaires make it easy to create a false impression of high intellectual humility[47,48]. Notably, response biases are attenuated when intellectual humility questionnaires ask people to report how intellectually humble they were in specific interpersonal situations in their lives, highlighting the value of more contextualized assessment of responses to specific situations (or states)[49]. In particular, reporting on how one searched for information or whether one recognized their fallibility during a specific event does not require as much mental effort because of access to specific memory cues, compared to reporting on how intellectually humble one is across situations. In addition, when recalling a specific situation, a desire to present oneself in a positive light might be trumped by a stronger desire to provide an honest response about a particular event. Thus, questionnaires that ask about intellectual humility in specific situations or relevant to specific events in people's lives might be less vulnerable to response bias than questionnaires that measure trait-level intellectual humility.

In sum, trait-level questionnaires are an efficient tool for obtaining an initial, general picture about one's intellectual humility. However, these scores should be considered in light of their limitations.

Although trait measures can be useful for describing typical ways of being in the world, they are not particularly good at detecting variability. Thus, they are not well-suited to studying how intellectual humility might vary in daily life or change in response to an intervention. In response to these limitations, some researchers have examined intellectual humility in specific contexts or in response to specific issues. Scholars studying these questions have developed state specific questionnaires of one's beliefs, reasoning, or behaviour that tap people's level of intellectual humility about specific issues, such as gun control, vaccine mandates, or more mundane interpersonal disagreements [37,49,50]. State measures enable researchers to capture how people's intellectual humility varies as they move through various contexts and situations in their life [37,50,51].

Focus on state-specific measures echoes a modern take on personality science, which defines a trait via a person's profile of states[52,53]. A person's general profile—when aggregating across state-specific expression of a characteristic—is typically stable over time. At the same time, state-specific expression of a characteristic will be systematically variable from one situation to the next. Indeed, daily diary and experience-sampling studies demonstrate substantial within-personal variability in intellectual humility [37,50]. Although individuals differ in their trait-level intellectual humility, they can also demonstrate a high degree of systematic variation depending on the demands of specific contexts. Capturing only global self-perceptions of intellectual humility with a trait measure glosses over this variability and nuance.

When researchers are interested in people's overall patterns of intellectual humility across situations and variability from situation to situation, we recommend integrating state and trait approaches by taking repeated situation-specific assessments. We recommend reports of intellectual humility in the context of specific situations. Ideally these assessments should be administered multiple times. We only recommend using trait-level assessments of intellectual humility in research focused on people's global attributions of intellectual humility to themselves

(self-reports) or close others (informant reports). A profile of intellectual humility can further be established by modeling responses across multiple situations.

If researchers are solely interested in participants' general self-perceptions of intellectual humility, trait assessments might be suitable, with caveats outlined above. Notably, little work has directly compared benefits of trait assessments of intellectual humility to repeated situation-specific assessments of intellectual humility, calling for further research on this topic.

Behavioural tasks. A key advantage of behavioral tasks over other measures is that their scores do not typically depend on subjective judgements and are therefore not as prone to response biases and faking [45,47,48]. For example, measuring whether a person delegates a question to a more knowledgeable peer captures a real behavior in the moment, in contrast to a self-report of a person's impression of their behavior in general or in a past situation. In addition, behavioral tasks depend less on language than questionnaires and might therefore be better for assessing intellectual humility in young children or in different cultural contexts. Behavioral tasks also put all participants in the same situation with the same opportunity to exhibit intellectual humility. In comparison, estimates of intellectual humility via questionnaires suffers from the confound of natural variability in opportunity to be intellectually humble in daily life.

Nonetheless, custom-designed behavioral tasks can be less effective at measuring typical rather than extraordinary performance [54]. Experimental tasks capture only a small segment of behavior in an artificial situation contrived by a researcher. A participant might be highly motivated to perform well on the task by displaying high levels of intellectual humility, rendering a score that captures their maximal capacity rather than their typical or externally-valid intellectual humility. Behavioral measures also assume that the assessed behavior is motivated by recognizing one's ignorance and intellectual fallibility, which might not always be the case. Such behavior may be motivated by situational pressures or other processes not characteristic of intellectual humility.

Behavioural tasks typically sample situation-specific responses, presenting a challenge for scholars interested in a general, trait-level picture of intellectual humility. It might be possible to administer behavioral tasks multiple times to obtain a more complete picture of someone's typical behavior. However, repeated exposure to the same task risks undermining score validity as participants become more familiar with what they are asked to do, bored, or more fluent with the task procedures.

Overall, behavioral tasks offer another useful measurement approach for assessing intellectual humility to complement questionnaires. Nevertheless, the development and use of behavioral tasks has lagged behind questionnaires. No research has yet developed a valid intellectual humility behavioral task by performing psychometric testing of theoretically expected associations with other constructs and outcomes, in contrast to the many published studies doing so for questionnaires. Validation of behavioral tasks to assess intellectual humility is an important direction for future research.

