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The primacy of trust within romantic relationships: Evidence from conjoint analysis of HEXACO-derived personality profiles

Justin K. Mogilski[a,*], Jennifer Vrabel[b], Virginia E. Mitchell[b], Lisa L.M. Welling[b]

[a] Department of Psychology, University of South Carolina Salkehatchie, 807 Hampton Street, Walterboro, SC 29488, USA
[b] Department of Psychology, Oakland University, Pryale Hall, 654 Pioneer Drive, Rochester, MI 48309, USA

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ABSTRACT

Mate preference research often focuses on traits that indicate a romantic partner's personal worth (e.g., their physical attractiveness, resource potential) rather than their tendency to leverage that worth for mutual vs. zero-sum benefit (i.e., their trustworthiness). No one has assessed the contribution of trustworthiness to perceived mate value *relative* to other personality dimensions. Here we examined the desirability of a partner's trustworthiness relative to five other personality indicators of mate quality during initial partner selection. Participants (n = 918) ranked multivariate partner profiles constructed from the HEXACO model of personality (i.e., honesty-humility, emotionality, extraversion, agreeableness, conscientiousness, and openness to experience) and provided partner ratings for each trait. Using conjoint analysis, we found that honesty-humility influenced participants' ranking decisions substantially more than each other characteristic (all Cohen's ds > 0.62). This was true for both long- (i.e., committed) and short-term (i.e., purely sexual) partner evaluations, though honesty-humility was relatively more important for long- vs. short-term contexts. There were no sex differences. A different pattern, including sex differences, emerged for partner ratings. Based on these findings, we hypothesize that the challenge of avoiding romantic interpersonal predation may have been a relatively stronger selection pressure during the evolution of human mate preference than has the challenge of identifying other valuable partner traits.

1. Introduction

Romantic relationships are partnerships to support and achieve in-pair cooperative goals (e.g., reproduction and child care, sexual and emotional fulfillment, accumulation of resources and prestige). Like platonic relationships, these partnerships are vulnerable to subterfuge (Jonason, Lyons, Baughman, & Vernon, 2014), inequitable relationship investment (Sela, Mogilski, Shackelford, Zeigler-Hill, & Fink, 2017; Sprecher, Schmeeckle, & Felmlee, 2006), cost-infliction (Buss & Duntley, 2014), and other zero-sum behaviors and practices (e.g., Burleigh, Rubel, & Meegan, 2017; Crocker, Canevello, & Lewis, 2017; Wong, Klann, Bijelić, & Aguayo, 2017), wherein one partner invests more effort into shared goals than the other. For example, divestment from child care allows a parent to pursue self-enhancement (e.g., career development, romantic courtship, more leisure time), but may impact offspring survival and impose a burden on the other parent, the child's family, or non-kin support networks (e.g., step-parents, public child support services). Likewise, romantic partners rely on one another for sex, emotional support, and other benefits (e.g., shared finances, access to novel social groups, strategic collusion) that can become inequitably distributed among partners or otherwise exploited.

Identifying when an individual is likely to transgress a relationship agreement or otherwise parasitize a partner's investments would have been a recurrent adaptive problem for which humans likely evolved heuristics for disambiguating earnestly cooperative partners from dishonest ones. Ancestrally, mating with an untrustworthy partner may have introduced detriments to fitness, such as an increased likelihood of cuckoldry or relationship defection. Research suggests that individuals infer trustworthiness from nonverbal cues, such as vocal characteristics (Oleszkiewicz, Pisanski, Lachowicz-Tabaczek, & Sorokowska, 2017; Tsankova et al., 2015), facial appearance (Klapper, Dotsch, van Rooij, & Wigboldus, 2016; Stirrat & Perrett, 2010; Todorov, 2008; Todorov & Duchaine, 2008; Wilson & Rule, 2015; though also see Wilson & Rule, 2017), and brief social interactions (Lu, Kong, Ferrin, & Dirks, 2017). The accuracy of these inferences is equivocal (see Todorov, Olivola, Dotsch, & Mende-Siedlecki, 2015 for a review and critique) as judgments of trustworthiness may be indirectly inferred from other qualities or subjective impressions (Rule, Krendl, Ivcevic, & Ambady, 2013). For

* Corresponding author.
E-mail address: jmogilsk@mailbox.sc.edu (J.K. Mogilski).

