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Measuring Honesty-humility with an Implicit Association Test (IAT): Construct and Criterion Validity

Yolandi-Eloise Janse van Rensburg[1], François de Kock[2], Reinout E. de Vries[3], and Eva Derous[4]

[1] Department of Industrial Psychology, Stellenbosch University

[2] Section for Organisational Psychology, University of Cape Town

[3] Department of Experimental and Applied Psychology, Vrije Universiteit Amsterdam

[4] Department of Work, Organisation and Society; Vocational and Personnel Psychology Lab, Ghent University

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Correspondence concerning this article should be addressed Dr Yolandi-Eloise Janse van Rensburg, Department of Industrial Psychology, Faculty of Military Science, Frans Erasmus Drive, Saldanha, 7395. E-mail: Yolandij@sun.ac.za; contact number: +27 71 384 5079.

Credit Authorship Contribution Statement

Yolandi-Eloise Janse van Rensburg: Conceptualisation, investigation, formal analysis, visualisation, writing - original draft, writing - review and editing.

François de Kock: Conceptualisation, visualisation, writing - review and editing.

Reinout de Vries: Writing - review and editing.

Eva Derous: Conceptualisation, visualisation, writing - review and editing.

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Abstract

The goal of this research was to develop an implicit association test for honesty-humility (IAT-HH) and assess its validity. Construct validity was established by conducting correlations and confirmatory factor analysis. A model with honesty-humility facets measured by two related but distinct method factors (self-report vs. implicit) showed superior fit, suggesting that our IAT-HH captured important substantive variance, but also IAT-specific variance. We further investigated criterion-related validity in relation to academic behaviour of Belgian university students ($N = 161$), using both desirable and undesirable criteria. Our results suggest that IATs of honesty-humility may show measurement overlap with self-reports. However, the IAT-HH could neither predict self-report nor behavioural academic criteria. Predicting behaviour with the IAT-HH appears to be complex and is discussed.

Keywords: Implicit association test, Self-report, Honesty-humility, Cheating, Counter-academic behaviour

Measuring Honesty-Humility with an Implicit Association Test (IAT): Construct and Criterion Validity

1. Introduction

The Implicit Association Test (IAT) (Greenwald et al., 1998) has received increased attention in the field of personality psychology, because some researchers are of the opinion that IATs could measure personality in a way that is unbiased by self-distortion (Becker & Menges, 2013; Perugini & Banse, 2007). IATs have also shown predictive value for various criteria, such as non-cheating behaviour (Perugini & Leone, 2009), academic outcomes (Vianello et al., 2010), and job performance (Vecchione et al., 2016). However, despite their rising popularity, IATs are not widely used for assessment and selection in universities and other organisations, largely because important questions remain about measurement issues. In particular, their construct- and criterion-related validity remains a subject of debate (Janse van Rensburg et al., 2019; Lazarević et al., 2021).

One way to establish the construct validity of IATs is to assess their convergent validity with other measures or measurement methods, to operationalise the same construct. To show convergent validity (Campbell & Fiske, 1959), IAT scores should covary[1] with scores from other assessment methods used to measure the same construct. For example, recent research shows that, although self-report and implicit measures of extraversion and neuroticism converge, they appear to measure distinct constructs (Kolnes et al., 2021). This raises questions about convergent validity (across methods) to assess other personality traits. The use of implicit tests to measure traits outside of the Big Five trait framework, for example, honesty-humility (from the HEXACO model), appears especially promising. To address concerns (see Fan et al., 2012; Schnabel et al., 2008) that self-reported honesty-humility measures may be vulnerable to socially desirable responding, self-report bias, faking and being prone to test-takers' lack of introspective accuracy, novel measurement methods to assess honesty-humility have been developed, including computer games (Barends et al., 2021) and situational judgment tests (Oostrom et al., 2019). Implicit tests for honesty-humility are especially promising alternatives to mainstream self-report measures as such tests are expected to be less subject to voluntary control and faking. However, it is unclear how implicit tests of honesty-humility relate to self-report measures.

In addition to construct validity issues, establishing the criterion validity of IATs is important. Criterion validity is the 'gold standard' requirement for operational use of tests in organisations (Sackett et al., 2018). Self-report measures of honesty-humility show promising criterion validity. Not only does research show that self-reported honesty-humility outperforms all other personality traits in predicting counterproductive work behaviour (Pletzer et al., 2019; Pletzer et al., 2020) and prosocial behaviour (Thielmann et al., 2020); prior studies also suggest that including self-report measures of honesty-humility, in addition to the Big Five traits, may improve prediction of honesty-relevant criteria (Ashton & Lee, 2007). Whether or not implicit measures of honesty-humility predict criteria and if they could show incremental prediction (beyond self-report measures) are important questions to answer.

Against this background, the main goal of this research was to develop an implicit association test of honesty-humility (IAT-HH) and to assess the construct and criterion validity of this test. To this end, we administered the newly developed IAT-HH (alongside a self-report trait measure of honesty-humility) on a sample of university students and used confirmatory factor analysis (CFA) to evaluate the construct and criterion validity of the test. We collected data on a range of criterion measures

[1] By definition, IATs are designed to circumvent conscious response distortion, resulting in some expected degree of divergence from self-report measures, which are prone to distortion.

relevant to student outcomes, and these were administered at four different points in time. This allowed us to evaluate the criterion and incremental validity of the IAT in comparison to a traditional self-report measure. Together, our findings are relevant to researchers and practitioners interested in using IATs to assess honesty-humility and predict integrity-related behaviour in a student and/or academic context.

2. Construct Validity of the Implicit Association Test (IAT) of Honesty-Humility

As one form of construct validity, convergent validity manifests in correlations between measures that assess the same construct using different methods, also known as monotrait-heteromethod correlations (Campbell & Fiske, 1959). Such studies may reveal that measures using implicit and self-report methods respectively are related, but still measure distinct constructs, for example measures of ethnocentrism (Cunningham et al., 2004) and extraversion and neuroticism (Kolnes et al., 2021).

