

Situation-Based Contingencies Underlying Wisdom-Content Manifestations: Examining
Intellectual Humility in Daily Life

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Abstract

Objectives: Existing assessments of intellectual humility (IH)—a key component of wisdom—do not examine its manifestation in daily life while sufficiently focusing on the core idea of the construct: owning up to one’s intellectual shortcomings. The present research sought to examine situational contingencies underlying daily manifestations of IH-relevant characteristics. The State-Trait IH scale developed here is novel in that it both offers greater content validity and coverage of IH and provides a robust measure for assessing IH in a contextualized manner in daily life. **Methods:** We developed a trait version of the State-Trait IH Scale in two studies and subsequently examined daily manifestations of IH-relevant characteristics utilizing a contextualized state version of the State-Trait IH Scale in a 21-day experience sampling study. Here we tested how specific situational contingencies (associated with *the context and the personality of the individual with whom participants engaged*) influenced the manifestation of IH-relevant qualities. **Results:** We found strong evidence for the validity of both versions of the scale. Specifically, the state measure exhibited high within-person variability, and aggregated state assessments were strongly correlated with the trait measure. Additionally, morality positively predicted manifestation of IH, while disagreeableness negatively predicted manifestation of IH. **Discussion:** These results offer new directions for research on the expression of wisdom-related characteristics in daily life.

Keywords: intellectual humility; within-person variability; multilevel modeling; density distribution approach

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From the place where we are right
Flowers will never grow
In the spring.

The place where we are right
Is hard and trampled
Like a yard.

But doubts and loves
Dig up the world
Like a mole, a plow.
And a whisper will be heard in the place
Where the ruined
House once stood.

— Yehuda Amichai, “*The Place Where We Are Right*”

“It is unwise to be too sure of one's own wisdom. It is healthy to be reminded that the strongest might weaken and the wisest might err.”

— Mahatma Gandhi

Contemporary scientists have expressed an increased interest in understanding wisdom (e.g., Grossmann, 2017; Jayawickreme & Blackie, 2016; Staudinger & Gluck, 2011; Sternberg, 1998; Thomas & Kunzmann, 2014; Webster, Westerhof, & Bohlmeijer, 2014). One prominent approach to wisdom conceptualizes it in terms of unbiased thought (Brienza, Kung, Santos, Bobocel, & Grossmann, 2017), and as such, researchers have argued that wisdom-relevant cognition is facilitated through the enactment of intellectual humility (IH; Grossmann, 2017; Whitcomb, Battaly, Baehr & Howard-Snyder, 2015). IH has been primarily defined in terms of a disposition to be alert to, admit to, and take responsibility for cognitive limitations and mistakes

(Whitcomb, Battaly, Baehr & Howard-Snyder, 2015; see also Roberts & Wood, 2007 for an alternative view). Yet, as we outline in the following section, capturing the manifestation of IH-related qualities in daily life are needed to gain an accurate understanding of individuals' trait standing on IH (Brieza & Grossmann, 2017; Fleeson & Jayawickreme, 2015), as well as whether specific *situational contingencies* (Fleeson, 2007) predicts cross-situation variability in daily manifestations of IH-relevant characteristics. The present research therefore focuses on examining the extent to which daily manifestations of IH-relevant characteristics are characteristic of a psychological capacity to demonstrate wise reasoning in daily life after challenging interpersonal situations (Jayawickreme & Blackie, 2016), as well as specific situations associated with daily manifestations of IH-relevant characteristics (Fleeson, 2007; see also Bleidorn & Denissen, 2015). In order to examine this question, we develop a new trait and state measure of IH that allows for the direct comparison of trait and state responses with instruments assessing the same content.

Current Conceptualizations and Assessments of Intellectual Humility

Leary et al. (2017) conceptualized IH in terms of recognizing the fallibility of personal beliefs accompanied by appropriate attentiveness to the evidence available for that belief, as well as one's own limitations in obtaining and evaluating relevant information. Hoyle, Davisson, Diebels, & Leary (2016) offer a variation on this view and apply this definition to specific personal views. Alternatively, Meagher et al. (2015) emphasize "an accurate or modest assessment" of one's intelligence, being receptive to the contributions of others, and being able to accept criticism about one's own ideas. McElroy et al. (2014) provide a third distinct definition, which emphasizes both insight about the limits of one's knowledge, involving openness to new ideas, and regulating arrogance, marked by the ability to present one's ideas in a

non-offensive manner and receive contrary ideas without taking offense, even when confronted with alternative viewpoints. Finally, Krumrei-Mancuso & Rouse (2016) identify four distinct dimensions of IH: independence of intellect and ego, openness to revising one's viewpoints, respect for others' viewpoints, and lack of intellectual overconfidence.

Although it should be noted that some definitions of humility incorporate aspects of IH (see Chancellor & Lyubomirsky's [2013] identification of "openness to new information" as a hallmark of humility), definitions of IH all clearly distinguish IH from general humility, as well as emphasizing the fallibility of possessed knowledge. However, insofar as one defines a disposition to be alert to, and to 'own' cognitive limitations and mistakes as integral to IH, as argued by some philosophers specializing in epistemology and intellectual virtues (Whitcomb et al., 2015), then many of the above definitions are problematic for capturing this core feature. For example, Meagher et al. (2015) focus on "an accurate or modest assessment" of one's intelligence rather than on taking ownership of one's mistakes. This focus may further conflate the accuracy of one's knowledge with moderate estimations (which may sometimes be underestimations) of one's beliefs. Other IH questionnaires move beyond the disposition to be alert to and to own one's cognitive limitations, including domains that arguably are not central components to IH. For example, McElroy et al. (2014) developed an informant measure of IH in which IH was conceptualized as an ability to weigh a lack of arrogance as equally important to insight into the limits of one's knowledge (of note, this added dimension may be an attempt to incorporate an additional philosophical perspective on IH provided by Roberts & Wood [2007]). Krumrei-Mancuso and Rouse's (2016) definition goes even further, adding dimensions that arguably represent outcomes that IH would predict as opposed to core dimensions of the constructs itself, such as independence of intellect and ego. Characteristics such as independence

of intellect and ego are possibly characteristics exhibited by wise individuals (Wayment & Bauer, 2008), yet are not a core component of IH per se. Such over-inclusion of dimensions therefore represents examples of “concept creep” into the area on IH (Tangney, 2000).

Of the existing measures of IH, Leary et al.’s (2017; see also Hoyle et al., 2016) definition is the closest to Whitcomb and colleagues’ (2015) definition of IH as a disposition to be alert to and to ‘own’ cognitive limitations and mistakes. The six-item measure by Leary et al. (2017) fits closely with the idea of admitting fallibility of one’s ideas that is central to IH (Whitcomb et al., 2015). However, in sharp contrast to the problems of “concept creep,” the relative brevity of Leary et al.’s scale’s means that it prioritizes reliability over breadth and therefore may be missing core thoughts, feelings and behaviors characteristic of IH that manifest in daily life. Specifically, given that IH frequently manifests itself in interpersonal contexts (Grossmann et al., 2016), a state measure of IH should include assessments of thoughts, feelings and behaviors associated with IH in interpersonal contexts. This is in contrast with the broader, less contextualized items included in the Leary et al. (2017) measure (e.g. “I accept that my beliefs and attitudes may be wrong”, “I question my own opinions, positions, and viewpoints because they could be wrong”). In other words, the Leary et al.’s focus on a small number of key IH-relevant characteristics may not make it suitable as a comprehensive and contextualized state assessment of IH.

The Importance of Assessing IH in Daily Contexts

Given that it is imperative to assess the wisdom of an action within the confines of a particular context, Grossmann et al. (2016) have asserted that wisdom is best assessed through daily manifestations of wise reasoning and behaviors. This echoes the sentiment of Fleeson (2001; 2007), who proposed that personality traits can be best understood as *density distributions*

of personality states. This conceptualization of personality focuses on the extent to which an individual manifests a given trait at a specific point in time. Fleeson's (2001) research demonstrated that while individuals' mean trait-levels varied from person to person, individuals demonstrated a greater degree of variation around their own mean. Essentially, an individual's behavior varies significantly, albeit systematically, depending on the demands of the situation. For example, a shy individual might be less talkative than some individuals on average, but she will be more talkative in situations when she is with friends than when she is alone. We note that states differ from traits in distinct ways (Jayawickreme, Meindl, Helzer, Furr & Fleeson, 2014). States are phenomenologically experienced, and can be thought of a set of emotions, as well as cognitions and actions, in a particular situation. In contrast, traits represent an individual's base-rate proclivity toward (or away from) a set of emotions, cognitions, or actions (Fleeson, 2001; Sedikides, Slabu, Lenton, & Thomaes, 2017, p. 522). Also, the duration of a state is shorter than that of a trait, meaning that states and traits are quantitatively distinguishable. Additionally, there are certain features associated with states that may not be associated with the corresponding trait. To provide one example, while trait extraversion may be associated strongly with brain structure, such a relationship may not be evident for state extraversion. (Jayawickreme et al., 2014, p.294).

Building on this view, Fleeson (2007) provided initial support for the integration of individual-differences theories and within-person process approaches to personality psychology. On this view, within-person variability at the trait level is predicted by characteristics of the situation that are psychologically active for that trait, meaning that the situation evokes a change in the extent to which one might enact behavior consistent with the content of a given trait (Bem & Allen, 1974; Cervone, 2004; Frederiksen, 1972; Funder, 2001; Furr & Funder, 2004; Pervin, 1978; Shoda & Lee Tiernan, 2002; Snyder & Cantor, 1998; Ten Berge & De Raad, 1999;

Vansteelandt & Van Mechelen, 2004). Indeed, the research showed that, for characteristics of the Big Five personality traits, situational features or psychologically active characteristics of situations such as anonymity and task-orientation were predictive of within-person variability in the manifestations of trait-relevant characteristics.

Fleeson (2007) also acknowledges that, while these psychologically active characteristics influence manifestations of personality traits and can explain within-person variability in manifestations of personality traits, this process is also reliably affected by the trait itself, and the contingencies differ based on the individual. Although this may seem at odds with both the individual difference and within-person process theories of personality, Fleeson (2007) further addresses the idea that these results indicate that variability and stability are not mutually exclusive, nor does the magnitude of one diminish the magnitude of the other. Further, he posits that these findings regarding variability and stability offer unique opportunities for psychologists to understand the mechanisms of personality trait manifestation in a given situation.

Building on the findings of Fleeson (2007), further research has found adjacent results when investigating situational contingencies for character traits and virtuous behavior (Bleidorn & Denissen, 2015). Character traits differ from personality traits (e.g., the Big Five explored by Fleeson [2007]) in that the traits themselves are viewed as inherently positive and of moral value. Bleidorn and Denissen examined an individual's social role – parent or professional – at a given time as a situational contingency for a variety of virtue states. The researchers found that within-person variation in virtue states was reliably contingent on the individual's social role at the time of the report. In addition to this result, the participants also showed stability over time in their degree of variability as well as the ways in which they reacted to the situation.