Threats to intellectual humility

Being intellectually humble involves embracing uncertainty and ambiguity, and entertaining the possibility that even one's closely held beliefs might be incorrect [9]. Thus, intellectual humility requires people to deliberately remain flexible in their beliefs [11]. However, many aspects of human psychology run counter to intellectual humility. We provide a non-

exhaustive review of the personal, interpersonal, and cultural factors that often work against intellectual humility.

Personal and interpersonal factors. When people try to reason through an issue, they often work hard to find evidence that confirms their perspective[55–58]. This process is often called confirmation or myside bias. Some theorists suggest that reasoning abilities have evolved to justify oneself and defend one's reputations in front of others, so looking for confirmatory evidence to convince others of one's good standing is a default strategy[59,60]. Because confirmatory search likely directs attention to arguments in support of one's initial beliefs (rather than to the limits of one's beliefs and their fallibility), this bias might act as a metacognitive limitation counter to intellectual humility in many situations.

Even when a person desires to be intellectually humble, recognizing the limits of knowledge requires overcoming further metacognitive limitations that distort self-appraisal. For example, people tend to confidently overestimate how much they know about various phenomena —such as how a zipper works, how snow forms, how a helicopter takes flight — and only become aware of their lack of knowledge after failing to explain the phenomenon[61–64]. Moreover, people often fail to distinguish their knowledge from the knowledge of other people. Simply being aware that others understand how something works can result in people overestimating how much they understand the same phenomenon[65]. Therefore, people struggle to recognize the limits of their knowledge and their fallibility—two core features of intellectual humility.

Intellectual humility also involves accepting uncertainty about one's beliefs. Although people differ in their tolerance of uncertainty and ambiguity, many find uncertainty disquieting or avoid it altogether in situations that are personally threatening [66]. To overcome the threat, people tend to become more self-focused and eager to cling to unambiguous, comforting beliefs, rather than seek to understand more ambiguous truths [34,67]. Consequently, personal threats can lead to thinking in terms of extremes and absolutes ('black and white' thinking) and an unwillingness to recognize one's own limited perspective and potential fallibility [68–71]. For example, people who were made to feel highly threatened became less comfortable considering opposing political opinions and were more wary of members of political outgroups compared to people who were made to feel moderately threatened [72]. Feelings of personal threat may therefore interfere with the ability to exhibit intellectual humility.

Intellectual humility can also be hard to manifest and sustain when acknowledging the limitations of one's beliefs risks compromising interpersonal relationships. When members of cultural, religious, political, or other social groups conform to the group's ideology, they feel closer to one another [73–76]. Thus, people might reflexively adhere to their groups' beliefs to strengthen relationships with other members of the group [77–79]. Group solidarity might therefore trump intellectual humility. For example, when embedded within ideologically homogeneous (versus varied) social networks, people become more resistant over time to changing their ideological beliefs—a tendency diametrically opposite to intellectual humility [80,81]. When a 'group's truth' collides with reality, intellectual humility will be hard to come by.

The motive to attain status within one's community might also work against intellectual humility [82]. Group members often gain prestige and rank by fervently endorsing the group's ideology [57,83–85]. Espousing the group's beliefs serves as a form of self-persuasion, further

convincing people that the views they endorse must be correct, while moving further away from intellectual humility [86–88].

However, fervently endorsing a group's ideology does not mean that one is unlikely to show intellectual humility in general. People might endorse their group's political dogmas while also being mindful of their intellectual limitations when arguing with individuals within the group. People become more intellectually humble during interpersonal conflicts when they feel connected to their group compared to situations when they feel disconnected[42,89]. This insight suggests that one might show little intellectual humility when endorsing group dogmas, while simultaneously displaying intellectual humility with close others (in the group). This situational dependency underlines the variability of intellectual humility as a construct.