In demonstrating the convergent validity, it is important to consider how possible method effects (e.g., IAT vs. self-report) may affect dimension level scores of honesty-humility. Strong correlations between implicit and self-report scores can be interpreted as evidence of convergent validity, and weak correlations suggest low convergent validity (Nosek & Smyth, 2007). However, when intercorrelations are excessively high (e.g., $r > .70$), it would imply that both measures considerably overlap, making it redundant to use both methods (Bornstein, 2002). On the other hand, no or low intercorrelations between implicit and self-report measures could imply that the two methods tap into different constructs. Thus, either one of the two methods may not be suitable to measure the specified construct (i.e., honesty-humility).

Meta-analyses indicate that the relations between implicit and self-report scores of the same construct show small to moderate convergent validity estimates, with correlations ranging from $r = .17$ to .48 (Bar-Anan & Nosek, 2014; Greenwald et al., 2009), averaging around $r = .25$ (Greenwald et al., 2015). Adopting a latent variable framework, Nosek and Smyth (2007) established that, across seven general attitude domains, a model describing implicit versus self-reported attitudes as distinct latent factors, provided a better fit than a single-factor conceptualisation.

In line with the latent variable framework to test convergent validity, we wanted to establish whether –

- honesty-humility measured with both an implicit and a self-report is best represented by a one-factor model (i.e., depicted as single global latent construct); or
- a two-factor model (where implicit and self-reported honesty-humility are two separate, unrelated constructs); or
- implicit and self-reported honesty-humility are related, but also distinct factors.

Following Kolnes et al. (2021), we used CFA to test the convergence of the implicit versus self-report measurement method for honesty-humility and expected that:

> **Hypothesis 1.** Implicit honesty-humility (i.e., the IAT-HH) and self-reported honesty-humility have a low to medium positive relation with each other (H1).

3. Criterion-Related Validity of Honesty-Humility: Self-report vs. Implicit Measures

3.1. Self-reported honesty-humility

In the student academic context, numerous studies (such as De Vries et al., 2011; Holtrop et al., 2014; Janse van Rensburg et al., 2018; Marcus et al., 2007; McAbee et al., 2014) have shown self-reported honesty-humility predicts counter-academic behaviour. The term *counter-academic behaviour* refers to students committing counternormative acts, such as plagiarising, having low personal standards in performing tasks, or presenting someone else's work as their own (Marcus et al., 2007). Students that report higher honesty-humility are also less likely to cheat during games, such as dice-rolling (Kleinlogel et al., 2018; Pfattheicher et al., 2019) or coin-tossing (Hilbig & Zettler, 2015), or even during cognitive tasks performed in an educational setting where monetary incentives are involved (Janse van Rensburg et al., 2018). Additionally, self-reported measures of honesty-humility may also predict desired behaviour in a student setting (Allgaier et al., 2015). For example, De Vries et al. (2011) found a significant positive relation between honesty-humility and grade point averages (GPA; r = .23, p < .01) and, more specifically, the narrow facet *greed avoidance* displayed the strongest relation with academic performance. The findings suggested that students who were greedy felt the need to take on a job (apart from going to school) to be able to afford luxury goods, which would lead to less time in class and/or studying, finally resulting in lower academic performance.

Against this background, we expected on both empirical and conceptual grounds that:

Hypothesis 2. Self-reported honesty-humility is negatively related to counter-academic behaviour (H2a), objective cheating (H2b), and self-confessed cheating (H2c), but it is positively related to GPA scores (H2d).

3.1. Implicit honesty-humility

Researchers have noted that the IAT might be a valuable tool for educational research (Nosek & Smyth, 2011; Nosek et al., 2009). In contrast to criterion validity for self-reports, studies of implicit honesty-humility are rare. As far as we know, no prior research has considered the predictive validity of an IAT for the honesty-humility personality trait in the context of (un)desirable academic behaviour. However, studies that considered other implicit traits might be informative: One study (Perugini & Leone, 2009) using an IAT to assess the

self-concept of morality found it predicted actual cheating behaviour, $r = .37$, $p < .05$. Other research relying on an implicit measure of conscientiousness correlated significantly with responsibility behaviours, $r = .20$, $p < .01$ (Costantini et al., 2015) and job performance, $r = .27$, $p < .05$ (Vecchione et al., 2016). Conscientiousness IATs may also predict the number of examinations that students passed, $r = .27$, $p < .05$ (Steffens & Schulze König, 2006; Vianello et al., 2010). Finally, Rowatt et al. (2006) assessed the reaction times of *humility* vs. *arrogance* word associations with an IAT and compared these scores to students' academic course grades. Results showed that students who approached new classroom experiences and education with humility, maximised their learning experience and performed better ($r = .28$, $p = .05$) as compared to students who were arrogant and pretentious.

In line with these findings, we posit:

Hypothesis 3. Implicit honesty-humility is negatively related to counter-academic behaviour (H3a), objective cheating (H3b), and self-confessed cheating (H3c), but it is positively related to GPA scores (H3d).

3.3. Incremental Predictive Validity of the IAT-HH

Finally, researchers have suggested using both self-report and implicit measures to predict criteria as a means to capitalise on the strengths of both methods (Wilson et al., 2000). In one study (Apers et al., 2019), an implicit personality measure predicted income growth beyond a model only consisting of self-report personality ($\Delta R^2 = .05$; χ^2 (3) = 10.37, $p = .02$). In other studies (e.g., Egloff & Schmukle, 2002; Schnabel et al., 2006), personality IATs incrementally predicted anxious behaviour, above that of self-report measures ($\Delta R^2 = .064$, $p < .01$). Finally, an IAT to assess the implicit self-concept of morality could predict non-cheating behaviour (i.e., rightfully returning a lottery ticket, $R^2 = .25$, $p < .01$), whereas a self-report measure of honesty-humility did not relate to the same non-cheating behaviour ($r = .16$, $p > .05$) (Perugini & Banse, 2007). These findings support the notions of dual process theory (i.e., the reflective–impulsive model; Strack & Deutsch, 2004). Dual process theory could be used to explain general social behaviour as a joint function, detected from two distinct but related measures (i.e., both implicit and self-report measures). In line with this theory and prior findings, we expected:

Hypothesis 4. Implicit honesty-humility incrementally predicts counter-academic behaviour (H4a), objective cheating (H4b), self-confessed cheating (H4c), and grade point average (H4d) beyond self-reported honesty-humility.

