

# Personality and Prosocial Behavior: Linking Basic Traits and Social Value Orientations

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Concerning the dispositional determinants of prosocial behavior and cooperation, work based on the classic 5 personality factors, and especially Agreeableness, has turned out somewhat inconsistent. A clearer picture has emerged from consideration of the HEXACO model of personality—though supported entirely by hypothetical behavior as criterion, so far. Thus, in 2 studies and a reanalysis, we investigated “actual behavior” in the form of individually and socially consequential distribution decisions. As expected, HEXACO Honesty-Humility consistently predicted prosocial behavior, including a theory-consistent pattern on the facet level. Importantly, this pattern might explain why five-factor Agreeableness has only sometimes been found to account for prosocial behavior. Indeed, further results indicate that five-factor Agreeableness comprises some aspects that are predictive of prosocial behavior—aspects well covered by HEXACO Honesty-Humility—but also others that play no role for this criterion. As such, the links between five-factor Agreeableness and prosocial behavior are well-covered by HEXACO Honesty-Humility, but not vice versa. Taken together, these findings hint that especially HEXACO Honesty-Humility (and certain aspects of five-factor Agreeableness) account for prosocial behavior—thus explaining previous inconsistencies and providing a more nuanced understanding of the links between basic personality and prosocial or cooperative behavior.

**Keywords:** Honesty-Humility, Agreeableness, HEXACO, prosocial behavior, social value orientation

Contrary to standard economic theory, the hypothesis that humans primarily act in a self-interested manner has been conclusively refuted based on a large and diverse body of empirical research (e.g., Colman, 2003; Fehr & Gintis, 2007; Henrich et al., 2001; Kocher, Cherry, Kroll, Netzer, & Sutter, 2008). Indeed, in economic games and social dilemmas, a substantial proportion of individuals are typically willing to forgo some profits for the benefit of others. However, at closer inspection, the extant findings

also reveal a noteworthy degree of variability, such that some individuals actually behave very much in line with self-interested individual utility maximization, whereas others display other-regarding preferences (e.g., Engel, 2011; Fischbacher, Gächter, & Fehr, 2001). Overall, “the empirical evidence . . . has repeatedly refuted the conception of humans as rational and narrowly self-interested actors, instead showing large individual variation in behaviour” (Lönqvist, Verkasalo, & Walkowitz, 2011, p. 301).

To account for this variability, an increasing number of investigations have considered basic personality traits as predictors of behavior in economic games and social dilemmas (e.g., Becker, Deckers, Dohmen, Falk, & Kosse, 2012; Ferguson, Heckman, & Corr, 2011; Glöckner & Hilbig, 2012; Hirsh & Peterson, 2009; Kurzban & Houser, 2001; Lönqvist, Walkowitz, Wichardt, Lindeman, & Verkasalo, 2009). Clearly, given the wide range of real-life situations on which these paradigms are modeled (Falk & Heckman, 2009), one would expect that corresponding individual differences would be covered by basic trait models. From within the most widely recognized model of basic personality structure, the five-factor model (e.g., Costa & McCrae, 2009; John & Srivastava, 1999), the one trait that should be most predictive of cooperation is Agreeableness (in what follows, we use FFM-AG to refer to Agreeableness as conceptualized within the five-factor model). In general terms, FFM-AG is “concerned with how individuals differ in their orientations toward interpersonal relationships” (Graziano & Tobin, 2009, p. 46), and it has been empirically linked to

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social outcomes such as conflict resolution (Jensen-Campbell & Graziano, 2001), nonaggression (Gleason, Jensen-Campbell, & Richardson, 2004), noncompetitive group performance (Graziano, Hair, & Finch, 1997), and helping behavior (Graziano, Habashi, Sheese, & Tobin, 2007).

Correspondingly, FFM-AG has also been suggested to account for selfish vs. prosocial behavior. Specifically, it has been considered to reflect “differences in the motivation to cooperate (vs. acting selfishly) in resource conflicts” (Denissen & Penke, 2008, p. 1285) such that it “contrasts a prosocial . . . orientation toward others with antagonism and includes traits such as altruism . . . and modesty” (John, Naumann, & Soto, 2008, p. 120). However, within the *Drosophila* paradigms of prosocial behavior—economic games and social dilemmas in which the hypothesis of pervasive self-interest has been refuted (Colman, 2003; Dawes & Thaler, 1988)—the empirical evidence concerning FFM-AG is somewhat mixed. That is, there are only some investigations supporting an association between FFM-AG and prosociality or cooperation (Ben-Ner, Kong, & Putterman, 2004; Koole, Jager, van den Berg, Vlek, & Hofstee, 2001; Pothos, Perry, Corr, Matthew, & Busmeyer, 2011; Volk, Thöni, & Ruigrok, 2011), whereas others have essentially reported null-effects (Ben-Ner, Kramer, & Levy, 2008; Brocklebank, Lewis, & Bates, 2011; Hirsh & Peterson, 2009; Kurzban & Houser, 2001; Lönngqvist et al., 2011). So, although FFM-AG is theoretically well-suited to account for prosocial behavior and indeed predicts various social outcomes in general (for an overview, see Graziano & Tobin, 2009), it has not proven a strong or consistent explanatory variable in one of the quintessential domains of prosocial versus selfish behavior.

