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Certainty improves the predictive validity of Honesty-Humility and Dark Triad traits on cheating behavior☆

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ABSTRACT

This research examined the extent to which certainty can strengthen the relationship between individual differences and cheating behavior. In the first two studies, participants completed the Honesty-Humility or the Dark Triad scales. Then, they rated the certainty they had in their responses to each of those two inventories. In the third study, participants completed both scales within the same experimental design and were randomly assigned to a certainty vs. doubt condition. As the dependent variables, we used different cheating outcomes across studies. As predicted, the link between these two traits and cheating behavior was greater for participants with higher levels of certainty in their responses to the inventories (Studies 1 and 2) or for those assigned to the certainty (vs. doubt) condition (Study 3). Incorporating the certainty with which individuals hold their traits contributes to enhancing the predictive validity of personality measures relevant to cheating.

A significant body of literature on personality has addressed the prediction of behavior (Ozer & Benet-Martinez, 2006). In the present research, we examine a variable that helps to identify when personality tests are more predictive of behavior: the certainty with which people hold the scores on the test. Our studies concentrate on two specific personality traits relevant to cheating behavior, as detailed below.

The HEXACO model of personality offers a comprehensive assessment of an individual's personality traits rather than the widely used Five-Factor Model (Lee & Ashton, 2004). This model includes a unique dimension called Honesty-Humility (HH), which captures a person's sincerity, fairness, greed avoidance, modesty, and a lower likelihood of engaging in exploitative or deceptive behavior (Ashton et al., 2014; Ashton & Lee, 2007). As a result, this dimension has been associated with prosocial behavior (Hilbig et al., 2013) and low antisocial behavior (Wiltshire et al., 2014). Prior research has found a negative association between this trait and cheating behavior (Kleinlogel et al., 2018; Pfattheicher et al., 2019).

Contrasting with Honesty-Humility, the Dark Triad is a cluster of three personality traits known for their antisocial tendencies, characterized by a lack of empathy and a tendency to exploit or manipulate others for personal gain (Paulhus & Williams, 2002). Specifically, the Dark Triad (DT) consists of Narcissism, Machiavellianism, and Psychopathy. Previous research has integrated the Dark Triad within the HEXACO model and found that the Dark Triad was nearly perfectly inversely related to Honesty-Humility (Hodson et al., 2018; Horsten et al., 2021; Vize et al., 2020). This is the primary reason we studied these two personality variables together in the present research, which focuses on the prediction of cheating.

Narcissists are characterized by their grandiose sense of self-importance, entitlement, and dominance and a tendency to view themselves as superior to others in terms of intelligence, attractiveness, and overall competence. Despite these self-attributed perceptions, individuals who exhibit narcissistic personality traits often experience feelings of insecurity, seeking validation and admiration from others (Jonason & Webster, 2010; O'Reilly & Doerr, 2020; Raskin & Terry, 1988). Machiavellians are usually described as individuals who are strategic and cynical in their approach to life. They prioritize fulfilling their own needs and desires, frequently at the expense of moral considerations and the needs of others, and they can resort to manipulative tactics to achieve their goals (Aldousari & Ickes, 2021; Paulhus &

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Williams, 2002). Finally, psychopaths exhibit a lack of empathy and frequently engage in impulsive and thrill-seeking behaviors that disregard the well-being of others (Jonason & Krause, 2013). In sum, the Dark Triad of personality traits involves common features such as deceitfulness, self-promotion, coldness, disagreeableness, exploitation, and even aggression (Furnham et al., 2013). As might be expected, a positive link between the Dark Triad and cheating behavior is well-established (Baughman et al., 2014; Dane et al., 2018; Jones & Paulhus, 2017).

As noted, there is a negative correlation between the Dark Triad and the HH trait. Therefore, as we describe next, it stands to reason that prior research has shown that they are both capable of making predictions regarding cheating behavior, though in opposite directions.

1. Honesty-Humility and Dark Triad predict cheating behavior

Prior studies have shown that individuals who score high on the HH dimension of the HEXACO personality model tend to be less likely to engage in unethical behavior (Ashton & Lee, 2008; Kleinlogel et al., 2018; Zettler & Hilbig, 2010). For example, Kleinlogel et al. (2018) found that individuals with higher levels of HH were less likely to cheat in a die game in which participants could win a bonus (extra money) if they got a 6 in the die. In their study, participants' cheating behavior was assessed as the overreporting of 6s to obtain the bonus.

As stated, Dark Triad traits are associated with various forms of exploitative interpersonal behavior, and that includes cheating. Specifically, prior literature has found that individuals with high levels of Dark Triad traits use various "cheater strategies" to achieve their interpersonal and social goals (Jonason & Webster, 2012). For example, Esteves et al. (2021) showed that individuals with higher levels of Dark Triad traits tend to cheat more in academic settings (see also Zhang et al., 2019). Other studies have shown that narcissistic individuals tend to lie during selection interviews (Paulhus et al., 2013), that Machiavellians are more likely to plagiarize essays (Nathanson et al., 2006) and to commit fraud by misreporting (Harrison et al., 2018; Murphy, 2012), and that psychopathic individuals are more likely to use deception in relationships (Baughman et al., 2014). Even more in line with how we operationalized cheating in the present work (Study 2), Jones and Paulhus (2017) found that Dark Triad traits predicted cheating on a coin-flipping task when participants had the opportunity to get a bonus. Participants were instructed to flip the coin just once to be fair, but they could flip the coin many times. They made a choice about "heads" or "tails" and then flipped the coin. Whether participants flipped the coin more than once to match what they chose was taken as the cheating measure. Results indicated that higher levels of Dark Triad traits were associated with more cheating.

A few possible reasons for why these individuals tend to cheat have been offered. For example, psychopaths are thought to be motivated to cheat by their desire for triumph and lack of moral disinhibition (Williams et al., 2010). Machiavellian individuals tend to cheat because they need to restore their perceived lack of ability to directly control external events (Aldousari & Ickes, 2021), and narcissistic individuals tend to cheat because they have a high need for personal achievement (Brunell et al., 2011).

2. Certainty increases the link between traits and behavior

The present research builds on the tenets of Self-Validation Theory (SVT, Briñol & Petty, 2022). SVT offers an integrative framework to understand when and for whom mental contents, including traits, are most predictive of behavior. SVT provides *a priori* predictions about which individuals are more inclined to act on any given construct that is present in their minds. The critical aspect of SVT is the perceived validity with which a person's mental content is held. Thus, when a trait is held with perceptions of high validity, that trait becomes more consequential for behavior. Perceptions of validity can be easily assessed by requesting individuals to rate the level of certainty they possess in their responses to a scale measuring a given trait after individuals have completed the scale.

These perceptions of validity constitute a type of meta-cognition as they entail reflecting on the perceived validity of one's trait assessments (Briñol & DeMarree, 2011; Petty et al., 2007). Hence, SVT differentiates between initial thoughts (primary cognition, e.g., I tend to be cynical) and the subsequent perceptions of validity of those initial thoughts (secondary cognition or meta-cognition, e.g., I am sure I tend to be cynical). The use of perceptions of validity has proven valuable in moderating the impact of different traits on behavior, including the *need for cognition* (Shoots-Reinhard et al., 2015) and *self-efficacy* (e.g., Horcajo et al., 2022; Moreno et al., 2022). Importantly, these perceptions of validity can be measured, but they can also be manipulated. For instance, previous work by Paredes et al. (2021) demonstrated that participants' scores on a scale of dispositions toward pornography were more associated with porn consumption in a certainty (vs. doubt) condition. Manipulating certainty provided support for a causal link between certainty and the relationship between responses to the porn scale and porn consumption. Regardless of whether it is measured or manipulated, perceptions of validity have been useful in moderating the effects of individual differences in other domains, such as group identity (Paredes et al., 2020), scientific identity (Moreno et al., 2024), and aggression (e.g., Santos et al., 2019).