4. Method

4.1. Participants

Our sample consisted of Flemish (Belgian) university students (N = 178; 137 women and 41 men) aged between 21 and 53 years (M = 24.34; SD = 4.7), comprising psychology (n = 94) and medical (n = 84) students. Some dropout occurred as data were collected at four separate time points over a period of almost four months: eight students dropped out of the course, the IAT scores of seven participants were not recorded (due to technical errors or non-participation), and the data of two participants were removed (given that they had 10% trials < 300 *ms* on the IAT-HH). As such, the total effective sample size was N = 161.

4.2. Procedure

The study was approved by the university ethics committee. All participants gave informed consent prior to data collection and after the purpose of the research had been made known to them. Each participant was awarded course credits and three euro for participation. In addition, we incentivised maximum performance during the cheating task by offering prize money of 60 euro for best performance on the task.

Figure 1 presents a timeline and the order in which tests were administered in this study. Students completed the implicit and self-reported honesty-humility measures online and at home (*T1*), followed by the cognitive task, which captured cheating (*T2*). Subsequently (*T3*), counter-academic behaviour was measured, and at this point, students were also given the opportunity to confess whether they had cheated during the cognitive task (at *T2*). Finally, students were debriefed by the main researcher, revealing the full purpose of the study and sharing the general results to enhance the students' educational experience. GPA results were collected after students' final exams, eight weeks later (*T4*).

[Insert Figure 1 about here]

4.3. Measures

4.3.1. Implicit Association Test for Honesty-Humility (IAT-HH)

We developed the IAT for honesty-humility (IAT-HH), combining the categories 'I am' (*educated, human, alive, clothed*) vs. 'I am not' *(illiterate, an astronaut, dead, naked*) with 'high honesty-humility' (*sincere*, *fair*, *modest, generous*) vs. 'low honesty-humility' (*insincere*, *immodest*, *unfair, greedy*). See Appendix A for the three-step procedure we followed, all definitions, and supplementary material on the development of the IAT-HH. Although various IAT-scoring algorithms exist, the traditional D-score is a good measure and is still the most well-documented in the IAT literature (Richetin et al., 2015). Therefore, IAT-HH was scored according to the improved algorithm by Greenwald et al. (2003). To this end, we used the R-package called 'Shiny', which allows researchers to upload IAT data to calculate IAT effects (De Schryver, 2018) and the calculation of the split-half reliability (based on an odd–even split and corrected by the Spearman–Brown formula). Based on the abovementioned improved scoring algorithm, the IAT-HH score (also referred to as the 'D-score' or the 'IAT-effect') was calculated as follows.

First, we eliminated all trials with latencies greater than 10 000 *ms*. Second, we included error trials in the analysis by using the latency between stimulus presentation and correct response. Third, we subtracted the mean latency for the critical trials of the *I am honest* block from the mean latency for the critical trials of the *I am dishonest* block. Finally, we computed the IAT effect by dividing the difference by the individual respondent reaction time standard deviation.

Whilst a high IAT effect suggests a stronger association between *self* and *high honesty-humility*, a low score suggests a stronger association between *self* and *low honesty-humility*. None of our participants had fewer than the required 160 trials, but two participants had 10% reaction time faster than 300 ms and were therefore removed from the IAT database. The split-half reliability of the IAT-HH showed to be acceptable (based on an odd–even split and corrected by the Spearman–Brown formula, $r = .77$).

4.3.2. Self-reported Honesty-Humility

The 16 items measuring honesty-humility were extracted from the revised HEXACO Personality Inventory (Lee & Ashton, 2004, 2016). Participants were asked to self-report on the items (e.g., *I'd be tempted to use counterfeit money, if I were sure I could get away with it*) and to select a response on a five-point Likert-type scale, ranging from 1 (*strongly disagree* to 5 = *strongly agree*). The alpha reliabilities were acceptable for the global trait, honesty-humility

(α = .78), as well as for each of the narrow facets, namely fairness (α = .71), greed avoidance (α = .70), modesty (α = .65), and sincerity (α = .75).

4.3.3. Objective and Self-confessed Cheating

Participants were instructed to complete the online cheating tasks (see Appendix B) as an evening assignment at home. To measure cheating (both objective and self-confessed), we used a self-developed online cognitive test (adapted from Janse van Rensburg et al., 2018). This online task involved deception, given that it captured actual cheating behaviour. The online tasks consisted of a series of general knowledge items. Prior to commencing with the cheating task, participants were given instructions not to use any unauthorised help (i.e., the internet, a calculator or asking help from a friend) or to exchange answers whilst completing the task, as this would have constituted cheating. We could capture cheating in an objective manner as we were able to track, record, and save participants' actual cheating behaviour using our research platform (Qualtrics, 2018). However, as it was also possible for participants to cheat in ways undetected in Qualtrics (e.g., asking help from a friend or using the internet for assistance), we explicitly asked participants whether they had cheated during the task or not (for a similar approach to assess self-confessed cheating see Abeler et al., 2014; Pfattheicher et al., 2019). This question was asked only after all data had been collected. In sum, two separate measures for cheating were captured: *objective cheating* (i.e., during the online cognitive task in which we could see whether a person had cheated) and *self-confessed* cheating (i.e., when every participant was given the opportunity to 'come clean' or to confess whether he or she had cheated or not).

To score cheating behaviour, we followed Doliński (2018, p. 10), who noted, "between 0 and 1 there is a tremendous qualitative difference: nothing versus something" and that deceiving six or seven out of ten times "is de facto quite small", compared to not deceiving at all. Therefore, also in line with previous research (Halevy et al., 2014; Peer et al., 2014) both objective and self-reported cheating were captured respectively as binary outcome variables (0 = *did not cheat* and 1 = *did cheat*), irrespective of the method or frequency of cheating.

4.3.4. Counter-productive Academic Behaviour

In line with recent studies (De Vries et al., 2011; Holtrop et al., 2014; Marcus et al., 2007), self-reported counter-academic behaviour was assessed by extracting 25 items from the Inventory of Counter-productive Behaviour (ICB; Hakstian et al., 2002). Respondents were asked to think how frequently they had shown specific behaviour in the past five years of school or university when completing the items (e.g., *I stayed home and did not write an exam because I felt unprepared*). Response options were presented on a Likert-type scale, ranging from 1 (*never even considered it*) to 6 (*did it three or more times*). The alpha reliability in our data was acceptable (α = .78).