Recently, a more consistent picture on the link between basic personality traits and prosocial behavior has emerged through consideration of the HEXACO model of personality (Ashton & Lee, 2007). Based on lexical studies across various languages (Ashton et al., 2004; Lee & Ashton, 2008), this model suggests a six-factor structure of basic traits. In simplified terms, the HEXACO model is an extension and variation of the classical five-factor structure. Most important, the model yields a new sixth basic personality factor termed Honesty-Humility (HEX-HH). This factor represents dispositional tendencies such as being sincere, honest, faithful, modest/unassuming, and fair-minded versus sly, greedy, pretentious, hypocritical, boastful, and pompous. Importantly, this factor is distinguished from a separate Agreeableness factor (HEX-AG) which covers aspects such as being patient, tolerant, lenient, and forgiving versus ill-tempered, quarrelsome, stubborn, and vindictive. Thus, HEX-HH and HEX-AG essentially stand for separate though complementary aspects of cooperativeness (Ashton & Lee, 2007; Hilbig, Zettler, Leist, & Heydasch, 2013): Whereas HEX-HH represents the tendency to actively cooperate (i.e., nonexploitation), HEX-AG represents the tendency to reactively cooperate (i.e., nonretaliation). Thus, actively self-interested versus other-regarding or prosocial behavior is predicted to be driven mainly by HEX-HH, at least initially (HEX-AG should only come into play as tolerance of some degree of exploitation by others and thus as a reaction rather than an action).

As the factor content indicates, both HEX-HH and HEX-AG partially overlap with FFM-AG (Ashton, Lee, & De Vries, 2013). Empirically, the association between HEX-AG and FFM-AG is the stronger one, and indeed the two factors share much of their

content. The overlap between HEX-HH and FFM-AG is more limited: Specifically, the HEX-HH facets Sincerity and Modesty relate to the Straightforwardness and Modesty facets of FFM-AG (McCrae & Costa, 2008). However, HEX-HH also comprises unique aspects beyond FFM-AG, especially in terms of its facets Fairness and Greed avoidance (Ashton & Lee, 2005, 2008; Lee & Ashton, 2013).

Corroborating the implications of the HEXACO model, the HEX-HH factor has been consistently linked to prosocial (vs. self-interested) behavior in terms of hypothetical dictator game giving (Hilbig & Zettler, 2009), public goods contributions (Hilbig, Zettler, & Heydasch, 2012), and prisoner's dilemma cooperation (Zettler, Hilbig, & Heydasch, 2013), as well as more distal, real-life expressions of (non)cooperation, such as counter-productive work behavior (Marcus, Lee, & Ashton, 2007; Zettler & Hilbig, 2010), unethical business decisions (Ashton & Lee, 2008), or proenvironmental behavior (Hilbig, Zettler, Moshagen, & Heydasch, 2013). Also, HEX-AG was indeed unrelated to these criteria or only weakly so (Ashton et al., 2013; Hilbig, Zettler, Leist, & Heydasch, 2013), thus supporting the suggestion that the two should be kept separate.

However, all of these findings essentially represent associations between self- or observer-reported measures and/or hypothetical scenarios rather than what one might refer to as actual behavior (Baumeister, Vohs, & Funder, 2007; King, 2010). By contrast, in behavioral economics and related fields, it is common practice to investigate prosocial versus self-interested behavior in fully incentivized situations with real interaction partners (Camerer & Hogarth, 1999; Handgraaf & van Raaij, 2005; Hertwig & Ortmann, 2001)—first and foremost based on the argument that participants' responses must be consequential (in terms of their payoffs and the impact decisions have on others) for findings to generalize beyond the lab. More specifically, the main caveat of hypothetical scenarios is that responses may be partially or even entirely due to social desirability biases (Moshagen, Hilbig, & Musch, 2011). So, if prosocial behavior is assessed via hypothetical scenarios, any association with self-reported personality traits may be spuriously inflated, suppressed, or otherwise biased by social desirability. Furthermore, the effect of personality traits might depend on whether real consequences are involved. For example Ben-Ner et al. (2008) found no main effects of personality or incentives on prosocial giving but an interaction: Agreeableness had a negative effect on giving in hypothetical games but a more positive effect in incentivized games.

Thus, it is vital to understand the links between personality and prosocial behavior with actual behavior as the criterion—thus ensuring that behavior is consequential and thereby arguably less distorted by response tendencies. Since “incentives are . . . useful when the response may be affected by social desirability, as in the case of cooperation in social dilemmas” (Baron, 2001, p. 403), the studies reported in what follows aimed to critically test the association between personality and self-interested versus prosocial behavior in a fully incentivized situation with consequences for the decision maker and another individual. In line with prior research, we first predicted that HEX-HH should be linked to prosocial behavior even if the latter requires foregoing individual payoffs. In addition, we aimed to provide an enhanced test of the claim that HEX-HH, but not HEX-AG, would predict active prosocial behavior in the sense of nonexploitation of others, as implied by the

Table 1  
Means (Standard Deviations) and Bivariate Correlations of All Variables With Internal Consistency Reliabilities (Cronbach's Alpha) in the Diagonal (Study 1a)

Variable	<i>M</i> ( <i>SD</i> )	1	2	3	4	5	6
1. Honesty-Humility	3.42 (0.64)	.84					
2. Emotionality	3.42 (0.56)	.12	.80				
3. Extraversion	3.47 (0.61)	-.11	-.31*	.86			
4. Agreeableness	3.01 (0.57)	.11	-.26*	.20	.83		
5. Conscientiousness	3.60 (0.57)	-.03	.14	.06	-.09	.83	
6. Openness	3.60 (0.60)	-.08	-.02	.35**	.03	.25	.82
SVO <sup>a</sup>	22.3 (14.5)	.37**	.06	.05	.10	.04	.17

Note. SVO = social value orientation.

<sup>a</sup> The SVO measure is computed as the inverse tangent of the ratio between the mean allocation to oneself and the other (Murphy et al., 2011); larger values indicate a more prosocial orientation.

\*  $p < .05$ . \*\*  $p < .01$  (all two-sided);  $N = 61$ .

HEXACO model (Ashton & Lee, 2007; Hilbig, Zettler, Leist, & Heydasch, 2013).