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example, accurately inferring a person's honesty can be impaired by cues that people learn to associate with trustworthiness (e.g., professional clothing), but which do not reliably indicate dispositional trustworthiness (Bonnefon, Hopfensitz, & De Neys, 2013). Nevertheless people make quick assessments of others' honesty and place a great deal of importance on this trait within a potential romantic partner (Cottrell, Neuberg, & Li, 2007). People weigh a partner's history of sexual fidelity − a proxy for relationship trustworthiness − as more important than other desirable traits (i.e., financial stability, physical attractiveness, emotional investment, and similarity to self) when ranking hypothetical partner profiles that vary in these attributes (Mogilski, Wade, & Welling, 2014). This suggests that humans have evolved systems for screening partners who will maximize the benefit of pooled relationship resources and avoiding those who would exploit these resources, particularly within long-term relationships (Conroy-Beam, Goetz, & Buss, 2015). It is therefore reasonable to suppose that humans may preferentially choose mates who possess traits that signal trustworthiness and willingness to invest compared to other personality traits.

Researchers have developed inventories such as the PID-5 (Krueger, Derringer, Markon, Watson, & Skodol, 2012) and the HEXACO (Ashton & Lee, 2009), and measures of the Dark Tetrad (Paulhus, 2014) which assess a common latent variable (see Hodson et al., 2018) that reliably predicts the tendency to engage in unethical decision-making (e.g., cheating, lying; Roeser et al., 2016). The honesty-humility domain of the HEXACO, in particular, models an individual's willingness to exploit others for personal gain and does so alongside five other interpersonally relevant domains of personality: emotionality, extraversion, agreeableness, conscientiousness, and openness to experience. These qualities are consequential to the formation, maintenance, and dissolution of romantic relationships (Brunell et al., 2010; Holden, Zeigler-Hill, Pham, & Shackelford, 2014; Kashdan et al., 2018; Wurst et al., 2017), and may afford situational advantages within a romantic relationship (see De Vries, Tybur, Pollet, & van Vugt, 2016; Lukaszewski, Gurven, von Rueden, & Schmitt, 2017). For instance, honest individuals (i.e., those who score higher on honesty-humility) are more likely to cooperate in the absence of punishment (Hilbig, Zettler, & Heydasch, 2012; also see Zhao & Smillie, 2015), are less likely to defect in prisoner dilemma games when the risk of defection has been lowered and the benefits of defecting are more tempting (Zettler, Hilbig, & Heydasch, 2013), use fewer cost-inflicting mate retention strategies (Holden et al., 2014), and are less likely to have committed romantic or sexual infidelity (Hilbig, Moshagen, & Zettler, 2015). Identifying and preferring an honest partner may decrease the chance of partner defection, thereby permitting more stable cooperation within romantic relationships (see Barclay, 2016; Conroy-Beam et al., 2015).

1.1. Measuring personality preference

Prior research has asked participants to rate the attractiveness of personality features independently (e.g., Botwin, Buss, & Shackelford, 1997), by evaluating unidimensional partner profiles (e.g., Carter, Campbell, & Muncer, 2014; Jonason, Lyons, & Blanchard, 2015; Rauthmann & Kolar, 2013), by selecting speed dating partners (Jauk et al., 2016), or by controlling for variation in other partner attributes (e.g., Fletcher, Tither, O'Loughlin, Friesen, & Overall, 2004). These designs document how people evaluate the attractiveness of traits independently, but do not assess their relative value within the constellation of cues that people use to evaluate partner quality (see Conroy-Beam, 2018; Mogilski et al., 2014). Naturally, partner traits are evaluated alongside variation in other partner traits, and people consider certain traits relative to others (i.e., make trade-offs) when assessing romantic partners, yet researchers have dedicated less effort to comparing the *relative* worth of partner trustworthiness compared to other personality dimensions.