4.3.5. Grade Point Average (GPA)

Permission was granted to obtain GPAs from official academic records. The GPA for each individual student was computed as the average of all the examinations taken during one

academic year (i.e., at the end of the academic year in which the study was conducted) and ranged from 1 to 20, with higher scores indicating higher GPAs.

5. Results

5.1 Descriptives

Prior to the main analyses, we checked for missing values, normality, linearity, univariate and multivariate outliers, homogeneity of variance-covariance matrices, and multicollinearity, with no violations noted (Field, 2013). Additionally, we investigated whether we needed to control for participants' demographics.[2] For our main analyses, we performed a series of bivariate correlations and regression analyses. Table 1 reports means, standard deviations, and correlations of the study variables.

[Insert Table 1 about here]

5.2 Self-report vs. Implicit Measure of Honesty-humility

Hypothesis 1 held that the relation between implicit honesty-humility (i.e., the IAT-HH) and self-reported honesty-humility would show a low to medium positive correlation (H1). The implicit measure (IAT-HH) related significantly to self-reported honesty-humility scores (r = .18, p = .03; CI 95% = 0.03; 0.32); hence, providing support for Hypothesis 1.

Next, more elaborate tests of convergent and discriminant validity were completed. To test whether implicit and self-reported honesty-humility were distinct, we ran CFA in LAVAAN (Rosseel, 2012), a package in R (version 3.5.1). Specifically, we tested three separate models with honesty humility facets as indicators, and measurement method as latent variable(s), namely Model 1 (with implicit and self-reported honesty-humility as one global factor), Model 2 (with the two methods as unrelated factors), and Model 3 (with the methods as two distinct but related factors). Figures 2–4 graphically illustrate these CFA models.

[2] In deciding whether to include control variables in our main analyses, we first considered empirical findings about collegiate cheating. In studying the relations between honesty-humility, counter-academic behaviour, and cheating, researchers have either controlled for gender (De Vries et al., 2011; Marcus et al., 2007), for both age and gender (Holtrop et al., 2014), or did not control for either (Hilbig & Zettler, 2015). We based our final decision (i.e., whether to control for age and/or gender) on following the sequential steps presented in the Decision-Making Tree (Bernerth & Aguinis, 2016). Although gender and age have been associated with cheating in the past (Whitley, 1998), these variables show non-consistent findings with regard to cheating in academic settings (Gallant et al., 2015; Spiller & Crown, 1998). Additionally, by controlling for age and gender, no additional variance could be explained; hence, we included none.

As indicator variables for our models of self-reported honesty-humility, we included the four items for each narrow facet as a parcel (i.e., fairness, sincerity, greed avoidance and modesty). For the implicit measure, we followed a homogenous parcelling strategy in which the items in the parcel were related to one another, forming a homogenous group (Marsh et al., 2013), based on the narrow facets of implicit honesty-humility (i.e., fairness, sincerity, greed avoidance and modesty).

As a rule of thumb, we used the following criteria for good model fit (Hu & Bentler, 1999):

- comparative fit index or goodness-of-fit indices (CFI/GFI) values > .90;
- standardised root mean square residual (SRMR) < .05 indicating good fit (.08 deemed acceptable); and
- root mean square error of approximation (RMSEA) < .05 (good) and <.08 (close), smaller chi-square (indicating poor fit).

Finally, we based our primary criterion for judging whether one model significantly improved on the fit of another on the RMSEA of the change in fit (e.g., Nosek & Smyth, 2007).

In assessing the fit indices of each model (as seen in Table 2), we found that Model 1 showed the poorest fit [x^2(df) = 52.575(16); p = .00; CFI = 0.730; RMSEA = 0.113; SRMR = 0.078]. Whilst the fit indices improved in Model 2 [x^2(df) = 52.575(16); p = .00; CFI = 0.936; RMSEA = 0.113; SRMR = 0.078], Model 3 showed the best fit [x^2(df) = 21.014(19); p = 0.334; CFI = 0.985; RMSEA = 0.024; SRMR = 0.044].

[Insert Table 2 about here]

[Insert Figures 2, 3 and 4 about here]

These results support convergent validity between the self-report and implicit approaches, given that Model 3 fitted the data better (compared to Model 1), indicating that the self-reported and implicitly measured indicators of honesty-humility are two separate constructs, not one global trait. Discriminant validity was also evident as Model 3 fitted the data better than Model 2. The weaker fit in Model 2 indicates that the self-reported and implicitly measured indicators of honesty-humility were unrelated. As Model 3 showed superior fit, the implicit and self-reported honesty-humility measures appeared to be distinct, but also related operationalisations. These findings served as further evidence for Hypothesis 1.

5.3 Criterion-related Validity

Hypothesis 2 held that self-reported honesty-humility is negatively related to counter-academic behaviour (H2a), objective cheating (H2b), and self-confessed cheating (H2c), and is positively related to GPA (H2d). Correlation analysis showed that self-reported honesty-humility related significantly and negatively to counter-academic behaviour (H2a; r = -.16, p = .03; CI 95% = -0.43; 0.02), but showed a non-significant relation with objective cheating (H2b; r = .06, p = .47), self-confessed cheating (H2c; r = -.03, p = .70), and GPA (H2d; r = - .08, p = .29). Therefore, only Hypothesis 2a was supported.

Hypothesis 3 proposed that implicit honesty-humility is negatively related to counter-academic behaviour (H3a), objective cheating (H3b), and self-confessed cheating (H3c), and is positively related to GPA (H3d). However, we found no support for this hypothesis for any of the criteria as IAT scores were largely unrelated to counter-academic behaviour (H3a; r = -.08, p = .32), objective cheating (H3b; r = -.01, p = .86), self-confessed cheating (H3c; r = -.07, p = .41), nor for GPA (H3d; r = .04, p = .59).