Thus, a *situational contingency* is defined here as a systematic relationship between a given state (i.e., intellectual humility) that an individual enacts and a given characteristic of the situation (Fleeson, 2007). For example, an individual may experience an increase in intellectual humility when debating a political issue with a friend. In this example, there is a contingency of the intellectually humble state as a function of engagement with that specific situation. Such contingencies do not refer to the trait of intellectual humility itself or to individual differences in intellectual humility. *Instead, they refer to changes in the state, that is, to changes in the extent to which the affective, behavioral, and cognitive content of the trait of intellectual humility describes the way the individual is being at the moment.* In our research, the question is whether specific situations increase the extent to which individuals can be described as intellectually humble while they are in that situation, as opposed to how individual differences in intellectual humility are revealed in such situations.

We note that recent work has begun to highlight the importance of situational contingencies for the manifestation of IH-relevant characteristics. For instance, Grossmann and Kross have shown that IH is heightened in situations that involve reflecting on challenges faced by others, rather than personal challenges (Kross & Grossmann, 2012; Grossmann & Kross, 2014). Additionally, diary work by Grossmann et al. (2016) showed evidence for increased state IH in situations where work colleagues or friends were present, as opposed to the presence of strangers. One explanation for these findings is that taking the perspective of another may be a critical mechanism for wise reasoning.

Moreover, given that IH has been conceptualized as a morally-relevant trait (Baehr, 2011), prior work exploring situational characteristics of virtue-relevant states is relevant here (Bleidorn & Denissen, 2015). Specifically, Bleidorn and Denissen's work highlights the

likelihood that character traits may not be relevant or appropriate to enact in every situation. For example, it may not be relevant to behave in an intellectually humble manner about trivial, factual disagreements. In the context of the present research, we would therefore expect to see within-person variation in IH from moment to moment, as IH would only be expected to manifest in relevant situations. Thus, developing an appropriate state measure of IH allows us to capture this within-person variation and provides a point of comparison to examine the validity of trait measures of IH. Furthermore, as IH is a morally-relevant trait, there is potential for socially desirable responding and self-enhancement biases in traits (Brienza et al., 2017). Research shows that daily measures of morally-relevant traits are less susceptible to these biases, as people are less willing to misrepresent their behaviors in the moment (Meindl, Jayawickreme, Furr, & Fleeson, 2015). Therefore, self-reports of state IH should be less susceptible to such biases compared to self-reported global trait assessments.

Existing State Measures of Intellectual Humility

While Grossmann and colleagues (2016) identified IH as one such wisdom-related construct, their state assessment of IH consisted of just one item on gathering more information and two items on the potential impact of challenging experiences, as opposed to directly assessing IH as acknowledging one's limitations. More recently, Brienza et al.'s (2017) expanded contextualized measure included four items assessing IH, which focus on double-checking one's information before formulating one's opinion (e.g., "*I double-checked whether my opinion on the situation might be incorrect*"; "*I double-checked whether the other person's opinions might be correct*"; "*I looked for any extraordinary circumstances before forming my opinion*"; "*I behaved as if there may be some information to which I did not have access*"), as well as four items assessing change and multiple outcomes that are arguably relevant to IH (e.g.,

“I often consider multiple ways how social situations may unfold”). While the assessment of IH as an acknowledgement of the limits of one’s knowledge is indeed consistent with the core conception of the trait as a disposition to be alert to and ‘own’ one’s cognitive limitations and mistakes (Whitcomb et al., 2015), the state version of the measure described in the present research aims to expand on Brienza et al.’s (2017) pioneering work by providing a more comprehensive assessment of IH in daily life. The present study thus fills a gap in the literature (Brienza & Grossmann, in press) by combining an assessment of daily manifestations of characteristics relevant to IH (Grossmann et al., 2016) with a contextualized approach to assessing these qualities (Brienza et al., 2017).

Assessing Intellectual Humility Content at Both the Trait and State Level

As we have discussed earlier, assessing IH in daily life utilizing state self-reports can capture dynamic personality processes, including person-by-situation interactions and within-person fluctuations of trait-relevant thoughts, feelings and behavior. Additionally, recent research has focused on the extent to which self-reported global trait standings capture manifestations of the trait in daily life (Fleeson & Gallagher, 2009). Fleeson and Gallagher (2009) found that for the Big Five traits, self-reported global trait standings were strongly predictive of individual differences in trait manifestation in behavior. Specifically, Big Five trait standings predicted average levels with correlations between .42 and .56, and approached .60 for stringently restricted studies.

Finnigan and Vazire (2017) however found that aggregated Big Five state responses did not predict additional variance in informant reports of Big 5 traits after controlling for global Big Five self-reports. While these findings point to the importance of examining the measurement limitations of experience sampling (Fleeson, 2017), the present research is innovative in both

employing a contextualized approach to assessing state IH (as noted above), and developing an equivalent set of items to assess IH at both the state and trait level. With regards to the importance of assessing state and trait IH with the same set of items, we note that the Big Five state items Finnigan and Vazire (2017, Study 2) employed only contained 2–3 items per trait. This was in contrast to the global self- and informant reports, which contained 8–9 items per trait. While Finnigan and Vazire addressed this limitation by performing additional analyses employing only the 2-3 common items across the state and trait items, having assessments that capture the full range of the thoughts, feelings and behaviors would have provided important additional information on the trait. Therefore, an important goal of the present study was to develop a measure of IH that both accurately assessed the full range of thoughts, feelings and behaviors associated with the construct that could be employed at both the trait and state level. The main goal of developing the State-Trait IH Scale, in sum, is to create a scale that assesses core features of IH *at both the trait level and in daily life* while ensuring it sampled an adequate range of thoughts, feelings, and behaviors associated with IH.

The Present Research

The present research aims to assess wisdom through a focus on its individual components, focusing specifically on IH. Building on the conceptual research outlined above, in the present research we develop and validate a new measure to assess IH, the State-Trait IH Scale. In a subsequent 21-day, twice-daily experience sampling study, participants reported on interpersonal interactions that could potentially elicit manifestations of IH-relevant characteristics. Here, the researchers validated a state version of the measure, examined intra-individual variability in the measure, explored the relationship between trait and state IH, and

tested how specific situational contingencies influenced the manifestation of IH-relevant characteristics.

The present research focuses primarily on one feature of the situation—the individual with whom participants were engaging when they reported IH manifestations, because admitting to one’s cognitive limitations and taking responsibility for mistakes is an interactive social process. Given that successfully coordinating interpersonal actions is vital for in-group coordination and other survival-related activities (Brienza & Grossmann, in press; Ellis, Bianchi, Griskevicius, & Frankenhuus, 2017), we would expect state IH to vary in response to changes in the perceived social context. Moreover, following current accounts of IH, situations that fostered defensiveness are typically associated with lower levels of state IH, while situations that fostered non-defensiveness are associated with higher levels of state IH (Whitcomb et al., 2015). Therefore, we hypothesized that perceiving an interpersonal situation as a disagreement (fostering defensiveness in the participant) would therefore be associated with low levels of state IH. This trait content-relevant hypothesis is also consistent with past work showing that trait-relevant situations (studying/working) predicted fluctuations in state conscientiousness (Wilson, Thompson, & Vazire, 2017). We also hypothesized that the participants’ perceiving the individual interacting with them as more moral would foster a non-defensive perception of that individual (given that perceiving individuals as moral indicates the nature of a person’s intentions and whether those intentions are oriented toward being helpful or harmful, good or bad; Goodwin, 2015, p. 42) and would therefore be associated with exhibiting high state IH.

Item Development and Pilot Studies

The process for generating items for the State-Trait IH scale first required definitional clarity on the core features of IH. An initial review of the literature yielded a number of differing definitions, including a conceptualization of IH as a lack of concern for intellectual vices (Roberts & Wood, 2007). However, the authors, in careful review of the literature and extensive discussions with a moral philosopher with a specific interest in intellectual virtues (Alan Wilson, University of Bristol), determined that a simple lack of intellectual arrogance is not indicative of the presence of IH, as it could instead be the marker of a complete lack of confidence or ability, rather than proper attentiveness to one's knowledge. As such, we determined that there were significant limitations to Roberts and Wood's (2007) "low concern" account of IH. The authors determined that these concerns are largely alleviated by adopting the "limitations owning" conceptualization (Whitcomb et al., 2015), which presents intellectual humility as a middle ground between intellectual arrogance - that is, overconfidence in the value of one's intellectual abilities and ideas - and a complete lack of confidence in the value of one's intellectual abilities and ideas. In the "limitations owning" account, therefore, intellectual humility cannot be understood as the absence of arrogance, vanity, conceit, egotism, hyper-autonomy, grandiosity, pretentiousness, snobbishness, impertinence (presumption), haughtiness, self-righteousness, domination, selfish ambition, and self-complacency (as described by Roberts and Wood, 2007), and instead can be more accurately conceptualized as a proper awareness of and attentiveness to intellectual limitations.

With the Whitcomb et al. (2015) conceptualization of IH in mind, and the overarching goal of understanding how IH presents in daily interactions, the team began to generate items that captured the manifestation of IH in daily social interactions. This process consisted of reviewing existing scales for IH and IH-relevant constructs, and identifying ways in which

available instruments were appropriate or inappropriate for assessing IH in daily social interactions. Items which we determined to be potentially appropriate for use in assessing IH focused on an awareness and openness to new information that differed from one's existing opinion or belief. After determining the ways in which these measures successfully accounted for the "limitations owning" conceptualization of IH, the team created a set of items which assessed affective, behavioral, cognitive and motivational aspects of IH in daily life. Drawing on the contextualized approach of Grossman et al. (2016), the authors and their collaborators sought to identify items which could be applied both broadly to describe personality (traits) and to specific instances (states) by only changing verb tense. These 20 items can be found in Appendix A.

Across two pilot studies, we subsequently developed and tested the trait version of the State-Trait Intellectual Humility Scale, as well as a contextualized measure in which participants responded to the IH items in their state format, with regards to a particular incident of their choosing. In addition, we collected data pertaining to convergent and discriminant validity, and assessed the performance of the State-Trait IH Scale by comparison to existing trait IH scales (Leary, et al., 2017; Krumrei-Mancuso & Rouse, 2016). The pilot studies are briefly summarized below; detailed information can be found in the Appendix.

Pilot Study 1

Participants. The participants for Pilot 1 were 612 individuals in the United States recruited through MTurk. The data set was randomly divided into two groups to serve as the samples for Pilot 1A ($n = 283$, exploratory factor analysis) and Pilot 1B ($n = 329$, confirmatory factor analysis). The entire group of participants served as the sample for Pilot 1C ($n = 612$).

Measures. Measures for Pilot Study 1 can be found in the Appendix.

Exploratory Factor Analysis Results. A principal axis factor analysis with oblimin rotation (see Appendix A) found that a one-factor solution accounted for 53.4% of the variance ($\alpha = .91$), with all factor loadings for selected items greater than 0.63.