Studies that account for this dimension of mate choice find that participants attempt to secure more valuable traits when choice is restricted. For example, using a budget allocation method wherein participants build potential romantic partners by assigning points to several different potential traits (see Li, Bailey, Kenrick, & Linsenmeier, 2002), Perilloux and Cloud (2019) found that men allocate more points to bodily (versus facial) traits when evaluating a short-term mate, but only when given a low point budget (i.e., when choice was restricted). Likewise, Cottrell et al. (2007) asked participants to design partners for several types of relationships (e.g., romantic, familial, work) and found that trustworthiness was prioritized across all relationship contexts. Furthermore, Conroy-Beam and Buss (2017) found that models that use partner profiles to predict mate preference outperform ideal preference models in discriminating short- and long-term partner attraction.

Here, to examine the relative contributions of trustworthiness and other personality traits to perceptions of attractiveness, we use conjoint analysis. Conjoint analysis (CA) is an analytic tool used primarily in consumer science (see Gustafsson, Herrmann, & Huber, 2007) to assess how consumers evaluate multi-attribute products. For example, automotive researchers may ask people to rank order a list of cars that each possess a unique combination of product features (e.g., gas mileage, price, and horsepower). CA can be performed on these data to reveal which attributes are most influential to purchasing decisions. Although all features may be attractive, it may not be possible, cost-effective, or practical to include all features in a given product, and so researchers use conjoint analysis to investigate how traits are ranked relative to each other when evaluated holistically (e.g., whether gas mileage and price are relatively more important than horsepower).

This logic can be extended to the mating market. In the first study to pioneer this technique in mate preference research, Mogilski et al. (2014) designed partner profiles that varied in quality (i.e., high, medium, and low) across five traits (i.e., physical attractiveness, financial stability, history of sexual infidelity, emotional investment, and similarity) and had participants rank these profiles by their desirability in a potential long- and short-term mate. CA revealed that a partner's history of sexual infidelity was substantially more important (all Cohen's $ds > 0.47$) than each other characteristic, particularly for a long-term relationship. Similarly, Mogilski and Welling (2017) presented participants with 2D photos of potential romantic partners whose faces were digitally manipulated to appear high, low, or unaltered on facial masculinity, bilateral symmetry, and skin color cues to health. CA revealed that participants' attractiveness ranking decisions were more heavily influenced by sexually dimorphic shape cues, which predict competitive and antagonistic personality features (see Bird et al., 2016; Carré & McCormick, 2008; Carré, McCormick, & Mondloch, 2009; Sanchez-Pages, Rodriguez-Ruiz, & Turiegano, 2014), than cues of developmental stability (i.e., symmetry) and current health (i.e., skin coloration; see Henderson, Holzleitner, Talamas, & Perrett, 2016; Jones, 2018; Little, 2014).

Similar designs, such as the budget allocation method (Cottrell et al., 2007; Li et al., 2002; Perilloux & Cloud, 2019), model how raters prioritize partner traits when choice is constrained (e.g., when given a low vs. high mating budget). However, a major limitation of this method, is that it lacks ecological validity. By comparison, CA requires participants to evaluate whole individuals comprised of various combinations of traits. Furthermore, conjoint designs measure revealed, rather than stated, preferences (see Wood & Brumbaugh, 2009) by recording how individuals choose from among imperfect romantic partners. Whereas stated preferences are subject to revisionism and response bias (Shepherd & Zacharakis, 1997; Wilson & Dunn, 1986), CA bypasses the need for participants to recursively think about and report their preference. In this way, CA allows researchers to directly measure how humans parse and weigh a partner's romantic qualities against other traits and mates. A conjoint design collects data from participants by pre-specifying combinations of partner traits that participants must holistically evaluate and requires them to make trade-offs among competing partner traits, similar to how potential romantic partners are naturally evaluated.