5.4 Incremental Validity

Finally, to test incremental predictive validity, we regressed each criterion, namely counter-academic behaviour (H4a), objective cheating (H4b), self-confessed cheating (H4c), and GPA (H4d), first on self-reported honesty-humility (Model 1), and then on implicit honesty-humility (Model 2). These results are reported in Table 3. To predict counter-academic behaviour, we found that the predictive validity of self-reported honesty-humility (Model 1, R^2 = .027, p = .03; CI 95% = -0.41; -0.02) was not incremented by implicit honesty-humility (Model 2, R^2 = .01, p = .32). Furthermore, self-reported honesty-humility (Model 1, R^2 = .007, p = .27) and implicit honesty-humility (Model 2, R^2 = .002, p = .58) did not significantly explain variance in predicting GPA results ($\Delta R^2 = \ -.017$).

[Insert Table 3 about here]

Given that our cheating tasks resulted in categorical outcomes, we conducted a series of logistic regression analyses, where we first regressed objective cheating (H4b) and then self-confessed cheating (H4c) on self-reported honesty-humility (Step 1) and lastly on implicit honesty-humility (Step 2). Results for both regression analyses are presented in Table 4. Neither self-reported nor implicit honesty-humility predicted (objective and self-confessed) cheating.

[Insert Table 4 about here]

6. Discussion

6.1. Main Findings

The aim of this study was to provide empirical evidence on the construct and criterion validity of a newly developed implicit association test of honesty-humility (IAT-HH). As hypothesised, our IAT-HH showed small to moderate convergence with the self-report measure, in line with meta-analytic estimates of effect size between measurement of these methods (averaging around $r = .25$; Greenwald et al., 2015; Greenwald et al., 2009). Medium-sized effects between implicit and self-report measures may be considered ideal, because a lack of correlation or small effects may run counter to convergent validity (Bornstein, 2002; Campbell & Fiske, 1959). Likewise, convergence that is excessive may be similarly undesirable, because implicit and self-report measures use different methods to assess dissimilar underlying motives or cognitions (McClelland et al., 1989). As an aside, our study further suggests that this method of convergence may extend beyond the Big Five personality traits (e.g., Kolnes et al., 2021) to traits within the HEXACO framework.

In addition to construct validity, we also tested whether the implicit measure scores predicted academic criteria. However, criterion validity for a wide spectrum of positive and negative criteria was poor, although the self-report measure showed similarly poor predictive validity (with the exception of counter-academic behaviour, measured two months apart). Self-reported honesty-humility and counter-academic behaviour were negatively related, which is not uncommon according to current literature (De Vries et al., 2011; Holtrop et al., 2014; Janse van Rensburg et al., 2018; Marcus et al., 2007; McAbee et al., 2014).

A key aspect of our study was to include objective criterion measures. However, contrary to our expectation, neither our objective cheating task nor self-confessed cheating was predicted by either self-reported or implicit honesty humility scores. The prediction of 'single' objective behaviours is notoriously difficult (often with small effect sizes; Perugini & Leone, 2009) because personality trait measures and objective criterion behaviours are conceptually and empirically different (Back et al., 2009). In addition, as a wide array of individual and contextual variables may affect whether students cheat or not, explaining cheating behaviour may require more complex models than were used in this study (see McCabe et al., 2012; McCabe et al., 2008). Lastly, statistical artefacts may have contributed to these findings as post

hoc achieved power[3] calculations indicated the study might have been underpowered. Moreover, unreliability of the measures may have attenuated validities (Nunnally & Bernstein, 1994), although the self-report predictors and criteria showed acceptable alpha reliabilities (both .78). Furthermore, we also found criterion convergence between objective and self-reported cheating (r = .65).

In addition to predicting undesirable criteria, we also tested whether implicit and self-reported honesty-humility scores predicted desirable behaviours. Our results showed the implicit measure was unpredictive of students' GPA, contrary to some earlier studies (e.g., De Vries et al., 2011; Rowatt et al., 2006). However, this finding is not surprising, given that null and even negative effects have been observed between self-reported honesty-humility and GPA (cf. Kajonius, 2016). Finally, we showed that implicit honesty-humility could not incrementally predict criteria, irrespective of the criterion used (e.g., counter-academic behaviour, objective cheating, self-confessed cheating, or GPA). We take from these results that complementary assessment practices, where self-reported and implicit association measures of honesty-humility are used together to predict academic outcomes, show little promise.

6.2. Contributions and Limitations

Our study offers novel insights with potential to deepen our understanding of how honesty-humility, measured using different methods, may or may not enhance both measurement and prediction of academically relevant criteria. Overall, we showed that an implicit association test of honesty-humility shows some measurement overlap with self-reported honesty-humility, whilst retaining some element of distinctiveness, which may imply that they measure different cognitions and/or motivations. However, our expectation that the implicit honesty-humility measure (uncontaminated by self-distortion biases) might predict criteria better than a self-report measure, was not supported. Our study implemented rigorous instrument development and various design improvements over earlier studies (e.g., including objective cheating tasks and collecting criterion data at different time points), with little to no effect on results. In fact, one of our interventions – collecting data at different time-points – may have shown more adverse effects than anticipated. Without exception, prior studies

[3] When planning our study, the required sample size was calculated with power considerations in mind. To find small to medium-sized effects (r = .30) with high statistical power (1 - β = .95), a sample size of N = 134 was required (Faul et al., 2009), which was adequate for our research purposes. However, post hoc power analysis with achieved sample size (161 < N < 178) revealed suboptimal power, largely because of the small effect size. In retrospect, the fact that data were collected longitudinally might have influenced the effect size and the resulting power.

involved cross-sectional designs where data were collected on the same day. We addressed this limitation by collecting criterion data at four different points in time, spanning four months, given that we wanted to avoid common method bias (Podsakoff et al., 2003). Dispersing criterion measures temporally also suited our predictive validity design better (Nunnally & Bernstein, 1994). As criterion measures were administered almost two months apart from the predictors, our design might be more ecologically valid, but maturation effects and other sources of 'noise' might have been introduced. Further research needs to be conducted to determine whether honesty-humility (whilst accounting for situational circumstances) is able to predict actual unethical behaviour longitudinally (i.e., as suggested by De Vries et al., 2017). In conducting future research, as suggested, we strongly suggest an increased sample size, given that our sample size was just big enough to detect small to medium effects.