It is key to recognize that, although there are differences between measuring certainty by directly asking participants about their confidence in their responses to a scale and manipulating certainty (e.g., by asking them to recall past episodes in which they felt certain), these are operationalizations of the same underlying construct: perceptions of validity that can be applied to any salient mental content. When certainty is measured through responses to an inventory, the scores can result from differences in the content of the responses (Petty et al., 2002), the ease with which responses come to mind (Tormala et al., 2007), or personality traits related to certainty (DeMarree et al., 2020). In contrast, when certainty is manipulated by an incidental induction, it is induced by prior experiences unrelated to the initial responses to the scale. This induced certainty is then misattributed to the mental content currently available, specifically the earlier scale responses. Importantly, in both scenarios, the certainty (regardless of its source) influences participants' perceptions of their own Dark Triad or Honesty-Humility traits. Therefore, a unique aspect of SVT is that it predicts similar outcomes for certainty, whether it is measured or manipulated, and irrespective of whether it stems from the initial responses (as in Study 1 and Study 2) or from unrelated, incidental origins (as in Study 3).

3. Overview and hypotheses

The primary aim of this research was to build convergent validity both for the association between HH and cheating behavior as well as the association between the Dark Triad traits and cheating behavior and to examine for the first time whether those associations between traits and cheating could be strengthened by certainty. To the best of our knowledge, this is the first work in which certainty, both measured and manipulated, is applied to a positive and a negative trait leading to opposite cheating outcomes depending on the trait. Thus, when certainty is applied to a positive trait (i.e., high scores in HH), we expect cheating to decrease, but when certainty is applied to a negative trait (i.e., high scores on Dark Triad traits), cheating is expected to increase. Consistent with the SVT, we formulated the following hypotheses:

H1a. The HH trait will yield a main effect on cheating behavior, such that higher levels of the HH trait will be associated with less cheating.

H1b. The Dark Triad traits will yield a main effect on cheating behavior, such that higher levels of Dark Triad traits will be associated with more cheating.

If supported, these predictions could provide a conceptual replication of past literature in the domain of these constructs. However, they could be generalized to new materials and samples in this case.

H2a. An interaction between the HH trait and certainty on cheating behavior will occur such that the relationship between HH and cheating behavior will be greater for participants with higher levels of certainty in their HH trait or assigned to a certainty (vs. doubt) condition.

H2b. An interaction between the Dark Triad traits and certainty will occur on cheating behavior such that the relationship between the Dark Triad traits and cheating behavior will be greater for participants with higher levels of certainty in their Dark Triad traits or assigned to a certainty (vs. doubt) condition.

If supported, these predictions could provide an innovative contribution to the existing literature on cheating by showing that enhanced certainty improves the predictive validity of these inventories. Additionally, given that certainty is manipulated in one study through recalling instances of past memories (which is a situational and incidental induction), the implication would be that complementary to the idea that the situation can unify people based on their individual differences, it can also diversify them based on their personality.

We used a triangulation approach for all the variables examined in this research. First, we used two different traits that are relevant to cheating (Dark Triad and Honesty-Humility) with opposing predictions for cheating in each case. Second, we employed two operationalizations of certainty: one correlational approach measuring the natural certainty participants had in their traits, and one experimental approach in which certainty was manipulated orthogonally and incidentally to the trait measurement. In the measurement case, the origin of the certainty scores can come from any differences in the content of the responses to the HH and DT inventories, from methodological (reliability, extremity) or personality variables (e.g., confounds with other certainty-related traits). However, the manipulation of certainty is incidental and content-independent, as we did not ask participants to recall episodes in which they had certainty in their traits, but instances of their general certainty. As noted, we made similar predictions for certainty regardless of whether it was measured or manipulated, and therefore regardless of whether certainty comes from origins related to the initial responses (as in Studies 1 and 2) or from origins unrelated to HH and DT (as in Study 3).

In sum, predicting and showing that operationalizing certainty through these different approaches (measurement in a content-dependent approach and manipulated in an incidental content-independent manner) is capable of producing the very same SVT effects is a strength of this research. It provides convergence validity for our different procedures. Finally, we relied on different cheating-related paradigms to generalize across cheating outcomes (i.e., lying in a behavioral task, a social dilemma of betrayal of a co-worker, and the prediction of lying in the future). Taken together, the three outcomes provide convergent evidence for the effect.

4. Study 1

The aim of the first study was to examine the association between Honesty-Humility (HH) and cheating behavior as well as the moderation of that relationship by certainty. In line with most previous research, we expected a negative correlation between the HH trait and cheating behavior. Furthermore, we investigated whether an inventory assessing individual differences in HH would be a better predictor of cheating behavior when participants were more certain about their scale responses. Based on SVT, our hypothesis was that as participants' certainty in their responses to the HH inventory increased, so would the association between their responses and cheating behavior.

4.1. Method

4.1.1. Participants and design

Two hundred and seven individuals (72.9 % females) participated anonymously in the study. Participants were recruited through Qualtrics among the general population of the United States and participated with the chance of winning a lottery with a prize of 20 dollars at the end of the survey. The age of participants ranged from 18 to 66 ($M_{age} = 32.1$, $SD = 13.08$). The HH trait and certainty were measured as predictor variables, and cheating behavior was measured as the criterion variable. By default, we anticipated a generic small effect (Cohen's $f^2 = 0.04$). Results indicated that the desired sample size for a two-tailed test ($\alpha = 0.05$) with 0.80 power was $N = 199$ participants. Our final sample slightly surpassed the intended sample size ($N = 207$) to allow for attrition. A *sensitivity* analysis for a linear multiple regression was run using G*Power. Results of that analysis (Faul et al., 2009) revealed that our sample size ($N = 207$) with an estimated power of 0.80 was capable of detecting an effect size greater than $f^2 = 0.038$. We report how we determined our sample size, all data exclusions (if any), all manipulations, and all measures in the study. All materials, data, and code are publicly available in an open repository at: https://osf.io/5a6hr/?view_only=1a780898326d4fc89ddb603cf47d6f99 (DOI: 10.17605/OSF.IO/5A6HR).[1]

4.1.2. Procedure

Permission to conduct the study was provided by the university institutional research board before the study began. Participants were told that they would be taking part in a study related to pilot testing of some experimental materials and that their responses would be completely anonymous. After obtaining informed consent, participants were asked to complete the HH scale and report the degree of certainty they had about their responses to the scale. Next, participants completed the dependent measure by taking part in a social dilemma involving cheating behavior. Finally, participants responded to sociodemographic information and were debriefed and dismissed.

4.1.3. Predictors variables

Honesty-Humility (HH). As a measure relevant to cheating, we used a scale designed to assess to what extent people held self-views related to honesty. Specifically, participants completed the HH scale (Ashton et al., 2014; Ashton & Lee, 2007). It includes 10 items coded on a Likert-type scale ranging from 1 ("Strongly Disagree") to 5 ("Strongly Agree"). Examples of items were "I would never accept a bribe, even if it were very large" (direct item) and "If I knew that I could never get caught, I would be willing to steal a million dollars" (reversed item). We reversed the items about dishonesty to create a composite measure tapping the honesty and humility aspects. Item ratings were intercorrelated ($\alpha = 0.71$), thus averaged to form a single measure of Honesty-Humility. Higher scores indicated more HH ($M = 3.68$; $SD = 0.66$).

Certainty in HH. Participants were asked to report their general certainty in their responses to the Honesty-Humility assessment. Specifically, their certainty in the scores on the Honesty-Humility measure was assessed using one 7-point scale item anchored at 1 ("Not at all certain") and 7 ("Extremely certain"). That is, participants were asked, "How certain are you in the responses you just gave to the previous 10 items?" Thus, higher scores on this item indicated greater certainty ($M = 5.43$; $SD = 1.16$). The correlation between certainty and Honesty-Humility was positive, $r(205) = 0.20$,[2] $p = .003$.

[1] We did not preregister these studies.

[2] We tested the predictors with variance inflation factor test (VIF) for potential multicollinearity. Multicollinearity was unlikely to be a problem given the highest VIF was 1.020, which is below the multicollinearity threshold (VIF < 5).

This measure was previously validated and used in similar lines of research with different personality inventories (Paredes et al., 2020; Santos et al., 2019; Shoots-Reinhard et al., 2015). This study and previous studies both demonstrated that a single item was sufficient to measure certainty in order to detect the predicted interaction effects, and that this is an efficient way to assess confidence (e.g., Tormala & Petty, 2002). Moreover, previous research using an indicator with more items (a 3-item measure of certainty) showed similar results to our single-item measure of certainty (Paredes et al., 2020).