Next, to understand how—rather than merely whether—personality relates to prosocial behavior, we further attempted to dissect which aspects of different personality factors account for variance in this behavior. To this end, we intended to differentially test which of the HEX-HH facets (namely, fairness, greed avoidance, sincerity, and modesty) would predict self-interested versus prosocial behavior. From the facet definitions, one might expect that fairness (“high scorers are unwilling to take advantage of others,” Lee & Ashton, 2004, Table 1) and greed avoidance (“high scorers are not especially motivated by monetary or social-status considerations,” Lee & Ashton, 2004, Table 1) should be most likely to account for self-interested versus prosocial behavior, whereas this is less plausible for the facets sincerity (“high scorers are unwilling to manipulate others,” Lee & Ashton, 2004, Table 1) or modesty (“high scorers view themselves as ordinary people without any claim to special treatment,” Lee & Ashton, 2004, Table 1). Thus, we predicted that the aspects of HEX-HH primarily driving its relation to prosocial behavior should be fairness and greed-avoidance. In the following, Study 1a (and a reanalysis of other data denoted Study 1b) tested all the predictions referring to the HEX-HH, HEX-AG, and the four different facets of HEX-HH.

If the above can be shown empirically, additional hypotheses can be derived to shed further light on why the effects of FFM-AG on prosocial behavior might have appeared less consistent: The facet-level hypothesis essentially implies that those aspects of HEX-HH that are not covered well by FFM-AG should be the ones primarily linked to prosocial behavior. Thus, a direct comparison of the effects of HEX-HH, HEX-AG, and FFM-AG could reveal more clearly which common or distinct aspects across these factors are predictive of prosociality versus selfishness. We address this in Study 2.

## Study 1a

### Participants and Procedure

To maximize anonymity and thus minimize influences of social desirability, the study was run via the Internet, adhering closely to the standards for Web-based experimenting (Reips, 2002). Recent research has established that investigations of personality (and

beyond) can be safely administered via the Internet without method-specific biases (Chuah, Drasgow, & Roberts, 2006; Cronk & West, 2002; Gosling, Vazire, Srivastava, & John, 2004). A total of 61 participants (59% female; aged 19 to 62 years,  $M = 27.3$  years,  $SD = 7.7$  years; no demographics available for eight participants) were recruited from the Max-Planck Institute Decision Lab participant pool using the Online Recruitment System for Economic Experiments (ORSEE; Greiner, 2004).<sup>1</sup> Importantly, all participants recruited via this pool had never been subject to experimental deception; if they had previously participated in experiments involving economic paradigms, these usually comprised incentives and thus real stakes for self (and, if applicable, also for others).

After providing informed consent, participants were asked to complete the German 104-item version of the HEXACO Personality Inventory Revised (Lee & Ashton, 2006), which has been used successfully in several Web-based studies (e.g., Zettler, Hilbig, & Haubrich, 2011). Each HEXACO factor was thus assessed with 16 items (4 for each facet) to which participants responded on a 5-point scale ranging from “strongly disagree” to “strongly agree.” (Information on the inventory and sample items can be found at <http://hexaco.org>)

Next, participants were asked to complete the measure of social value orientation (SVO; Messick & McClintock, 1968; Van Lange, 1999; Van Lange, De Bruin, Otten, & Joireman, 1997) recently developed by Murphy, Ackermann, and Handgraaf (2011). Specifically, participants made six decisions allocating points to themselves and, concurrently, another individual. The six items are designed to allow for a continuous assessment of the relative weights individuals assign to their own versus another's outcomes (Fiedler, Glöckner, Nicklisch, & Dickert, 2013). For example, one item had participants select one of the following allocations: 50, 100; or 54, 89; or 59, 79; or 63, 68; or 66, 58; or 72, 47; or 78, 36; or 81, 26; or 85, 15 (with the first number referring to the points allocated to the decision maker and the second number to the points allocated to the other individual). As can be seen from the example, selfishness (maximizing one's own

<sup>1</sup> For reasons of efficiency, the experiment was run in combination with another study investigating psychometric properties and validity of a student-developed questionnaire.



Table 2

*Means (Standard Deviations), Internal Consistency Reliabilities (Cronbach's Alpha), and Association With Prosocial Behavior of the Four HEX-HH Facet Scales (Study 1a)*

Facet scale	<i>M</i> ( <i>SD</i> )	Reliability	Association with prosocial behavior	
			Bivariate correlation	Regression weight <sup>a</sup>
1. Fairness	3.52 (1.1)	.82	.30*	.29*
2. Greed avoidance	3.32 (1.0)	.86	.30*	.27†
3. Modesty	3.68 (0.78)	.78	.17	.04
4. Sincerity	3.18 (0.84)	.74	.24†	-.04

*Note.* HEX-HH = HEXACO Honesty-Humility; SVO = social value orientation.

<sup>a</sup> Standardized coefficients from a regression of prosocial behavior (SVO measure) on the four HEX-HH facets.

†  $p < .10$ . \*  $p < .05$  (all two-sided);  $N = 61$ .

outcome) implied choice of the last option (85 to self, 15 to the other). This clearly conflicts with prosocial behavior (since this option provides the lowest outcome for the other) and, in this particular item, with social efficiency (the sum of outcomes for both individuals is smallest in this option). From the corresponding choices across all six items, an overall measure of prosocial versus self-interested SVO can be computed. The measure has been shown to possess highly satisfactory psychometric properties and good construct validity (Murphy et al., 2011). Importantly, participants' decisions on the SVO measure were incentivized such that the points were going to be transformed into monetary payoffs both for the participants themselves and another individual. Participants were informed about the exchange rate (1 point = €0.03) and that one allocation decision would be randomly selected and incentivized for the decision maker and a second randomly selected participant and that furthermore the allocation decision of a third randomly selected participant would in the same way determine an additional payment to the decision maker. The transformation implied possible payoffs ranging from €1.95 (approximately \$2.70) to €6.00 (approximately \$8.20) for the decision maker and the other individual. Allocation decisions were thus consequential for the participants and another, unknown individual—thereby arguably reducing the influence of social desirability (simply because socially desirable responses, indicating a more prosocial SVO, necessarily yielded lower monetary payoffs). Note that the SVO concept is heavily relied on in current research and is in turn a noteworthy predictor of cooperation in social dilemmas in general (as confirmed by a recent meta-analysis, Balliet, Parks, & Joireman, 2009).