Figure 2.
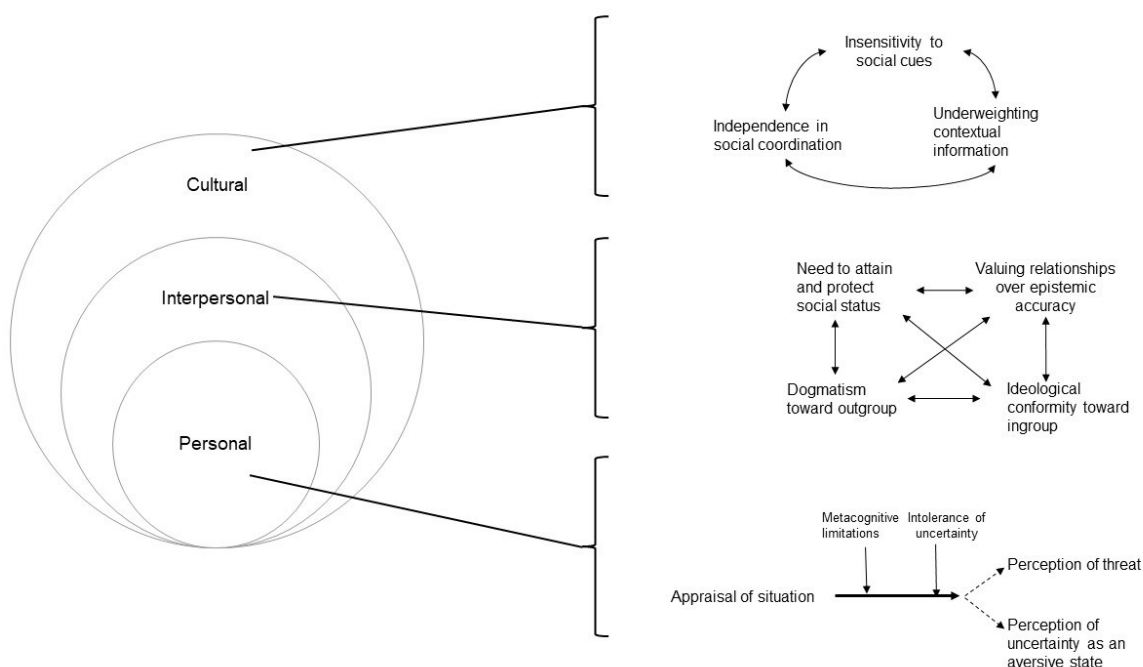
Threats to intellectual humility | Figure depicting threats to intellectual humility at the cultural, interpersonal, and individual levels. Threats pertaining to each level are outlined on the right side of the figure. These threats include various metacognitive limitations, such as biased information search, overestimation of knowledge, failing to recognize unknowns as well as situational factors. The arrows between the various threats depict the unidirectional (single tipped) and mutual (double tipped) influence each threat has on the other threats. That is, the presence of one threat increases the likelihood that the other threats will emerge. Specific threats can further accentuate and interact with processes at other (broader or more specific) levels in a form of cross-level interactions. On the left side, the smaller circle contained within larger circles depict an individual contained within interpersonal and cultural spheres. These spheres represent threats that apply at the broader level, as well as threats that apply at the more specific level of the individual.

Cultural factors. Cultural contexts shape the way people think and process information [90,91] and have the potential to influence whether they think in intellectually humble ways. For instance, people living in societies that emphasize interdependence in social coordination (such as Japan) tend to reflect on mental states of others more, define the self through relationships with others, and are better able to avoid underweighting contextual information, relative to people living in more independent contexts, such as the United States [92,93]. More generally, societies that emphasize interdependence rather than independence are more likely to promote relational goals, paying attention to social cues, defining the self as embedded within one's social environment, and social context vigilance [92–95]. Furthermore, people in communities that rely on interdependent social coordination for their food, such as fishing or rice farming, display more sensitivity to contextual information than people from communities that rely on individual-focused herding or wheat farming [96,97].

Consideration of contextual information and mentalizing might be conducive to greater recognition of the limits of one's knowledge and awareness of one's fallibility. Indeed, there is some evidence for within and between country differences in intellectual humility. Within China, people who rely on rice farming tend to display greater intellectual humility when reflecting on social conflicts compared to people who rely on wheat farming [98]. In cross-cultural comparisons, individuals from countries that emphasize social coordination more, such as Japan or China, spontaneously show more intellectual humility in reflections on social conflicts compared to individuals in the US and Canada [99,100].

Overall, intellectual humility can be influenced by many factors, from the cognitive habits people have to the cultural contexts they inhabit. Individuals are usually motivated to confirm their prior beliefs, to feel like they know more than they actually do, and to avoid opposing opinions when threatened. A desire to maintain interpersonal bonds can also tempt people to blindly believe in group "truths." Simultaneously, people's interpersonal and cultural contexts can make them more or less intellectually humble when dealing with others. Feeling accepted by one's peers may promote intellectually humility during social conflicts. Finally, interdependent cultural contexts that require a high level of social coordination tend to promote ways of thinking that are sensitive to context and conducive to intellectual humility

Importance of intellectual humility

The willingness to recognize the limits of one's knowledge and fallibility can confer societal and individual benefits if expressed in the right moment and to the proper extent. This latter insight echoes the philosophical roots of intellectual humility as a virtue[30,31]. State and trait intellectual humility have been associated with a range of cognitive, social, and personality variables (Table 2). At the societal level, intellectual humility can promote societal cohesion by reducing group polarisation and encouraging harmonious inter-group relationships. At the individual level, intellectual humility can have important consequences for well-being, decision-making, and academic learning.