4.1.4. Criterion variable

Cheating Behavior (Stag Hunt Dilemma). In this study, we used an adaptation of the Stag Hunt dilemma as a proxy to assess cheating behavior. In this social dilemma, participants have to choose between cooperation or defection. Participants were given a hypothetical situation in which they had the option of submitting a business project with an old colleague (cooperating, contrast coded as "-1") or cheating on him and presenting the project alone (cheating, contrast coded as "1"). In this hypothetical situation, an oral promise of partnership had been made in a bar and participants only had one day to submit their project. Therefore, breaking the promise can be considered cheating. The Stag Hunt dilemma is considered a weak situation because it has two Nash equilibrium points (both cooperate or both cheat), meaning that either cooperating or betraying the other person can be a good strategy. In this study, 68.1 % of participants selected cooperative behavior ("submit with your 'associate'"), and 31.9 % selected cheating behavior ("submit the project alone"). These percentages are very similar to the ones obtained in previous research (Busemeyer et al., 2006; Croson, 1999; Li & Taplin, 2002; Shafir & Tversky, 1992; Tversky & Shafir, 1992).

4.2. Results

Table 1 summarizes the descriptive statistics and correlation matrix. To test the relationship between the Honesty-Humility (predictor variable) and certainty (moderator variable), a logistic binary regression analysis was conducted on the Stag Hunt dilemma (criterion) variable with Honesty-Humility (centered), certainty in Honesty-Humility scores (centered), and the interaction term (Honesty-Humility × certainty) entered as predictors. The main effects were interpreted in the first step of the regression and the two-way interaction in the second step (Cohen & Cohen, 1983).

Consistent with H1a, results indicated a main effect of the HH trait, $B = -0.487$, $SE = 0.235$, $z = -2.07$, $p = .039$, 95 % CI: [0.388, 0.975], showing that participants higher in HH (high honesty) were less likely to cheat on their colleague than participants lower in HH (low honesty). We did not find a main effect of certainty in HH, $B = -0.121$, $SE = 0.131$, $z = -0.924$, $p = .356$, 95 % CI: [0.685, 1.145].

More importantly, the predicted interaction between the HH trait and certainty in HH was significant, $B = -0.456$, $SE = 0.218$, $z = -2.094$, $p = .036$, 95 % CI: [−0.8838, −0.0291], revealing that the negative link between HH and cheating was more likely to emerge at higher levels of certainty, supporting H2a. The effect size of this two-way interaction is OR = 0.634, 95 % CI: [0.413, 0.971], (Cohen's $f^2 = 0.023$). As illustrated in Fig. 1, among those participants reporting greater certainty scores (analyzed at one standard deviation above the mean), HH was negatively associated with cheating behavior $B = -0.997$, $SE = 0.346$, $z = -2.884$, $p = .004$, 95 % CI: [−1.675, −0.320]. For those participants with lower certainty scores (analyzed at one standard deviation below the mean), no relationship emerged between HH trait and cheating behavior in the dilemma, $B = 0.065$, $SE = 0.357$, $z = 0.181$, $p = .856$, 95 % CI: [−0.634, 0.764].

Finally, a complementary analysis with the Johnson-Neyman technique was conducted to show how the slope of Honesty-Humility on cheating behavior varied across the full range of values of certainty. As illustrated in Fig. 2, results revealed one region of significance (5.45). That is, when the score in certainty was greater than or equal to 5.45, then lower levels of Honesty-Humility were significantly associated with greater cheating behavior.

Table 1
Means, Standard Deviations, and Correlations between the Variables in Study 1, 2, and 3.

	M (*SD*)	1	2
Study 1			
1. Honesty-Humility	3.68 (0.66)		
2. Certainty in Honesty-Humility	5.43 (1.16)	0.20*	
3. Cheating Behavior (Stag Hunt Dilemma)	0.31 (0.46)	−0.15	0.09
Study 2			
1. Dark Triad	2.89 (2.59)		
2. Certainty in Dark Triad	5.83 (1.30)	−0.18*	
3. Cheating Behavior (Bonus)	0.46 (0.50)	0.20*	0.11
Study 3			
1. Honesty-Humility	3.62 (3.73)		
2. Dark Triad	1.89 (1.64)	−0.55**	
3. Cheating Intentions (Online Survey)	7.57 (20.88)	<−0.01	0.13

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

4.3. Discussion

As predicted, higher levels of the HH trait (higher honesty) were associated with less cheating behavior. This finding conceptually replicated previous research in this domain (Hilbig et al., 2018; Kieslich & Hilbig, 2014; Zettler et al., 2013). Most importantly, trait certainty moderated this association for the first time, introducing a new finding and specifying a condition determining when the trait-behavior link is more likely to be observed. Consistent with SVT, we found that the HH scale predicted cheating behavior in the Stag Hunt dilemma to a greater extent when participants were higher in their certainty in their reported HH trait. Thus, as certainty in the HH trait increased, so too did the ability of the trait to predict cheating on a colleague in the dilemma. An open question is whether other traits relevant to cheating would show the same relationship uncovered in this study. Therefore, we conducted a second study to generalize this phenomenon to other personality traits relevant to cheating behavior.

Moreover, Study 1 used a hypothetical scenario for the cheating measure. Although these scenarios are ecologically valid (Zayas et al., 2002), another open question worth examining is whether these effects would hold for actual cheating behavior. Thus, in the next study, we moved to a paradigm involving actual cheating to maximize one's economic benefit.

5. Study 2

The aim of this second study was to generalize the findings further by using another relevant trait for cheating behavior, namely the Dark Triad. In line with most previous research, we expected a positive correlation between Dark Triad traits and cheating behavior. More importantly, we expected the relationship between the Dark Triad traits and cheating behavior to be stronger for those participants who were more certain of their responses to the scale. Thus, we hypothesized an interaction between the Dark Triad traits and certainty in the Dark Triad, such that increased certainty should lead to more cheating behavior for participants higher in the Dark Triad scale. If successful, this study would specify who is more likely to show trait-behavior consistency (i.e., those with high certainty in scale responses).

5.1. Method

5.1.1. Participants and design

Two hundred and forty-eight participants from the U.S. (133 women, 113 men, and 2 non-binary, $M_{age} = 40.81$, $SD = 12.22$) were recruited via *CloudResearch* in exchange for monetary compensation ($0.50). They participated in this study by completing an online survey in

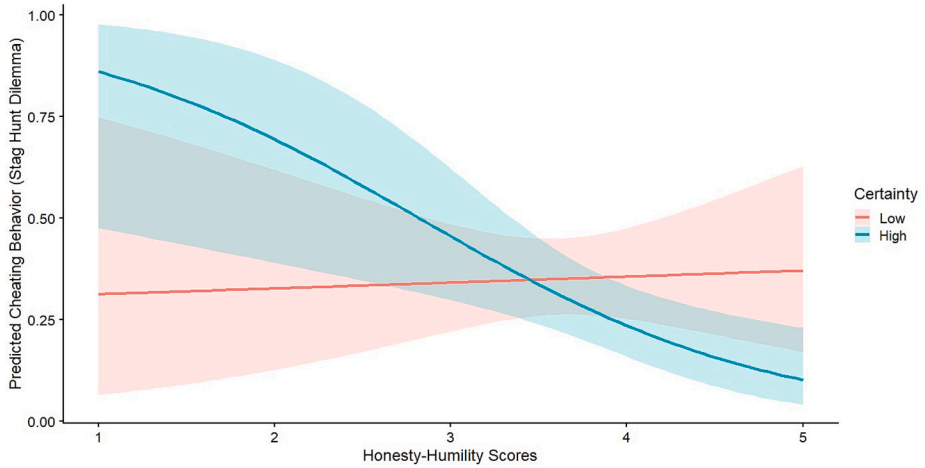

Fig. 1. Predicted cheating behavior (Stag Hunt dilemma) as a function of Honesty-Humility trait and certainty.