Respondents completed the IAT-HH online, at home, which might have introduced a lack of standardisation and a likely increase in random error. However, despite this challenge, reaction time tasks, such as the IAT, can render valid measures when administered online (Hilbig, 2015). Additionally, our research did not account for situational or environmental effects on cheating and honesty-humility responses (Gawronski et al., 2018).

6.3. Future Research Opportunities

Our study raises potential avenues for future research. Recent meta-analyses show how increases in the correlation between implicit and self-report measures enhance the predictive validity of the implicit association test (Greenwald et al., 2015; Greenwald et al., 2009; Kurdi et al., 2018). Stated otherwise, in itself, method convergence may affect criterion-related validity. This effect may occur because implicit evaluations might reshape self-reported cognition, which in turn drives behaviour (Greenwald & Banaji, 2017; Kurdi et al., 2018). Using an IAT for emotional stability and conscientiousness, Siers and Christiansen (2013) found that the implicit and self-report scores did not converge; hence, predicting behaviour was not possible. We call for future studies of this nature, particularly in the domain of honesty-humility measures.

One way to increase the association between implicit and self-report measures is by using conceptual correspondence (Ajzen & Fishbein, 1977). If measures are tailored to the same level of specificity, for example by adding text to self-report measures to create a frame of reference by specifying the *target-object* being assessed (e.g., *an individual at home* versus *a*

student at school) and/or a *context* or *situation* (e.g., being *alone* versus *amongst others*), conceptual correspondence might improve. Not only does adding category labels and contextual cues in IATs influence IAT scores (Foroni & Mayr, 2005; Govan & Williams, 2004; Steffens & Schulze König, 2006), but adding tags (e.g., *at school* or *at home*) to self-report questionnaire items have improved the criterion validity of the HEXACO personality inventory (Holtrop et al., 2014). Therefore, improving conceptual correspondence may enhance convergence between implicit and self-report measures of honesty-humility, which, in turn, may increase their criterion validity (Greenwald et al., 2015; Kurdi et al., 2018).

To further tease out whether the IAT-HH shows important substantive variance or IAT specific variance, future researchers can consider investigating the correlation between IAT-HH scores and honesty-humility (as rated by others). Additionally, researchers can also use the IAT to measure the other HEXACO personality traits to investigate the convergence between self-report and IAT scores across other personality traits, and in doing so, it is recommended to conduct multitrait multimethod validation research on IATs (Lazarević, Bjekić, & Knežević, 2021).[4]

7. Conclusion

In this article, we reported on the development of an implicit association test of honesty-humility and we evaluated its construct and criterion validity. Our results showed mixed findings as our measure converged with a self-report measure; yet, it retained a degree of measurement distinctiveness. However, the implicit associations test for honesty-humility could neither predict self-report nor actual criteria. As evidence in this research is tentative, we recommend more research on the criterion-related validity of our implicit measure of honesty-humility. With our study, we hope to stimulate further research into the implicit measurement of personality traits relevant to integrity behaviour.

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Figure 1

Data collection Timeline Illustrating the Sequence of Tests Administration.

Proceedings of how data were collected for empirical study (N = 178)					
Briefing (in class) Students briefed about proceedings of how data will be collected	*Time 1* (same day as briefing) Implicit honesty-humility Self-reported honesty-humility	*Time 2* (five weeks later) Online "cognitive task" (to assess objective cheating)	*Time 3* (two weeks later) Counter-academic behavior Online debriefing (to assess self-confessed cheating and get informed consent)	*Debrief* (in class) Students debriefed by main researcher and provide details of the research (for educational purposes)	*Time 4* (eight weeks later) Grade point average (GPA)

Figure 2

Model 1 Depicting Honesty-humility as One Global Factor.

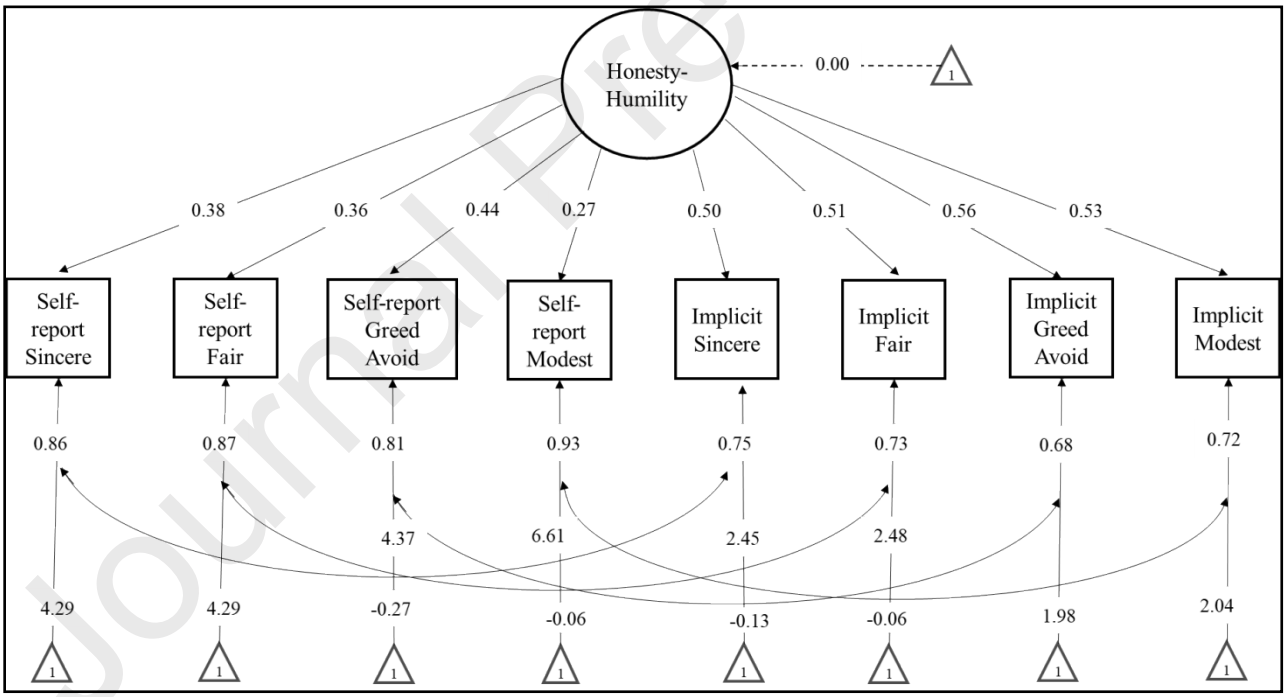

Figure 3

Model 2 Depicting Implicit and Self-reported Honesty-humility as Two Separate Factors.

