Links between intellectual humility and acquiring knowledge

Elizabeth J. Krumrei-Mancuso, Megan C. Haggard, Jordan P. LaBouff and Wade C. Rowatt

Department of Psychology, Pepperdine University, Malibu, CA, USA; Department of Psychology, Francis Marion University, Florence, SC, USA; Department of Psychology, University of Maine, Orono, ME, USA; Department of Psychology and Neuroscience, Baylor University, Waco, TX, USA

ABSTRACT

Five studies (N = 1,189) examined how intellectual humility (IH) relates to acquiring knowledge (learning). IH was associated with more general knowledge, but was unrelated to cognitive ability, and associated with slightly lower GPA. Findings were also mixed for meta-cognition. IH was associated with less claiming of knowledge one doesn’t have, indicating a more accurate assessment of one’s knowledge. However, IH was also associated with underestimating one’s cognitive ability. The differences may have resulted from using multiple measures of IH, each tapping unique aspects of the construct. Finally, IH was associated with a variety of characteristics associated with knowledge acquisition, including reflective thinking, need for cognition, intellectual fallibility, and meta-cognition. IH was also associated with less social vigilantism, which may promote collaborative learning. Finally, IH was associated with an intrinsic motivation to learn. These links may help explain the observed relationship between IH and possessing more knowledge.

Individuals’ epistemological beliefs play a critical role in acquiring knowledge (Kardash & Scholes, 1996). Research demonstrates that those who believe knowledge is certain are likely to incorrectly draw definitive conclusions from ambiguous evidence (Kardash & Scholes, 1996; Schommer, 1990). That is, individuals tend to distort information to fit their epistemological beliefs, which can affect their interpretation of information and knowledge acquisition. Intellectual humility (IH) has generated research interest in recent years as a topic related to epistemological beliefs. In previous research, IH has been conceptualized as a trait and as a virtue. If IH fosters good outcomes, such as contributing to the acquisition of intellectual goods, this would strengthen the conceptualization of IH as a virtue. The current work examined empirically whether IH contributes to the intellectual goods of acquiring knowledge, having insight into one’s knowledge, and other underlying cognitive traits associated with learning.

Humility, in general, is often thought of as a virtue relevant to gaining new knowledge, as most definitions of humility involve acknowledgement of one’s limitations. Simply put, learning requires the humility to realize one has something to learn. This has been demonstrated by humility being associated with better academic learning, as assessed by course grades (Rowatt et al., 2006). Theory suggests IH offers even more value than general humility when it comes to gaining new and more accurate knowledge. IH can be thought of as humility specific to the domain of thoughts, beliefs, ideas, and opinions. One definition of IH is a non-threatening awareness of one’s intellectual fallibility (Krumrei-Mancuso & Rouse, 2016). This assumes intellectually humble people understand and accept that their cognitive faculties are not perfect and that their viewpoints may, at times, be erroneous. This realization protects individuals from uncritically accepting current perspectives as necessarily accurate. Thereby, IH involves openness to new information that may improve people’s current knowledge. In this conceptualization, IH involves a healthy independence between intellect and ego, meaning people will not feel threatened by intellectual disagreements, will not be overconfident about their knowledge, will respect the viewpoints of others, and will be open to revising their viewpoints when warranted (Krumrei-Mancuso & Rouse, 2016).

Baehr (2016) argued that IH is intimately connected to good thinking and learning and is therefore a worthy and meaningful educational aim. The outcomes of IH are thought to include gaining insight into one’s areas of ignorance, distinguishing what one does and doesn’t understand about a subject, avoiding claims of knowledge that one doesn’t have, admitting to mistakes in
one’s understanding, discovering one’s false beliefs and misconceptions, and changing viewpoint when warranted (Elder & Paul, 2012). Theoretically, each of these qualities is likely to result in gaining more knowledge; yet, empirical work is needed to confirm whether this is the case.

Being able to acquire new knowledge is essential to productive daily living, including accomplishing academic and career goals. Academic institutions, employers, and society in general tend to value knowledge acquisition as a skill. To date, very little research has examined IH as a potential mechanism for fostering knowledge acquisition. Therefore, the current research took a broad approach as a starting point. The goal of the current paper is to advance understanding of how IH relates to a host of factors associated with knowledge acquisition. Through a series of studies, we examined links between IH and three categories of variables relevant to gaining knowledge: (a) indicators of past knowledge acquisition, (b) meta-knowledge, and (c) thinking styles, interpersonal dispositions, and learning goals that may contribute to knowledge acquisition.

**Indicators of knowledge acquisition**

The first theme we examined was whether IH is associated with indicators of knowledge acquisition, including cognitive ability (Study 1), grade point average (GPA; Study 2), and general knowledge (Study 3). Having conceptualized IH as a virtue relevant to gaining new knowledge, we expected IH to be positively associated with these constructs.

Previous research offers support for links between IH and indicators of learning. For example, IH has been linked to more general knowledge of people, places, and events, and better recognition memory (Alfano et al., 2017; Deffler, Leary, & Hoyle, 2016). This is consistent with the public perception that intellectually humble individuals are knowledgeable and smart (Samuelson et al., 2015). The inverse has also been observed, that lacking awareness of one’s knowledge, which is one characteristic of a lack of IH, is more common among less knowledgeable people (Dunning, 2011). Similarly, college students’ overconfidence in the correctness of chosen responses on a multiple-choice test, which might be a sign of intellectual arrogance, has been associated with lower grades on the test (Zakay & Glicksohn, 1992). Deffler et al. (2016) suggested the link between IH and knowledge acquisition might be due to differential attentional processing when exposed to new information. Intellectually humble individuals may gain more knowledge because they pay more attention to new information.

**Meta-knowledge**

The second theme we examined was how IH relates to meta-knowledge or perceptions of one’s knowledge. Specifically, we examined how IH relates to general estimates of one’s cognitive ability as well as estimates of one’s cognitive ability in relation to actual cognitive ability (Study 1) and how IH relates to a person’s likelihood of overclaiming general knowledge (Study 3). Based on the conceptualization of IH as involving an awareness of one’s intellectual fallibility, we expected IH to be consistent with accurate estimates of one’s cognitive ability and negatively associated with overclaiming knowledge.

A number of previous studies have suggested IH may relate to how people judge what they do and do not know. Two studies have examined whether IH predicts less overclaiming of knowledge (i.e., claiming to have knowledge one doesn’t have), one confirming this hypothesis (Alfano et al., 2017) and one finding no relationship (Deffler et al., 2016). In addition, there is experimental evidence that greater self-perceived knowledge independent of actual knowledge, a potential sign of intellectual arrogance, is associated with overclaiming of knowledge (Atir, Rosenzweig, & Dunning, 2015). Similarly, Deffler et al. (2016) found that those low in IH were more confident in their incorrect answers on a recognition memory task than those higher in IH. Thus, it seems that IH may make individuals more accurate at judging what they do not know. Having the IH to realize what one doesn’t know might increase one’s desire to be more informed and encourage greater attention to new information. This could account for the links between IH and gaining knowledge.

However, the available research on this topic is limited and there are some inconsistencies across studies. For example, some empirical evidence suggests intellectual arrogance predicts better course grades among college students (Meagher, Leman, Bias, Latendresse, & Rowatt, 2015) and, as noted, findings regarding links between IH and overclaiming of knowledge are not consistent (Alfano et al., 2017; Deffler et al., 2016). Therefore, further research is needed to examine these relationships.