## Results and Discussion

Descriptive statistics, correlations, and reliabilities of all variables can be found in Table 1. As can be seen, HEX-HH was associated with more prosocial allocations in the SVO measure ( $r = .37$ , 95% CI [.13, .64]), yielding a medium to large effect size (Cohen, 1988) in line with the hypotheses. Furthermore, the correlations in Table 1 show that HEX-AG was not related to prosocial behavior, or only very weakly so. To statistically test this pattern (which comprises a null hypothesis), we followed a three-

step analytical approach (cf. Hilbig, Zettler, Leist, & Heydasch, 2013): First, we computed the Bayesian posterior probability of the hypothesis that there is a correlation given the data, using the Bayesian information criterion approximation for  $R^2$  (Raftery, 1995, Equation 26; Wagenmakers, 2007) and assuming uniform priors. The Bayesian posterior probability of a correlation between HEX-HH and prosocial behavior was  $p(H|D) = .92$ , whereas the corresponding posterior probability of a correlation between HEX-AG and prosocial behavior was  $p(H|D) = .15$ , thus implying evidence for the null hypothesis. Second, we directly compared the two correlation coefficients (using a Z-test for correlated correlation coefficients; Meng, Rosenthal, & Rubin, 1992) and found that the correlation between HEX-HH and prosocial behavior was marginally larger than the correlation between HEX-AG and said criterion ( $Z = 1.62$ ,  $p = .054$ ). Finally, we regressed prosocial behavior on both HEX-HH and HEX-AG and found that HEX-HH predicted unique variance ( $\beta = .36$ ,  $p < .01$ ), whereas HEX-AG did not ( $\beta = .06$ ,  $p = .63$ ). As all these results consistently imply, HEX-HH but not HEX-AG predicted prosocial behavior. Indeed, HEX-HH predicted unique variance in prosocial behavior beyond all the remaining HEXACO factors ( $\beta_{HH} = .38$ ,  $p < .01$ ), none of which predicted unique variance (all  $\beta \leq .19$ , all  $p \geq .17$ ).

Finally, we tested the hypothesis that primarily the HEX-HH facets fairness and greed avoidance should be linked to prosocial behavior. Table 2 reports descriptives along with the association between each of the four HEX-HH-facets and prosocial behavior. In terms of simple bivariate correlations, it was confirmed that fairness and greed avoidance were significantly associated with prosocial behavior, yielding medium-sized effects. When regressing prosocial behavior on all four facets concurrently, we found that, strictly speaking, only fairness explained unique variance, though the regression weight of greed avoidance only marginally failed to reach a conventional level of statistical significance ( $p = .07$ ). Thus, the hypothesis was fully supported with regard to fairness, and at least marginally so with regard to greed avoidance. As was also expected, the remaining HEX-HH facets, sincerity and modesty, did not predict unique variance in this criterion whatsoever.

Overall, the study confirmed that the HEX-HH factor of the HEXACO model predicts prosocial behavior, whereas HEX-AG does not. Also, the facets of the HEX-HH factor that most strongly related to prosocial behavior were fairness and greed avoidance. Both insights, in turn, bear important implications for why prior research found only small and inconsistent effects of FFM-AG on behavior in economic games: First, FFM-AG overlaps more with HEX-AG (than with HEX-HH) and thus with the HEXACO factor unrelated to prosocial behavior. Second, those aspects actually linking FFM-AG to HEX-HH, modesty and straightforwardness, are exactly the ones that do not account for variance in prosocial behavior—whereas those HEX-HH facets that are not well subsumed in FFM-AG, fairness and greed avoidance, do.

However, before testing these implications more directly, we addressed a caveat of Study 1a. Specifically, one may argue that assessing prosocial behavior via the Internet renders the situation a rather impersonal one. That is, although the task itself clearly involves social interaction—since one's choices determine one's

<sup>2</sup> Here and in the following,  $\beta$  refers to standardized regression weights.

Table 3  
Means (Standard Deviations) and Bivariate Correlations of All Variables With Internal Consistency Reliabilities (Cronbach's Alpha) in the Diagonal (Study 1b)

Variable	M (SD)	1	2	3	4	5	6
1. Honesty-Humility	3.17 (.62)	.81					
2. Emotionality	2.95 (.60)	.10	.83				
3. Extraversion	3.38 (.59)	-.34*	.11	.85			
4. Agreeableness	2.90 (.42)	.24	-.09	.02	.62		
5. Conscientiousness	3.20 (.56)	.04	.12	.19	-.03	.80	
6. Openness	3.43 (.66)	.04	.16	.54**	.08	.27†	.85
SVO <sup>a</sup>	23.1 (13.9)	.34*	.18	-.06	.01	.06	.03

Note. SVO = social value orientation.

<sup>a</sup> The SVO measure is computed as the inverse tangent of the ratio between the mean allocation to oneself and the other (Murphy et al., 2011); larger values indicate a more prosocial orientation.

†  $p < .10$ . \*  $p < .05$ . \*\*  $p < .01$  (all two-sided);  $N = 37$ .

own and another individual's payoffs—other individuals were absent from the situation. As such, it seemed prudent to test whether the above findings replicate if prosocial behavior is assessed in a lab-based setting with relevant others present. To this end we reanalyzed a data set from Fiedler et al. (2013), the results of which are briefly summarized in the following.

### Study 1b

#### Participants and Procedure

Although their experiment was concerned with information processing—as measured via eye-tracking—in social dilemmas, Fiedler et al. (2013, Experiment 1) also assessed self-reports on the same 104-item HEXACO-PI-R, though they did not report any of the corresponding data. More important, they also collected SVO data using the same slider measure as in our Study 1a, though in their case in the lab. Thus, relevant others were, in principle, present in the decision situation. Again, the SVO task was incentivized such that choices determined one's own and another participant's payoffs. The sample consisted of  $N = 38$  individuals, recruited from the same participant pool as our Study 1a. For

details on the sample and procedures, see Fiedler et al. (2013, Experiment 1).