Our study expands on previous literature by presenting participants with partner profiles constructed from an array of psychometrically meaningful partner qualities (i.e., the HEXACO model of personality; see Ashton, Lee, & De Vries, 2014). Insofar as personality is quickly assessed at zero-acquaintance (Beer & Watson, 2008; Fink, Neave, Manning, & Grammer, 2006; Sparks, Burleigh, & Barclay, 2016; but also see Todorovet al., 2015), we wanted to examine which traits are most salient relative to other traits during initial partner evaluation. Parsing which traits are relatively more important reveals how people prioritize different aspects of partner personality during mate selection. For example, were it found that a partner's honesty-humility had greater impact on mate choice than each other personality trait, as we predict here, this would suggest that a partner's willingness to exploit others may generally outweigh their extraversion, agreeableness, emotionality, conscientiousness, or openness to experience. In other words, evolution may have shaped humans to prioritize an honest partner over other valued partner characteristics (Buss & Schmitt, 1993; Conroy-Beam, 2018; De Vries et al., 2016; Li et al., 2002, Lukaszewski et al., 2017).

Other traits such as emotionality, openness to experience, and extraversion may also be important cues when making mating decisions. Those who score high on emotionality are less prone to risk-taking and sensation-seeking (De Vries, de Vries, & Feij, 2009), and extraverted people tend to achieve dominant social group positions (Ilies, Gerhardt, & Le, 2004; Judge, Bono, Ilies, & Gerhardt, 2002) and have larger social networks (Selfhout et al., 2010). Partners higher in emotionality may also be valued to the extent that this trait predicts the tendency to invest in close personal and kin relationships (Ashton & Lee, 2007). Mating with someone with these traits may offer in-pair benefits, such as access to opportunities or social connections that may otherwise be difficult to acquire. Furthermore, similarity in openness may predict similarity in personal values (Lee et al., 2009; Thielmann, Hilbig, & Zettler, 2018), which can enable congenial, low-conflict partnerships that facilitate shared goals (Laland, Odling-Smee, & Feldman, 2001; Liu, Ludeke, Haubrich, Gondan, & Zettler, 2018). Insofar as personality confers a context-dependent advantage to survival and reproduction (De Vries et al., 2016; see also, Reis, 2008), individuals may prioritize certain partner personality qualities over others in different mating contexts (e.g., when selecting a partner for a short sexual or long-term commitment relationship; Buss & Schmitt, 1993; Gangestad & Simpson, 2000).

1.2. Planned analyses

Conjoint analysis produces importance values, which indicate a trait's overall contribution to how profiles are ranked (e.g., honesty-humility, extraversion, etc.), and part-worth utility estimates, which indicate the relative importance of each level within each trait (e.g., high, medium, or low honesty-humility). We will compare importance values to assess the contribution of each personality trait to partner evaluations. Based on prior research (e.g., Mogilski et al., 2014), we expect that (*H1*) a partner's honesty-humility will be relatively more important than each other trait, particularly in a long-term mate (Regan, Levin, Sprecher, Christopher, & Gate, 2000). We will also compare preference across biological sex to determine whether men and women prioritize different traits. Because women must minimally invest more in offspring for their survival (e.g., gestation, lactation) compared to men, who need only invest a single deposit of sperm (see Trivers, 1972), and because women prioritize cues to long-term relationship investment more than men (e.g., Li & Kenrick, 2006), we expect that (*H2*) women will prioritize honesty-humility more than men will, particularly in a long-term partner.