Confirmatory Factor Analysis Results. We analyzed the one factor solution identified by the Exploratory Factor Analysis with structural equation modeling, using *MPlus*. Fit indices supported a one-factor solution (CFI = .923; SRMR = .045, see Appendix). 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).

In order to confirm that the state version of the State-Trait IH Scale was applicable to state reports, the authors examined the factor structure of the contextualized measure using the *lavaan* package in R (Rosseel, 2012). The one-factor model fit the data well: $\chi^2 (109) = 180.03$, $p < 0.001$; CFI = 0.95; RMSEA = 0.076 [90% CI=0.066, 0.085].

Convergent and discriminant validity. Pearson correlations were used to measure associations between scores on both the trait and state version of the State-Trait IH Scale, and scores on the other measures. Results of these correlation analyses provided support for the conceptualization of intellectual humility as a moral trait, and an intellectual virtue, yet still a distinct construct from general humility. Further information about these measures and relationships can be found in the Appendix. Descriptions of these scales, including example items and expected relationships between these scales and trait IH, are outlined in Appendix C.

In addition, we adapted the methodology of Brienza et al. (2017) in administering an event reconstruction task, which was then paired with a contextualized state measure of IH, in order to test the applicability of the scale to a single event (i.e. state). The event reconstruction

task is detailed in Appendix D. In order to confirm that the state version of the Trait-State IH Scale was applicable to state reports, the authors examined the factor structure of the contextualized measure using the lavaan package in R (Rosseel, 2012). The one-factor model fit the data well: $\chi^2(109) = 180.03$, $p < 0.001$; CFI = 0.95; RMSEA = 0.076 [90% CI=0.066, 0.085].

Finally, Pearson correlations were used to measure associations between scores on both the trait and state IH scales, and scores on the other measures. The values of these correlations can be seen in Appendix E.

Pilot Study 2

Participants. The participants for Study 2 were 445 individuals in the United States recruited through MTurk. Of the Study 2 participants, 7 were excluded from analyses as a result of failure to respond in a satisfactory manner to attention check questions, leaving a sample size of $n = 438$.

Measures. Measures for Pilot Study 2, and expected relationships between those measures and the State-Trait IH Scale can be found in Appendix F.

Analyses and results. As in the research by Leary, et al. (2017), Pearson correlations were used to measure associations between scores on the IH scale and scores on the other measures. Results of these analyses are presented in the Appendix.

Overall, the correlational analyses showed similar magnitude and direction to those of the other measures of IH (Leary et al., 2017; Krumrei-Mancuso & Rouse, 2016). However, of particular interest are a number of correlations that illustrate discriminant validity with constructs that are theoretically expected to bear similarities (or differences) to IH, including relationships with measures of open-mindedness and epistemic curiosity which distinguish the constructs from IH (see Appendix).

Finally, we conducted hierarchical regression analyses consistent with the analyses by Krumrei-Mancuso and Rouse (2016) to examine incremental validity of the State-Trait Intellectual Humility Scale in predicting scores on Actively Open-Minded Thinking (Stanovich & West, 2007) and the NPI-40 (Raskin & Terry, 1988). The State-Trait IH Scale was found to have similar predictive validity to the Comprehensive Intellectual Humility Scale for both AOMT and NPI-40.

Consistent with the analyses by Krumrei-Mancuso and Rouse (2016), Step 1 predictors were age and social desirability. Step 2 predictors were the greed-avoidance and modesty facets of the HEXACO Honesty-Humility subscale (Lee & Ashton, 2016). Step 3 predictor was either the CIHS (Krumrei-Mancuso & Rouse, 2016) or the Intellectual Humility Scale (Leary et al., 2017) in respective analyses. Step 4 predictor was the State-Trait IH scale. Notably, our analyses did not include IPIP Values in Action Humility Scale data (Goldberg, et al., 2006), although this scale was included in the original analyses by Krumrei-Mancuso and Rouse (2016). The State-Trait IH Scale has similar predictive validity to the CIHS (Krumrei-Mancuso & Rouse, 2016) and the Intellectual Humility Scale (Leary et al., 2017) for both AOMT and NPI-40. Results of these analyses are presented in Appendices H and I. Additionally, the State-Trait IH Scale predicted additional variance in epistemic curiosity and tolerance (but not AOMT) over *both* the CIHS and the Leary et al. IH Scale when controlling for age, social desirability, greed-avoidance and modesty (see Appendices J and K).

Main Study: Examining Manifestations of IH in Daily Life

As measuring an individual's IH in daily life can provide important insight into the frequency and stability with which people behave in an intellectually humble manner, the next step was to validate the state version of the State-Trait IH scale, as approximated in Pilot Study

1. To summarize our progress thus far, we successfully validated a trait version of the State-Trait IH Scale for utilization in tandem with the state version (Fleeson & Gallagher, 2011), as well as validating a contextualized daily assessment methodology (Brinza et al., 2017). The main study therefore employs a state version of the scale – after first successfully confirming the factor structure of the state version of the State-Trait IH scale - to examine manifestations of IH-relevant characteristics in daily life using an experience sampling methodology.

Methods

We employed Experience Sampling Methodology (ESM; Conner, Tennen, Fleeson, & Barrett, 2009) in order to examine the relationships between self-reported trait level IH and self-reported state IH. (Wake Forest University IRB #00022643)

Participants. Participants were students enrolled in an introductory psychology course at a small, private university in the southern United States. Of the participants ($n = 111$) who provided information about their gender identity, 58 (52.3%) identified as male and 53 (47.7%) identified as female. Participants were between 18 and 22 years of age ($M = 19.06$, $SD = 0.94$). When reporting their ethnicities, the majority of participants identified themselves as White ($n = 79$; 71.2%), while smaller numbers of Hispanic or Latino ($n = 6$; 5.4%), Black ($n = 7$; 6.3%), Asian ($n = 14$; 12.6%) and Other ethnicity ($n = 5$; 4.5%) individuals participated in the study. Participants received course credit for taking part in the study.

Procedure. Participants in the main study first completed the trait measure of IH in person. The night after completing their trait measure, participants received an invitation via email to a questionnaire about their recent interactions. The participants received two such invitations per day, for a period of 21 days.

Measures

Intellectual Humility. The participants completed a trait measure of IH at the introductory session (see Appendix A) as well as a state IH scale twice daily. Items in the state scale were identical to trait scale, with the exception of changes in verb tense. As we expected that IH should show itself in daily life, but only in relevant situations, participants were provided with the following prompt at the beginning of each daily response, adapted from the procedure of Brienza et al. (2017):

“We would like you to think about a challenging situation (e.g., a disagreement, conflict, discussion, problem that you had to solve) that has happened to you with another person since the last survey. This should be a situation that you yourself were involved in, whether or not you were the person who initiated the situation. Have you had such an interaction within the past 60 minutes?”

If participants responded by saying “yes” to this question, they were directed towards the IH state scale, along with a series of questions about the person with whom they interacted, including the extent to which they perceived the situation as being a disagreement, whether they saw the other individual in the situation as intelligent, knowledgeable, likeable, moral and reasonable (on a five point Likert scale).

Following the procedure employed in Blackie, Jayawickreme, Tsukayama, Forgeard, Roepke, and Fleeson (2017), participants who responded “no” to the prompt were directed to a series of questions about a social interaction they had experienced since their last assessment, and measures examining their current well-being as well as their daily manifestation of four Big Five traits (all Big Five traits except Agreeableness). Both sets of assessments were created to be equivalent in length¹.

¹ A reviewer noted the possibility reporting an IH-relevant event first could be associated with greater likelihood of subsequent endorsement (or non-endorsement) of IH-relevant events. We tested for this possibility among participants who endorsed experiencing an IH-relevant event at

Results

Overall, we collected a total of 3,045 survey responses from participants. However, given that participants did not always report opportunities to enact IH, only 833 of the daily responses included manifestations of IH-relevant characteristics. Further, due to a coding error, two items (“Even when I am certain about my opinion, I will research information supporting the opposing viewpoint” and “I ask others to provide constructive criticism towards my ideas”) were excluded from this analysis of trait IH. Nevertheless, analyses showed that aggregated state and trait IH were highly correlated, $r(94) = .47, p < .001, , 95\% \text{ CI } [0.30, 0.61]$.

Examining the factor structure of state IH. To test whether state and trait IH yielded similar factor structures, we ran a multilevel CFA using R with the lavaan package (Rosseel, 2012) and the mcfa.input() function provided by Huang (2017). We specified a single factor solution for both within-person and between-person levels. The hypothesized models fit the data well. Specifically, confirmatory factor analyses for the state version of the State-Trait IH scale showed a strong fit for the hypothesized within-person model (CFI = .941, RMSEA = .061, SRMR = .041), and an adequate fit for the hypothesized between-person model (CFI = .907, RMSEA = .090, SRMR = .058).

Examining within-person variability in daily IH. The researchers expected substantial within-person variability on state IH. In order to test this hypothesis, we computed an unconditional means model to partition the total variance into between- and within-level components. The results indicated that there was substantial within-person variance and that the within-person variance was larger than the between-person variance (Table 1).

least one point during the study by conducting an independent samples t-test examining differences the percentage of IH-relevant event endorsements across the course of the study for participants endorsed experiencing an IH-relevant event at the first assessment ($M = .34, SD = .24$) and those who did not endorse experiencing an IH-relevant event at the first assessment ($M = .26, SD = .22$). There was no significant difference between the two conditions, $t(100) = -1.84, p = .46$.

Situational contingencies of IH manifestations. We ran a MLM regression to examine the extent to which individuals higher in IH perceived the individual with whom they had a difference in opinion as intelligent, knowledgeable, likeable, moral, or reasonable. Perceiving the interaction as a disagreement was negatively related to manifestations of IH, such that lower levels of IH were associated with perceiving the difference in opinion as a disagreement. Additionally, seeing the individual as moral positively predicted IH, such that higher intellectual humility was reported in conjunction with reports of the interaction's moral relevancy. Seeing the other individual as intelligent or knowledgeable also positively predicted IH, but these effects only reached marginal significance (Table 2). These findings are arguably also consistent with the “non-defensiveness” account of IH (Whitcomb, et al., 2015), given that being seen as possessing knowledge may have the same impact on targets as being moral (see Baehr, 2011 on the value of epistemic virtue), and thus may signal specific intentions towards targets (Goodwin, 2015). However, these results are tentative and await future replication.

General Discussion

The present research builds on new directions in research on personality (e.g., Jayawickreme, Meindl, Helzer, Furr, & Fleeson, 2014; Blackie & Jayawickreme, 2015) and existing research to assess within-person variability of state-IH in people's lives. Given the potential self-report biases involved when participants report on positive or socially desirable traits (Paulhus & Vazire, 2007; Vazire & Carlson, 2010), it is important that researchers assess the extent to which participants' beliefs about their self-concept are manifested in participants' daily behavior (Blackie et al., 2017). Furthermore, given the recent call to study wisdom in context (Grossmann, 2017), the studies outlined in the present article aimed to build on existing measures of IH to assess a core quality of IH – taking ownership of one's cognitive limitations

by admitting one's mistakes—in interpersonal contexts. The present scale builds on the existing literature to offer a contextualized understanding of how IH may facilitate wise reasoning in daily life.