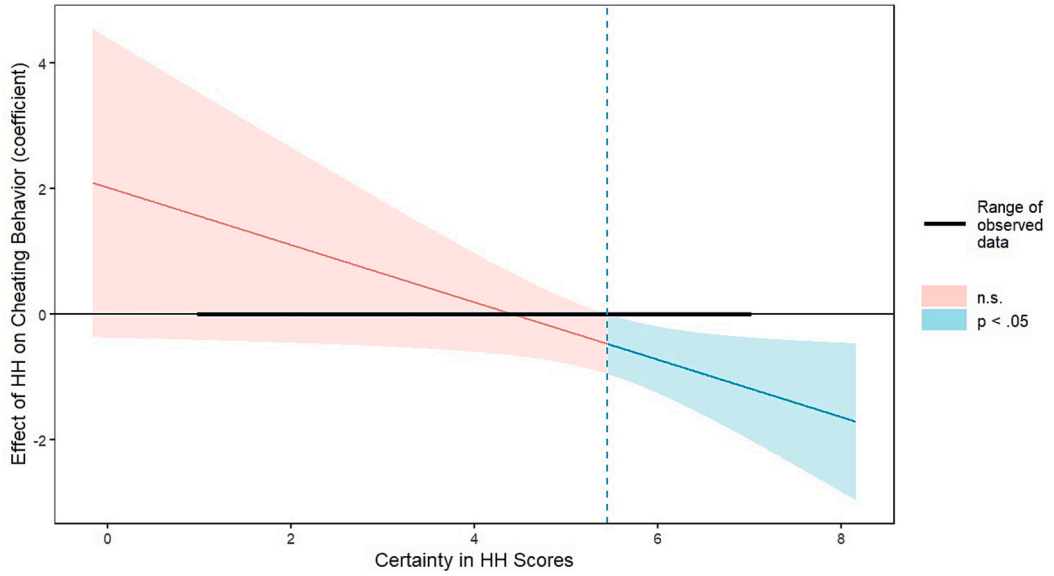

Fig. 2. Johnson-Neyman significance regions for certainty in the Honesty-Humility. The y-axis shows the relationship between Honesty-Humility and cheating behavior. The x-axis shows certainty. The line represents the slope of the effect of Honesty-Humility on Cheating behavior for each value of certainty in Honesty-Humility. The shaded area is the CI around the relationship of Honesty-Humility and cheating behavior for each value of certainty in Honesty-Humility.

Qualtrics. We assessed the relationship between the Dark Triad of personality (predictor variable) and certainty (moderator variable) on cheating behavior (criterion variable). Because no prior research had specifically examined our key predicted interaction, an *a priori* power analysis was performed using G*Power (Faul et al., 2009), which assumed a generic small value for the interaction effect size (Cohen's $f^2 = 0.04$). Results of this analysis suggested that the desired sample size for a two-tailed test ($\alpha = 0.05$) with 0.80 power was $N = 199$. Our final sample ($N = 248$) somewhat exceeded this number to allow for attrition. A *sensitivity* analysis for a linear multiple regression was run using G*Power. Results of that analysis (Faul et al., 2009) revealed that our sample size ($N = 248$) with an estimated power of 0.80 was capable of detecting an effect size greater than $f^2 = 0.032$.

5.1.2. Procedure

Permission to conduct the study was provided by the university institutional research board before the study began. First, the participants were informed that this study would investigate their personality using various questions (as the cover story), their participation was voluntary, and their answers would remain anonymous. After completing the consent form, they completed the 'Dirty Dozen' scale of the Dark Triad; then they were asked to complete a measure regarding certainty in their responses to these items. After that, they were given a chance to cheat in order to win a bonus using a procedure described shortly. Finally, participants answered several demographic questions, then were debriefed about the purpose of the study, thanked, and dismissed.

5.1.3. Predictor variables

Dark Triad. The Dark Triad of personality was measured using the brief inventory 'Dirty Dozen' (Jonason & Webster, 2010). Using four items per subscale (a dozen in all), this measure has generated a large body of research (see Jonason et al., 2012). Each of the Dark Triad's aspects (narcissism, Machiavellianism, and psychopathy) is represented by four statements such as "I tend to want others to pay attention to me" (narcissism), "I tend to manipulate others to get my way" (Machiavellianism), and "I tend to be cynical" (psychopathy). Participants responded to each statement on an eleven-point scale anchored at 0 ("Strongly disagree") and 10 ("Strongly agree"). In the present sample, internal consistencies for the Dirty Dozen subscales were all appropriate:

Narcissism ($\alpha = 0.93$), Machiavellianism ($\alpha = 0.92$), and psychopathy ($\alpha = 0.92$). The overall Cronbach's alpha for the scale was 0.96, and items were averaged to create a merged Dark Triad index ($M = 2.89$; $SD = 2.59$).

Certainty in Dark Triad. Following the Dark Triad scale, participants indicated their certainty in their responses using the same item as in Study 1. Specifically, participants were asked to indicate: "How certain are you in the responses you gave to the previous 12 questions about your personality?" (1 = "Extremely uncertain" to 7 = "Extremely certain"), with higher scores indicating higher certainty ($M = 5.83$, $SD = 1.30$). The subscales intercorrelations were as follows: Machiavellianism with narcissism ($r = 0.81$, $p < .001$); Machiavellianism with psychopathy ($r = 0.85$, $p < .001$); and psychopathy with narcissism ($r = 0.78$, $p < .001$). These inter-correlations are in line with the findings of a previous meta-analysis including nearly 100 articles (Furnham et al., 2013). Additionally, the correlation between certainty and the Dark Triad was negative, $r = -0.18$, $p = .004$.[3]

5.1.4. Criterion variable

Cheating Behavior (Bonus). After completing the predictor variables, participants were informed that, as a token of appreciation, some of them would be randomly selected and awarded a bonus of $0.25. This procedure and operationalization of cheating were adapted from Suri et al. (2011) who investigated detecting dishonest behavior in online settings. Participants were instructed to roll a die on the computer to determine who was eligible to receive the bonus. If they rolled a 5 or 6, they would be awarded the bonus. Specifically, participants read: "Please use the following link to get access to an online die. When you click on the link, there will appear a result on the die, so click on "Roll Again," just once. The number that appears after you click the button is your result." After this, participants were asked to report their result.

Although each die roll cannot be known (it was random) and, therefore, we cannot know if specific individuals did or did not report their results honestly, we can infer cheating from the aggregated data. If there was no cheating, each number should appear approximately 1/6 of the time and the average die roll should be 3.5. The average reported roll of the 248 participants was significantly higher than what would be expected by chance (i.e., a mean of 3.87; Wilcoxon rank sum test V = 19,158, $p < .001$). Lammers et al. (2010) employed a similar procedure by using self-reported dice rolling for the number of tickets in the experiment lottery and our results are in line with their report of significant upward mean deviation as an indicator of cheating (see also Kleinlogel et al., 2018).

Participants did not always pick the highest number to cheat. As an alternative, some players report a five instead of a six. This could be because they wanted to maintain an appearance of honesty (Hao & Houser, 2017) or to avoid feeling dishonest (Mazar et al., 2008). This pattern is similar to the findings of Fischbacher and Föllmi-Heusi (2013) and Kleinlogel et al. (2018), who observed that participants reported a result that produced the second highest outcome. In our case, reporting both 5 or 6 produce the same outcome, but it is possible that falsely reporting a 5 feels like a "lesser lie" than falsely reporting a 6. In our paradigm, any reported roll below 5 was coded as 0 (no bonus), and 5 and 6 were coded as 1 (bonus). In this study, 45.57 % of participants reported winning the bonus (significantly higher than the 33.33 % chance level; $\chi^2 = 16.696$, $p < .001$). Because winning the bonus depended on a random process, any additional chance to win can be attributed to cheating behavior.

Furthermore, there was a significant difference between the distribution of reported rolls and the uniform distribution ($\chi^2 = 30.758$, $p < .001$), indicating a greater number of fives and sixes were reported by players than would be expected. The specific distribution of rolls was as follows: number 1, 37 rolls (14.92 %); number 2, 22 rolls (8.87 %); number 3, 34 rolls (13.70 %); number 4, 42 rolls (16.94 %); number 5, 70 rolls (28.23 %); and number 6, 43 rolls (17.34 %).