Because part-worth utility estimates measure the contribution of each level within each trait (e.g., whether being high in a trait is preferable to being low in a trait), we will compare these values to assess the direction of preference for each of the six personality variables. We expect that (*H3*) high, medium, and low amounts of each trait will follow a linear preference pattern. Furthermore, we will compare the absolute difference between part-worth utilities for high and low levels of each trait. Utility estimates are zero-centered; therefore, high and low trait level utility estimates are directionally opposite and differ to the extent that specifying a "high" or "low" amount for any trait draws preference away from the "medium" amount. In other words, a statistically significant difference between the absolute values of high and low utility estimates reveals whether the high or the low trait contributes relatively more to partner selection. We have no a priori hypotheses for this data, but these analyses will allow us to distinguish whether a high or low amount of each personality trait is most influential to participants' romantic decision-making (e.g., whether the benefit of high honesty-humility outweighs the cost of low honesty-humility, or vice versa).

H1. Honesty-humility will be relatively more important than each other personality trait, particularly in a long-term mate.

H2. Women will prioritize honesty-humility more than men will, particularly in a long-term partner.

H3. High, medium, and low amounts of each trait will follow a linear preference pattern.

H4. Rated preference will diverge from conjoint rankings to the extent that participants' decisions are unconstrained by other partner traits.

To permit cross-measure comparisons, we also asked participants to evaluate a potential partner's attractiveness on each item from the HEXACO-60 (Ashton & Lee, 2009). Because these measures do not force raters to simulate how they weigh and prioritize some partner traits over others, we expect (*H4*) these attractiveness ratings will diverge from conjoint rankings to the extent that participants' decisions are unconstrained by other partner traits.

2. Method

2.1. Participants

Participants ($N = 1128$) were recruited from the Psychology Subject Pool at a university in the mid-western United States and from social media outlets (e.g., Facebook, Reddit, Twitter). Because the experimental design is relatively new and there is little literature on which to estimate an expected effect size, a large sample was collected to detect potentially small effects. All participants were from the United States, and 99.1% were from Michigan. University students were recruited from introductory and research methods psychology classes and were compensated with class credit. To recruit participants from social media, the authors shared a link to the research with a brief summary of the study via their personal and lab social media accounts. Participants who did not complete each conjoint ranking task ($n = 210$) were excluded from analyses. Our final sample ($n = 918$; 706 women, 212 men, 2 "other"; age: $M = 20.07$, $SD = 3.75$, range = 10–60) was composed of mostly heterosexual (91.7%, 2.1% homosexual, 5.7% bisexual or pansexual, 0.4% asexual) and Caucasian (79.8%, 7.9% African-American, 6.5% Asian 2.8% Hispanic/Latino, 2.7% "Other") participants. Fewer than half (40.7%) of women reported using hormonal birth control. Two participants who identified their gender as "other" were excluded from analyses of sex differences.

2.2. Measures

Partner profiles were modeled from the six HEXACO traits (Ashton & Lee, 2009): honesty-humility (i.e., sincerity, fairness, greed-avoidance, modesty), emotionality (i.e., fearfulness, anxiety, dependence, sentimentality), extraversion (i.e., social self-esteem, social boldness, sociability, liveliness), agreeableness (i.e., forgivingness, gentleness,

Table 1
Orthogonal array of partner profiles and their respective trait combinations.

Profile	Honesty-humility	Emotionality	Extraversion	Agreeableness	Conscientiousness	Openness
1	Low	Med	Low	High	High	High
2	High	High	Low	Medium	Medium	Low
3	High	Medium	Low	High	Low	Medium
4	Medium	Medium	Medium	Medium	Low	Low
5	High	High	Medium	Low	Low	High
6	High	Low	High	Medium	High	High
7	Low	Medium	Medium	Medium	Medium	High
8	High	Medium	High	Low	Medium	Medium
9	Low	Low	High	Medium	Low	Medium
10	Low	Low	Low	Low	Low	Low
11	Medium	Low	Medium	High	Medium	Medium
12	Medium	High	Low	Medium	High	Medium
13	Medium	Medium	High	Low	High	Low
14	Low	High	High	High	Low	High
15	Medium	High	High	High	Low	High
16	Medium	Low	Low	Low	Medium	High
17	High	Low	Medium	High	High	Low
18	Low	High	Medium	Low	High	Medium
19 (Holdout)	High	High	High	Medium	Medium	Low
20 (Holdout)	Medium	Medium	High	High	Medium	High
21 (Holdout)	High	Medium	Medium	High	Low	Low