**Thinking styles, interpersonal dispositions, and learning goals associated with knowledge acquisition**

The third theme we examined was how IH relates to a host of thinking styles, interpersonal dispositions, and learning goals that contribute to gaining knowledge (Studies 3–5). Our research questions are based on a theory that begins with the assumption that individuals
low in IH tend to be either oblivious to or overly concerned about their intellectual fallibility and may be burdened by a psychological need to be seen as intelligent, right in their thinking, or intellectually superior. In contrast, IH involves a non-threatening awareness of one’s intellectual fallibility that stems from a healthy independence between one’s intellect and ego. Therefore, we anticipated IH would free individuals from the distraction of egotistical concerns about their intellectual limitations, correctness, or superiority, which, in turn, would free them to: (a) focus on information, ideas, and thinking without the distraction of egotistical concerns about their intellect, (b) explore knowledge in an open-minded manner given their awareness that their current views could be incorrect, (c) be both assertive and respectful in interpersonal pursuits of knowledge without egotistical worries about how their viewpoints are seen by others, and (d) pursue knowledge for its own sake, rather than for external validation. For these reasons, we hypothesized IH would allow for a deeper, less burdened expression of need for cognition, cognitive reflection, intellectual engagement, curiosity, intellectual openness, open-minded thinking, assertiveness, less social vigilantism, and mastery rather than achievement goals. Each of these variables has previously been associated with greater knowledge acquisition, thereby offering potential connections between IH and gaining new knowledge. Next, we briefly review previous literature on these categories of variables.

**Need for cognition, cognitive reflection, intellectual engagement, and curiosity**

Previous research has indicated that the general population uniquely attributes the desire for knowledge to intellectually humble individuals, including love of learning, curiosity, and inquisitiveness (Samuelson et al., 2015). Some conceptualizations of IH include a desire for knowledge and love of learning (Haggard et al., 2018). In the current studies, effortful thinking and love of learning were not an inherent part of the definition of IH, but were considered relevant outcomes.

Within several independent samples, we assessed a number of constructs reflective of a desire to engage in complex, effortful, elaborate, reflective forms of thinking, including need for cognition, cognitive reflection, intellectual engagement, and curiosity. These variables describe an intrinsic tendency to seek and enjoy cognitive activities. These thinking styles promote the acquisition of knowledge because they are associated with more effortful information processing. Numerous studies have shown that, compared to individuals low in these thinking styles, those high in these thinking styles recall more information to which they are exposed, possess more knowledge on a variety of topics, and perform better on cognitive tasks (Cacioppo, Petty, Feinstein, & Jarvis, 1996). This is also associated with better academic learning, as these thinking styles have been linked to better performance on academic (Sadowski & Gulgoz, 1992, 1996) and standardized (Waters & Zakrjsek, 1990) tests, higher course grades (Leone & Dalton, 1988), and higher GPAs (Tolentino, Curry, & Leak, 1990; Waters & Zakrjsek, 1990).

Previous research has suggested links between IH and need for cognition (NFC; Davis et al., 2016) and curiosity (Leary et al., 2017). Further, NFC is associated with less belief in the certainty of knowledge (Kardash & Scholes, 1996), which may also promote IH. In addition to our theory that IH frees individuals from egotistical concerns about their intellect and thereby frees them to engage more fully in cognitive efforts, we also theorized that IH would be predictive of more intellectual thinking because accepting one’s intellectual fallibility requires a certain degree of skepticism as opposed to uncritically accepting one’s current perspective. Therefore, IH should involve thinking beyond simple, obvious answers and searching for, evaluating, and considering more information.

**Intellectual openness and open-minded thinking**

Research has demonstrated that in some circumstances, people’s prior beliefs bias their reasoning (Stanovich & West, 1997). Undervaluing or ignoring alternative ideas to one’s current thinking has been implicated in a number of cognitive biases including overconfidence, hindsight bias, and errors in belief updating (McKenzie, 1998). In contrast, intellectual openness and open-minded thinking involve flexible thinking, willingness to decontextualize, and the tendency to weigh new evidence against current beliefs.

These constructs are predictive of knowledge acquisition. Because open-minded thinking involves taking into account alternative hypotheses, it can improve judgment (McKenzie, 1998). Open-minded thinking has been associated with positive learning outcomes, including Scholastic Aptitude Test and vocabulary test scores (Stanovich & West, 1997). Perhaps this is because individuals higher in open-minded thinking seek out more information, and, to the extent that available information is predictive of future outcomes, are therefore more accurate in their knowledge and judgments (Haran, Ritov, & Mellers, 2013).

Intellectual openness and open-minded thinking are closely related to IH. These thinking styles are associated with less overconfidence regarding estimates and predictions (Haran et al., 2013), which can be considered a component of IH. Not surprisingly, others view intellectually humble people as open-minded (Samuelson et al., 2015) and IH is predictive of greater
open-minded thinking (Krumrei-Mancuso & Rouse, 2016), including greater openness to learning about opposing perspectives (Porter & Schumann, 2018). Therefore, we expected to see positive links between IH and intellectual openness and open-minded thinking in the current research.

**Interpersonal dispositions associated with cooperative learning**

We were also interested in IH’s ability to facilitate people gaining knowledge from and with others. Research has indicated IH is predictive of greater tolerance (Krumrei-Mancuso & Rouse, 2016), empathy, altruism, benevolence, and less power seeking (Krumrei-Mancuso, 2017). The current research built on this, theorizing IH would be predictive of more assertiveness and less social vigilantism. Assertiveness taps into the tendency to defend one’s ideas without imposing upon the viewpoints of others. Some define IH specifically as a mean between the vice of intellectual arrogance and intellectual diffidence (Jones, 2012; Samuelson et al., 2015). Thus, IH is not only about awareness of the limits of one’s knowledge, but also includes confidence in the knowledge one possesses. Systematically underestimating one’s knowledge is neither theoretically (Elder & Paul, 2012) nor empirically (Krumrei-Mancuso & Rouse, 2016) part of the presentation of IH. Therefore, IH may be associated with assertiveness, which would promote the idea that IH is associated with healthy confidence about one’s knowledge that is balanced with respecting others’ views. Further, IH was expected to be a negative predictor of social vigilantism, or the view that others are inadequate and inferior to oneself, which may be a mechanism by which IH facilitates cooperative and interactive learning.

**Learning goals**

The final topic we examined is how IH relates to learning goals. Mastery goals, or being motivated to learn out of a desire to understand knowledge, have been associated with better learning outcomes, including better academic performance, in comparison to performance goals, which involve being motivated to learn out of a desire to perform to a certain standard, such as achieving a particular grade (Hsu, 2013). IH has been associated with greater striving toward gaining new knowledge and more information-seeking behavior (Porter & Schumann, 2018). IH has also been associated with a greater openness to learning within the workplace (Owens, Johnson, & Mitchell, 2013). Therefore, we predicted IH would be associated with more mastery goals than performance goals within an educational setting.

**Study 1**

Study 1 examined how IH relates to cognitive ability as an indicator of knowledge gained, as well as individuals’ meta-cognitive awareness of their cognitive ability and performance. Study 1 data were collected in 2012, prior to the publication of a validated measures of IH; therefore, a scale was developed for this research. This measure of IH taps (a) excessive attitudes of intellectual superiority, reverse coded (not-a-know-it-all) and (b) openness to learning from others (i.e., intellectual openness). We hypothesized IH may be associated with better performance on a cognitive ability assessment and with less overestimation of cognitive ability.

**Method**

**Participants**

A U.S. sample of 120 adults (53% male, 47% female; Mage = 36, SD = 11) completed an online survey using Amazon Mechanical Turk (MTurk). The sample was 82% Caucasian, 9% Asian, 2% another race, 1% Black, and 6% identified as Hispanic.

**Measures**

**IH.** An 8-item measure of IH was developed for the current study. Table 1 shows the dimensionality of this IH measure in two independent MTurk samples. The scale consists of a Knowing-It-All subscale (con-trait), assessing excessive attitudes of intellectual superiority, and an Intellectual Openness subscale (pro-trait), assessing openness to learning from others. Items were rated on a 9-point scale ranging from not at all characteristic of me to very characteristic of me. Descriptive statistics and psychometric properties of the scale are included in Tables 1 and 2.

**Wonderlic cognitive ability pretest.** The 30-item Wonderlic Cognitive Ability Pretest (Wonderlic, Inc, 2004) was used to assess vocabulary, arithmetic, reasoning, and spatial abilities. It was scored by tallying the number of correct answers out of 30 given within the 8-minute time limit. This assessment has been shown to have good reliability (Wonderlic, Inc, 2007). Descriptive statistics within the current sample are provided in Table 2.