Notably, empirical research has provided little evidence on how generalizable the benefits or drawbacks of intellectual humility are beyond the unique contexts of WEIRD (Western, Educated, Industrialized, Rich, and Democratic) people[90]. With this caveat aside, below is an initial set of findings concerning the implications of possessing high levels of state or trait intellectual humility. Unless otherwise specified, the evidence below concerns trait-level

intellectual humility. After reviewing these benefits, we consider attempts to improve an individual's intellectual humility.

Social implications. People higher in intellectual humility are more likely to display tolerance of opposing political and religious views, exhibit less hostility toward members of those opposing groups, and are more likely to resist derogating outgroup members as intellectually and morally bankrupt [101–103]. Although intellectually humbler people are capable of intergroup prejudice[104], they are more willing to question themselves and to consider rivaling viewpoints relative to those lower in intellectual humility[104]. Indeed, people with greater intellectual humility display less myside bias, expose themselves to opposing perspectives more often, and show greater openness to befriending outgroup members on social media platforms [19,22,102]. By comparison, people with lower intellectual humility display features of cognitive rigidity and are more likely to hold inflexible opinions and beliefs [9,11].

In addition to being associated with intergroup tolerance, intellectual humility is also associated with engaged cooperation with outgroup members. In both state and trait form, intellectually humbler people are more willing to let outgroup members speak freely and show greater interest in joining bipartisan groups aimed at discussing political issues [34,105]. Individuals showing greater state intellectual humility are also more cooperative after thinking through their position in a public goods game, where they have to decide how much to contribute to a common pool that will be redistributed to all players, an effect which contrasts with the typical finding that deliberation leads to greater selfishness [106,107]. People showing higher intellectual humility are therefore less likely to demonize groups with opposing views and tend to be open to the possibility for engagement and cooperation.

Intellectual humility is also associated with intentions to forgive and reconcile with others who hurt one or offended one's beliefs [40,108]. Furthermore, intellectual humility might support interpersonal cohesion by reducing derogative behaviors during arguments, such as labeling opponents as malicious or unintelligent [19]. [117]Close-minded thinking can lead individuals to disparage others' opinions or arguments [109]. Conversely, intellectual humility is associated with open-mindedness and a willingness to learn about differing perspectives, which might promote respectful debate [19].

The willingness to acknowledge one's intellectual limitations might also have important implications for interpersonal relationships. Intellectual humility is positively associated with multiple values, including empathy, gratitude, altruism, benevolence, and universalism, which suggests that people with greater intellectual humility are more likely to value and care about the well-being of others [110]. Intellectual humility might also be instrumental in maintaining interpersonal relationships in the face of social adversity. For example, state intellectual humility is associated with higher positive affect and sense of closeness toward others following an interpersonal conflict [111].

Overall, people reporting greater intellectual humility tend to be more open to opposing perspectives and more forgiving of others' offenses. However, because reviewed empirical evidence is cross-sectional, it remains to be seen whether intellectual humility causes these social benefits.

Individual benefits. Intellectual humility might also have direct consequences for individuals' wellbeing. People who reason about social conflicts in an intellectually humbler manner, and consider others' perspectives (components of wise reasoning) are more likely to , report higher levels of life satisfaction and less negative affect compared to people who do not [41].

Leaders who are higher in intellectual humility are also higher in emotional intelligence and receive higher satisfaction ratings from their followers, which suggests intellectual humility could benefit professional life [112,113]. Nonetheless, intellectual humility is not associated with personal wellbeing in all contexts: religious leaders who see their religious beliefs as fallible experience lower wellbeing relative to leaders who are less intellectually humble in their beliefs [114].

Intellectual humility might also help people make well-informed decisions. Intellectually humbler people are better able to differentiate between strong versus weak arguments, even if those arguments go against their initial beliefs [9]. Intellectual humility may also protect against memory distortions. Intellectually humbler people are less likely to falsely claim that they have seen certain statements before[115]. Likewise, intellectually humbler people are more likely to scrutinize misinformation and are more likely to intend to receive the COVID-19 vaccine [116,117].

Lastly, intellectual humility is positively associated with knowledge acquisition, learning, and educational achievement. Intellectually humbler people are more motivated to learn and more knowledgeable about general facts [39]. Intellectually humbler high schoolers and university students expend greater effort when learning difficult material, are more receptive to assignment feedback, and earn higher grades [14,118].

Despite evidence of individual benefits associated with intellectual humility, much of this work is correlational. Therefore, associations may be the product of such confounding factors as agreeableness, intelligence, or even general virtuousness. Longitudinal or experimental studies are needed to address the question whether and under what circumstances intellectual humility promotes individual benefits. Notably, the philosophical theorizing about situation-specific virtuousness of the construct suggests that high levels of intellectual humility are unlikely to benefit all people in all situations[30,31].