#### Results and Discussion

Table 3 shows a summary of descriptive statistics, correlations, and reliabilities of all variables. Again, HEX-HH was associated with more prosocial allocations in the SVO with almost exactly the same effect size as in Study 1a, albeit comprising a larger confidence interval due to the smaller sample size ( $r = .34$ , 95% CI [.02, .69]). Also, there was once more little to no evidence for an association between HEX-AG and prosocial behavior,  $r = .01$ ,  $p(\text{HID}) = .14$ . The two correlation coefficients (HEX-HH with SVO vs. HEX-AG with SVO) again differed with marginal statistical significance ( $Z = 1.60$ ,  $p = .055$ ) and regressing prosocial behavior on both HEX-HH and HEX-AG concurrently showed that HEX-HH predicted unique variance ( $\beta = .36$ ,  $p < .05$ ), whereas HEX-AG did not ( $\beta = .09$ ,  $p = .60$ ). Once again, HEX-HH predicted unique variance in prosocial behavior beyond all the remaining HEXACO factors ( $\beta_{\text{HH}} = .37$ ,  $p < .05$ , one-sided), none of which accounted for unique variance (all  $\beta \leq .13$ , all  $p \geq .45$ ).

Finally, Table 4 reports descriptives along with the association between each of the four HEX-HH-facets and prosocial behavior. As can be seen, the pattern found in Study 1a was almost perfectly replicated: Fairness was most strongly associated with prosocial behavior and was indeed the only facet to explain unique variance in a multiple regression. Greed avoidance also showed a bivariate effect size comparable to the one found in Study 1a. However, this effect failed to reach a conventional level of statistical significance due to the small sample size. Also, in a multiple regression, greed avoidance did not predict unique variance in prosocial behavior. Exactly as in Study 1a, the facets modesty and sincerity did not contribute to the prediction of prosocial behavior.

In summary, the current reanalysis almost perfectly replicated the patterns observed in Study 1a, despite assessing prosocial behavior in the lab (rather than the Web). Indeed, effect sizes were highly similar to those reported above, albeit accompanied by inherently larger confidence intervals due to the small sample size. Taken together, the results of Study 1a and this reanalysis are well aligned with the hypotheses derived from the HEXACO model: HEX-HH but not HEX-AG predicted prosocial behavior and, more

Table 4  
Means (Standard Deviations), Internal Consistency Reliabilities (Cronbach's Alpha), and Association With Prosocial Behavior of the Four HEX-HH Facet Scales (Study 1b)

Facet scales	M (SD)	Reliability	Association with prosocial behavior	
			Bivariate correlation	Regression weight <sup>a</sup>
1. Fairness	3.12 (.93)	.71	.41*	.37*
2. Greed avoidance	2.99 (.97)	.84	.25	.08
3. Modesty	3.41 (.79)	.71	.16	.01
4. Sincerity	3.18 (.80)	.67	.11	-.03

Note. HEX-HH = HEXACO Honesty-Humility; SVO = social value orientation.

<sup>a</sup> Standardized coefficients from a regression of prosocial behavior (SVO measure) on the four HEX-HH facets.

\*  $p < .05$  (all two-sided);  $N = 37$ .

Table 5

*Means (Standard Deviations) and Bivariate Correlations of All Variables With Internal Consistency Reliabilities (Cronbach's Alpha) in the Diagonal (Study 2)*

Variable	<i>M (SD)</i>	1	2	3	4	5	6	7	8	9	10	11
1. HEXACO Honesty-Humility	3.37 (.67)	.80										
2. HEXACO Emotionality	3.10 (.65)	.25*	.82									
3. HEXACO Extraversion	3.57 (.57)	.03	.01	.79								
4. HEXACO Agreeableness	3.11 (.57)	.17	-.12	.10	.77							
5. HEXACO Conscientiousness	3.40 (.54)	.16	.12	.01	-.13	.74						
6. HEXACO Openness	3.65 (.54)	.12	.00	.20	.19	.14	.69					
7. NEO Openness	3.61 (.49)	-.05	-.10	.22*	.18	.05	.67***	.69				
8. NEO Conscientiousness	3.56 (.51)	.01	.05	.27*	-.03	.70***	.12	.07	.80			
9. NEO Extraversion	3.44 (.49)	-.05	.19	.75***	.18	-.05	.09	.08	.21	.75		
10. NEO Agreeableness	3.66 (.53)	.38***	.30**	.36***	.63***	.02	.23*	.26*	.10	.45***	.79	
11. NEO Neuroticism	2.68 (.64)	.03	.43***	-.58***	-.24*	-.12	-.09	-.18	-.32**	-.40***	-.18	.86
SVO <sup>a</sup>	22.3 (14.5)	.36***	-.05	.01	.19	.14	.20	.18	-.02	-.03	.31**	-.06

*Note.* SVO = social value orientation.

<sup>a</sup> The SVO measure is computed as the inverse tangent of the ratio between the mean allocation to oneself and the other (Murphy et al., 2011); larger values indicate a more prosocial orientation.

\*  $p < .05$ . \*\*  $p < .01$ . \*\*\*  $p < .001$  (all two-sided);  $N = 80$ .

interestingly, those facets of HEX-HH that primarily drove this association were the ones less subsumed in the more classical five-factor conceptualization of Agreeableness—thereby potentially explaining why FFM-AG has been linked to prosocial behavior only inconsistently.

To go beyond this indirect reasoning, it seemed necessary to compare the different personality factors more directly in terms of their association with prosocial behavior. In particular, any conclusion about FFM-AG requires assessment of the five classic personality factors via a corresponding five-factor inventory (Costa & McCrae, 2009). So, in another study, we aimed for a more direct comparison of HEX-HH, HEX-AG, and FFM-AG. In addition, we sought to implement larger monetary incentives so as to ensure that the findings are not limited to situations in which relatively little is at stake.