**Self-reported estimates and overestimation of cognitive ability.** Participants predicted their general problem-solving ability using an 11-point scale (i.e., 1 = 0 percent of people are worse at problem-solving than me; 2 = 10 percent of people are worse at problem solving than me . . . 10 = 90 percent of people are worse
at problem solving than me, 11 = 99 percent of people are worse at problem solving than me).

Participants also estimated how many items (out of 30) they answered correctly on the Wonderlic. To assess overestimation of cognitive ability, an actual-estimated difference score was computed by subtracting the number of questions participants estimated they correctly answered on the Wonderlic from the actual number of questions they correctly answered. For example, if a participant scored 25 on the Wonderlic, but thought he got 28 correct, his actual-estimated difference score would be −3. A negative value on this difference score indicates worse actual performance than estimated performance. Descriptive statistics are provided in Table 2.

**Procedure**

Participants completed the self-report measure of IH embedded in an online personality survey and predicted their general problem-solving ability. Next, participants completed the Wonderlic followed by an estimate of how many items they thought they answered correctly on the Wonderlic.

**Results**

**Preliminary analyses**

Participants’ estimates of their general problem-solving ability (r = .43, p < .001) and their estimates of how they performed on the Wonderlic (r = .61, p < .001) both correlated moderately with their actual test score. A t-test was used to compare participants’ estimated and actual cognitive ability. Participants estimated they would personally answer fewer questions correctly (M = 22.27, SD = 5.66) than they actually answered correctly (M = 27.40, SD = 4.68), t(117) = −11.94, p < .001.

**Links between IH and cognitive ability**

Correlation analyses were conducted to examine links between IH and predicted, actual, and post-test estimated performance on the Wonderlic. As shown in Table 2, self-reported IH did not correlate with actual cognitive ability assessed with the Wonderlic. However, scoring higher on the know-it-all facet of the IH scale was associated with providing higher estimates of one’s problem-solving ability and cognitive ability. This

| Measures                                      | Sample 1 | Sample 2 |
|-----------------------------------------------|----------|----------|
| 1. IH Not a Know-it-all                       |          |          |
| 2. IH Intellectual Openness                   | .14      |          |
| 3. IH (single item 9)                         | .09      | .63***   |
| 4. Predicted problem-solving ability          | −.33**   | −.05     |
| 5. Estimated Wonderlic performance            | −.21*    | .07      |
| 6. Actual Wonderlic score                     | .01      | .06      |
| 7. Actual-estimated difference score          | .29**    | −.06     |

The Actual-Estimated Difference score was computed by subtracting the number of questions participants estimated they answered correctly on the Wonderlic from the actual number of questions they answered correctly on the Wonderlic test.

---

**Table 1. Intellectual humility scale principal components.**

| Not a Know-It All subscale | Sample 1 | Sample 2 |
|----------------------------|----------|----------|
| (3r) My intellectual ideas are usually superior to others’ ideas. | .86      | .82      |
| (2r) I desire to be famous for an intellectual contribution | .82      | .76      |
| (4r) I know just about everything there is to know | .59      | .68      |
| (10r) Other people think that I am a know-it-all | .74      | .66      |

**Table 2. Associations between intellectual humility (IH), estimated cognitive ability, and actual cognitive ability (N = 120).**

| Measures                                      | 1        | 2        | 3        | 4        | 5        | 6        | Mean | SD  | α     |
|-----------------------------------------------|----------|----------|----------|----------|----------|----------|------|-----|-------|
| 1. IH Not a Know-it-all                       | .14      |          |          |          |          |          | 6.57 | 1.46| .76   |
| 2. IH Intellectual Openness                   |          | .63***   |          |          |          |          | 9.09 | 1.72| .65   |
| 3. IH (single item 9)                         | .09      |          | −.15     |          |          |          | 6.17 | 1.46|       |
| 4. Predicted problem-solving ability          | −.33**   | −.05     |          |          |          |          | 6.84 | 2.18|       |
| 5. Estimated Wonderlic performance            | −.21*    | .07      | −.01     | .60***   |          |          | 22.27| 5.66|       |
| 6. Actual Wonderlic score                     | .01      | .06      | −.08     | .43***   | .61***   |          | 27.40| 4.68|       |
| 7. Actual-estimated difference score          | .29**    | −.06     | −.11     | −.24**   | −.50***  | .32***   | 4.94 | 4.49|       |
means that self-reporting not being a know-it-all (i.e., greater IH) was associated with more conservative estimates of problem-solving ability and performance on the cognitive ability test. Further, the not-a-know-it-all facet of IH was associated with less overestimation of cognitive ability. Not being a know-it-all was associated with better actual-than-estimated performance on the Wonderlic. This suggests intellectually humble people may underestimate their cognitive ability.

Discussion

Even though IH has been linked to more general knowledge and better recognition memory (Alfano et al., 2017; Deffler et al., 2016), IH was not correlated with cognitive ability in the current study. Perhaps this is because the Wonderlic assesses both crystalized and fluid constructs (Matthews & Lassiter, 2007), thereby minimizing links to IH, which we hypothesized would relate to acquired knowledge, but not fluid cognitive abilities.

With regard to meta-cognition, those low in IH (know-it-alls) were found to overestimate their cognitive ability, thinking they had performed better on the Wonderlic than they actually had. Consistent with previous research and our hypotheses, IH was associated with more conservative assessments of cognitive ability. Overall, these findings suggest intellectually humble people are not more or less cognitively able than others, but underestimate their cognitive performance relative to their actual performance. This raises the possibility that the scale of IH used in this study may be tapping not only IH, but intellectual servility or diffidence.

Study 2

The goal of Study 2 was to examine how IH toward the beginning of college might predict final, cumulative GPA as a measure of academic learning during the college years. IH data were collected in 2013, prior to the publication of any measures of IH. Therefore, the IH scale developed in Study 1 was employed. After graduation, objective GPA data were collected from the registrar’s office.

Method

Participants

The sample consisted of 142 honors college students in the US (60% female and 37% male). The sample was 90% Caucasian, 1% Black, 1% Asian or Pacific Islander, 3% other, and 1% identified as Hispanic.

Measures

IH. IH was assessed with the 8-item measure developed for Study 1. In this study, participants rated items on a 100-point slider (e.g., ‘I am an intellectually humble person; 0 = not at all like me; 100 = very much like me). Scores for each subscale were summed and averaged. Scores can range from 0 to 100 for each subscale. The current sample’s scores ranged from 25.75 to 100 for the Not a Know-It-All subscale (\( M = 70.52, SD = 17.16, \alpha = .60 \)) and from 34 to 100 for the Intellectual Openness subscale (\( M = 76.75, SD = 13.34, \alpha = .67 \)).

GPA. Final cumulative GPA data were gathered as an objective measure from the university registrar. GPAs ranged from 1.43 to 4.00 (\( M = 3.52, SD = .46 \)).

Procedure

In the Spring of 2013, first- and second-year students at an Honors College were invited to participate in a self-report survey assessing IH. In the Spring 2018 the University registrar provided the cumulative GPA for each student.

Results

Preliminary analyses

We examined whether IH correlated with demographic factors. The Not-a-Know-It-All subscale of IH was correlated with gender (\( r = .41, p < .001 \)). A t-test indicated women expressed more IH than men: \( M_{women} = 75.96; SD_{women} = 14.67; M_{men} = 61.50; SD_{men} = 17.57; t(135) = -5.16, p < .001 \). Therefore, gender was controlled in subsequent analyses. IH was not correlated with other demographic factors.

IH as a predictor of GPA

Not a know-it-all IH was predictive of lower registrar-reported final GPA, accounting for 4.6% of variance (see Table 3). The Intellectual Openness subscale of IH was unrelated to GPA.