Improving intellectual humility. Given the benefits of intellectual humility in various contexts, it might be desirable to increase one's level of intellectual humility. Daily diary and experience sampling studies, along with cross-cultural surveys, show that people's level of intellectual humility systematically varies within and across individuals facing different ecological and situational demands, creating opportunities for intervention [34,37,50,119]. Initial evidence suggests several promising techniques for boosting intellectual humility.

Some experiments have documented short-term gains in intellectual humility following brief reflection, writing, or reading exercises carefully designed to shift intellectual humility in the moment. Participants showed higher levels of intellectual humility after reflecting on experiences by taking a step back and envisioning oneself from the vantage point of a distant observer (self-distanced), rather than imagining oneself living out a particular situation (self-immersed) [34]. In other experiments, participants self-reported higher levels of intellectual humility after reflecting on trust betrayal scenarios of real-life events involving disagreements or interpersonal conflicts from self-distanced rather than a self-immersed perspective[1,120]. In a series of studies on the "illusion of understanding," people also overestimated their self-reported knowledge of a policy less after writing a detailed explanation of how that policy works, thereby recognizing that their knowledge of the policy was less complete than they originally thought [63,121,122]. Likewise, people reported less confidence when answering a question if they first identified their 'known unknowns' by listing two things they did not know [123]. In another study, simply reading about the benefits of being intellectually humble, as opposed to being highly certain, also boosted self-reported intellectual humility [118]. Similarly, reading a short, persuasive article about intelligence being a malleable characteristic that can be developed, as compared to a
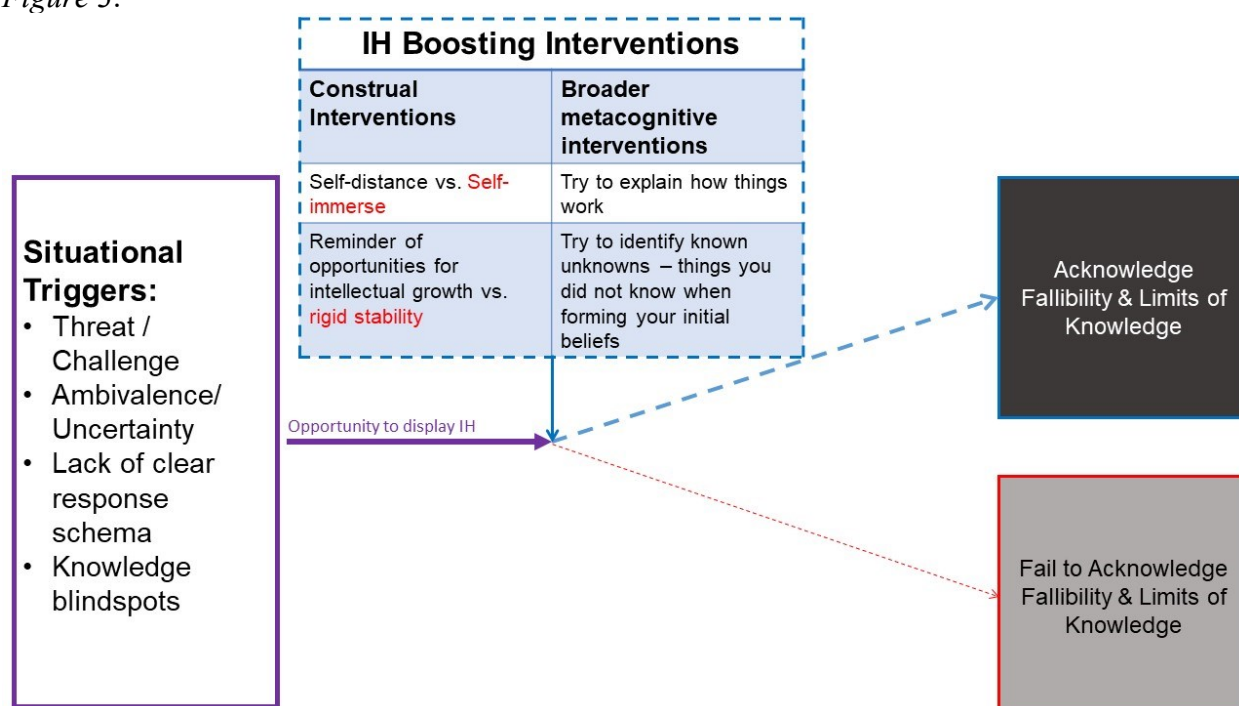
fixed characteristic that is mostly genetically determined, increased self-reported state intellectual humility[19]. These studies collectively suggest that intellectual humility can be temporary boosted through simple, low-cost techniques.