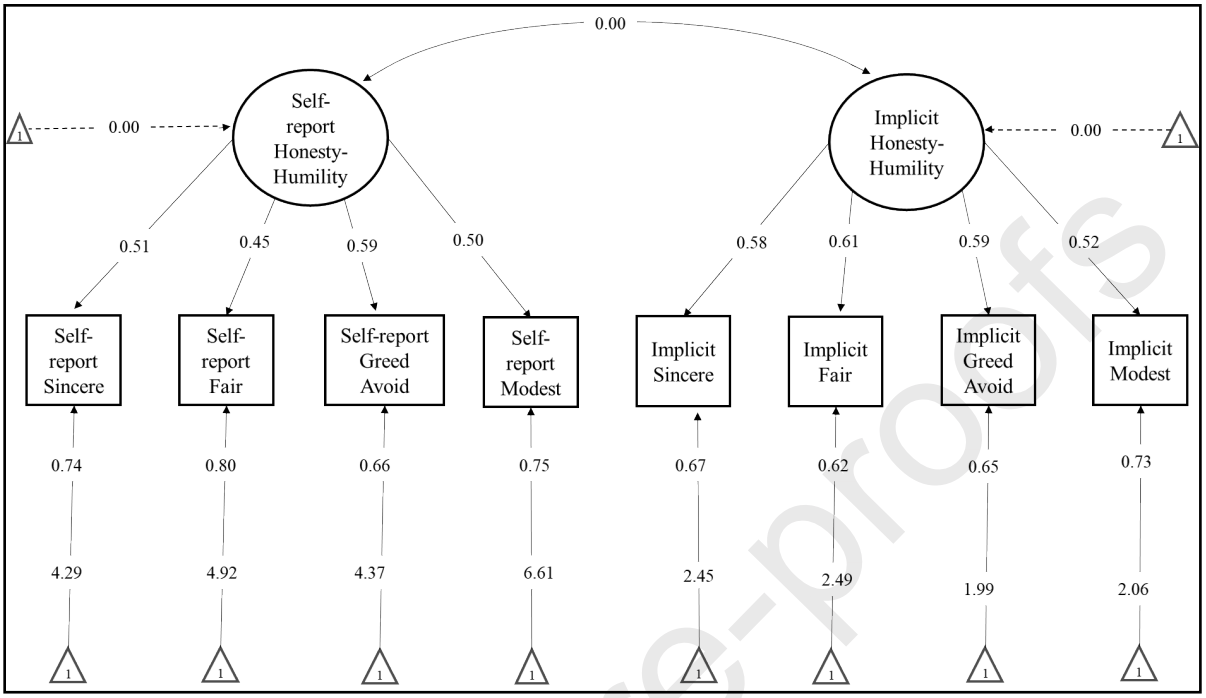

Figure 4

Model 3 Depicting Implicit and Self-Reported Honesty-Humility as Two Distinct, Related Factors.

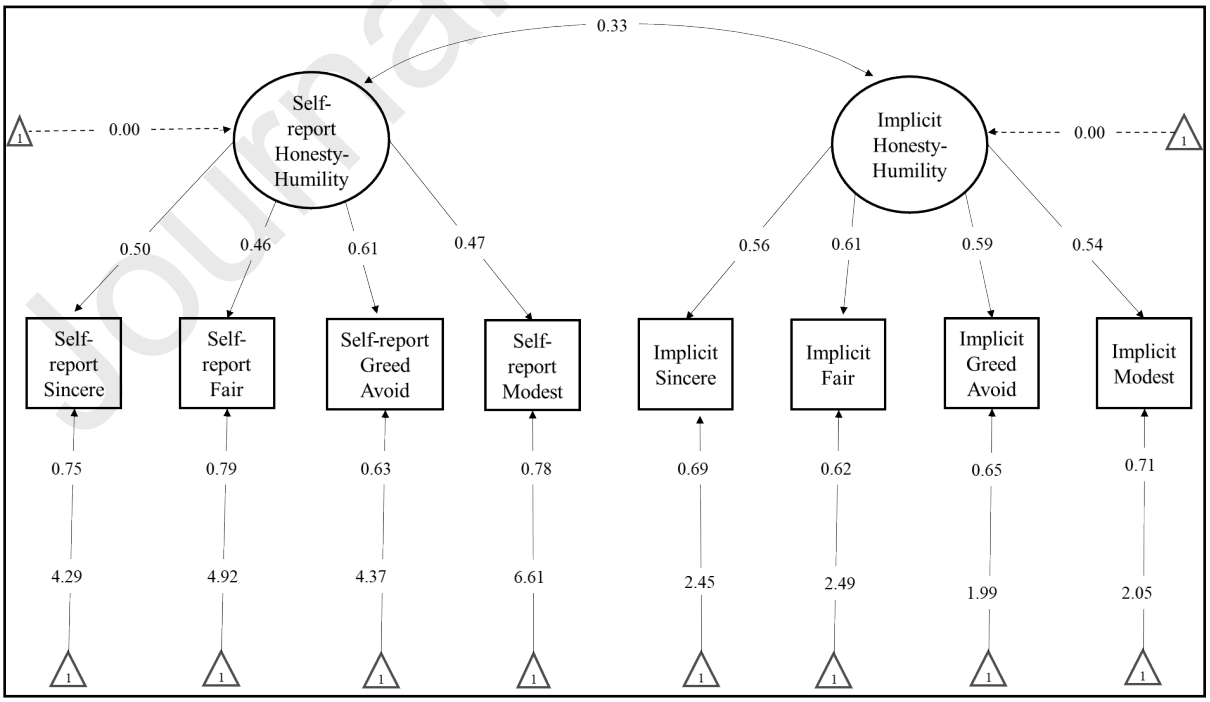

Table 1

Means, Standard Deviations and Intercorrelations of Study Variables.