The State-Trait IH Scale was found in its different instantiations to be a reliable measure of both trait and state IH. The factor structure and reliability of the scale were comparable to existing measures of IH, for example, the Intellectual Humility Scale (Leary, et al., 2017). However, the State-Trait IH Scale includes additional content addressing the ability to admit and take ownership of one's mistakes, which scholars have argued is central to IH (Whitcomb et al., 2015) in interpersonal contexts. Further, the present research demonstrated convergent validity as the trait version of the State-Trait IH Scale was positively correlated with constructs that capture the intellectual nature of this virtue and skills involved in enacting it, such as Need for Cognition (Cacioppo, Petty, & Kao, 1984) and Intellect (Mussel, 2013). Moreover, we found evidence for discriminant validity, because, as expected, the trait version of the State-Trait IH Scale was not related to trait Narcissism (Raskin & Terry, 1988), HEXACO Emotionality (Lee & Ashton, 2016) or religious/spiritual beliefs (Koenig & Büssing, 2010). However, the trait version of the State-Trait IH Scale was also correlated (albeit to a small degree) with other measures which are related, but not central, to the definition of IH (e.g., self-esteem). We also found that the trait measure exhibited good incremental predictive validity over two established IH trait scales. Our findings suggest that the trait version of the State-Trait IH Scale and the Leary et al. (2017) are equally valid for assessing IH at the global trait level. However, we note again the main advantage of the State-Trait IH Scale is that it allows for a direct comparison between trait and state IH utilizing the same content.

One goal of the main study was to validate the suitability of the state version of the State-Trait IH Scale for use in daily assessment. The results of the confirmatory factor analyses indicated that the state version of the State-Trait IH Scale is equivalent to the trait version of the State-Trait IH Scale in its validity as an assessment of IH. As Fleeson (2014) argued, showing that the changes people report at the trait level manifest in daily beliefs, behaviors and emotions is an important criterion for demonstrating that a trait assessment trait in fact reflects daily behavior.

We also found that aggregated IH state assessments were strongly correlated with summary trait scores, showing that individuals trait reports largely track their reported behaviors in daily life (Fleeson & Gallagher, 2009). While IH is a socially desirable trait that may be sensitive to bias, the contextualized experience sampling assessment utilized in the main study (building on the work of Grossmann, et al., 2016) was developed to mitigate some of these biases. Future research should build on this work by examining other methods to combat bias in state assessment (Finnigan & Vazire, 2017; Fleeson, 2017).

Moreover, the present research found that participants demonstrated significant within-person variability in state-IH, and that this variability was greater than the between-person variability. The finding that participants' own IH daily behavior varies to a greater degree than it does from other participants indicates that further research is needed to understand the situations that promote or hinder the enactment of IH. This contextualized approach to diary assessment represents a novel approach to experience-sampling that may help mitigate biases in ESM assessment. Nevertheless, examining the relationship between self-report (state and trait) IH and informant IH represents an important avenue of future research.

The main study further assessed situational contingencies that promote engagement in

state-IH thoughts, feelings and behaviors at a particular moment in time. As noted in the introduction, much existing research into IH has viewed it as a character virtue, in which some people are categorized as being more or less humble than others. However, although there are dispositional differences in individuals' IH, there is reason to believe that this virtue can be learned through individuals' experiences. The main study employed this contextual approach (Grossmann, 2017) and focused on one such experience – the social interaction with another person that involved working to resolve a disagreement or problem together. As hypothesized (following Goodwin, 2015), participants who saw the other individual as moral demonstrated more IH in their daily interactions. We also found that perceiving the situation as a disagreement was unsurprisingly negatively related to IH. However, future research should replicate these findings and also test for the hypothesis that seeing the other individual as intelligent or knowledgeable predicts IH. While this received only marginal support in the present study, such a hypothesis is arguably supported by the non-defensive account of IH (Whitcomb et al., 2015), as seeing someone as an authority could lead to a greater willingness to admit one's fallibility.

Limitations and Future Directions

We note a number of limitations. First, we defined state IH in this study as IH assessed twice per day. However, as noted in Jayawickreme, Tsukayama & Kashdan (2017), there is variability in range of the duration of what is considered a 'momentary' assessment. Jayawickreme et al. (2017) assessed daily satisfaction once per day, while King et al.'s (2006), 'momentary' assessments of psychological well-being (PWB) were from participants' reflections over their previous two days. Changing the frame of state IH may change the observed relationships. Second, our results were based on predominantly white, American students at a private university and might not generalize to other samples. Future work needs to replicate this

finding in both similar and different samples, including samples where state-IH manifestations may vary significantly (e.g., across different cultures [Grossmann, et al., 2012] and levels of social class; Brienza & Grossmann, in press). We note here that college students may not be a representative indicator of how wisdom-related qualities manifest in the general population.

Third, future research should both examine other theoretically-based psychological properties of the situations people are in when making well-being assessments (Rauthmann, Gallardo-Pujol, Guillaume, Todd, Nave, Sherman et al., 2014), and experimentally manipulate situational contingencies to directly assess their causal relationship with state IH (following Grossmann & Kross, 2014).

Fourth, given that an important goal of the present study was to develop a measure of IH that both accurately assessed the full range of thoughts, feelings and behaviors associated with it and could be employed at both the trait and state level, our scale development strategy focused on validating the trait measure before the state measure. While this direction of validation is consistent with past research (e.g. Fleeson, 2001, extrapolated state content from the Big Five trait measures), future research on state IH and state wisdom may focus directly on developing valid state assessments (Fleeson, 2017).

In summary, the present research developed the State-Trait IH scale for assessing the construct at the trait and state level. We believe that future research can build on the present findings to assess state manifestations of wisdom with greater validity and identify the mechanisms underlying wisdom (Fleeson, 2017). We believe that these new measures are novel in that they both offer greater content validity and coverage of IH (focusing on its definition as owning up to one's intellectual shortcomings [Whitcomb, et al., 2015]) and provide a robust measure for assessing IH in daily life. We are hopeful that this preliminary research represents

the latest step in capturing one of the significant advantages of assessing wisdom in daily life, as opposed to through hypothetical scenarios or one-off trait assessments (Grossmann et al., 2016)—increasing our understanding of the contextual factors that impact within-person variability in wisdom-content characteristics.

Declaration of Conflicts of Interest

The authors have no conflicts of interest in the reported work, nor in the conclusions, implications or opinions stated.

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Table 1

Estimates from multilevel unconditional means model on the state IH scale

	IH scale
Grand mean	3.34 [3.23, 3.45]
Between-person variance	0.25
Within-person variance	0.36
Intraclass correlation	0.41
Between-person <i>n</i>	823
Within-person <i>n</i>	113

Note. 95 % confidence interval is reported in the bracket

Table 2

Random intercept model for Variables Predicting State Intellectual Humility

Random Intercept Model		
Parameters	Estimates	95 % CI
<i>Regression coefficients (fixed effects)</i>		
Intercept	2.65 (.16)***	[2.34, 2.97]
Disagreement	-0.10 (.02)***	[-0.13, -0.06]
Intelligent	0.07 (.04)†	[0.00, 0.14]
Knowledgeable	0.06 (.03)†	[0.00, 0.13]
Likeable	0.04 (.03)	[-0.02, 0.09]
Moral	0.07 (.03)*	[0.01, 0.13]
Reasonable	0.01 (.03)	[-0.05, 0.06]
<i>Variance components (random effects)</i>		
Residual	0.23	-
Intercept	0.31	-
<i>Model summary</i>		
Deviance statistic		1528.7
Number of estimated parameters		9

Note. Parameter estimates standard error are listed in parentheses.

† $p < .10$ * $p < .05$ *** $p < .001$

Appendix A.

Trait items for State-Trait IH scale EFA/CFA (Pilot Study 1).

Instructions: A number of statements which people have used to describe themselves in general are given below. Read each statement and then select the appropriate answer option to indicate your level of agreement. There are no right or wrong answers. 5-point scale (1 = strongly disagree, 5 = strongly agree)

1. When I lack knowledge about a particular subject, I am comfortable with admitting it to others.
2. I am willing to compliment the good ideas of those who disagree with me.
3. I view the challenging of my ideas as an opportunity to grow and learn.
4. I appreciate having others provide constructive criticism towards my ideas.
5. People would say that I search actively for reasons why my beliefs might be wrong.
6. I am happy to admit it when someone is more knowledgeable about a particular topic than I am.
7. I ask others to provide constructive criticism towards my ideas.
8. When I am passionate about an issue, I research information to support the opposing viewpoint.
9. It is possible that my opinions could be wrong.
10. Finding the best answer is more important to me than proving to others that I am knowledgeable.
11. I prefer to seek a second opinion from someone who has a different point of view from my own.
12. I find it enjoyable to consider multiple solutions to a problem.
13. I enjoy trying to make sense of conflicting information.
14. I use new information to reevaluate my existing viewpoints.
15. I acknowledge my intellectual shortcomings in order to improve them.
16. I am impressed by the knowledge of those around me.
17. I learn a lot from people whose beliefs differ from mine.
18. If I do not know the answer to a question, I do not pretend to know the answer.
19. I see myself as someone who is easily convinced to adopt new attitudes or beliefs.
20. It does not take a lot of contradictory evidence for me to think that my opinion is wrong.

Appendix B.

Final Trait items for State-Trait IH scale.

Instructions: A number of statements which people have used to describe themselves in general are given below. Read each statement and then select the appropriate answer option to indicate your level of agreement. There are no right or wrong answers. 5-point scale (1 = strongly disagree, 5 = strongly agree)

1. Trait: I compliment the good ideas of those who disagree with me
State: I complimented the good ideas of those who disagreed with me
2. Trait: I view the challenging of my ideas as an opportunity to grow and learn
State: I viewed the challenging of my ideas as an opportunity to grow and learn.
3. Trait: I am open to constructive criticism of my ideas
State: I was open to constructive criticisms of my ideas.
4. Trait: I search actively for reasons why my beliefs might be wrong
State: I searched actively for reasons why my beliefs might be wrong
5. Trait: I ask others to provide constructive criticism towards my ideas
State: I asked others to provide constructive criticism of my ideas
6. Trait: Even when I am certain about my opinion, I will research information supporting the opposing viewpoint
State: Even when I was certain about my opinion, I researched information supporting the opposing viewpoint.
7. Trait: When solving a problem, I prefer to seek a second opinion from someone who has a different point of view from my own
State: I preferred to seek a second opinion from someone who has a different point of view from my own.
8. Trait: I feel that it is important to work through competing solutions to a problem
State: I feel that it was important to work through competing solutions to the problem.
9. Trait: I enjoy trying to make sense of conflicting information
State: I enjoyed trying to make sense of conflicting information.
10. Trait: I learn a lot from people whose beliefs differ from mine
State: I learned a lot from person(s) whose beliefs differed from mine
11. Trait: I use new information to reevaluate my existing viewpoints
State: I used new information to reevaluate my existing viewpoint.