Discussion

The goals of this study were to examine if IH was predictive of academic learning over time, as assessed by GPA. Contrary to hypotheses, IH, in particular the Not-a-Know-It-All subscale, predicted slightly lower GPA. This is inconsistent with the findings of Zakay and Glicksohn (1992), who observed that being overconfident, the inverse of not being a know-it-all, was associated with lower exam grades. However, the current findings are consistent with Meagher et al.’s (2015)...
observation that intellectual arrogance predicts better course grades, as in this case being a know-it-all was associated with higher GPA.

Honors students with higher GPAs may have more difficulty with IH. Perhaps honors students with high grades are used to being know-it-alls. They may invest more in academic achievement and may, therefore, be more challenged to acknowledge intellectual limits because they are concerned with protecting their academic reputation. Further, students who have an easy time maintaining higher grades may have fewer opportunities to encounter the limits of their intellectual abilities, whereas those with lower GPAs may develop IH through critical feedback they receive about their performance.

A number of other explanations are possible as well. Given the finding of Study 1 that intellectually humble people tend to underestimate their cognitive performance, it is possible not being a know-it-all is reflective of lower levels of confidence in one’s intellectual ability, which may in turn account for lower academic performance. Finally, a complicating factor is that the scale may not be differentiating between intellectual humility and accurate assessments of one’s knowledge (Davis et al., 2011). That is, ratings of not being a know-it-all may reflect accurate self-assessments of less knowledge, rather than humility, thereby predicting lower GPA.

Study 3

The purpose of study 3 was to use a more extensive assessment of IH to examine if IH is associated with knowledge gained in the form of general knowledge scores and whether IH relates to the likelihood of being overconfident about one’s knowledge. Based on previous research (Alfano et al., 2017; Deffler et al., 2016), we anticipated IH would be associated with more general knowledge and more conservative claims of knowledge.

Based on the theory that IH may free individuals to express dispositions and engage in thinking styles amenable to knowledge acquisition, Study 3 also examined whether IH predicts more cognitive reflection and assertiveness, and less social vigilantism.

Method

Participants

The sample included 604 adults (53% male, 47% female; Mage = 35, SD = 10) from the US who completed a larger survey on MTurk. The sample was 78% Caucasian, 9% Black, 8% Asian, 1% Native American, 1% Mixed Race, and 4% identified as Hispanic.

Measures

IH. The 22-item Comprehensive Intellectual Humility Scale (CIHS; Krumrei-Mancuso & Rouse, 2016) was used to assess cognitions, emotions, and behaviors representative of IH. The measure represents a higher-order factor consisting of four subscales: (1) independence of intellect and ego (e.g.: ‘When someone contradicts my most important beliefs, it feels like a personal attack’, reverse scored), (2) openness to revising one’s viewpoint (e.g.: ‘I’m willing to change my mind once it’s made up about an important topic’), (3) respect for others’ viewpoints (e.g.: ‘I welcome different ways of thinking about important topics’), and (4) lack of intellectual overconfidence (e.g.: ‘When I am really confident in a belief, there is very little chance that belief is wrong,’ reverse scored). The measure has demonstrated appropriate levels of validity and reliability (Krumrei-Mancuso & Rouse, 2016). Items were rated on a 5-point scale, ranging from (1) strongly disagree to (5) strongly agree. Scores can range from 22 to 110. The current sample’s scores ranged from 40 to 111 (M = 83.63, SD = 11.35, α = .90).

General knowledge and overclaiming knowledge.

The Overclaiming Foil Scale was used to assess participants’ tendency to claim familiarity with fictitious concepts (Bing, Kluemper, Kristl Davison, Taylor, & Novicevic, 2011). Participants rated level of familiarity
with 25 concepts that are either real (ex. Napoleon, My Lai) or fictitious (ex. Queen Shattuck, Murphy’s Last Ride) using a 5-point scale ranging from (1) never heard of it to (5) very familiar. Response patterns were analyzed with signal detection methods to create a score for accurate knowledge (d’), which indicates a person’s ability to correctly discriminate between real and fictitious items, and a score for overclaiming knowledge (c), which indicates the extent to which a person indicates recognizing topics even if they are only vaguely familiar (assessed on the basis of how strong an individual’s sense of familiarity has to be to indicate being familiar with an item). In the current sample, accurate knowledge (d’) ranged from −.71 to 2.72 (M = 1.13, SD = .59) and overclaiming knowledge (c) ranged from −1.36 to 1.93 (M = .52, SD = .49).

Cognitive reflection. The Cognitive Reflection Task (Toplak, West, & Stanovich, 2011) was given to assess slow, reflective thinking. It includes 3 word problems, all of which have a quick but incorrect heuristic answer. The correct answer can be arrived at with no advanced mathematical training, but requires more reflective thinking. An example item reads, ‘A bat and ball cost $1.10 in total. The bat costs a dollar more than the ball. How much does the ball cost?’ In this case, participants must override the initial inclination to answer 10 cents, which would be incorrect, and instead consider the problem long enough to arrive at the correct answer of 5 cents. Responses are scored as either incorrect (0) or correct (1) and summed across questions. The current sample’s scores ranged from 0 to 3 (M = 2.02, SD = 1.15, α = .76).

Assertiveness. The Short Form of the Simple Rathus Assertiveness Scale (Jenerette & Dixon, 2010) was used to assess the extent to which participants will defend their own ideas without imposing upon others’ rights, with items such as ‘If someone has been telling false and bad stories about me, I see him (her) as soon as possible to “have a talk” about it’. Responses to the 19 items were coded using a 6-point scale ranging from (1) very unlike me to (6) very much like me. Scores were summed and averaged. The current sample’s scores ranged from 1.16 to 6.00 (M = 3.50, SD = .84, α = .89).

Social vigilantism. The Social Vigilantism Scale (Saucier & Webster, 2010) was used to assess the tendency to ignore inaccuracies in one’s beliefs and to view the beliefs of others as inadequate and inferior (e.g., ‘I feel as if it is my duty to enlighten other people’). Items were scored using a 9-point scale, ranging from (1) disagree very strongly to (9) agree very strongly and were summed and averaged. The current sample’s scores ranged from 1 to 8.50 (M = 5.09, SD = 1.25, α = .88).

Social desirability. The Self-Deceptive Enhancement subscale of the Balanced Inventory of Desirable Responding (Paulhus, 1991) was used to assess honest but overly positive responding (20 items). Items used a 7-point scale ranging from (1) not true to (7) very true. Scores were averaged to create a mean self-deceptive enhancement, since polytomous scoring has been shown to provide more exact estimates of desirable responding than dichotomous scoring (Vispoel & Kim, 2014). The current sample’s scores ranged from 1.65 to 6.80 (M = 4.23, SD = .75, α = .79).

Procedure
Mturk participants completed an online survey with measures presented in randomized order.

Results
Preliminary analyses
An a priori decision was made to control years of education and social desirability within the analyses, given that years of education may relate to the cognitive variables and social desirability can be of concern in self-report methodology. However, neither years of education (r = .04, p = .30), nor social desirability (r = .07, p = .06) were correlated with IH in the current sample.

IH as a predictor of cognitive traits
Hierarchical regression results are displayed in Table 4. IH predicted more accurate knowledge (d’), accounting for 3.8% of variance, based on higher IH being associated with better discrimination between the real and fictitious concepts. IH also predicted less overclaiming knowledge (c), accounting for 2.1% of variance, meaning IH predicts less of a tendency to liberally claim knowledge of subjects. In addition, IH predicted more cognitive reflection, accounting for 2.1% of variance.

IH as a predictor of personality and social traits
Hierarchical regression results are displayed in Table 5. Although IH was unrelated to assertiveness, it predicted less social vigilantism, accounting for 13.6% of variance.

Discussion
IH was predictive of knowledge acquisition and meta-knowledge, not accounted for by social desirability or years of education. Consistent with hypotheses, IH was predictive of having a higher threshold for claiming recognition of general knowledge items, meaning
individuals higher in IH had more awareness about their own knowledge, as they were less likely to exaggerate what they knew. This fits the trend observed in Study 1, where IH was associated with more conservative estimates of problem-solving ability and cognitive ability.