5.2. Results

Table 1 summarizes the descriptive statistics and correlation matrix. The dependent variable was submitted to a logistic regression analysis following the same procedure as in Study 1. Supporting H1b, results indicated a significant main effect of the Dark Triad on receiving a bonus, $B = 0.19$, $SE = 0.054$, $z = 3.513$, $p < .001$, 95 % CI: [0.087, 0.300]. This main effect indicated that participants with higher levels of Dark Triad scores were more likely to cheat (i.e., increased the probability of getting a bonus above random chance). Results also showed a main effect of certainty in Dark Triad scores on winning the bonus, $B = 0.253$, $SE = 0.109$, $z = 2.333$, $p = .020$, 95 % CI: [0.045, 0.473].

Most importantly, a significant two-way interaction between the Dark Triad and certainty emerged, $B = 0.134$, $SE = 0.053$, $z = 2.524$, $p = .012$, 95 % CI: [0.030, 0.238] which supports H2b.[4] The effect size of this two-way interaction is OR = 1.14, 95 % CI: [1.033, 1.273], (Cohen's $f^2 = 0.026$). To further explore this interaction, we conducted post-hoc tests to examine the relationship between the Dark Triad and claimed bonus separately for participants who reported relatively high and low levels of certainty. As shown in Fig. 3, among those with higher certainty scores (analyzed one standard deviation above the mean), the Dark Triad was positively associated with claiming a bonus (i.e., cheating behavior), $B = 0.331$, $SE = 0.082$, $z = 4.028$, $p < .001$, 95 % CI: [0.170, 0.491]. However, for those with lower certainty scores (analyzed one standard deviation below the mean), no relationship emerged between the Dark Triad and claiming a bonus, indicating no cheating behavior at low levels of certainty on the Dark Triad, $B = 0.001$, $SE = 0.091$, $z = 0.010$, $p = .992$, 95 % CI: [−0.177, 0.179]. Our data showed a relationship between the Dark Triad and claiming a bonus (i.e., cheating behavior) among individuals who are relatively more certain in their Dark Triad traits, but no relationship between Dark Triad and bonus for individuals with lower levels of certainty.

Again, as a complementary analysis, we used the Johnson-Neyman technique to show how the slope of Dark Triad traits on reporting bonuses varied across the full range of certainty values. As illustrated in Fig. 4, results revealed one region of significance (5.83). That is, when the score in certainty was greater than or equal to 5.83, then greater Dark Triad traits were significantly associated with greater cheating behavior (more claimed bonuses).

5.3. Discussion

Consistent with most prior research, this study showed that the Dark Triad traits were associated with claiming a bonus (i.e., cheating behavior). Therefore, using a behavioral outcome, this study provided convergent evidence for the association between the Dark Triad and

[3] We tested the predictors with variance inflation factor test (VIF) for potential multicollinearity. Multicollinearity was unlikely to be a problem given the highest VIF was 1.106, which is below the multicollinearity threshold (VIF < 5).

[4] We conducted similar regressions with each subscale of the Dark Triad measure (narcissism, Machiavellianism, and psychopathy) and the results followed a similar pattern to the composite Dark Triad, in both the first and second steps of analysis. Specifically, the Machiavellianism × certainty interaction was significant, $B = 0.130$, $SE = 0.051$, $z = 2.558$, $p = .011$, 95 % CI: [0.030, 0.230], the psychopathy × certainty interaction was significant, $B = 0.149$, $SE = 0.051$, $z = 2.934$, $p = .003$, 95 % CI: [0.050, 0.249] but the narcissism × certainty interaction was not significant, $B = 0.064$, $SE = 0.042$, $z = 1.521$, $p = .128$, 95 % CI: [−0.018, 0.146]. One reason for this null effect could be that narcissism is especially associated with defending from perceived vulnerability (and therefore it involves some degree of ambivalence between reporting grandiosity and feeling fragile). Certainty in ambivalent dimensions would not produce the predicted two-way by SVT (e.g., DeMarree et al., 2015; Durso et al., 2016).

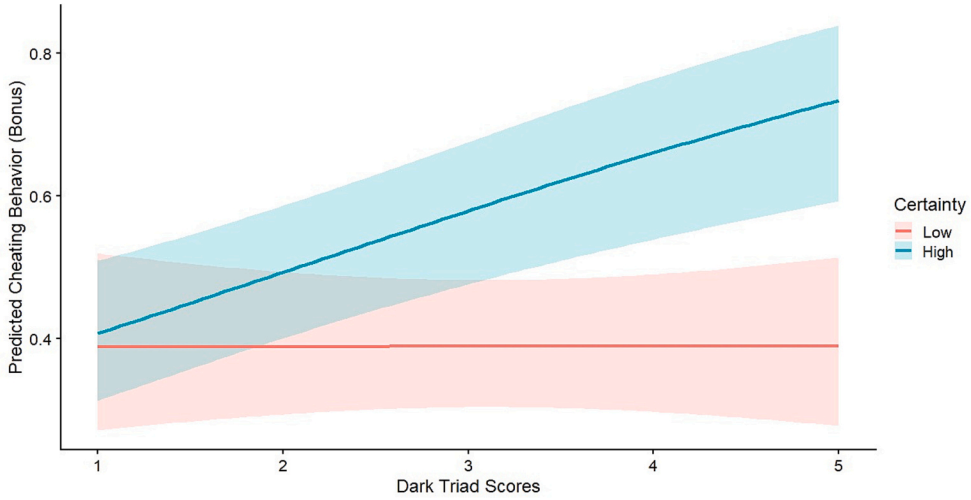

Fig. 3. Predicted cheating behavior (bonus) as a function of Dark Triad and certainty.

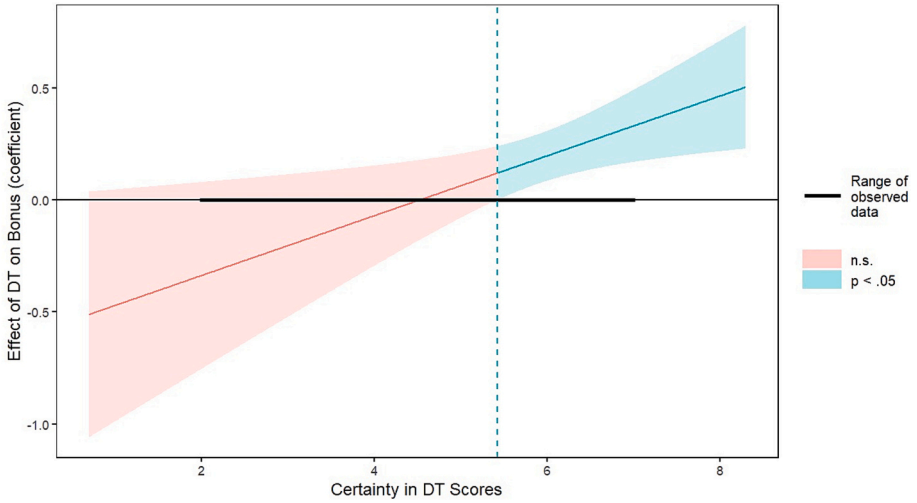

Fig. 4. Johnson-Neyman significance regions for certainty in the Dark Triad. The y-axis shows the relationship between Dark Triad and bonus (cheating behavior). The x-axis shows certainty. The line represents the slope of the effect of Dark Triad traits on bonus for each value of certainty in Dark Triad. The shaded area is the CI around the relationship of Dark Triad and reporting a bonus for each value of certainty in Dark Triad.

cheating. Most importantly, our findings indicated that certainty moderated the link between Dark Triad traits and claiming a bonus. In accord with SVT predictions, we found that the relationship between Dark Triad traits and cheating behavior was greater for participants with higher levels of certainty in their Dark Triad responses. Thus, as certainty regarding individual differences in the Dark Triad traits increased, their ability to predict cheating behavior also increased. Hence, by factoring in the degree of certainty in individual differences, it is possible to better predict and comprehend those individuals who are more inclined to act upon their Dark Triad traits (i.e., those who exhibit relatively high certainty in their responses to the scale).