Reliability of trait scale: $\alpha = .91$, factor loading on single factor for 11 item EFA $>.63$)

Appendix C.

Measures and expected relationships for Pilot Study 1

Scale	Description	Example item(s)	Expected relationship	Conceptual reasoning
Need for Cognition Scale – Short Form (NFC; Cacioppo, Petty, & Kao, 1984)	Need for Cognition is defined as “an individual’s tendency to engage in and enjoy effortful cognitive endeavors” (p. 306). 18-item, trait level scale. Participants rate the extent to which they feel that the statements describe themselves on a 5-point scale (1 = strongly disagree, 5 = strongly agree).	“I prefer my life to be filled with puzzles that I must solve” “I only think as hard as I have to (R).”	+	The authors would expect a positive relationship between Need for Cognition and IH because NFC is conceptually related to epistemic non-defensiveness, such that those who enjoy putting forth cognitive effort will not respond defensively towards opposition to their ideas. Additionally, Leary and colleagues (2017) found $r = .34, p < .001$.
Moral Trait Scale: General Moral Character (Prentice, Hawkins, Fleeson & Furr, in prep.)	General Moral Character is described by Prentice, et al. (in prep.) as a propensity to be “generally concerned with and exhibiting of virtue in daily life across contexts”. 6-item, trait level subscale. Participants rate the extent to which they feel that the statements describe themselves on a 5-point scale (1 = strongly disagree, 5 = strongly agree).	“I would say that I am a good person” “I am not a particularly virtuous person (R).”	+	We would expect a positive relationship between General Moral Character and IH, as IH is understood to be a moral trait.

<p>Moral Trait Scale: Loyalty (Prentice, Hawkins, Fleeson & Furr, in prep.)</p>	<p>Loyalty is defined by Prentice, et al. (in prep.) as “faithful adherence to interpersonal obligations”.</p> <p>4-item, trait level subscale. Participants rate the extent to which they feel that the statements describe themselves on a 5-point scale (1 = strongly disagree, 5 = strongly agree).</p>	<p>“I am a loyal person”</p> <p>“I shift my loyalties easily (R).”</p>	<p>+</p> <p>Loyalty is expected to have a slight positive correlation with IH, as loyalty emphasizes value placed on interpersonal contexts.</p>
<p>Moral Trait Scale: Honesty (Prentice, Hawkins, Fleeson & Furr, in prep.)</p>	<p>Honesty is defined by Prentice, et al. (in prep.) as “being truthful”.</p> <p>4-item, trait level subscale. Participants rate the extent to which they feel that the statements describe themselves on a 5-point scale (1 = strongly disagree, 5 = strongly agree).</p>	<p>“I consistently tell the truth”</p> <p>“I don’t believe that honesty is that important (R).”</p>	<p>+</p> <p>Honesty is expected to be positively correlated with IH, as both are moral traits which value the truth.</p>
<p>Moral Trait Scale: Fairness (Prentice,</p>	<p>Fairness is defined by Prentice, et al. (in prep.) as the “seeking of just outcomes”.</p>	<p>“ I treat people fairly”</p>	<p>+</p> <p>We would expect a small, positive correlation between fairness and IH because of the conceptual similarities</p>

Hawkins, Fleeson & Furr, in prep.)	4-item, trait level subscale. Participants rate the extent to which they feel that the statements describe themselves on a 5-point scale (1 = strongly disagree, 5 = strongly agree).	“I don’t believe it is important to treat others fairly (R).”		between seeking just outcomes and seeking the truth, or the best answer.
Moral Trait Scale: Compassion (Prentice, Hawkins, Fleeson & Furr, in prep.)	Compassion is defined by Prentice, et al. (in prep.) as “caring about the well-being of others; helpful”. 4-item, trait level subscale. Participants rate the extent to which they feel that the statements describe themselves on a 5-point scale (1 = strongly disagree, 5 = strongly agree).	“I care a lot about helping other people” “It’s not important to me to be compassionate (R).”	+	IH necessarily involves openness to learning from others, as well as consideration of their ideas. As such, we would expect a small, positive correlation between compassion and IH.
Moral Trait Scale: Humility (Prentice, Hawkins, Fleeson & Furr, in prep.)	Humility is defined by Prentice, et al. (in prep.) as “seeking accuracy in beliefs about self, not boastful”. 4-item, trait level subscale. Participants rate the extent to which they feel that the statements describe themselves on a 5-point scale (1 = strongly disagree, 5 = strongly agree).	“I want to accurately assess my strengths and weaknesses” “I often boast about myself (R).”	+	As IH is a distinct construct from general humility, we would not expect a strong correlation between the scales. Still, the two constructs conceptually overlap in that they involve seeking accuracy and not overstating one’s abilities, so we would expect them to be positively correlated.
Moral Trait Scale: Purity (Prentice, Hawkins, Fleeson & Furr, in prep.)	Purity is defined by Prentice, et al. (in prep.) as “seeking wholesomeness in action and thought, inoffensive.”	“ I want to think and act without vulgarity or filth.”	0	Purity or “wholesomeness” is not conceptually related to IH, so we would expect not to see a relationship between the two constructs.

4-item, trait level subscale. Participants rate the extent to which they feel that the statements describe themselves on a 5-point scale (1 = strongly disagree, 5 = strongly agree).

“I will admit that some things I do are indecent (R).”

Moral Trait Scale: Respect (Prentice, Hawkins, Fleeson & Furr, in prep.)

Respect is defined by Prentice, et al. (in prep.) as “being respectful of others and of tradition and authority”.

“I am a respectful person”

4-item, trait level subscale. Participants rate the extent to which they feel that the statements describe themselves on a 5-point scale (1 = strongly disagree, 5 = strongly agree).

“It is not important to show respect to tradition and authority (R).”

+

IH involves respect for the ideas of others, so we would expect a small, positive correlation between Trait-State IH scores and scores on the Respect subscale of the Moral Trait Scale.

Egoistic Socially Desirable Responding (Parmač Kovačić, Galić, & Jerneić, 2014)

Egoistic Socially Desirable Responding is defined as “participants’ tendency to exaggerate their social and intellectual competence and leads to unrealistically positive self-descriptions of traits, such as efficiency and dominance, fearlessness, emotional stability, intellect, and creativity” (p. 532).

“I am always brave in threatening situations.”

0

10-item, trait level scale, participants rate the extent to which they feel that the statements describe themselves on a 7-point scale (1 = strongly disagree, 7 = strongly agree).

The researchers would not expect that intellectually humble individuals would exaggerate their competence, and thus would expect no relationship between Trait-State IH and Egoistic Socially Desirable Responding.

Moralistic Socially
Desirable Responding
(Parmač Kovačić, Galić,
& JerneiĆ, 2014)

Moralistic Socially Desirable
Responding is defined as “overly
positive self-descriptions of traits, such
as agreeableness and
conscientiousness, as well as an
excessive emphasis on moral qualities
and respect for social rules” (p. 532).

10-item, trait-level scale, participants
rate the extent to which they feel that
the statements describe themselves on
a 7-point scale (1 = strongly disagree,
7 = strongly agree).

“I never read sexy
books or magazines”

“I have some pretty
awful habits (R).”

+

Due to IH being seen as a moral trait, we
would expect a small, positive
relationship with Moralistic Socially
Desirable responding, as the focus of the
construct is on enhancing moral
qualities. However, the strength of the
relationship would be expected to be low
due to intellectually humble individuals’
lack of overstating their positive
attributes.

Intellect (Mussel, 2013)

Intellect is defined as “a dispositional
individual difference variable
involving behavior, intentions, affect,
attitudes, and mental processes related
to intellectual performance, such as
problem-solving, thinking, information
search, learning, or creativity” (p.
886).

24-item, trait level scale. Participants
rate the extent to which they feel that
the statements describe themselves on

“I enjoy learning about
subjects that I’m not
familiar with.”

+

a 7-point scale (1 = strongly disagree,
7 = strongly agree).

Appendix D.

State items for contextualized version of State-Trait IH scale. (event reconstruction task adapted from Grossmann, et al., 2016)

The event reconstruction task was designed in order to assess wise reasoning in daily life and to combat challenges associated with trait measures. These challenges include a tendency for individuals to report rare, but memorable, experiences when responding to trait measures (Schwarz, Kahneman, & Xu, 2009), as well as the possibility of a propensity towards self-enhancement and impression management (Paulhus & Vazire, 2007; Vazire & Carlson, 2010). By asking participants to recall cues concerning the “what,” “where,” “when,” and “how” of the recalled experience, Grossmann and colleagues (2016) reason that the event reconstruction task (as outlined by Brienza, et al., 2017) facilitates accurate access to episodic memory.

We adapted this event reconstruction task in order to pilot test the applicability of the Trait-State IH Scale to a context-specific manifestation of IH-relevant characteristics. The state version of the IH scale was identical to the trait version, with the exception of changes in verb tense to refer to a particular situation in the past, rather than the present tense used in the trait version.

Instructions: In this section we would like you to think about a challenging situation (e.g. a disagreement, conflict) that has happened to you with another person. This should be a situation that you yourself were involved in, whether or not you were the person who initiated the situation. We would like you to take a moment to recall the situation and visualize the events in your mind’s eye; consider who was involved and what happened, what you thought and how you felt. After doing so, please respond to the following questions.

1. When did this situation first begin?

- This week
- Within the last month
- Within the last 6 months
- Within the last year
- Over a year ago

2. What day of the week was it?

- Monday
- Tuesday
- Wednesday
- Thursday

- Friday
- Saturday
- Sunday
- I don't remember

3. What time of day was it?

- Morning
- Afternoon
- Evening
- I don't remember

4. What were you doing when it happened? This only needs to be a sentence or two. [text entry box]

5. Where were you? [text entry box]

6. Who was involved in this situation? Check any/all that apply – you may select more than one for any person: ex. a coworker may also be a friend.

- Boss, supervisor or manager
- Mentor
- Trainer
- Colleague or coworker
- Subordinate
- Mentee
- Trainee or Apprentice
- Customer or client
- Supplier
- Friend
- Family

7. Was the person the same gender as you?

- Yes
- No

8. As you were thinking about this situation, what thoughts came to your mind? Please write your thoughts in the space provided. [text entry box]

9. Please describe the situation in three words or less. [text entry box]

10. Did you perceive this situation to be about a matter of:

- Factual information
- Morality
- Societal norms
- Personal preferences

11. How important is the subject of the interaction to you?

5-point scale, (1= not at all important, 5 = extremely important).