Variables	*M*	*SD*	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*	*11*	*12*	*13*	*14*	*15*
Demographic																	
1. Gender[a]	0.23	.42	—	—													
2. Age	24.34	4.70	-.06	—													
Construct Validity																	
Self-report Honesty-Humility																	
3. Self-report HH[b]	3.53	0.47	-.12	.17*	(.78)												
4. Self-report Sincerity	3.19	0.75	-.01	.18*	.68**	(.78)											
5. Self-report Fairness	3.79	0.77	-.21**	.08	.67**	.23**	(.71)										
6. Self-report Greed Av	3.22	0.74	-.01	.11	.70**	.29**	.27**	(.70)									
7. Self-report Modesty	3.94	0.60	-.08	.05	.61**	.26**	.21**	.29**	(.65)								
Implicit Honesty-Humility																	
8. IAT-HH[c]	0.87	0.26	-.05	.13	.18*	.10	.12	.17*	.07	—							
9. IAT Sincerity	0.99	0.41	.07	.14	.06	-.03	.09	.09	-.00	.62**	—						
10. IAT Fairness	1.01	0.41	-.05	.06	.13	.05	.13	.15	.01	.61**	.31**	—					
11. IAT Greed Av	0.91	0.46	.01	.14	.18*	.10	.17*	.14	.06	.65**	.41**	.35**	—				
12. IAT Modesty	0.91	0.44	-.02	.11	.22**	.23**	.07	.19*	.10	.64**	.29**	.39**	.24**	—			
Criterion-Related Validity																	
13. CAB[d]	2.73	0.62	.18*	-.05	-.16*	-.00	-.29**	-.03	-.09	-.08	.07	-.14	-.03	-.07	(.78)		
14. Objective Cheating	0.35	0.48	.01	-.00	.06	.08	-.07	.06	.11	-.01	.04	-.04	-.05	-.04	.06	—	
15. Confessed Cheating	0.24	0.43	.09	-.10	-.03	-.04	-.07	.07	-.04	-.07	.01	.03	-.10	-.13	.16*	.65**	—

Variables	*M*	*SD*	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*	*11*	*12*	*13*	*14*	*15*	
16. GPA[e]	13.33	2.43	-.015	-.26**	-.08	-.12	-.05	.03	-.07	.04	.05	-.02	-.01	.00	-.12	-.05	-.01	—

Notes. N size ranged from 161 to 178 due to missing data.

Internal consistencies for self-report measures (α) are available in parenthesis on the diagonal.

The IAT-HH latency ranged from 0 to 1.5 and split-half reliability = .77.

[a]Gender was coded 0 = female and 1 = male; [b]HH = Honesty-humility; [c]IAT-HH = Implicit Association Test Honesty-humility [d]CAB = Counter-academic Behaviour; [e] GPA = Grade Point Average.

*$p < .05$. ** $p < .01$ (two-tailed).

Table 2

Goodness-of-fit Indices for the Three Measurement Models for Honesty-Humility.

Model	x^2*(df)*	*p-value*	*CFI*	*GFI*	*RMSEA*	*SRMR*	*AIC*
Model 1 (One factor)	52.575(16)	.00	0.730	0.996	0.113	0.078	2229.098
Model 2 (Two unrelated factors)	28.68(20)	.101	0.936	0.998	0.049	0.073	2197.81
Model 3 (Two distinct but related factors)	21.014(19)	.334	0.985	0.998	0.024	0.044	2192.506

Table 3

Hierarchical Regression and Relative Weights of Grade Point Average (GPA) and Counter-academic Behaviour (CAB) on Self-report and Implicit Honesty-humility as a Global Trait.

Predictor	Counter-academic Behaviour				Grade Point Average			
Model 1	Final $\mathcal{B}$'s	RWA	R^2	ΔR^2	Final $\mathcal{B}$'s	RWA	R^2	ΔR^2
Self-report HH	-.164	81.73%	.027*		-.081	73.80%	.007	
Model 2								
Implicit HH	-.079	18.26%	.01	-.017	.043	26.20%	.002	-.005

Note. $N = 163$ for counter-academic behaviour and $N = 164$ for GPA.

*$p < .05$.

Table 4

Logistic Regression and Relative Weights Analysis of Objective Cheating and Confessed Cheating on Explicit and Implicit Honesty-humility as a Global Trait.

Predictor	Objective Cheating			Confessed Cheating		
	β	*Exp(β)* [95% CI[a]]	*p*	*β*	*Exp(β)* [95% CI[a]]	*p*
Model 1						
Self-report honesty-humility	.37	1.45 [0.706; 2.98]	.34	-.13	0.88 [0.40; 1.94]	.75
-2 log likelihood		207.96			178.61	
R² (N)		.006			.001	
R²(CS)		.008			.002	
Model 2						
Implicit honesty-humility	-.23	0.79 [0230; 2.73]	.31	-.52	0.59 [0.153;2.303]	.45
-2 log likelihood		207.82			178.04	
R² (N)		.007			.005	
R²(CS)		.009			.007	

Notes. N = 162 All predictors showed zero effect.

R² (N) = Nagelkerke; *R² (CS)* = Cox and Snell; cheating was coded as 0 = *did not cheat*, and 1 = *did cheat*; therefore positive *β* values indicate positive associations with cheating. For objective cheating, Hosmer and Lemeshow Test for Model 1 (Explicit honesty-humility): $\chi^2(8) = 14.74$, $p = .064$. Model 2 implicit honesty-humility: $\chi^2(8) = 12.79$, $p = .12$. For confessed cheating, Hosmer and Lemeshow Test for Model 1 (Explicit honesty-humility): $\chi^2(8) = 9.78$, $p = .28$. Model 2 implicit honesty-humility: $\chi^2(8) = 3.71$, $p = .88$. [a]95% confidence interval (95%). Bootstrapped results are based on 1 000 bootstrap samples. *$p < .05$. ** $p < .01$.

Highlights

- We developed an implicit association test to assess honesty-humility (IAT-HH).
- Self-reported honesty-humility and IAT-HH measures were related but measured distinct constructs.
- Self-reported honesty-humility related negatively to counter-academic behavior.
- The IAT-HH did not incrementally predict academic criteria beyond self-reported honesty-humility.

Graphical Abstract