Also consistent with hypotheses and previous research, IH was associated with scoring better on an assessment of general knowledge of persons, places, and things (Study 3). This contrasts the findings of studies 1 and 2, where IH was not associated with cognitive ability assessed on the basis of vocabulary, arithmetic, reasoning, and spatial abilities, and was associated with slightly lower GPA. Perhaps the diversity of findings is attributable to the fact that two distinct measures of IH were used in Studies 1 and 2 versus Study 3, possibly tapping different outcomes.

The current finding that IH is associated with more general knowledge may be explained, in part, by the observed link between IH and reflective thinking. IH being associated with more careful and deliberate thinking may facilitate a greater depth of learning in life.

IH was unrelated to assertiveness in the current study. This indicates that the findings that IH is associated with more conservative estimates of cognitive abilities and knowledge do not translate into IH being associated with less assertiveness when it comes to defending one’s viewpoints in social contexts. However, as expected, IH was a protective factor against social vigilantism, in that those higher in IH were less likely to view the beliefs of others as inferior. This is likely to place those with greater IH in a better position to gain information from and with others in collaborative learning contexts.

**Study 4**

The goal of Study 4 was to examine among a sample of college students whether IH would predict cognitive traits related to acquiring knowledge. We theorized IH would free individuals from egotistical concerns about their intellect and thereby allow them to focus more freely on effortful cognitive activities and intellectual curiosity.

**Method**

**Participants**

The sample consisted of 144 college students (70% female, 30% male; Mage = 19 years, SD = 1.35). The sample was 49% Caucasian, 24% Asian, 18% Multi-Racial, and 5% Black. In addition, 15% of the sample identified as Latino.

**Measures**

**IH.** The 22-item Comprehensive Intellectual Humility Scale (CIHS; Krumrei-Mancuso & Rouse, 2016) described
in Study 3 was used to assess IH. The current sample’s scores ranged from 58 to 106 ($M = 79.30$, $SD = 9.68$, $\alpha = .88$).

**Need for cognition.** The 18-item Need for Cognition Scale (Cacioppo, Petty, & Kao, 1984) was used to assess the extent to which participants were inclined toward effortful cognitive activities (e.g., ‘I would prefer a task that is intellectual, difficult, and important to one that is somewhat important but does not require much thought’). Items were scored on a 9-point scale ranging from (−4) very strong disagreement to (4) very strong agreement. Scores can range from −72 to 72. The current sample’s scores ranged from −37 to 48 ($M = 3.72$, $SD = 13.57$, $\alpha = .75$).

**Intellectual engagement.** The 10-item International Personality Item Pool (IPIP) Intellect scale was used to assess the tendency to be intellectually curious (Goldberg et al., 2006). This scale is a public domain version of the Revised NEO Personality Inventory facet of Ideas. The items assess interest in theoretical/philosophical discussions, solving complex problems, thinking about abstract ideas, and reading challenging material. Items also assess confidence in one’s intellect, including being able to handle a lot of information and having a rich vocabulary. Items were scored on a 5-point scale ranging from (1) strongly disagree to (5) strongly agree. Scores can range from 10 to 50. The current sample’s scores ranged from 16 to 49 ($M = 32.20$, $SD = 6.74$, $\alpha = .80$).

**Curiosity and exploration.** The Curiosity and Exploration Inventory-II (Kashdan et al., 2009) was used to assess trait curiosity with the 5-item Stretching subscale, which assesses embracing the novel, uncertain, and unpredictable nature of daily life ($\alpha = .84$; e.g.: ‘I like to do things that are a little frightening’). Items were scored on a 5-point scale ranging from (1) very slightly or not at all to (5) extremely. Scores for each subscale can range from 5 to 25. In the current study, scores on both subscales ranged from 5 to 25 ($M = 17.10$ and $SD = 4.03$ for Stretching and $M = 16.02$ and $SD = 4.42$ for Embracing).

**Social desirability.** The Social Desirability Scale, Form C (Crowne & Marlowe, 1960), was used to assess the tendency to try to appear to behave in socially favorable ways. The 13 items had a true/false format. The current sample’s scores ranged from 0 to 13 ($M = 5.54$, $SD = 2.41$, $\alpha = .60$).

**Procedure**

Participants completed an online survey with measures presented in randomized order. They received assignment credit in a psychology class for participating.

**Results**

**Preliminary analyses**

Correlation analyses were conducted to examine whether IH correlated with demographic factors or social desirability tendencies. IH was not correlated with any assessed demographic factors, including age, gender, race, ethnicity, or religious affiliation ($p$ ranging from .15 to .97). There was a small correlation between IH and social desirability ($r = .18$, $p = .03$). Therefore, social desirability was controlled in subsequent analyses.

**IH as a predictor of cognitive traits**

Hierarchical regression results are displayed in Table 6. IH accounted for 8.2% of the variance in need for cognition, 8.7% of the variance in intellectual engagement, 8.4% of the variance in stretching curiosity, and 7.7% of the variance in embracing curiosity.

| Table 6. Hierarchical regressions of intellectual humility (ih) predicting cognitive traits (N = 144). |
|--------------------------------------------------|--------------------------------------------------|
| **Need for Cognition** | **Intellectual Engagement** |
| **Step 1** | **Step 2** | **Step 1** | **Step 2** |
| $B$ ($SE$) | $\beta$ | $\Delta R^2$ | $B$ ($SE$) | $\beta$ | $\Delta R^2$ |
| Social Desirability | .11 (.46) | .20* | .51 (.23) | .18* | .82*** |
| IH | .41 (.11) | .11*** | .21 (.06) | .30*** |

| **Curiosity and Exploration Stretching** | **Curiosity and Exploration Embracing** |
|-----------------------------------------|----------------------------------------|
| **Step 1** | **Step 2** | **Step 1** | **Step 2** |
| $B$ ($SE$) | $\beta$ | $\Delta R^2$ | $B$ ($SE$) | $\beta$ | $\Delta R^2$ |
| Social Desirability | .26 (.14) | .16 | .17 (.15) | .09 | .006 |
| IH | .09 (.03) | .22** | .04 (.04) | .08 |

* $p < .05$. ** $p < .01$. *** $p < .001$. 

---

E. J. KRUMREI-MANCUSO ET AL.
engagement, 4.8% of the variance in the stretching domain of curiosity and exploration. IH was not predictive of the embracing domain of curiosity.

**Discussion**

Consistent with hypotheses, this study revealed IH is associated with a number of cognitive traits likely to promote knowledge acquisition, including the tendency to participate in and enjoy challenging cognitive tasks. This is consistent with the Study 3 finding that IH is associated with reflective thinking. The current study further confirmed IH is also associated with the tendency to be intellectually curious. When curiosity was examined more closely, IH was specifically predictive of the motivation to seek out knowledge and new experiences, but was unrelated to the tendency to embrace the novel, uncertain, and unpredictable nature of daily life. This distinction is likely the result of the intellectual nature of IH promoting curiosity in the intellectual domain more so than life in general. Taken together, the observed links between IH and these cognitive traits may help explain the Study 3 finding that IH is associated with possessing more general knowledge.

**Study 5**

Study 5 examined additional traits likely to promote knowledge acquisition within a new sample of college students, consistent with the theory that IH may free individuals from egotistical concerns about their knowledge and thereby allow them to be more intellectually open and open-minded. In addition, this study examined achievement goals. We hypothesized that compared to students lower in IH, students higher in IH would be more motivated to learn for the sake of gaining knowledge and less motivated to learn for the sake of external rewards.

**Method**

**Participants**

The sample consisted of 179 college students (68% female, 26% male; Mage = 19 years, SD = 1.50). The sample was 53% Caucasian, 25% Asian, 11% Multi-Racial, 6% Black, 2% American Indian, and 2% Pacific Islander. In addition, 15% of the sample identified as Latino.

**Measures**

**IH.** The CIHS (Krumrei-Mancuso & Rouse, 2016) described in Study 3 was used to assess IH. The current sample’s scores ranged from 56 to 103 (M = 79.84, SD = 8.64, \( \alpha = .82 \)).