Participants' certainty was measured in the first two studies, and it is possible that other unmeasured factors (e.g., knowledge, abilities, experiences, etc.) may have been confounded with reported certainty. Therefore, we moved to an experimental paradigm manipulating participants' certainty to infer the causal role of this variable in the next study. Moreover, the previous two studies measured the personality traits in separate samples; thus, an additional refinement introduced in the final study is to measure them within the same sample.

Finally, Study 2 used a behavioral task for cheating that had some potential limitations since we are aggregating responses among those who might and might not have cheated by using reports of a 5 or a 6 roll as the dependent variable. In Study 2, we modeled the probability of "reporting a 5 or 6 die roll" which corresponds to winning the bonus. Although we cannot infer that every 5 or 6 is cheating, we know from the aggregate level analysis that the probability becomes higher than expected for 5 s and 6 s, and we know from the interaction that this was more the case for high Dark Triad traits - high certainty participants. Note that rolling the die is a random procedure. Therefore, in the absence of cheating, one would expect to see only non-significant results of Dark Triad traits, certainty, and their interaction on winning the bonus. The fact that there are significant effects allows us to infer that any systematic effect on the bonus result (5 or 6) most plausibly comes from cheating. Although this measure was still capable of capturing the effect of Dark Triad traits on cheating in the expected manner, we changed the cheating outcome in the next study for generalization purposes and to increase the ecological validity of the dependent measure of cheating.

6. Study 3

The primary goal of Study 3 was to extend the findings of Studies 1 and 2 by moving to a more experimental design. In the previous studies, certainty was measured, so it might be confounded with other potential

factors. In this final study, we manipulated the core construct, certainty, to establish its causal role. Given that a certainty induction produces a momentary feeling (i.e., a situational cue), the implication of this last study is that, in addition to the idea that situations can unite individuals despite their individual differences, they can also contribute to enhancing these differences based on personality.

A second important change is that we measured both HH and DT within the same study to control for individual variability. Finally, this study included a new dependent measure consisting of participants' future intentions to cheat in surveys like the one in which they were participating. Once more, we expected the relationship between HH and cheating intentions and between DT and cheating intentions to be stronger in the certainty (vs. doubt) condition. Thus, we hypothesized two two-way interactions on the measure of intentions to cheat: HH × certainty and DT × certainty.

6.1. Method

6.1.1. Participants and design

One hundred and forty-two participants from the U.S. (68 women, 73 men, and 1 non-binary, $M_{age} = 37.77$, $SD = 12.15$) were recruited via *CloudResearch* in exchange for monetary compensation ($0.50). Because this research used a different design, we did not rely on the effect size of Studies 1 and 2. Based on the most recent SVT research in which certainty is manipulated and measured (Toader et al., 2024), we expected a certainty manipulation to produce a larger effect than the measure. Thus, we assumed a generic medium value for the interaction effect size (Cohen's $f^2 = 0.06$). An a priori power analysis using G*Power (Faul et al., 2009) suggested that the desired sample size for a two-tailed test ($\alpha = 0.05$) with 0.80 power was $N = 128$. Our final sample ($N = 142$) was above this number to allow for potential attrition. In this study, there were no exclusions. A *sensitivity* analysis for a linear multiple regression was run using G*Power. Results of that analysis (Faul et al., 2009) revealed that our sample size ($N = 142$) with an estimated power of 0.80 was capable of detecting an effect size greater than $f^2 = 0.056$. Participants in this study completed an online survey in Qualtrics. We assessed the relationship between the Honesty-Humility index and the Dark Triad of personality (predictor variables) while manipulating the certainty (moderator variable) on cheating behavior (criterion variable).

6.1.2. Procedure

Initially, the participants were told that this study would use a series of questions that investigate their personalities (as the cover story), that participation was optional, and that their responses would be kept confidential. Following submitting the consent form, they completed both the Honesty-Humility scale and the Dark Triad scale. Then, participants were randomly assigned to either the certainty or doubt condition. After that, they had to indicate their future intentions to cheat in surveys like the one in which they were participating. Finally, participants responded to some demographic information, then were debriefed about the goal of the study, thanked, and dismissed.

6.1.3. Independent/Predictor variables

Honesty-Humility. Participants reported their HH using the same scale as in Study 1. We followed the same process to create a composite measure of HH. Item ratings were inter-correlated ($\alpha = 0.76$), and higher scores indicate more HH ($M = 3.62$; $SD = 0.73$).

Dark Triad. The Dark Triad of personality was measured using the same brief inventory as in Study 2. In this sample, internal consistencies for the Dirty Dozen subscales were all appropriate: narcissism ($\alpha = 0.81$), Machiavellianism ($\alpha = 0.82$), and psychopathy ($\alpha = 0.73$). The overall Cronbach's alpha for the scale was 0.84, and items were averaged to create a merged Dark Triad index ($M = 1.89$; $SD = 0.64$). The subscale intercorrelations were as follows: Machiavellianism with narcissism ($r = 0.46$, $p < .001$); Machiavellianism with psychopathy ($r = 0.48$, $p < .001$); and psychopathy with narcissism ($r = 0.25$, $p < .001$). As expected (Hodson et al., 2018), HH and DT were inversely related, $r = -0.55$, $p < .001$.

Certainty. After participants completed the HH and DT scales, they were asked to recall a past event where they felt either certain or doubtful. They were told they could pick any topic and that grammar was not important. In the certainty condition, they listed instances such as "Despite the tough conditions, I had 100% confidence that I had what it takes to complete the race" or "I decided to propose to my partner because I was sure they were the one for me." On the other hand, in the doubt condition, participants recalled instances such as "I have felt doubt about telling a friend a difficult truth that their family has been keeping from them" or "When I ended a long-term relationship, I started doubting my decision afterward."[5] Prior research has used this technique to induce states of certainty or doubt (Petty et al., 2002), and recent SVT research has shown that this induction is capable of affecting reported feelings of certainty while not affecting other important variables such as chronic self-confidence (Santos et al., 2024). The logic behind this manipulation is that the certainty (vs. doubt) experienced after recalling past memories can be misattributed to any thought currently available in mind, in this case, the responses to the scales. Since the manipulation was induced after the HH and DT measures, it could not have affected these scores (HH, $p = .847$; and DT, $p = .335$).

6.1.4. Dependent variable

Cheating intentions. Participants' cheating intentions were measured with one single item: "How likely it is that you will respond randomly on a future Cloudresearch survey?" with anchors from 0% to 100%. This item has been adapted from prior research to assess cheating intentions (Curtis et al., 2022). Behavioral intentions are generally reliable predictors of behavior (e.g., Bleske-Rechek et al., 2010; Fishbein & Ajzen, 2011; Webb & Sheeran, 2006; see Morwitz & Munz, 2021, for a review).

We conducted a post-test study to examine the validity of this dependent measure.[6] This post-test found that the single item used as the

[5] The provided answers are paraphrased to maintain participants' anonymity

[6] In this post-test, 89 participants were recruited online through Connect CloudResearch. Twenty-two participants failed both attention checks. Participants in the resulting sample (56.72 % women, 41.79 % men, and 1.49 % non-binary, $M_{age} = 39.09$, $SD = 10.31$) were asked to respond to the same item regarding participants' intentions to cheat in future studies. Then, they entered a study on math skills in which they were presented with 20 matrices on the computer screen. Each matrix contained three rows and four columns of three-digit numbers (e.g., 5.19). Participants were instructed to find the two numbers in each matrix that summed up to 10.00. Once the experiment started, participants had 5 min to complete the task. Instructions and an example were presented at the top of the screen. Participants were told they would earn $0.20 for each correct solution. To provide participants with an opportunity to engage in actual cheating in order to raise their earnings, we adopted the computer-glitch paradigm originally introduced by Vohs and Schooler (2008). That is, after completing the task, participants received a system failure screen, informing them that the Qualtrics program had a glitch, and the correct answers were not stored properly in the system. Due to that, participants were told to report their performance in a box provided within the same screen, to receive payment based on their self-reported performance after completing the task.A cheating index was created for each participant by subtracting the number of the actually solved matrices from the number of the solved matrices that each participant reported. This enabled us to assess whether and to what extent participants had overstated their performance. This behavioral cheating task is a well-established procedure in dishonesty (Mazar et al., 2008).Pearson's product-moment correlation analyzed the relationship between our dependent measure (the cheating intentions item) and the behavioral task, providing a quantitative basis for assessing the predictive validity of our measure. The correlation with the matrix task discrepancy was significant, with a coefficient of 0.256 ($t(65) = 2.139$, $p = .036$). This corroborates the validity of our single item, suggesting its effectiveness in capturing the propensity to cheat in incentivized tasks.

dependent outcome in this study was capable of predicting actual cheating in an incentivized task, supporting the validity of the measure.