## Study 2

### Participants and Procedure

As in Study 1a, participants completed a Web-based study.<sup>3</sup> A total of 80 participants (56% female, aged 19 to 56 years,  $M = 24.3$  years,  $SD = 5.2$  years) were once again recruited from the Max-Planck Institute Decision Lab participant pool using ORSEE (Greiner, 2004). The sample size was chosen to provide excellent statistical power ( $1 - \beta = .95$ ) to replicate the effect of HEX-HH ( $r = .37$ ) observed in Study 1a (Faul, Erdfelder, Buchner, & Lang, 2009).

After providing informed consent, participants completed the German version (Moshagen, Hilbig, & Zettler, in press) of the 60-item HEXACO Personality Inventory Revised (Ashton & Lee, 2009). This shorter version was used because it provides a more economic measure of the six HEXACO factors, which seemed important, given that participants additionally completed an inventory to measure the five classic personality factors. Specifically, they responded to the German 60-item NEO Five-Factor Inventory (Borkenau & Ostendorf, 1994), which assesses the classic five personality factors (Costa & McCrae, 1992) with 12 items each.

Furthermore, participants completed the same measure of SVO as used in both previous studies (Murphy et al., 2011) to assess prosocial behavior. However, we increased the incentives by two thirds (exchange rate: 1 point = €0.05; maximum payoff €10.00, approximately \$13.60). To avoid specific carry-over effects, the order of all measures was counterbalanced across participants.

## Results and Discussion

Descriptive statistics, correlations, and reliabilities of all variables can be found in Table 5. As can be seen, the main pattern of results found in Studies 1a and 1b was again replicated: First off, HEX-HH was associated with prosocial behavior as indicated by SVO ( $r = .36$ , 95% CI [.15, .60]), again yielding a medium to large effect size (Cohen, 1988). Correspondingly, the Bayesian posterior probability of a correlation between HEX-HH and prosocial behavior was  $p(H|D) = .97$ , thus implying strong evidence (Wagenmakers, 2007). Although, unlike in the previous studies, HEX-AG also showed a small association with prosocial behavior, the correlation coefficient was statistically nonsignificant and its confidence interval included zero ( $r = .19$ , 95% CI [-.03, .42]). Also, the posterior probability of a correlation between HEX-AG and prosocial behavior was  $p(H|D) = .33$ , thus implying evidence for the null hypothesis. A Z-test for correlated correlation coefficients (Meng et al., 1992) again confirmed that the correlation between HEX-HH and prosocial behavior was stronger than the one between HEX-AG and said criterion, though failing to reach a conventional level of statistical significance ( $Z = 1.2$ ,  $p = .11$ ). Nonetheless when regressing prosocial behavior on both HEX-HH and HEX-AG, we found that HEX-HH predicted unique variance ( $\beta = .34$ ,  $p < .01$ ), whereas HEX-AG did not ( $\beta = .13$ ,  $p = .24$ ). In summary, the current results largely replicate those of Study

<sup>3</sup> For reasons of efficiency, the study was again run in combination with an unrelated study investigating the description experience gap in risky choice (e.g., Hertwig & Erev, 2009) with additional personality measures and a lab session, all of which were conducted after recording the measures reported on in this article.



Table 6  
Standardized Regression Coefficients (Study 2) Predicting  
Prosocial Behavior (SVO)

Variable	Set of predictors		
	HEXACO	Five-factor model	Five-factor model + HEX-HH
Honesty-Humility	.35**		.28*
Emotionality/Neuroticism	-.13	-.07	-.07
Extraversion	-.04	-.22 <sup>†</sup>	-.14
Agreeableness	.10	.38**	.22
Conscientiousness	.09	-.04	-.05
Openness	.13	.09	.13
Total $R^2_{adj}$	.12	.09	.14

Note. HEX-HH = HEXACO Honesty-Humility; SVO = social value orientation.

<sup>†</sup>  $p < .10$ . \*  $p < .05$ . \*\*  $p < .01$  (all two-sided);  $N = 80$ .

1a and 1b, implying that HEX-HH but not HEX-AG accounts for prosocial behavior.

To compare the effects of the different personality factors—as conceptualized within the HEXACO and the five-factor framework—we regressed prosocial behavior on (a) all HEXACO factors, (b) all classical five factors (as assessed via the NEO-FFI), and (c) all classical five factors and HEX-HH as well. The results are reported in Table 6, which shows that, of the HEXACO factors, only HEX-HH accounted for unique variance in prosocial behavior. Similarly, of the classic five factors, only FFM-AG predicted unique variance in this criterion, although the coefficient for Extraversion was also marginally significant. Finally, adding HEX-HH to the classic five factors showed that only HEX-HH was a significant predictor of prosocial behavior. Interestingly, the coefficients for HEX-HH (among the other five HEXACO variables) and for FFM-AG (among the remaining four FFM variables) were quite comparable, as was the proportion of explained variance in total (see final row of Table 6). Nonetheless, regressing prosocial behavior only on HEX-HH, HEX-AG, and FFM-AG revealed that HEX-HH was the strongest and only significant predictor ( $\beta = .29, p < .05$ ), followed by FFM-AG ( $\beta = .19, p = .18$ ), whereas HEX-AG had no contribution whatsoever ( $\beta = .02, p = .92$ ).

To better understand the above associations, we used mediation analyses (using the approach and macros provided by Preacher & Hayes, 2004), followed up by item-level analyses. First, in terms of mediation, we found that HEX-HH mediated the relationship between FFM-AG and prosocial behavior: Whereas FFM-AG predicted prosocial behavior ( $\beta = .31, p < .01$ ) in isolation, this relationship was only marginally significant ( $\beta = .20, p = .08$ ) when controlling for HEX-HH; the corresponding indirect effect of FFM-AG on prosocial behavior via HEX-HH was significant ( $z = 2.0, p < .05$ ). However, FFM-AG did not mediate the relationship between HEX-HH and prosocial behavior ( $z = 1.6, p = .12$ ). These findings further indicate that those aspects linking FFM-AG to prosocial behavior are indeed covered by HEX-HH, whereas the opposite cannot be concluded.