**Intellectual openness.** The 10-item IPIP Intellectual Openness scale was used to assess being curious about many topics, having a variety of interests, and liking new experiences (Goldberg et al., 2006). This scale is a public domain version of the Openness to Experience subscale of the Six Factor Personality Questionnaire. Items were scored on a 5-point scale ranging from (1) strongly disagree to (5) strongly agree. Scores can range from 10 to 50. The current sample’s scores ranged from 21 to 50 (M = 36.47, SD = 5.05, \( \alpha = .73 \)).

**Open-minded thinking.** The 41-item Composite Actively Open-Minded Thinking Scale (Stanovich & West, 2007) was used to assess open-minded and flexible thinking, including epistemological absolutism, willingness to change perspective, willingness to decontextualize, and the tendency to consider alternative opinions and evidence. Items were scored on a 6-point scale from (1) disagree strongly to (6) agree strongly. The current sample’s scores ranged from 96 to 221 (M = 165.16, SD = 20.77, \( \alpha = .88 \)).

**Achievement goals.** The 12-item Achievement Goal Questionnaire (Elliot & McGregor, 2001) was used to assess a 2 × 2 framework of mastery versus performance goals and approach versus avoidance goals. Mastery items assess the extent to which one’s motivation to achieve comes from a desire to fully understand knowledge (e.g.: ‘I want to learn as much as possible from my classes’) and performance items assess the extent to which one’s motivation to achieve comes from a desire to perform to a certain standard (e.g.: ‘My goal in my classes is to get a better grade than most of the other students’). Approach items assess the desire to achieve a positive outcome (e.g.: ‘I desire to completely master the material presented in my classes’) and avoidance items assess the desire to avoid a negative event or evaluation (e.g.: ‘My goal in my classes is to avoid performing poorly’). Items were rated on a 7-point scale from (1) not at all true of me to (7) very true of me. The current sample’s scores ranged from 4 to 21 for mastery approach goals (M = 16.21, SD = 3.63, \( \alpha = .86 \)). Scores ranged from 3 to 21 for each of the other subscales (M = 13.99, SD = 3.91, \( \alpha = .81 \) for mastery avoidance goals; M = 14.49, SD = 4.16, \( \alpha = .90 \) for performance approach goals; and M = 15.68, SD = 4.28, \( \alpha = .82 \) for performance avoidance goals).

**Social desirability.** The Social Desirability Scale, Form C (Crowne & Marlowe, 1960), described in Study 4 was used to assess the tendency to try to appear to behave in socially favorable ways. The current sample’s scores ranged from 0 to 13 (M = 5.42, SD = 2.55, \( \alpha = .64 \)).
Procedure
Participants completed an online survey with measures presented in randomized order. They received assignment credit in a psychology class for participating.

Results
Preliminary analyses
Correlation analyses were conducted to examine whether IH was correlated with demographic factors or social desirability tendencies. IH was not correlated with any assessed demographic factors, including age, gender, race, ethnicity, or religious affiliation. There was a small correlation between IH and social desirability ($r = .15$, $p = .048$). Therefore, social desirability was controlled in subsequent analyses.

IH as a predictor of cognitive traits
Hierarchical regression results are displayed in Table 7. IH accounted for 15.7% of the variance in intellectual openness and 30% of the variance in open-minded thinking.

IH as a predictor of achievement goals
Hierarchical regression results are displayed in Table 8. IH was predictive of 7.3% of the variance in mastery approach goals and was not predictive of mastery avoidance goals or performance goals.

Discussion
The goals of this study were to examine whether IH would predict traits that may promote knowledge acquisition and to examine whether IH would predict achievement goals among college students. First, this study replicated the findings of Study 2 with regard to IH predicting intellectual openness with two new measures in a new sample. This trait is likely to promote knowledge acquisition because it involves being curious about many topics and having a variety of interests and is therefore likely to promote exposure to more information. Not surprisingly, links were even stronger between IH and open-minded thinking, a construct that has some conceptual overlap with IH, in that both constructs include openness to considering alternative evidence and a willingness to change perspectives. These characteristics as well as the other components of open-minded thinking, such as flexible thinking, need for cognition, and a lack of need for closure, are likely to promote more accurate belief formation and knowledge acquisition.

Finally, consistent with expectations, IH was associated with mastery goals in academic settings, meaning those higher in IH are motivated to learn for the sake of gaining knowledge. IH was unrelated to performance goals, such as achieving a particular grade. Further, IH was associated with approach goals rather than avoidance goals, meaning those higher in IH are motivated by the desire to master knowledge rather than motivated by a fear of not mastering knowledge.

Table 7. Hierarchical regressions of intellectual humility (IH) predicting intellectual openness and open-minded thinking (N = 179).

|          | Intellectual Openness |          |                         | Open-minded Thinking |                         |
|----------|-----------------------|----------|-------------------------|----------------------|-------------------------|
|          | $B$ (SE) | $\beta$ | $\Delta R^2$ | $B$ (SE) | $\beta$ | $\Delta R^2$ |
| Step 1   |          |          |                |          |          |                |
| Social Desirability | .11 (.16) | .05 | .003 | .76 (.63) | .09 | .01 |
| IH       | .24 (.04) | .40*** | .157*** | 1.34 (.16) | .56*** | .030*** |

$p < .05$, **$p < .01$, ***$p < .001$.

Table 8. Hierarchical regressions of intellectual humility (IH) predicting achievement goals (N = 179).

|          | Mastery Approach Goals |          | Mastery Avoidance Goals |          |
|----------|------------------------|----------|-------------------------|----------|
|          | $B$ (SE) | $\beta$ | $\Delta R^2$ | $B$ (SE) | $\beta$ | $\Delta R^2$ |
| Step 1   |          |          |                |          |          |                |
| Social Desirability | .20 (.11) | .14 | .019 | −.08 (.12) | .18* | .002 |
| IH       | .12 (.03) | .27*** | .073*** | .02 (.04) | .04 | .004 |
| Step 1   |          |          |                |          |          |                |
| Social Desirability | −.02 (.13) | −.01 | .000 | −.10 (.13) | −.06 | .010 |
| IH       | −.04 (.04) | −.08 | .006 | −.05 (.04) | −.10 | .001 |

$p < .05$, **$p < .01$, ***$p < .001$.
This study demonstrates links between IH and cognitive traits and learning goals that are likely to involve a greater pursuit of knowledge and thereby may further explain the Study 3 finding that IH is associated with possessing more general knowledge.

**General discussion**

Academic interest in IH has risen in recent years. A relatively unexplored area of investigation is whether and how IH supports acquiring new knowledge. If IH is to be thought of as a virtue, one would expect it to foster beneficial intellectual outcomes. The current work examined empirically whether IH relates to the intellectual goods of acquiring knowledge, having insight into one’s knowledge, and other underlying dispositions associated with learning. This topic is particularly relevant in cultures where IH may be subtly discouraged through social pressures to have all the answers or the belief that saying ‘I don’t know’ makes one appear unintelligent or incompetent. Where this is the case, teaching IH may allow individuals to become fairminded, critical thinkers, resulting in fairminded, critical societies (Elder & Paul, 2012). Although there are substantial theoretical bases for these conclusions, empirical evidence directly linking IH to beneficial thinking styles is rare. The goal of the current research was to advance general understanding of how IH relates to several categories of outcomes related to knowledge acquisition.

**Intellectual humility and knowledge acquisition**

The first category of outcomes we examined in relation to IH consisted of indicators of knowledge acquisition. Overall, the findings were mixed. IH was associated with better scores on an assessment of general knowledge (Study 3), but was unrelated to cognitive ability (Study 1), and was associated with slightly lower GPA (Study 2). We had anticipated IH would be associated with cognitive ability because the Wonderlic assessment used is related to acquired knowledge (Matthews & Lassiter, 2007). However, the null results may have been a consequence of the nonverbal problem-solving components of the assessment. The fact that IH was linked to general knowledge but not cognitive ability seems to suggest that IH is associated with crystallized but not fluid intelligence.