flexibility, patience), conscientiousness (i.e., organization, diligence, perfectionism, prudence), and openness to experience (i.e., aesthetic appreciation, inquisitiveness, creativity, unconventionality). Each trait was assigned one of three possible levels (i.e., high, medium, and low) indicating how much of each trait that each hypothetical partner possessed. For example, a single profile may have been described as "low on honesty-humility, high on emotionality, medium on extraversion, high on agreeableness, low on conscientiousness, and medium on openness to experience". High and low values on each trait were described for participants using definitions provided on the Lee and Ashton (2009) HEXACO website (http://hexaco.org/scaledescriptions) (see supplementary materials for trait descriptions and a full list of profiles).

An orthogonal array of 18 partner profiles was generated using IBM SPSS 21 (see Table 1). A fractional-factorial design was used to minimize the number of personality profile variations that participants were required to rank (Hair, Anderson, Tatham, & Black, 1995). Three additional hold-out profiles were included to test the validity of CA utility estimates. These hold-out profiles are created with the orthogonal array and ranked alongside each other profile, but are not used to generate importance values and utility estimates. Instead, the conjoint preference model is generated from participants' rankings of the 18 profiles and used to predict how each hold-out profile is ranked by participants. This generates a coefficient (tau) that shows how accurately the model predicts participants' hold-out rankings.

Likert-scale measures of partner personality preference were generated by altering the HEXACO-60 (Ashton & Lee, 2009). Rather than rating themselves on each item, participants assessed how attractive each item would be in a potential romantic partner (anchors: 1 = very unattractive, 7 = very attractive). The HEXACO-60 (Ashton & Lee, 2009) assesses basic personality traits across six dimensions: honesty–humility (10 items; e.g. "I would never accept a bribe, even if it were very large" [$\alpha = 0.70$]), emotionality (10 items; e.g. "I sometimes can't help worrying about little things" [$\alpha = 0.45$]), extraversion (10 items; e.g. "The first thing that I always do in a new place is to make friends" [$\alpha = 0.82$]), agreeableness (10 items; e.g. "I rarely hold a grudge, even against people who have badly wronged me" [$\alpha = 0.74$]), conscientiousness (10 items; "I plan ahead and organize things, to avoid scrambling at the last minute" [$\alpha = 0.72$]), and openness (10 items; "People have often told me that I have a good imagination" [$\alpha = 0.67$]). The HEXACO-60, which is a 60-item version of the HEXACO-PI-R (Lee & Ashton, 2018), has been shown to possess adequate psychometric properties (see, e.g., Lee & Ashton, 2004).

2.3. Procedure

All experimental materials were presented using Qualtrics, an online browser-based survey software program. All participants completed the study at a personal computer of their choosing by remotely accessing the survey through a URL. The median time to complete the survey was 38 min. After providing consent, participants completed a demographic questionnaire. Then, participants were presented all 21 profiles simultaneously and asked to rank them from most to least attractive. After, they rated preference items by how attractive each HEXACO-60 item would be in a potential romantic partner. Participants completed each conjoint and rating task twice: once for long-term attractiveness and once for short-term attractiveness. The following definitions were provided:

Long-term: You are looking for the type of person who would be attractive in a long-term relationship. Examples of this type of relationship would include someone you may want to move in with, someone you may consider leaving a current partner to be with, and someone you may, at some point, wish to marry (or enter into a relationship on similar grounds as marriage).