Additional item-level analyses<sup>4</sup> confirmed this impression: First, we related each of the 12 FFM-AG items to prosocial behavior and then to HEX-HH and HEX-AG, respectively. Four out of the 12 FFM-AG items correlated significantly (one-sided) with prosocial behavior, namely, Items 1, 2, 4, and 12, with  $r =$

.20,  $r = .28$ ,  $r = .39$ , and  $r = .22$ , respectively. Thus, we constructed two ad hoc FFM-AG subscales—one from these four items related to prosocial behavior ( $\alpha = .56$ , correlation with SVO  $r = .41, p < .01$ ) and the other from the remaining items ( $\alpha = .74$ , correlation with SVO  $r = .22, p = .05$ ). In line with the previous findings, the former subscale was more strongly associated with HEX-HH ( $r = .50, p < .01$ ) than the latter ( $r = .26, p < .05$ ) and the difference between these dependent coefficients was significant ( $z = 2.7, p < .01$ ). In turn, the latter subscale was more strongly associated with HEX-AG ( $r = .62, p < .01$ ) than the former ( $r = .49, p < .05$ ), again yielding a significant difference ( $z = 1.7, p < .05$ ). In summary, FFM-AG indeed relates to HEX-HH and, more strongly so, to HEX-AG. However, those aspects of FFM-AG that are predictive of prosocial behavior are the ones well covered by HEX-HH, but not vice versa. Indeed, only HEX-HH contributes uniquely to explaining prosocial behavior—when controlling for HEX-AG, FFM-AG, or both.

## General Discussion

On the aggregate level, people's behavior is incompatible with the selfishness assumption of standard economic theory (Colman, 2003), but a closer look reveals that there are substantial individual differences in this regard—with some individuals conforming to (mostly selfish) individual utility maximization and others acting prosocially (Fischbacher et al., 2001; Lönnqvist et al., 2011). As a consequence, the past decade has seen an upsurge of interest in factors that may account for this variability in selfishness versus prosocial behavior, with an increasing number of investigations at the intersection between personality psychology and behavioral economics (e.g., Ferguson et al., 2011). From the perspective of basic traits, Agreeableness—as conceptualized in the widely accepted five-factor model (Costa & McCrae, 2009)—has typically been considered the most promising candidate trait to account for prosocial behavior. Indeed, FFM-AG is related to various kinds of social outcomes and thus is a plausible determinant of behavior in the *Drosophila* environment of prosociality: Economic games and social dilemmas.

However, studies investigating the role of FFM-AG—and other traits within the five-factor model—in corresponding paradigms have produced rather mixed findings. Arguably, this may be due to the fact that only some aspects of this broad basic factor actually relate to active prosociality in the sense of cooperating in social dilemmas or sharing in distributional decisions. To this effect, the

<sup>4</sup> On the level of single items, there were only rather weak indications in terms of content wise item overlap between FFM-AG items, HEX-HH items, and HEX-AG items. That is, three out of the 12 FFM-AG items showed some similarity to HEX-AG or HEX-HH items, but even these were clearly not identical. Nonetheless, to check for empirical item overlap we compared all bivariate correlation between FFM-AG items and the items of HEX-AG and HEX-HH, respectively. Crossing all FFM-AG items with all HEX-AG items, there were only three (out of  $12 \times 10 = 120$ ) coefficients that were marginally above  $|r| = .50$ . That is, for the vast majority of bivariate relationships, less than 25% of the variance of one item could be accounted for by the respective other. The median across all (absolute) correlation coefficients was .21. Furthermore, all possible correlations between FFM-AG items and HEX-HH items (again,  $12 \times 10 = 120$ ) were below  $|r| = .50$ , and the median of all these coefficients was merely .12. Thus, empirical overlap on the single-item level was very weak.

HEXACO model of personality (Ashton & Lee, 2007) provides a possible explanation: In essence, the HEXACO distinguishes an Honesty-Humility (HEX-HH) factor from Agreeableness (HEX-AG), with the former denoting active cooperativeness (nonexploitation) and the latter referring to reactive aspects. Importantly, FFM-AG comprises some aspects of HEX-HH (primarily modesty and straightforwardness), but the latter also has some unique aspects (in particular, fairness and greed avoidance; Ashton & Lee, 2005, 2008), which may essentially be more impactful for prosocial behavior. Also, FFM-AG is more strongly related to HEX-AG than to HEX-HH, but prior research shows that HEX-HH is much more strongly related to prosocial behavior than HEX-AG (for a brief overview, see Hilbig, Zettler, Leist, & Heydasch, 2013).

Despite the promising findings on HEX-HH, however, all extant conclusions have so far been based on associations between HEX-HH-scores and responses to questionnaires or in hypothetical scenarios. In turn, criteria may, to some unknown degree, be driven by social desirability biases, e.g., such that (some) individuals—and arguably those with higher self-reported HEX-HH-scores—claim to be more cooperative or prosocial in a hypothetical scenario. To overcome this limitation, it must be tested whether HEX-HH—and which aspects of this factor—can predict consequential rather than hypothetical prosocial behavior, that is, with monetary incentives and real interaction between individuals. This is the methodological standard in behavioral economics and related disciplines (Hertwig & Ortmann, 2001) with the idea of fostering “a connection to real life” (Lönqvist et al., 2011, p. 303) through ensuring that participants’ behavior is indeed consequential.