Though promising, most of these experiments were run on small to medium-sized samples and have not been subject to replication. Two exceptions are the self-distancing effect, which has been replicated in several studies, and the illusion of understanding work. The latter originally showed that writing a detailed explanation of how a policy worked reduced both overestimation of knowledge and attitude extremity[121]. A close replication of the original study reduced overestimation of knowledge but did not change people's extreme attitudes. [124]. In addition, the majority of studies reviewed above used self-report questionnaires to measure intellectual humility or indicators of intellectual humility. Results corroborated with behavioral measures and larger, more representative samples would shed more light on the extent to which brief techniques can boost intellectual humility.

A few intervention studies have sought to train intellectual humility and measure the effects of this training over longer time-periods than within a single session. In a randomized control trial, participants were assigned to a month-long diary activity that was either self-distanced – the intervention condition – or self-immersed – the comparison condition. Participants in the intervention group wrote daily reflections on significant issues from a self-distanced perspective, and those in the comparison group did the same from a self-immersed perspective. Participants in the intervention group showed higher positive change in intellectual humility (coded from written narratives) when examining responses at the end of the month (after the intervention) to those at the beginning of the month (before the intervention), compared to the participants in the control group [125]. Two further studies sought to increase intellectual humility through secondary and undergraduate philosophy courses. In one quasi-experimental study, a lesson on intellectual humility was either included at the beginning of a five-week philosophy class or not. Undergraduates who received the lesson showed greater levels of compromise-seeking in conflicts and were perceived by their peers as having higher intellectual humility than those in a control group at the end of the course, though the lesson did not increase self-reported intellectual humility[126]. Likewise, participation in a week-long philosophy summer camp for at least three years non-significantly increased self-reported intellectual humility among high school and middle school students relative to a control group who only attended one or two week-long sessions of the camp [127]. However, neither of the latter two interventions used a randomized design, so selection bias – where one comparison group systematically differs from the other on a variable other than receiving the intervention – may be responsible for the effects. Overall, research supports the use of self-distanced diary writing to increase intellectual humility. By contrast, evidence remains limited and inconclusive on whether intellectual humility can be increased with classroom teaching.

Figure 3.

IH Boosting Interventions

Construal Interventions	Broader metacognitive interventions
Self-distance vs. Self-immerse	Try to explain how things work
Reminder of opportunities for intellectual growth vs. rigid stability	Try to identify known unknowns – things you did not know when forming your initial beliefs

Situational Triggers:
- Threat / Challenge
- Ambivalence/ Uncertainty
- Lack of clear response schema
- Knowledge blindspots

Opportunity to display IH

Acknowledge Fallibility & Limits of Knowledge

Fail to Acknowledge Fallibility & Limits of Knowledge

Psychological strategies to boost intellectual humility | Figure depicting the process model through which situational triggers (unshaded box) may either result in greater intellectual humility (dark shaded, rightmost box) or intellectual arrogance (lightly shaded, rightmost box). The central box (partially shaded) depicts strategies that boost intellectual humility (black text) and strategies that hinder intellectual humility (red text). Whereas some construal interventions such as self-distancing and consideration of potential for growth, as well as broader metacognitive interventions such as helping to puncture the illusion of explanatory depth help to boost intellectual humility, other strategies such as self-immersing or rigid focus on stability can result in failure to acknowledge fallibility and limits of knowledge.

Summary and future directions

Recognizing one's ignorance and intellectual fallibility are core features of intellectual humility. Intellectually humbler people appear to be more curious, better liked as leaders, and tend to make more thorough, well-informed decisions. Intellectually humbler people also seem more open to cooperating with those whose views differ from their own. These habits of mind seem to be vital for confronting many of the challenges facing societies today, and are beneficial to laypeople, policy makers, and scientists (Box 1).

Despite the wealth of current insights on intellectual humility, a range of critical themes remain unexplored. One challenge is to understand when exactly intellectual humility becomes too much of a good thing. Arguably, contexts calling for judgment by a certain deadline and/or based on a pre-defined set of existing facts (such as in a legal court, in a war room, or in executive business meetings) can only benefit from intellectual humility when permitted by time and due process of law. In moments that require decisive action, focusing on one's fallibility and limits of knowledge might not be the best strategy. Intuitions about the bounded utility of

intellectual humility are corroborated by qualitative interviews with military personnel and business employees [128]. Moreover, situational contexts in which intellectual humility helps or does not help remain unexplored. Research identifying when and for whom intellectual humility becomes disadvantageous would help address this gap in the psychological science of intellectual humility.

Most research on intellectual humility has approached it as a relatively stable way that a particular person behaves across situations[32]. More work is required to understand how intellectual humility varies within a particular person in different situations and domains, and how organizations and cultures differ in intellectual humility. Future work will need to explore the causal links between a culture's emphasis on interdependence in social coordination and intellectual humility. Studies that measure intellectual humility across multiple domains and in multiple societies [99] will also lead to a better understanding of how cultural social coordination might shape intellectual humility in different domains. For example, large threats like war, natural disasters, or pandemics might increase the need for interdependence in social coordination, creating a culture that encourages people to be intellectually humble during social conflict with close friends and family. In turn, this intellectual humility might increase the capacity for social coordination at the expense of intellectual humility with strangers or those who question ideological orthodoxies, to safeguard social coordination from further threat [99].