6.2. Results

Table 1 summarizes the descriptive statistics and correlation matrix. To test the relationship between HH (predictor variable), DT (predictor variable), and manipulated certainty (moderator variable), a multiple regression analysis was conducted on cheating intentions (criterion), with HH (centered and Z-scored), DT (centered and Z-scored), certainty (contrast coded; −1 = doubt, 1 = certainty), and the interaction terms (HH × certainty; DT × certainty; HH × DT; HH × DT × certainty) entered as predictors.

Results revealed no significant main effect of the Dark Triad, B = 3.816, $t(138)$ = 1.735, p = .085, 95 % CI [−0.533, 8.164], HH, B = 1.918, $t(138)$ = 0.870, p = .386, 95 % CI [−2.440, 6.275], or manipulated certainty, B = 0.640, $t(138)$ = 0.350, p = .727, 95 % CI [−2.976, 4.257] on cheating intentions.

Results showed that manipulated certainty moderated both the link between HH and cheating intentions (conceptually replicating Study 1), B = −4.185, $t(138)$ = −2.247, p = .026, 95 % CI: [−7.868, −0.502], Cohen's f^2 = 0.037, and in a trend consistent with our predictions, between Dark Triad traits and cheating intentions (consistent with Study 2), B = 3.510, $t(138)$ = 1.936, p = .055, 95 % CI: [−0.076, 7.095], Cohen's f^2 = 0.027.

To further explore these interactions, we conducted post-hoc tests to examine the relationship of the Dark Triad and Honesty-Humility with cheating intentions separately for participants who were randomly assigned to certainty and uncertainty conditions. For the HH × certainty interaction, as illustrated in Fig. 5 (top panel), among those assigned to the certainty condition, HH scores tended to be negatively associated with cheating intentions, B = −5.30, $t(138)$ = −1.824, p = .07, 95 % CI: [−11.042, 0.447]. Conversely, among those assigned to the doubt condition, HH scores were not significantly associated with cheating intentions, B = 3.072, $t(138)$ = 1.317, p = .19, 95 % CI: [-1.539, 7.683].

For the DT × certainty interaction, as illustrated in Fig. 5 (bottom panel), among those assigned to the certainty condition, DT scores were associated with cheating intentions, B = 6.510, $t(138)$ = 2.453, p = .015, 95 % CI: [1.263, 11.756]. In contrast, among those assigned to the doubt condition, DT scores were not significantly associated with cheating intentions, B = −0.510, $t(138)$ = −0.206, p = .837, 95 % CI: [−5.40, 4.378].

Finally, there was no HH × DT, B = 1.353, $t(134)$ = 0.468, p = .641, 95 % CI: [−4.367, 7.074], nor HH × DT × certainty interaction, B = −1.774, $t(134)$ = −0.815, p = .417, 95 % CI: [−6.079, 2.531].

6.3. Discussion

Using an experimental approach to testing the causal role of the moderating variable, this final study conceptually replicated the findings of the two correlational studies in an additional sample in which we measured both Honesty-Humility and Dark Triad traits for all participants and manipulated certainty. Specifically, across participants assigned to the certainty condition, higher levels of DT and lower levels of HH were associated with greater cheating intentions. For those assigned to the doubt condition, the opposite trend was found. Although not all results reached statistical significance, the key two-way interactions were all directionally consistent with those of our first two studies.

7. General discussion

This research showed that HH and Dark Triad traits predicted cheating behavior. That is consistent with most prior literature and according to the H1a and H1b. First, our results conceptually replicated the findings of Kleinlogel et al. (2018) by showing that participants higher in HH (high honesty) were less likely to cheat on their colleague in the Stug Hunt dilemma. This was illustrated by the main effect of HH on cheating in Study 1. Second, our research also conceptually replicated the findings of Esteves et al. (2021) and Paulhus et al. (2013) by showing that individuals higher in the Dark Triad tended to engage in more cheating behavior. Again, this is evidenced by the main effect of the Dark Triad on cheating that we observed in Study 2.

Most importantly, our findings indicated that certainty, both measured and manipulated, moderated the relationship between HH and the Dark Triad traits on cheating behavior (H2a and H2b). As noted, operationalizing certainty using both a correlational and experimental approach is a strength of this research that is consistent with SVT. Following our predictions, the association of HH and the Dark Triad traits with cheating behavior was greater for participants with higher levels of certainty in the corresponding inventory responses or assigned to an incidental induction of certainty (vs. doubt). Rather than a main effect of certainty, we propose that certainty interacts with initial thoughts or available personality traits to influence behavior. Specifically, certainty can increase cheating when it validates positive thoughts about cheating (e.g., as in Lamprinakos et al., 2024) or traits associated with dishonesty—such as the Dark Triad traits as examined in our current studies. Conversely, certainty can decrease cheating when it validates negative thoughts about cheating (e.g., as in Lamprinakos et al., 2024) or traits associated with honesty, like Honesty-Humility in this research. In essence, the effect of certainty on cheating is contingent upon what is the mental content that is being validated. Under high thinking conditions, it is the interaction between certainty and these traits that drives the behavior, not certainty alone. Therefore, this research contributes to the literature on cheating by highlighting the importance of meta-cognitive processes of validation of mental constructs within this relevant context (see also Lamprinakos et al., 2024; Toader et al., 2024).

Moreover, the findings from Study 3 support the notion that situational cues, rather than merely competing with personality factors, have the potential to amplify individual differences in predicting behavior. Thus, our research advocates for a more nuanced understanding of the interplay between personality and situational influences, emphasizing that situations can both unite and differentiate individuals depending on how person and situation interact to predict behavior (see Santos et al., 2022, for an additional example in the context of agression).

Furthermore, our research showed a moderation by certainty of the effect of traits on cheating behavior. Although it seems that the interactions are more driven by certainty that is applied to the upper levels of the traits, it might also be the case that high levels of uncertainty about a specific trait might lead individuals to overcompensate by endorsing the opposite trait. For instance, someone who really doubts their intelligence might conclude they must be the opposite (i.e., unintelligent; Gandarillas et al., 2018). Similarly, having extreme doubts about one's low levels of Dark Triad may lead one to behave like a person with a high level of Dark Triad traits (see Briñol & Petty, 2024, for further discussion on the multiple outcomes of invalidation).