Despite the fact that IH was associated with possessing more general knowledge (Study 3), it was associated with slightly lower GPA (Study 2). This is surprising given that general humility has been associated with better course grades (Rowatt et al., 2006). However, previous research examining links between intellectual arrogance and grades has offered mixed results, with some finding a negative link (Zakay & Glicksohn, 1992) and some finding a positive link (Meagher et al., 2015). The current findings may relate to the sample consisting of honors college students, where the not-a-know-it-all subscale may have functioned as a proxy for accurate intellectual self-assessment rather than intellectual humility. That is, honors students with high GPAs may have accurately endorsed the items that their intellectual ideas are usually superior to others’ ideas and that they desire to be famous for an intellectual contribution, resulting in the false perception that they are low in IH. Alternatively, or in addition, these students may have genuinely exhibited a degree of lower IH. Honors students with high GPAs may have had few opportunities to be confronted with their intellectual fallibility and thereby may have had fewer opportunities to develop IH, causing them to endorse unrealistic statements of superiority, such as that they ‘know just about everything there is to know’ and that other people think of them as a ‘know-it-all.’ Additional explanations are offered next on the basis of the findings related to meta-knowledge.

**Intellectual humility and meta-knowledge**

The second category of outcomes we examined in relation to IH consisted of meta-cognitive awareness about one’s knowledge, because more accurate insight into what one does and doesn’t know may be a contributor to links between IH and knowledge acquisition. IH was associated with a lower likelihood of claiming knowledge one doesn’t have (Study 3), indicating that IH is associated with more accurate assessment of one’s general knowledge. Knowing what one doesn’t know may be the first step in the motivation to seek further knowledge, thereby facilitating the link between IH and learning.

An unexpected result with regard to meta-cognitive awareness was that IH was associated with underestimating one’s cognitive ability relative to actual cognitive ability (Study 1). This is inconsistent with the conceptualization of IH as claiming knowledge to the degree merited (Samuelson et al., 2015), as it may indicate those higher in IH claim to know less than merited. Researchers have been cautious to distinguish IH from intellectual servility (Haggard et al., 2018) and previous research has indicated IH is not associated with less confidence in one’s knowledge (Deffler et al., 2016) or less self-confidence in general (Krumrei-Mancuso & Rouse, 2016). It is possible the scale used
in Studies 1 and 2 may have tapped into intellectual servility or lower intellectual confidence, which could explain both the finding that IH was associated with underestimating one’s cognitive ability relative to actual cognitive ability (Study 1) as well as the finding that IH was associated with lower GPA (Study 2), given that underestimation of one’s cognitive ability may function as a barrier to learning. On the other hand, the scale used in Studies 3–5 has shown discriminant validity from concepts such as a lack of self-confidence, low self-regard, and social conformity (Krumrei-Mancuso & Rouse, 2016). Further, in Study 3, IH was unrelated to levels of assertiveness and in Study 4, IH was predictive of the Intellect scale, which includes an assessment of confidence in one’s knowledge. Thus, the mixed results observed in this research may have been the effect of unique nuances assessed with the different measure of IH employed in Studies 1 and 2 versus Studies 3 through 5. Recent research on general humility suggests that humility exists in both appreciative and self-abasing forms, and that self-abasing humility is uniquely associated with more negative self-insights (Weidman, Cheng, & Tracy, 2018). Perhaps the two measures employed in the current research tapped a parallel distinction for IH.

**Intellectual humility in relation to thinking styles, interpersonal traits, and learning goals**

The third category of outcomes we examined in relation to IH consisted of a variety of variables that may contribute to knowledge acquisition (Studies 3–5). Our theory was that IH as a non-threatening awareness of one’s intellectual fallibility would free individuals form the burden of being preoccupied with egotistical concerns about their intellectual limitations or correctness and thereby allow individuals to spend more time and effort engaged in cognitive efforts, exploring new ideas, and learning with and from others, each of which, in turn, may contribute to gaining new knowledge. Consistent with this theory, IH was associated with more reflective thinking, need for cognition, intellectual engagement, intellectual curiosity, intellectual openness, and open-minded thinking. IH was also associated with less social vigilantism, which may promote collaborative and cooperative learning. Finally, IH was associated with the intrinsic motivation to learn for the sake of gaining knowledge. All of these links may be relevant to explaining the observed relationship between IH and better scores on an assessment of general knowledge.

**Conclusions, limitations, and future directions**

The current research examined IH in relation to a number of variables indicative of past learning as well as thinking styles, traits, and motivations predictive of future learning. This research made use of numerous independent samples and used multiple measures to assess the predictors and outcomes. The findings replicate and expand previous studies using different measures of IH, thereby strengthening confidence in previous results and increasing understanding about the many ways IH is connected to knowledge acquisition (Alfano et al., 2017; Davis et al., 2016; Deffler et al., 2016; Leary et al., 2017). Additional work can be done to relate IH to immediate measures of knowledge acquisition.

The use of two measures of IH in this research makes it more difficult to compare results between the studies conducted (Studies 1 and 2 versus Studies 3–5), however, the use of multiple measures also adds to the richness of the findings. Although Haggard et al. (2018) have found multiple measures of IH to intercorrelated strongly, the current research points out that there may be differences in how distinct assessments of IH relate to measures of knowledge.

Our research examining links between IH and numerous variables known to contribute to knowledge acquisition was exploratory in nature. The observed correlations were consistent with our theory that IH may contribute causally to thinking styles, dispositions, and motivations that can promote knowledge acquisition. However, further investigation is needed to examine whether this is the case. Future research may examine mediation models with the thinking styles, dispositions, and motivations examined in this research functioning as mediators between IH and direct assessments of learning.

It should be clear that the current research did not establish directionality between variables. Although the focus of this paper was on ways IH may promote knowledge acquisition, research suggests gaining knowledge also promotes IH. For example, a greater amount of higher education has been associated with believing in the tentative nature of knowledge (Schommer, 1990), which could be considered a component of IH. This suggests exposing individuals to advanced knowledge increases an appreciation for the complexity of knowledge, thereby increasing people’s IH in realizing the limits of their knowledge. It would be beneficial for future research to examine the links between IH and learning in both directions with longitudinal and experimental designs.
Disclosure statement

No potential conflict of interest was reported by the authors.

Funding

This work was supported by a generous grant from the John Templeton Foundation under Grant [60622], Developing Humility in Leaders.

ORCID

Elizabeth J. Krumrei-Mancuso http://orcid.org/0000-0001-6151-7845

References

Alfano, M., Iurino, K., Stey, P., Robinson, B., Christen, M., Yu, F., & Lapsley, D. (2017). Development and validation of a multi-dimensional measure of intellectual humility. PloS one, 12(8), 1–28, e0182950.

Atir, S., Rosenzweig, E., & Dunning, D. (2015). When knowledge knows no bounds: Self-perceived expertise predicts claims of impossible knowledge. Psychological Science, 26, 1295–1303.

Baehr, J. (2016). Is intellectual character growth a realistic educational aim? Journal of Moral Education, 45, 117–131.

Bing, M. N., Kluemper, D., Kristl Davison, H., Taylor, S., & Novicevic, M. (2011). Overclaiming as a measure of faking. Organizational Behavior and Human Decision Processes, 116, 148–162.

Cacioppo, J. T., Petty, R. E., Feinstein, J. A., & Jarvis, W. G. (1996). Dispositional differences in cognitive motivation: The life and times of individuals varying in need for cognition. Psychological Bulletin, 119, 197–253.

Cacioppo, J. T., Petty, R. E., & Kao, C. F. (1984). The efficient assessment of need for cognition. Journal of Personality Assessment, 48, 306–307.

Crowne, D. P., & Marlowe, D. (1960). A new scale of social desirability independent of psychopathology. Journal of Consulting Psychology, 24, 349–354.