Interventions offer another avenue for future research. It remains to be seen whether interventions to boost intellectual humility can meaningfully address difficult societal problems such as polarization, misinformation, and conspiracy beliefs. Perhaps helping individuals become more aware of their intellectual fallibility can address such problems. Intellectual humility interventions might need to also incorporate social-contextual elements, such as changing organizational cultures, to produce meaningful improvements. Interventions should also measure changes in intellectual humility over a longer period of time to test whether and how long effects endure, and to identify interventions of optimal strengths to induce long-lasting change in intellectual humility[129].

Future research should also explore the role of larger cultural forces, such as media landscapes and public communication, in promoting or reducing intellectual humility. Public figures are often denigrated in the media for changing their minds or admitting mistakes [130]. News media also typically avoids reporting areas of uncertainty or ambiguity in favor of black-and-white stories, even though communicating uncertainty can promote trust in science[131–133] (though see[134]). Individuals might only be able to embrace intellectual humility to the extent that institutions validate and support it. Thus, interventions that normalize intellectually humility in public communication should be studied for the potential impact on both individuals and societies.

In the spirit of intellectual humility, we conclude by pointing out that intellectual humility is not a panacea. Although it has promise to counter societal incivility and misinformation, intellectual humility is cognitively effortful and is insufficient for addressing many other societal challenges. Moreover, a systemic approach is needed to foster intellectual humility at scale. Such an approach could involve a range of incremental changes that afford each person greater recognition of the limits of their knowledge and awareness of their fallibility. This approach to fostering intellectual humility calls for societal change in educational, scientific, and business

cultures: away from treating intellectual humility as a weakness and toward treating it as a core value that is celebrated and reinforced. Individual-focused interventions to boost intellectual humility are not likely to be effective in the long term without corresponding societal changes.

Box 1: **Intellectual humility in science**

The scientific enterprise is inherently imbued with uncertainty: When new data emerge, older ideas and models ought to be revised to accommodate the new findings. Thus, intellectual humility might be particularly important for scientists because it enables scientific progress. Acknowledging the fallibility of scientific results via replication studies can help scientists revise their beliefs about evidence for particular scientific phenomena[149]. Furthermore, scientific claims are typically probabilistic, and communication of the full finding requires communication of uncertainty intervals around estimates. For example, within psychology, most phenomena are multidetermined and complex. Moreover, most new psychological findings are provisional, with a gap between laboratory observation and application in real-world contexts. Finally, most findings in psychological sciences focus on explaining the past, and are not always well equipped for predicting reactions to critical social issues[150]. Critically, prediction is by definition more uncertain than (post-hoc) explanation, yet at the same time in most instances it is also of greater practical value. Focusing on predictions to test understanding of causal models in sciences can be a powerful way to foster intellectual humility. In turn, emphasizing the general value of intellectual humility can help scientists to commit to predictions, even if such predictions turn out to be wrong.

Because of uncertainty around singular scientific findings, communication of scientific insights to policy makers, journalists, and the public requires scientists to be intellectually humble[15]. Despite worry by some scientists that communicating uncertainty would lower public trust in science[151,152], there is little conclusive evidence to support this claim[153]. Whereas communicating consensus uncertainty, that is uncertainty in expert opinions on an issue, can have negative effects for trust[154], communicating technical uncertainty in estimates or models via confidence intervals or similar techniques has either positive or null effects for perception of scientific credibility[154]. At the same time, members of the public who show greater intellectual humility are better able to separate scientific facts from misinformed fictions. Although intellectual humility is foundational for science, scientists often shy away from reporting complex data patterns, preferring (often unrealistically) clear, 'groundbreaking' results[15]. Recognition of the limits of knowledge and of theoretical models can be beneficial for increasing credibility within the scientific community. Embracing intellectual humility in science via transparent and systematic reporting on limitations of scientific models and constraints on generality has the potential to improve the scientific enterprise[155]. Within science, intellectual humility could help reduce the file-drawer problem—the publication bias toward statistically significant or otherwise desired results, calibrate scientific claims to the relevant evidence, buffer against exaggeration, prevent motivated cognition and selective reporting of results that affirm one's hypotheses, and increase the tendency to welcome critique of one's work by other scholars.