12. How distressing did you find this interaction to be?

5-point scale, (1 = not at all distressing, 5 = extremely distressing)

13. Do you think the other person perceived this situation to be about a matter of...

(Please select the category that best describes the topic of your discussion. Some topics may fit more than one category, so please select the option that you think is most relevant or specific.)

- Factual information
- Morality
- Norms/behavioral expectations
- Personal preferences

14. Did you consider this situation to be a disagreement?

5-point scale, (1 = definitely yes, 5 = definitely not)

15. Please rate the extent to which this situation made you feel... 5-point scale, (1= strongly disagree, 5 = strongly agree)

- Excited
- Angry
- Satisfied

- Upset
- Calm
- Depressed
- Threatened
- Stimulated

16. Which of these statements best characterizes your impression of the situation?

- The other person's perspective has greater merit than my own
- Both perspectives have equal merit
- My perspective has greater merit than the other person's

17. Please respond to the following items about your reaction to this situation. 5-point scale (1 = strongly disagree, 5 = strongly agree)

- When I lacked knowledge about a subject, I admitted it to others.
- I complimented the ideas of those who disagreed with me.
- I viewed the challenging of my ideas as an opportunity to grow and learn.
- I was open to constructive criticisms of my ideas.
- I searched actively for reasons why my beliefs might be wrong.
- I asked others to provide constructive criticism of my ideas.
- Even when I was certain about my opinion, I researched information supporting the opposing viewpoint.
- Finding the best answer was more important to me than proving to the other person that I was more knowledgeable.
- I preferred to seek a second opinion from someone who has a different point of view from my own.
- I feel that it was important to work through competing solutions to the problem.
- I was easily convinced to adopt new attitudes or beliefs.
- I enjoyed trying to make sense of conflicting information.
- I used new information to reevaluate my existing viewpoint.
- I acknowledged my intellectual shortcomings in order to improve them.
- I was impressed by the knowledge of those around me.
- I felt threatened when my opinion was challenged.
- I learned a lot from person(s) whose beliefs differed from mine.
- If I did not know the answer to a question, I did not pretend to know the answer.
- It did not take a lot of contradictory evidence for me to think that my opinion was wrong.
- The other person(s) disagreeing with my ideas made me feel like they were challenging me as a person.

Appendix E.

Pilot Study 1 Pearson correlations.

Measure	<i>M</i>	<i>SD</i>	Trait IH	Contextualized IH
Trait-State IH	3.74	0.75	1	.53**
Contextualized IH	3.04	1.02	-	1
Need for Cognition	3.47	0.96	.47**	.18**
Overall Socially Desirable Responding	2.91	0.61	.28**	.30**
Egoistic Socially Desirable Responding	3.01	0.78	.27**	.28**
Moralistic Socially Desirable Responding	2.82	0.84	.16**	.17**
Moral Trait Scale: General Moral Character	4.14	0.66	.31**	.14**

Moral Trait: Loyalty	4.30	0.71	.26**	.02
Moral Trait: Honesty	4.29	0.71	.31**	.10*
Moral Trait: Fairness	4.47	0.64	.27**	-.02
Moral Trait: Compassion	4.06	0.84	.32**	.16**
Moral Trait: Humility	4.18	0.69	.30**	.09*
Moral Trait: Purity	3.47	0.88	.08 ⁺	.11*
Moral Trait: Respect	4.14	0.66	.27**	.05
Intellect Scale: Overall	3.82	0.77	.66**	.35**
Intellect: Think	3.82	0.85	.63**	.31**
Intellect: Learn	3.95	0.74	.65**	.29**
Intellect: Create	3.68	0.90	.57**	.39**

Intellect: Seek	3.91	0.83	.63**	.32**
Intellect: Conquer	3.72	0.80	.62**	.37**

Note: $N = 599$. * indicates $p < .05$, ** indicates $p < .01$, + indicates $p = .052$.

Appendix F.

Measures and expected relationships for Pilot Study 2.

Scale	Description	Example item(s)	Expected relationship	Conceptual reasoning
Intellectual Humility Scale (Leary, et al., 2017)	Intellectual humility is defined by Leary and colleagues (2017) as “the degree to which [people] accept that their beliefs and opinions might, in fact, be incorrect or unfounded” (p.793). 6-item, trait level intellectual humility scale. Participants rate the extent to which they feel that the statements describe themselves on a 5-point scale.	“I accept that my beliefs and attitudes may be wrong.”	++++	This is a reliable scale measuring trait Intellectual Humility, which adheres to the Whitcomb, et al. (2015) conceptualization of Intellectual Humility.
Comprehensive Intellectual Humility Scale (Krumrei-Mancuso & Rouse, 2015)	Intellectual Humility is defined by as “a nonthreatening awareness of one’s intellectual fallibility” (p. 210). 22-item, trait level intellectual humility scale. Participants rate the extent to which they feel that the statements describe themselves on a 5-point scale.	“I am willing to change my position on an important issue in the face of good reasons”	+++	This is another reliable scale measuring trait Intellectual Humility. We would expect a weaker relationship with CIHS than we would with the IHS due to the differences in conceptualization of IH.

Narcissistic Personality Inventory (Raskin & Terry, 1988)

The construct of narcissism is clinically defined as “a grandiose sense of self-importance or uniqueness; a preoccupation with fantasies of unlimited success, power, brilliance, beauty, or ideal love; exhibitionism; an inability to tolerate criticism, the indifference of others, or defeat; entitlement or the expectation of special favors without assuming reciprocal responsibilities; interpersonal exploitativeness, relationships that alternate between extremes of overidealization and devaluation; and a lack of empathy” (p. 891).

40-item, trait level narcissism scale. Participants make a choice between two options, labeled “A” and “B”, to describe their personalities and tendencies.

“A. I am more capable than other people.
B. There is a lot that I can learn from other people.”

-

Intellectual humility (and general humility) is distinct from a lack of narcissism. While people who score high on the NPI are probably not going to be intellectually humble, having a low score on the NPI should not be indicative of high IH. Further, Leary et al. (2017) found $r = -.04, p > .05$.

Duke University Religion Index (Koenig & Büssing, 2010)

Religiosity is measured in individuals by the three dimensions of organizational religious activity, non-organizational religious activity, and intrinsic religiosity (p. 79).

5-item, trait level religiosity scale. Participants rate the extent to which they feel that the statements describe

“My religious beliefs are what really lie behind my whole approach to life”

0

“How often do you spend time in private religious activities,

Leary found no relationship between religiosity (as measured by DUREL) and IH ($r = -.06$). Thus, we would also expect no relationship.

	<p>themselves on a 5 or 6-point scale (1 = definitely not true, 5 = definitely true of me, 1 = Rarely or never, 6 = More than once a day).</p>	<p>such as prayer, meditation, or Bible study?"</p>	
<p>Religious and Spiritual Struggles (Exline, Pargament, Grubbs & Yali, 2014)</p>	<p>Religious and spiritual struggles occur when "some aspect of religious or spiritual belief, practice or experience becomes a focus of negative thoughts or emotions, concern or conflict" (p. 208).</p> <p>26-item, trait level scale. Participants rate the extent to which they feel that the statements reflect their experiences over the last month on a 5-point scale (1 = not at all, 5 = a great deal).</p>	<p>"Felt as though God was punishing me"</p>	<p>Religious and Spiritual Struggles assesses people's experiences with doubting and revising religious and spiritual beliefs, which is consistent with propensity toward acknowledging the limitations of one's knowledge.</p>
<p>Satisfaction with Life Scale (SWLS; Diener, Emmons, Larson & Griffin, 1985)</p>	<p>The construct of life satisfaction is defined as "a global assessment of a person's quality of life according to chosen criteria" (p. 71).</p> <p>5-item, trait level life satisfaction scale. Participants rate the extent to which they feel that the statements describe themselves on a 7-point scale.</p>	<p>"If I could live my life over I would change almost nothing"</p>	<p>Ardelt (1997) found that wisdom was a positive predictor of life satisfaction in old age.</p>
<p>Dogmatism (DOG; Altemeyer, 2002)</p>	<p>Dogmatism is defined as a "relatively unchangeable, unjustified certainty" in one's beliefs (p. 713).</p>	<p>"Anyone who is honestly and truly seeking the truth will</p>	<p>Conceptually, dogmatism is an unwillingness to consider evidence which contradicts one's own beliefs. This is at odds with IH as we have</p>

	<p>20-item, trait level dogmatism scale. Participants rate the extent to which they feel that the statements describe themselves on a 5-point scale (1 = strongly disagree, 5 = strongly agree).</p>	<p>end up believing what I believe”</p> <p>“Flexibility is a real virtue in thinking, since you may well be wrong (R).”</p>		<p>defined it. Further, Leary et al., (2017) found $r = -.49, p < .001$.</p>
<p>Self-esteem (Rosenberg, 1965)</p>	<p>Self-esteem is a measurement of “both positive and negative feelings about the self” (p. 1).</p> <p>10-item, trait level self-esteem scale. Participants rate the extent to which they feel that the statements describe themselves on a 4-point scale (1 = strongly disagree, 4 = strongly agree).</p>	<p>“On the whole, I am satisfied with myself.”</p> <p>“I feel I do not have much to be proud of (R).”</p>	0	<p>Low self-esteem (or self-abasing nature) is not indicative of humility in our definition (contrary to the “Psychological Structure of Humility” argument by Weidman, Cheng & Tracy, 2015)</p>
<p>Hubristic Pride (Tracy & Robins, 2007)</p>	<p>Hubristic pride is in theory “associated with narcissism, which has been labeled the deadliest of the Seven Deadly Sins might contribute to aggression and hostility, interpersonal problems, relationship conflict, and a host of maladaptive behaviors” (p. 507).</p> <p>7-item, trait level hubristic pride scale. Participants rate the extent to which they feel that the statements describe themselves on a 5-point scale (1 = not at all, 5 = extremely).</p>	<p>“I generally feel arrogant”</p>	- -	<p>Hubristic pride is described as “self-aggrandizing,” which puts it at odds with the limitations-owning account of IH</p>

Authentic Pride (Tracy & Robins, 2007)	Authentic pride is theorized to “promote positive behaviors in the achievement domain and contribute to the development of a genuine and deep-rooted sense of self-esteem” (p. 507).	“I generally feel accomplished”	+	
	7-item, trait level authentic pride scale. Participants rate the extent to which they feel that the statements describe themselves on a 5-point scale (1 = not at all, 5 = extremely).			
Sense of Power (Anderson, John & Keltner, 2008)	It is argued that “possessing power shapes individual behavior because it instills an elevated sense of power” (p. 313).	“If I want to, I get to make the decisions”	0	After controlling for evaluative valence, Weidman, Cheng & Tracy (2015) found no relationship between scores on the Sense of Power scale and appreciative humility. This makes sense conceptually because the limitations-owning account of IH is not concerned with a desire to have others adopt one’s views.
	8-item, trait level sense of power scale. Participants rate the extent to which they feel that the statements describe themselves on a 5-point scale (1= Strongly Disagree, 5 = Strongly Agree).	“My ideas and opinions are often ignored (R).”		
HEXACO: Honesty-humility (Lee & Ashton, 2016)	Those with high scores on this scale avoid manipulating others for personal gain, feel little temptation to break rules, are uninterested in lavish wealth and luxuries, and feel no special entitlement to elevated social status.	“I am an ordinary person who is no better than others.”	+	IH is distinct from general humility, but the two still share <i>some</i> common characteristics, namely, a lack of desire for status or attention. Krumrei-Mancuso & Rouse (2016) found $r = .23, p < .001$.