In sum, these results suggest that research in cheating behavior may profit not only by assessing relevant traits but also the certainty with which people hold those traits. That is, it is informative to assess both cheating-relevant traits (e.g., Dark Triad, HH), and the spontaneous certainty in these traits to increase predictability in cheating. Thus, as certainty regarding individual differences in the Dark Triad and HH traits increased, their ability to predict cheating behavior also increased. Hence, by factoring in the degree of certainty in individual differences, it is possible to better predict and comprehend those individuals who are more inclined to act upon their traits, particularly those who exhibit relatively high certainty in their responses to the scale. Alternatively, it is also plausible that an individual's level of certainty could fluctuate over time, thus making the measure a useful tool for anticipating instances when that individual is more likely to act upon their level of Dark Triad or HH (i.e., during periods of heightened certainty in their

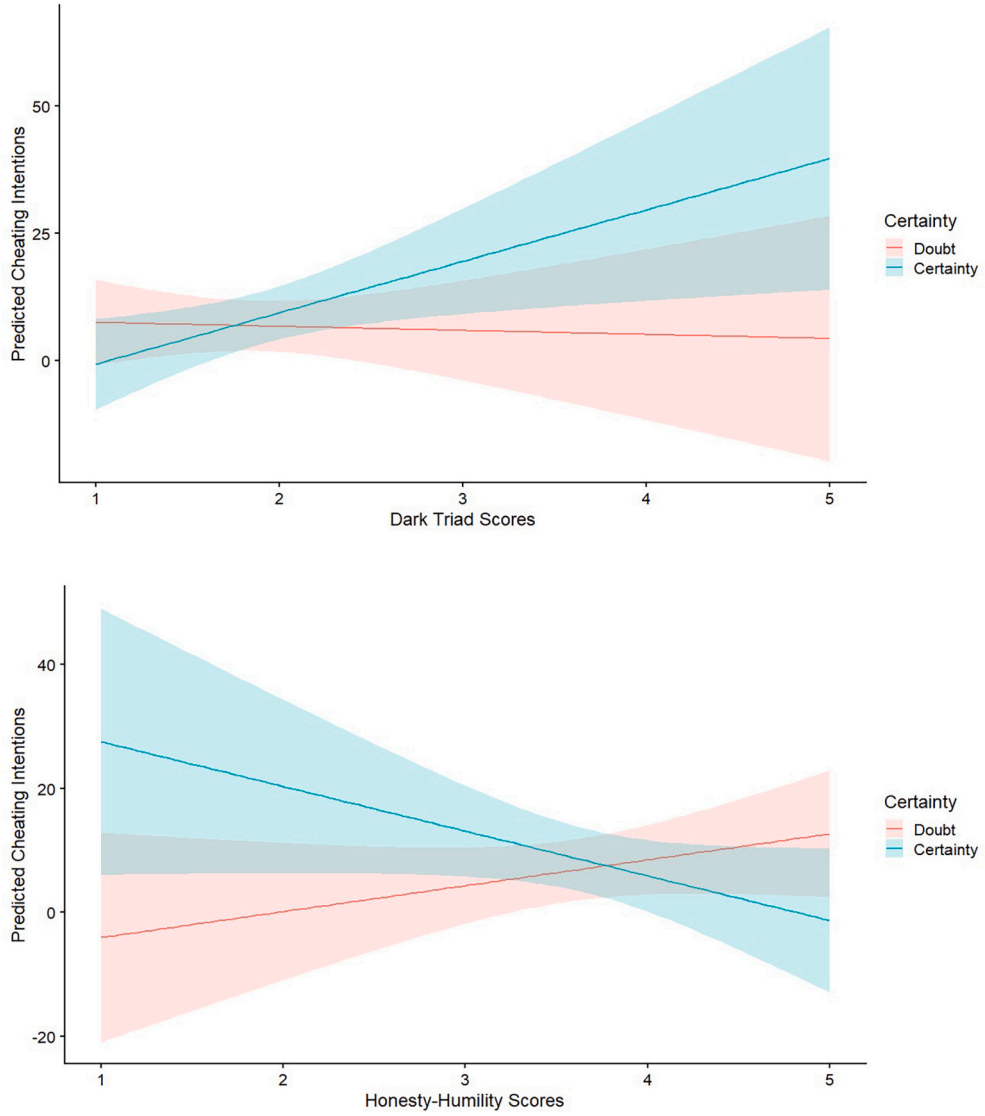

Fig. 5. Predicted cheating intentions as a function of Honesty-Humility trait and manipulated certainty (top panel) and Dark Triad traits and manipulated certainty (bottom panel).

responses).

Samples met the power criteria needed for the effects to emerge and varied in age, gender, and ethnicity across studies. However, these samples were limited in other aspects such as having lower levels of diversity regarding other important features (e.g., most participants were within Western white-majority regions).

Researchers working on personality and individual differences might find these findings of interest, as incorporating a costless measure of certainty into their questionnaires could be beneficial. The current study demonstrated that a single item, measuring certainty, amplified the relationship between Dark Triad and HH traits on significant outcomes, such as cheating. For example, after administering the Big Five personality scale, researchers could inquire about participants' level of certainty in their responses, as adding this single item could enhance the predictive validity of a particular trait on relevant outcomes. This is a simple and efficient way to improve the predictive validity of individual difference scales, as it only requires one additional item and has a minimal impact on the length of the questionnaire. Beyond HH and DT, future research can benefit from examining other traits that have been associated with both prosocial and antisocial behavior, such as individual differences in power (Cai et al., 2023; DeMarree, Briñol, & Petty, 2014; Fleischmann et al., 2019; Lamprinakos et al., 2024; Lammers et al., 2010, 2011; Rucker et al., 2018; Toader et al., 2024).

An open question is whether individuals could infer their certainty based on how they responded to the scale; for example, if they replied very consistently to the items, they inferred they had more certainty. Although this possibility in which certainty comes from a content-dependent factor, such features and methodological artifacts are only plausible for the first two correlational studies. Nonetheless, we still tested differences in internal consistency leading to more certainty by comparing the Cronbach's alpha of the scales as a function of the certainty variable across the three studies. As shown in Table 2, Cronbach's alpha did not differ as a function of certainty in any of the studies.

It is worth mentioning that the present work is based on the assumption that certainty is associated with properties of perceived validity. Thus, to the extent that certainty is associated with high perceived validity (e.g., believing one is right), the same results observed here should emerge. However, to the extent that certainty is associated with low validity for some individuals or in some situations (e.g., arrogance, mental rigidity), a different pattern of results should be obtained. Therefore, it is possible that the meaning of certainty in a particular context or for particular people moderates the impact that certainty in one's personality has on subsequent behavior (Briñol et al., 2018; Gascó et al., 2018).

Table 2
Cronbach's alpha of the personality scales as a function of certainty across studies.

Study	Scale	Certainty Split/Condition	Cronbach's Alpha		
			α	z	p-value
1	Honesty-Humility	Low	0.698	0.262	0.793
		High	0.671		
2	Dark Triad	Low	0.950	0.579	0.563
		High	0.942		
3	Honesty-Humility	Low	0.779	1.275	0.202
		High	0.717		
	Dark Triad	Low	0.827	1.205	0.228
		High	0.866		

Finally, future research should also specify the conditions under which perceived validity in the trait is more likely to be taken into consideration. SVT postulates that reliance on meta-cognitive assessments, such as certainty, is more likely to occur for individuals motivated and able to engage in thinking (Briñol & Petty, 2022; Moreno et al., 2024). These moderating effects of certainty might be more likely to emerge for people who are involved enough to consider not only their traits but the certainty with which they hold their traits. In conclusion, the current research provides an important extension to prior work on the Dark Triad, HH, and cheating. Specifically, the predictive validity of the Dark Triad and HH can be increased by considering a meta-cognitive variable, such as certainty in one's trait. As this research has shown, including a single item asking people to indicate how certain they are in their own Dark Triad or HH level can lead to more accurate predictions about who will cheat. The present work raises the possibility of extending these results and examining the moderating role of certainty on other consequences of antisocial traits such as risk-taking behavior, other types of manipulation, or even aggression.

Open practices

All materials, data, and code are publicly available in an open repository at: https://osf.io/5a6hr/?view_only=1a780898326d4fc89ddb603cf47d6f99 (DOI: 10.17605/OSF.IO/5A6HR).

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Ethics approval statement

This research was conducted in accordance with APA guidelines on the ethical treatment of human subjects and was approved by an institutional review board.

CRediT authorship contribution statement

David Santos: Writing – review & editing, Writing – original draft, Visualization, Supervision, Resources, Project administration, Methodology, Investigation, Funding acquisition, Formal analysis, Conceptualization. **Arsham Ghodsinia:** Writing – review & editing, Writing – original draft, Visualization, Methodology, Formal analysis. **Blanca Requero:** Writing – review & editing, Writing – original draft, Methodology, Conceptualization. **Dilney Gonçalves:** Writing – review & editing, Writing – original draft. **Pablo Briñol:** Writing – review & editing, Writing – original draft, Funding acquisition, Conceptualization. **Richard E. Petty:** Writing – review & editing, Writing – original draft, Conceptualization.

Declaration of competing interest

Authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.jesp.2024.104694.

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