661 **Table 1. Measures of intellectual humility**

Definition	Metacognitive emphasis	Approach	Aspect	Type
Multi-dimensional trait of self-oriented and other-oriented facets, characteristic way of responding to new ideas, seeking out new information, being mindful of others' feelings, and reactions in intellectual engagements [135]	Limits of knowledge + Fallibility awareness	Multidimensional	Trait	Questionnaire
Acknowledging the limitations of one's knowledge; accurately representing one's knowledge to other people, and being open to others' input [38]	Limits of knowledge	Multidimensional	Trait	Behavioral task
Absence of self-enhancement motive and egotistical bias. Ability to be objective with respect to one's beliefs [136]	Fallibility awareness	Multidimensional	Trait	Questionnaire
Placing an adequate level of confidence in one's beliefs, revising beliefs when needed, and being willing to consider other people's beliefs [35,37]	Limits of knowledge + Fallibility awareness	Multidimensional	Trait & State	Questionnaire
Having an accurate view of one's intellectual strengths and weaknesses and being respectful of others' ideas [101]	Limits of knowledge + Fallibility awareness	Multidimensional	Trait	Questionnaire
The mindset and actions associated with treating one's own views (such as beliefs, opinions, and positions) as fallible [137]	Fallibility awareness	Multidimensional	Trait	Questionnaire
Recognizing that a particular personal view or belief might be fallible, accompanied by an appropriate attentiveness to limitations in the evidentiary basis of that view or belief and to one's own limitations in obtaining and evaluating information relevant to it [33]	Fallibility awareness	Metacognitive	State	Questionnaire
Same as [33] but using a trait rather than belief-specific approach[9]	Fallibility awareness	Metacognitive	Trait	Questionnaire
The capacity to remain cognitively open to counterarguments particularly when the counterargument poses some threat [42]	Fallibility awareness	Multidimensional	State	Questionnaire
Recognizing the limits of one's knowledge [1,49,99]	Limits of knowledge	Metacognitive	State	Questionnaire, content analysis
A non-threatening awareness of one's intellectual fallibility [39,138]	Fallibility awareness	Multidimensional	Trait	Questionnaire
Having insights about the limits of one's knowledge and regulating intellectual arrogance in relationships [40]	Limits of knowledge	Multidimensional	Trait	Questionnaire
Low self-focus and little concern for status, caring most about the intrinsic value of knowledge and truth [139]	Fallibility awareness	Multidimensional	Trait	Questionnaire
Willingness to recognize the limits of one's knowledge and appreciate others' intellectual strengths [19]	Limits of knowledge	Multidimensional	Trait	Questionnaire
Openness to information that might conflict with one's personal views and relatively weak needs to enhance one's ego [89]	Limits of knowledge + Fallibility awareness	Multidimensional	State	Questionnaire

662 *Note.* Emerging research efforts measure intellectual humility with automated natural language processing techniques, promising to side-step issues concerning
663 self-report biases common to questionnaire measures [140]. Future work will be able to speak to the validity of this approach for measuring intellectual humility at
664 scale.

Table 2. Correlates of Intellectual Humility

Domain	Variable	Direction	Clarity of Evidence
Cognitive	Cognitive Ability[11,38,39,105]	Mixed	Unclear
	Dogmatism[9,35,140,141]	Negative	Clear
	Need for Cognition[9,18,19,39]	Positive	Clear
	Need for Cognitive Closure[19,142]	Mixed	Unclear
	Open-minded thinking/ Intellectual Openness/ Curiosity[2,9,11,19,35,39,43,49,116,118,138,139,143–145]	Positive	Clear
Social	Empathic Concern[110,146]	Positive	Clear
	Emotional Diversity[50,120]	Positive	Clear
	Forgiveness of others[40,49,50,112]	Positive	Clear
	General Humility[18,19,138]	Positive	Clear
	Perspective Taking[34,49,50,110,111,120,146]	Positive	Clear
	Political Orientation[9,19,22]	Unrelated	Somewhat clear
	Positive perception of person/disagreement[22,37,42,102,103,105,112,138,147]	Positive	Clear
	Prosociality[2,40,110,117]	Positive	Clear
	Seeking Compromise[49,50,111,120]	Positive	Clear
	Social Desirability[2,19,35,39,49,110,138]	Positive	Somewhat clear
Personality	Agreeableness[9,18,19,22,35,40,126,139,146]	Positive	Clear
	Conscientiousness[19,22,35,40]	Positive	Somewhat clear
	Extraversion[22,35,49,139]	Positive	Somewhat clear
	Neuroticism[35,40,49,139,148]	Negative	Clear
	Openness to experience[9,18,19,22,35,40,43,49,105,138,139]	Positive	Clear

Note. Only variables with two or more manuscripts examining them are included (39 manuscripts in total are included). For Clarity of Evidence, "Clear" signifies that the direction of the association of the variable is consistent across manuscripts. "Somewhat clear" signifies that at least one manuscript reports a finding inconsistent with the other manuscripts. "Unclear" signifies that there is no consistency in results reported across manuscripts.

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