Conversely, persons with very low scores will flatter others to get what they want, are inclined to break rules for personal profit, are motivated by material gain, and feel a strong sense of self-importance.

“If I want something from a person I dislike, I will act very nicely toward that person in order to get it.” (R)

16-item, trait level honesty-humility subscale. Participants rate the extent to which they feel that the statements describe themselves on a 5-point scale (1= Strongly Disagree, 5 = Strongly Agree)

HEXACO: Emotionality
(Lee & Ashton, 2016)

People who score very highly on this scale experience fear of physical dangers, experience anxiety in response to life's stresses, feel a need for emotional support from others, and feel empathy and sentimental attachments with others. Conversely, persons with very low scores on this scale are not deterred by the prospect of physical harm, feel little worry even in stressful situations, have little need to share their concerns with others, and feel emotionally detached from others.

“I would feel afraid if I had to travel in bad weather conditions.”

“I worry a lot less than most people do.” (R)

0

Emotionality is not conceptually related to IH. Leary and colleagues (2017) found no relationship between BFI Neuroticism ($r = -.01, p > .05$), an adjacent construct.

16-item, trait level hubristic pride subscale. Participants rate the extent to which they feel that the statements describe themselves on a 5-point scale

(1= Strongly Disagree, 5 = Strongly Agree).

HEXACO: Extraversion
(Lee & Ashton, 2016)

Those with very high scores on the Extraversion scale feel positively about themselves, feel confident when leading or addressing groups of people, enjoy social gatherings and interactions, and experience positive feelings of enthusiasm and energy. Conversely, persons with very low scores on this scale consider themselves unpopular, feel awkward when they are the center of social attention, are indifferent to social activities, and feel less lively and optimistic than others do.

16-item, trait level subscale. Participants rate the extent to which they feel that the statements describe themselves on a 5-point scale (1= Strongly Disagree, 5 = Strongly Agree).

“I feel reasonably satisfied with myself overall.”

“I rarely express my opinions in group meetings. (R)”

0

Extraversion is not conceptually related to IH. Leary and colleagues (2017) found no relationship with BFI Extraversion ($r = -.11, p > .05$), an adjacent construct.

HEXACO:
Agreeableness (Lee & Ashton, 2016)

Those with very high scores on the Agreeableness scale forgive the wrongs that they suffered, are lenient in judging others, are willing to compromise and cooperate with others, and can easily control their temper. Conversely, persons with very low

“I rarely hold a grudge, even against people who have badly wronged me.”

+

Conceptually, those higher in IH are more likely to compromise and forgive (i.e. Hook, et al., 2015), thus corresponding to higher scores on agreeableness. Additionally, Leary, et al. (2017) found a slight positive

scores on this scale hold grudges against those who have harmed them, are rather critical of others' shortcomings, are stubborn in defending their point of view, and feel anger readily in response to mistreatment.

16-item, trait level subscale. Participants rate the extent to which they feel that the statements describe themselves on a 5-point scale (1= Strongly Disagree, 5 = Strongly Agree).

HEXACO:
Conscientiousness (Lee & Ashton, 2016)

Persons with very high scores on the Conscientiousness scale organize their time and their physical surroundings, work in a disciplined way toward their goals, strive for accuracy and perfection in their tasks, and deliberate carefully when making decisions. Conversely, persons with very low scores on this scale tend to be unconcerned with orderly surroundings or schedules, avoid difficult tasks or challenging goals, are satisfied with work that contains some errors, and make decisions on impulse or with little reflection.

“People sometimes tell me that I am too critical of others.” (R)

“I always try to be accurate in my work, even at the expense of time.”

“I only do the minimum amount of work needed to get by (R).”

relationship with BFI agreeableness ($r = .15, p < .05$).

+

Leary et al. (2017) found no relationship ($r = .05, p > .05$) to BFI Conscientiousness. However, the researchers expect a slight positive trend due to the tendency for those high in HEXACO conscientiousness to focus on accuracy (i.e. finding truth).

16-item, trait level subscale.
Participants rate the extent to which they feel that the statements describe themselves on a 5-point scale (1= Strongly Disagree, 5 = Strongly Agree).

HEXACO: Openness
(Lee & Ashton, 2016)

Persons with very high scores on the Openness to Experience scale become absorbed in the beauty of art and nature, are inquisitive about various domains of knowledge, use their imagination freely in everyday life, and take an interest in unusual ideas or people. Conversely, persons with very low scores on this scale are rather unimpressed by most works of art, feel little intellectual curiosity, avoid creative pursuits, and feel little attraction toward ideas that may seem radical or unconventional.

16-item, trait level subscale.
Participants rate the extent to which they feel that the statements describe themselves on a 5-point scale (1= Strongly Disagree, 5 = Strongly Agree).

HEXACO: Altruism (Lee & Ashton, 2016)

Altruism is defined as a tendency to be sympathetic and soft-hearted toward others. High scorers on this scale avoid

“I'm interested in learning about the history and politics of other countries.”

“I would be quite bored by a visit to an art gallery.” (R)

++

IH is indicative of an openness to new ideas. Further, Leary and colleagues (2017) found $r = .33, p < .001$ with BFI openness.

causing harm and react with generosity toward those who are weak or in need of help, whereas low scorers are not upset by the prospect of hurting others and may be seen as hard-hearted.

“It wouldn’t bother me to harm someone I didn’t like.” (R)

4-item, trait level subscale. Participants rate the extent to which they feel that the statements describe themselves on a 5-point scale (1= Strongly Disagree, 5 = Strongly Agree).

Dominance (Cheng et al., 2010)

Dominance is defined as “the use of intimidation and coercion to attain a social status based largely on the effective induction of fear.” (p. 335)

“I enjoy having control over others”

“I do NOT have a forceful or dominant personality (R).”

-

We would expect IH to be negatively associated with Dominance, as individuals who are high in IH would not be expected to seek a higher social status.

17-item, trait level subscale. Participants rate the extent to which they feel that the statements describe themselves on a 7-point scale (1= Not at all, 7 = Very much).

Prestige (Cheng et al., 2010)

Prestige is defined as “status granted to individuals who are recognized and respected for their skills, success or knowledge” (p. 335).

“Members of my peer group respect and admire me”

“Others do NOT value my opinion” (R)

+

As IH is a component of wisdom, and prestige is granted to wise individuals, we would expect a small, positive correlation between Prestige and IH.

	<p>17-item, trait level prestige scale. Participants rate the extent to which they feel that the statements describe themselves on a 7-point scale (1= Not at all, 7 = Very much).</p>		
Social Desirability (Reynolds, 1982)	<p>Social desirability refers to an individual's tendency to self-enhance in responding to survey items.</p> <p>13-item social desirability scale. Participants rate each statement as either true or false.</p>	<p>"I am always courteous, even to people who are disagreeable"</p> <p>"There have been times when I was quite jealous of the good fortune of others (R)."</p>	<p>0</p> <p>Leary and colleagues (2017) found no relationship ($r = .03, p > .05$) when assessing the association between Social Desirability and IH.</p>
Social Vigilantism (Saucier & Webster, 2010)	<p>Social vigilantism is defined as "an enduring individual difference that assesses the tendency of individuals to impress and propagate their 'superior' beliefs onto others to correct others' more 'ignorant' opinions" (p. 19).</p> <p>14-item, trait level social vigilantism scale. Participants rate the extent to which they feel that the statements describe themselves on a 5-point scale (1= Strongly Disagree, 5 = Strongly Agree).</p>	<p>"If everyone saw things the way that I do, the world would be a better place."</p>	<p>0</p> <p>The Social Vigilantism Scale assesses the extent to which people feel their views are correct, and feel that others should be informed of these correct views (i.e. other views are indicative of ignorance). Leary and colleagues (2017) found no relationship ($r = .02, p > .05$) between Social Vigilantism and their IH scale.</p>

Existential Quest (Van Pachterbeke, Keller, & Saroglou, 2012)	Existential quest is a construct defined as “being open to questioning and changing one’s own existential beliefs and worldviews” (p. 2).	“Being able to doubt about one’s convictions and to reappraise them is a good quality.	++	Existential Quest Scale assesses people’s openness to revising existential beliefs. Leary and colleagues found $r = .35, p < .001$.
	9-item, trait level scale. Participants rate the extent to which they feel that the statements describe themselves on a 7-point scale (1 = not at all true, 7 = completely true).	“Years go by but my way of seeing the world doesn’t change (R).”		
Epistemic Curiosity (Litman & Spielberger, 2003)	Epistemic curiosity is defined as a ‘drive to know’ that was aroused by conceptual puzzles and gaps in knowledge (p. 187).	“Conceptual problems keep me awake thinking about solutions”	++	Epistemic curiosity is conceptually similar to IH, and involves an interest in solving intellectual problems. However, it still remains a distinct construct from IH. Leary and colleagues (2017) found $r = .35, p < .001$ for interest scale and $r = .27, p < .001$ for deprivation scale.
	10-item, trait level scale. Participants rate the extent to which they feel that the statements describe themselves on a 4-point scale (1 = Almost never, 4 = Almost always).			
Intolerance of Ambiguity (Martin & Westie, 1959)	Intolerance of ambiguity is defined as a trait of individuals who “have a need for absolute dichotomies” and “rigid, categorical thinking” (p. 523).	“There is only one right way to do anything”	--	Leary et al. (2017) found $r = -.32, p < .001$, such that those higher in IH scored lower on Intolerance of Ambiguity (i.e. they were more able to tolerate ambiguity). This is in line with limitations-owning IH, as high levels of IH necessitate tolerance of ambiguity/a level of comfort with not having a definitive answer.
	8-item, trait level scale. Participants rate the extent to which they feel that the statements describe themselves on a 5-point scale (1 = strongly disagree, 5 = strongly agree).			

Self-Righteousness
(Falbo & Belk, 1985)

Self-righteousness is defined as “the conviction that one's behaviors or beliefs are correct, especially in contrast to alternate behaviors or beliefs” (p. 172).

7-item, trait level scale. Participants rate the extent to which they feel that the statements describe themselves.

“People who disagree with me are wrong.”

“One person’s opinions are just as valid as the next (R).”

- -

Leary and colleagues (2017) found $r = -.35$, $p < .001$. As such, we would expect a similar relationship between self-righteousness and Trait-State IH. Indeed, IH conceptually does not involve a conviction that one has the best viewpoints.

Need for Closure
(Webster & Kruglanski, 1994)

Need for closure is a tendency described as “a desire for ‘an answer on a given topic, any answer...compared to confusion and ambiguity’” (p. 1049).