Herein, we tested a set of hypotheses pertaining to the HEX-HH factor, its facets, and the difference between HEX-HH and HEX-AG. From these, we then derived further predictions concerning FFM-AG. All were tested using a fully incentivized measure of SVO (Murphy et al., 2011) as the criterion—thus assessing selfish versus prosocial behavior. Importantly, participants made distributional decisions that affected their own payoffs and the payoffs of a real (yet unknown) other person. We found that, as expected, HEX-HH was positively related to more prosocial behavior and thus the willingness to forgo individual payoffs for the sake of joint outcome maximization or to increase others’ outcomes. Effect sizes were substantial and very well in line with prior findings on the link between HEX-HH and SVO (Hilbig & Zettler, 2009; Hilbig, Zettler, Moshagen, & Heydasch, 2013), though in this case with actual monetary incentives and, possibly more important, real interaction partners. Due to the nature of the SVO measure used, it can be concluded that individuals low in HEX-HH tended to weigh their own outcomes much more strongly than the outcomes of others (which is equivalent to selfishness), whereas their counterparts high in HEX-HH assigned less weight to their own and/or more weight to others’ outcomes. By contrast, HEX-AG did not play any noteworthy role for prosocial behavior. More fine-grained analyses on the level of HEX-HH facets further revealed that (primarily) fairness and (less so) greed avoidance accounted for the association with prosocial behavior, whereas no noteworthy links were found for the HEX-HH facets modesty and sincerity. Given the definitions of these facets (Ashton & Lee, 2007; Lee & Ashton, 2006), this is a plausible finding—and indeed the first to link specific facets of HEX-HH to cooperativeness.

As reasoned above, the results may also explain why FFM-AG was previously linked to prosocial behavior only inconsistently: First FFM-AG is more related to HEX-AG (which does not account for prosocial behavior) than to HEX-HH (which does). Also, FFM-AG and HEX-HH primarily share those aspects that were not predictive of prosocial behavior in the current studies, whereas those aspects that are more unique to HEX-HH (Ashton & Lee, 2005, 2008) accounted for prosocial behavior. Of course, the results also indicate that HEX-HH—much like any basic personality dimension—covers a broad array of aspects, only some of which relate to selfish versus prosocial behavior (similarly, Hirsh & Peterson, 2009, reported that only specific aspects of five-factor Neuroticism and Extraversion predicted cooperation).

Consequently, we further compared the HEXACO factors and the classic five factors (as assessed via a corresponding inventory) more directly. In line with the findings and reasoning above, both HEX-HH and FFM-AG were predictive of prosocial behavior. However, multiple regressions and mediation analyses—complemented by item-level tests—revealed that the contribution of FFM-AG to explaining prosocial behavior is well-covered by HEX-HH, but not vice versa. Again, these findings signal that the inconsistency of prior findings with regard to FFM-AG are not due to the fact that this dimension cannot account for prosocial behavior (as it theoretically should, Denissen & Penke, 2008). Rather, as with any broad personality factor, only some aspects of FFM-AG drive prosocial behavior. However, the results also indicate that there are other individual difference aspects—somewhat outside the scope of FFM-AG—that impact prosocial behavior. All these aspects—those within and those beyond FFM-AG—are well-covered by the HEXACO factor HEX-HH.

Furthermore, results confirmed that HEX-AG, in contrast to HEX-HH (and FFM-AG), did not predict prosocial behavior. And indeed, in terms of the HEXACO model, HEX-AG should not be predictive: In contrast to HEX-HH, HEX-AG is assumed to cover reactive aspects of prosociality, such as forgiveness and patience (Ashton & Lee, 2007; Hilbig, Zettler, Leist, & Heydasch, 2013) and thus whether individuals seek revenge and retaliate in the face of unfair treatment by others (Lee & Ashton, 2012; Shepherd & Belicki, 2008; Sheppard & Boon, 2012). In other words, HEX-HH represents nonexploitation and thus the tendency to actively cooperate with others, whereas HEX-AG represents nonretaliation and thus the willingness to uphold or repair cooperation after suffering some degree of exploitation. Since the current SVO measure—like many other paradigms—is a pure indicator of active cooperation (one can exploit another to maximize one’s profits) without any reactive aspects (no prior interaction with the other), the findings are indeed conceptually aligned with the HEXACO model and thus support the notion that the two factors should not be subsumed in one single broad dimension.

Before summary conclusions are drawn, at least two limitations of the current studies deserve attention. First, prosocial behavior was measured in a manner preserving anonymity. To critically test whether personality accounts for prosocial behavior beyond effects of socially desirable responding (Moshagen et al., 2011) such an anonymous setup is vital and indeed the standard in behavioral economics (Hertwig & Ortmann, 2001). However, in consequence, the situation was mostly void of interpersonal contact—although participants’ distributional decisions were consequential for their own and another’s payoffs. In turn, the degree of social contact



may well influence prosociality and, more important, the effect of certain personality traits. Second, the sample sizes of the current studies varied somewhat and some were not particularly large by common standards in personality research. Nonetheless, it should also be noted that effect sizes replicated almost perfectly across the three studies. Also, the additional approximation of Bayesian posteriors does not involve the traditional problem of insufficient power to accept the null hypothesis in case of small samples (Rouder, Speckman, Sun, Morey, & Iverson, 2009; Wagenmakers, 2007). Although we thus consider it unlikely that the conclusions are biased due to the sample sizes of the current studies, a more careful interpretation might be that the effect of HEX-AG on prosocial behavior is, at best, small, and clearly smaller than the effect of HEX-HH.

### Conclusions

In comparing the five-factor model and the HEXACO, a balanced conclusion may be that the HEXACO model provides a more fine-grained measure of different, complementary aspects of cooperativeness and prosociality. This is not meant to imply that the five classic personality factors cannot account for prosocial behavior. On the contrary, our results in Study 2 confirm that FFM-AG is associated with this criterion. Rather, we propose that those aspects linking FFM-AG to prosocial behavior—and indeed, some individual difference aspects explaining prosocial behavior that are beyond FFM-AG—are covered by HEX-HH. In turn, FFM-AG entails content not covered by HEX-HH but rather by HEX-AG and other factors (Ashton & Lee, 2008; Lee & Ashton, 2013)—which are unrelated to active prosocial behavior. In consequence, FFM-AG (which essentially subsumes elements of HEX-HH, HEX-AG, and other aspects; cf. Ashton et al., 2013; McCrae & Costa, 2008) may have been linked to cooperation and prosocial behavior only inconsistently because it subsumes active and reactive tendencies.

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