Short-term: You are looking for the type of person who would be attractive in a short-term relationship. This implies that the relationship may not last a long time. Examples of this type of relationship would include a single date accepted on the spur of the moment, an affair within a long-term relationship, and the possibility of a one-night stand.

The order in which conjoint ranking tasks and rated preference measures were presented was counterbalanced. The order in which profiles and items were presented within each task was randomized.

3. Results

All post-hoc comparisons were Bonferroni corrected for each set of analyses (critical $p = .008$. Homogeneity of variance was violated for several analyses. Log transformed values were substituted into the analyses, but did not change any pattern of significance. For clarity, we report analyses on untransformed means. Bivariate correlations comparing long- and short-term importance values, utility estimates, and rated attractiveness scores are presented in Table 4. These showed that long- and short-term values were weakly to moderately correlated, suggesting that participants discriminated between long- and short-

term evaluative contexts.

3.1. Conjoint preference analyses

To calculate conjoint values, utility estimates are first generated from participants' rankings of each profile. Utility estimates are β-regression coefficients that scale with the influence of each trait level (e.g., low, medium, and high extraversion) on participants' ranking decisions. Each trait level is assigned a coefficient, and importance values are calculated according to the distance between coefficients for each trait level. For example, the greater the difference between coefficients for high and low trait values, the greater the importance value. These differences are then compared across each trait and converted to percentages (i.e., honesty-humility, emotionality, etc.), which indicate each trait's contribution to participant ranking decisions relative to each other trait. Importance values therefore sum to 100.

3.1.1. Importance values

We performed a 2(participant sex) X 2(relationship type) X 6(personality trait) mixed-model ANOVA to assess differences among trait importance values across participant sex and relationship type. There was a main effect for trait, $F(5, 4580) = 190.09$, $p < .001$, $\eta_p^2 = 0.172$. Post-hoc tests revealed that honesty-humility had an overall greater importance value ($M = 26.76$, $SD = 13.79$) than each other trait: emotionality ($M = 15.37$, $SD = 7.44$, $p < .001$, $d = 0.63$), extraversion ($M = 14.08$, $SD = 7.05$, $p < .001$, $d = 0.74$), agreeableness ($M = 15.06$, $SD = 6.73$, $p < .001$, $d = 0.69$), conscientiousness ($M = 13.69$, $SD = 6.27$, $p < .001$, $d = 0.76$), and openness ($M = 15.05$, $SD = 7.43$, $p < .001$, $d = 0.64$). There were significant differences among other traits as well, but their effect sizes were much smaller (all $ds < 0.10$). Agreeableness, emotionality, and openness were equally important, and each was more important than extraversion (all $ps < 0.005$) and conscientiousness (all $ps < 0.001$). Extraversion and conscientiousness were equally important.

This main effect of trait was moderated by relationship type, $F(5, 4580) = 5.56$, $p < .001$, $\eta_p^2 = 0.006$. Importance values for honesty-humility were higher for a long-term ($M = 28.04$, $SD = 16.21$) than a short-term relationship ($M = 25.48$, $SD = 16.12$), $t(917) = 4.60$, $p < .001$, $d = 0.16$. By contrast, extraversion importance values were higher for a short-term ($M = 14.75$, $SD = 9.31$) than long-term relationship ($M = 13.41$, $SD = 8.62$), $t(917) = -3.68$, $p < .001$, $d = 0.11$. There were no other significant main effects or interactions (all $ps > 0.134$, all $\eta_p^2 < 0.002$).