15-item, trait level scale. Participants rate the extent to which they feel that the statements describe themselves on a 6-point scale (1 = completely disagree, 6 = completely agree).

“I do not usually consult many different opinions before forming my own view”

-

Leary et al. (2017) found $r = -0.14$, $p = .007$. This scale addresses comfort with uncertainty, and thus the authors would expect this relationship to be in line with Leary et al.’s (2017) findings, as well as in line with Intolerance of Ambiguity findings, as IH necessarily involves a level of comfort with uncertainty.

Actively Open-Minded Thinking (Stanovich & West, 2007)	<p>Actively Open-Minded Thinking is defined as the type of thinking that “incorporates a search for evidence, the extent to which is determined by the importance of the question, and an objectivity in one’s consideration and review of the evidence.”</p> <p>15-item, trait level open-mindedness scale. Participants rate the extent to which they feel that the statements describe themselves on a 5-point scale (1 = strongly disagree, 5 = strongly agree).</p>	<p>“Allowing oneself to be convinced by an opposing argument is a sign of good character.”</p> <p>“Changing your mind is a sign of weakness (R).”</p>	++	Krumrei-Mancuso & Rouse (2016) found a moderately strong correlation with AOMT ($r = .57, p < .001$). We would expect a weaker relationship than that found by Krumrei-Mancuso, as the limitations-owning account of IH is less broad than that measured with the CIHS. As such, we expect that more distinction would emerge between Trait-State IH and AOMT.
Tolerance (Goldberg, et al., 2006)	<p>Tolerance has been described as the “acceptance of diverse people and ideas and [freedom from] prejudice.” (Krumrei-Mancuso & Rouse, 2016, p. 218).</p> <p>9-item, trait level tolerance subscale. Participants rate the extent to which they feel that the statements describe themselves on a 5-point scale (1 = strongly disagree, 5 = strongly agree).</p>	<p>“I am open to change.”</p> <p>“I find it hard to forgive others (R).”</p>	+	Krumrei-Mancuso & Rouse (2016) found $r = .28, p < .001$. One important aspect of the tolerance subscale focuses on acceptance of different viewpoints, which is a key aspect of limitations-owning IH.
Cooperativeness (Goldberg, et al., 2006)	Cooperativeness is defined as “susceptibility to social influence and group pressure, the tendency to modify behavior	“I need the approval of others.”	0	Krumrei-Mancuso & Rouse found no relationship ($r = .14, p = .07$). We would also expect no relationship, as the subscale is intended to measure

to standards set by others, and the desire to fit in” (Krumrei-Mancuso & Rouse, 2016, p 218).

“I want to be different from others (R).”

conformity to social influence, which is conceptually separate from IH.

10-item, trait level cooperativeness subscale. Participants rate the extent to which they feel that the statements describe themselves on a 5-point scale (1 = strongly disagree, 5 = strongly agree).

Note: “0” indicates $|r| \leq .10$, + or - indicates $|r|$ between .11 and .30, ++ or -- indicates $|r|$ between .31 and .50, +++ or --- indicates $|r|$ between .51 and .70, ++++ or ---- indicates $|r|$ between .71 and .90, +++++ or ----- indicates $|r|$ between .91 and 1.0.

Appendix G.*Pearson correlations for Pilot Study 2: Correlations among measures of IH and relevant constructs.*

Measure	<i>M</i>	<i>SD</i>	Correlation with Trait-State IH	Correlation with Leary IH	Correlation with Comprehensive Intellectual Humility Scale
Trait-State IH	3.45	0.70	1	.77**	.67**
Leary IH	4.00	0.75	-	1	.73**
Comprehensive Intellectual Humility Scale	3.69	0.61	-	-	1
Narcissistic Personality Inventory	0.26	0.20	-.01	-.14**	-.25**
Duke University Religion Index	2.17	1.30	-.01	-.07	-.06
Religious and Spiritual Struggles	1.48	0.64	-.06	-.10**	-.24**
Satisfaction with Life Scale	20.66	8.60	.26**	.09	.13**
Dogmatism	2.40	0.63	-.42**	-.57**	-.62**
Self-Esteem	3.84	1.06	.24**	.12**	.25**
Hubristic Pride	1.42	0.68	-.20**	-.25**	-.33**
Authentic Pride	3.41	1.12	.30**	.15**	.20**

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Sense of Power	4.69	1.23	.24**	.15**	.21**
HEXACO: Honesty-Humility	3.60	.76	.19**	.19**	.39**
HEXACO: Emotionality	3.15	0.65	-.05	-.05	-.11*
HEXACO: Extraversion	3.08	0.83	.36**	.15**	.28**
HEXACO: Agreeableness	3.22	0.72	.48**	.40**	.55**
HEXACO: Conscientiousness	3.78	0.64	.31**	.32**	.47**
HEXACO: Openness	3.56	0.74	.49**	.42**	.44**
HEXACO: Altruism	3.95	0.81	.39**	.39**	.46**
Dominance	2.99	1.19	.16**	-.25**	-.40**
Prestige	4.79	1.09	.33**	.22**	.24**
Social Desirability	.47	0.28	.29**	.15**	.25**
Social Vigilantism	2.96	0.72	.06	-.02	-.29**
Existential Quest	4.52	0.99	.36**	.45**	.33**
Epistemic Curiosity	2.71	0.63	.48**	.35**	.21**

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Intolerance of Ambiguity	2.44	0.82	-.22**	-.30**	-.40**
Self-Righteousness	2.38	0.61	-.55**	-.52**	-.67**
Need for Closure	3.91	0.95	-.30**	-.24**	-.32**
Actively Open-Minded Thinking	3.67	0.58	.56**	.68**	.72**
Jackson Personality Inventory: Tolerance	3.83	0.70	.60**	.54**	.58**
Jackson Personality Inventory: Cooperativeness	2.42	0.77	-.16**	-.15**	-.22**

Note: * indicates $p < .01$; ** indicates $p < .001$.

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Appendix H.

Hierarchical regression model showing incremental validity in predicting Actively Open-Minded Thinking scores.

	Actively Open-Minded Thinking		
	<i>B</i> (SE)	β	ΔR^2
Step 1			.009
Age	.00 (.00)	.00	
Social desirability	.20 (.11)	.10	
Step 2			.126***
HEXACO Greed	.02 (.03)	.03	
Avoidance			
HEXACO Modesty	.23 (.04)	.35	
Step 3			.402***
CIHS	.69 (.04)	.73	
Step 4			.015***
State-Trait IH Scale	.14 (.04)	.17	
Total R^2			.552

Note: *** indicates $p < .001$.

	Actively Open-Minded Thinking		
	<i>B</i> (SE)	β	ΔR^2
Step 1			.010
Age	.00 (.00)	.00	
Social desirability	.20 (.11)	.10	
Step 2			.124***
HEXACO Greed	.02 (.03)	.03	
Avoidance			
HEXACO Modesty	.23 (.04)	.35	
Step 3			.369***
Leary et al. IH	.50 (.03)	.63	
Step 4			.004 ⁺
State-Trait IH Scale	.09 (.05)	.10	
Total R^2			.507

Note: *** indicates $p < .001$, + indicates $p = .082$

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Appendix I.

Hierarchical regression model showing incremental validity in predicting Narcissistic Personality

Inventory scores.

	Narcissistic Personality Inventory		
	<i>B</i> (SE)	β	ΔR^2
Step 1			.015*
Age	.00 (.00)	-.11	
Social desirability	.05 (.04)	.07	
Step 2			.440***
HEXACO Greed	-.03 (.01)	-.13	
Avoidance			
HEXACO Modesty	-.14 (.01)	-.62	
Step 3			.001
CIHS	.01 (.01)	.03	
Step 4			.010***
State-Trait IH	.03 (.01)	.10	
Total R^2			.465

Note: *** indicates $p < .001$, * indicates $p = .055$.

	Narcissistic Personality Inventory		
	<i>B</i> (SE)	β	ΔR^2
Step 1			.014 ⁺
Age	.00 (.00)	-.11	
Social desirability	.04 (.04)	.06	
Step 2			.440***
HEXACO Greed	-.03 (.01)	-.13	
Avoidance			
HEXACO Modesty	-.14 (.01)	-.62	
Step 3			.001
Leary et al. IH	.01 (.01)	.02	
Step 4			.014***
State-Trait IH	.06 (.02)	.19	
Total R^2			.468

Note: *** indicates $p < .001$, + indicates $p = .064$.

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Appendix J.

Hierarchical regression model showing incremental validity in predicting Epistemic Curiosity scores.

	Epistemic Curiosity		ΔR^2
	<i>B</i> (SE)	β	
Step 1			.017*
Age	.00 (.00)	-.09	
Social desirability	.23 (.11)	.10	
Step 2			.006
HEXACO Greed	-.03 (.04)	-.05	
Avoidance			
HEXACO Modesty	-.04 (.04)	-.05	
Step 3			.06***
CIHS	.29 (.06)	.28	
Step 4			.181***
State-Trait IH	.53 (.06)	.59	
Total R^2			.262

Note: *** indicates $p < .001$, * indicates $p < .05$.

	Epistemic Curiosity		ΔR^2
	<i>B</i> (SE)	β	
Step 1			.016*
Age	.00 (.00)	-.09	
Social desirability	.22 (.12)	.10	
Step 2			.006
HEXACO Greed	-.03 (.04)	-.04	
Avoidance			
HEXACO Modesty	-.03 (.04)	-.05	
Step 3			.133***
Leary et al. IH	.33 (.04)	.38	
Step 4			.100***
State-Trait IH	.47 (.07)	.52	
Total R^2			.255

Note: *** indicates $p < .001$, ** indicates $p < .01$.

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Appendix K.*Hierarchical regression model showing incremental validity in predicting Tolerance scores.*

	Tolerance		ΔR^2
	<i>B</i> (SE)	β	
Step 1			.181***
Age	.00 (.00)	.02	
Social desirability	1.07 (.12)	.43	
Step 2			.067***
HEXACO Greed	-.04 (.03)	-.06	
Avoidance			
HEXACO Modesty	.23 (.04)	-.29	
Step 3			.182***
CIHS	.56 (.05)	.49	
Step 4			.062***
State-Trait IH	.35 (.05)	.35	
Total R^2			.492

Note: *** indicates $p < .001$, ** indicates $p < .01$.

	Tolerance		ΔR^2
	<i>B</i> (SE)	β	
Step 1			.177***
Age	.00 (.00)	.02	
Social desirability	1.06 (.12)	.42	
Step 2			.070***
HEXACO Greed	-.04 (.03)	-.06	
Avoidance			
HEXACO Modesty	.24 (.04)	.30	
Step 3			.186***
Leary et al. IH	.43 (.04)	.45	
Step 4			.046***
State-Trait IH	.36 (.06)	.36	
Total R^2			.480

Note: *** indicates $p < .001$, ** indicates $p < .01$.

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