Davis, D. E., Hook, J. N., Worthington, J. E. L., Van Tongeren, D. R., Gartner, A. L., Jennings, D. J., & Emmons, R. A. (2011). Relational humility: Conceptualizing and measuring humility as a personality judgment. Journal of Personality Assessment, 93(3), 225–234.

Davis, D. E., Rice, K., McElroy, S., DeBlaere, C., Choe, E., Van Tongeren, D. R., & Hook, J. N. (2016). Distinguishing intellectual humility and general humility. The Journal of Positive Psychology, 11(3), 215–224.

Deffler, S. A., Leary, M. R., & Hoyle, R. H. (2016). Knowing what you know: Intellectual humility and judgments of recognition memory. Personality and Individual Differences, 96, 255–259.

Dunning, D. (2011). The Dunning-Kruger effect: On being ignorant of one’s own ignorance. In J. M. Olson, M. P. Zanna, J. M. Olson, & M. P. Zanna (Eds.), Advances in experimental social psychology (Vol. 44, pp. 247–296). San Diego, CA: Academic Press.

Elder, L., & Paul, R. (2012). Critical thinking: Competency standards essential to the cultivation of intellectual skills, part 4. Journal of Developmental Education, 35, 30–31.

Elliot, A., & McGregor, H. (2001). A 2 × 2 achievement goal framework. Journal of Personality and Social Psychology, 80, 501–519.

Goldberg, L. R., Johnson, J. A., Eber, H. W., Hogan, R., Ashton, M. C., Cloninger, C., & Gough, H. G. (2006). The international personality item pool and the future of public-domain personality measures. Journal of Research in Personality, 40, 84–96.

Haggard, M., Rowatt, W. C., Leman, J. C., Meagher, B., Moore, C., Fergus, T., … Howard-Snyder, D. (2018). Finding middle ground between intellectual arrogance and intellectual servility: Development and assessment of the limitations-owning intellectual humility scale. Personality and Individual Differences, 124, 184–193.

Haran, U., Ritov, I., & Mellers, B. A. (2013). The role of actively open-minded thinking in information acquisition, accuracy, and calibration. Judgment and Decision Making, 8(3), 188–201.

Hsu, C. S. (2013). The predictive effects of goal structure perception on achievement goal orientation, academic performance, and learning strategy: A meta-analysis of journal articles. Bulletin of Educational Psychology, 45(1), 63–82.

Jenerette, C., & Dixon, J. (2010). Developing a short form of the simple rathus assertiveness schedule using a sample of adults with sickle cell disease. Journal of Transcultural Nursing, 21, 314–324.

Jones, W. E. (2012). Higher education, academic communities, and the intellectual virtues. Educational Theory, 62, 695–711.

Kardash, C. M., & Scholes, R. J. (1996). Effects of preexisting beliefs, epistemological beliefs, and need for cognition on interpretation of controversial issues. Journal of Educational Psychology, 88, 260–271.

Kashdan, T. B., Gallagher, M. W., Silvia, P. J., Winterstein, B. P., Breen, W. E., Terhar, D., & Steger, M. F. (2009). The curiosity and exploration inventory-II: Development, factor structure, and psychometrics. Journal of Research in Personality, 43, 987–998.

Krumrei-Mancuso, E. J. (2017). Intellectual humility and prosocial values: Direct and mediated effects. The Journal of Positive Psychology, 12, 13–28.

Krumrei-Mancuso, E. J., & Rousse, S. V. (2016). The development and validation of the comprehensive intellectual humility scale. Journal of Personality Assessment, 98, 209–221.

Leary, M. R., Diebels, K. J., Davison, E. K., Jongman-Sereno, K. P., Isherwood, J. C., Raimi, K. T., … & Hoyle, R. H. (2017). Cognitive and interpersonal features of intellectual humility. Personality and Social Psychology Bulletin, 43(6), 793–813.

Leone, C., & Dalton, C. H. (1988). Some effects of the need for cognition on course grades. Perceptual and Motor Skills, 67, 175–178.

Matthews, T. D., & Lassiter, K. S. (2007). What does the wonderlic personnel test measure? Psychological Reports, 100, 707–712.

McKenzie, C. M. (1998). Taking into account the strength of an alternative hypothesis. Journal of Experimental Psychology: Learning, Memory, and Cognition, 24, 771–792.

Meagher, B. R., Leman, J. C., Blas, J. P., Latendresse, S. J., & Rowatt, W. C. (2015). Contrasting self-report and consensus ratings of intellectual humility and arrogance. Journal of Research in Personality, 58, 35–45.
Owens, B. P., Johnson, M. D., & Mitchell, T. R. (2013). Expressed humility in organizations: Implications for performance, teams, and leadership. *Organization Science, 24*, 1517–1538.

Paulhus, D. L. (1991). Measurement and control of response bias. In J. P. Robinson, P. R. Shaver, & L. S. Wrightsman (Eds.), *Measures of personality and social psychological attitudes* (pp. 17–59). San Diego, CA: Academic Press. doi:10.1016/B978-0-12-590241-0.50006-X

Porter, T., & Schumann, K. (2018). Intellectual humility and openness to the opposing view. *Self and Identity, 17*(2), 139–162.

Rowatt, W. C., Powers, C., Targhetta, V., Comer, J., Kennedy, S., & Labouff, J. (2006). Development and initial validation of an implicit measure of humility relative to arrogance. *The Journal of Positive Psychology, 1*, 198–211.

Sadowski, C. J., & Gulgoz, S. (1992). Association of need for cognition and course performance. *Perceptual and Motor Skills, 74*, 498.

Sadowski, C. J., & Gulgoz, S. (1996). Elaborative processing mediates the relationship between need for cognition and academic performance. *The Journal of Psychology, 130*, 303–307.

Samuelson, P. L., Jarvinen, M. J., Paulus, T. B., Church, I. M., Hardy, S. A., & Barrett, J. L. (2015). Implicit theories of intellectual virtues and vices: A focus on intellectual humility. *The Journal of Positive Psychology, 10*, 389–406.

Saucier, D. A., & Webster, R. J. (2010). Social vigilantism: Measuring individual differences in belief superiority and resistance to persuasion. *Personality and Social Psychology Bulletin, 36*, 19–32.

Schommer, M. (1990). Effects of beliefs about the nature of knowledge on comprehension. *Journal of Educational Psychology, 82*, 498–504.

Stanovich, K. E., & West, R. F. (1997). Reasoning independently of prior belief and individual differences in actively open-minded thinking. *Journal of Educational Psychology, 89*(2), 342–357.

Stanovich, K. E., & West, R. F. (2007). Natural myside bias is independent of cognitive ability. *Thinking & Reasoning, 13*, 225–247.

Tolentino, E., Curry, L., & Leak, G. (1990). Further validation of the short form of the need for cognition scale. *Psychological Reports, 66*, 321–322.

Toplak, M. E., West, R. F., & Stanovich, K. E. (2011). The Cognitive Reflection Test as a predictor of performance on heuristics-and-biases tasks. *Memory & Cognition, 39*, 1275–1289.

Vispoel, W. P., & Kim, H. Y. (2014). Psychometric properties for the balanced inventory of desirable responding: Dichotomous versus polytomous conventional and IRT scoring. *Psychological Assessment, 26*, 878–891.

Waters, L. K., & Zakrjasjek, T. D. (1990). Correlates of need for cognition total and subscale scores. *Educational and Psychological Measurement, 50*, 213–217.

Weidman, A. C., Cheng, J. T., & Tracy, J. L. (2018). The psychological structure of humility. *Journal of Personality and Social Psychology, 114*(1), 153–178.

Wonderlic, Inc. (2004). *The Wonderlic QuickTest series of tests successfully predicts scores on the Wonderlic Personnel Test (WPT)*. Libertyville, IL: Author.

Wonderlic, Inc. (2007). *Wonderlic Personnel Test normative report*. Libertyville, IL: Author.

Zakay, D., & Glicksohn, J. (1992). Overconfidence in a multiple-choice test and its relationship to achievement. *The Psychological Record, 42*, 519–524.