3.1.2. Utility estimates

We performed six 2(participant sex) x 2(relationship type) x 3(personality trait level) mixed-model ANOVAs to assess differences among utility estimates for each personality trait level across sex and relationship type (see Table 2 for descriptive statistics). There were main effects of level for each trait: honesty-humility, $F(2, 1832) = 488.30$, $p < .001$, $\eta_p^2 = 0.348$; agreeableness, $F(2, 1832) = 254.36$, $p < .001$, $\eta_p^2 = 0.217$; extraversion, $F(2, 1832) = 102.84$, $p < .001$, $\eta_p^2 = 0.101$; conscientiousness, $F(2, 1832) = 70.812$, $p < .001$, $\eta_p^2 = 0.072$; emotionality, $F(2, 1832) = 33.11$, $p < .001$, $\eta_p^2 = 0.035$; openness, $F(2, 1832) = 167.17$, $p < .001$, $\eta_p^2 = 0.154$. Post-hoc tests indicated that participants' preferences were linear (i.e., low was significantly less desirable than medium, which was significantly less desirable than high) for each trait, except for emotionality. Utility estimates for emotionality were similar in that low was significantly less desirable than medium and high emotionality, but utility estimates for medium and high were not significantly different within this trait.

There was a significant interaction between relationship type and trait level for honesty-humility, $F(2, 1832) = 21.1$, $p < .001$, $\eta_p^2 = 0.023$. Utility estimates for low honesty-humility were significantly lower for long-term ($M = -2.54$, $SD = 2.61$) than for short-term relationships ($M = -1.88$, $SD = 2.73$), $t(917) = -6.84$, $p < .001$, $d = -0.23$, and high honesty-humility was significantly higher for long-term ($M = 1.99$, $SD = 2.42$) than for short-term relationships ($M = 1.43$, $SD = 2.55$), $t(917) = 5.88$, $p < .001$, $d = 0.19$. There was also a significant interaction between relationship type and trait level for emotionality, $F(2, 1832) = 16.64$, $p < .001$, $\eta_p^2 = 0.018$. Utility estimates for low emotionality were significantly lower for long-term ($M = -0.70$, $SD = 1.76$) than for short-term relationships ($M = -0.22$, $SD = 1.86$), $t(917) = -6.26$, $p < .001$, $d = 0.21$, and high emotionality was significantly higher for long-term ($M = 0.44$, $SD = 1.72$) than for short-term relationships ($M = -0.07$, $SD = 1.87$), $t(917) = 6.65$, $p < .001$, $d = 0.22$. There were no other significant interactions (all $ps > 0.094$, all $\eta_p^2 < 0.004$).

To assess whether a high or low amount of each trait was exerting relatively greater influence on participants' long- and short-term preferences, absolute values were calculated for high and low utility estimates for each trait. These values were then compared using paired-samples *t*-tests. For long-term evaluations, low honesty-humility ($M = 3.04$, $SD = 1.99$) influenced participants' decisions significantly more than high honesty-humility ($M = 2.59$, $SD = 1.75$), $t(917) = 9.00$, $p < .001$, $d = 0.30$. Low emotionality ($M = 1.50$, $SD = 1.16$) influenced decisions significantly more than high emotionality ($M = 1.36$, $SD = 1.13$), $t(917) = 3.41$, $p = .001$, $d = 0.12$. Low agreeableness ($M = 1.55$, $SD = 1.20$) was significantly more influential than high agreeableness ($M = 1.37$, $SD = 1.04$), $t(917) = 4.91$, $p < .001$, $d = 0.16$. Finally, low openness ($M = 1.49$, $SD = 1.25$) was more influential than high openness ($M = 1.23$, $SD = 1.09$), $t(917) = 6.46$, $p < .001$, $d = 0.22$. There were no significant differences between high and low extraversion ($p = .655$, $d = 0.02$) nor conscientiousness ($p = .080$, $d = 0.06$). For short-term evaluations, low honesty-humility ($M = 2.70$, $SD = 1.92$) influenced participants' decisions significantly more than high honesty-humility ($M = 2.35$, $SD = 1.73$), $t(917) = 7.42$, $p < .001$, $d = 0.25$. Low extraversion ($M = 1.45$, $SD = 1.19$) influenced decisions significantly more than high extraversion ($M = 1.32$, $SD = 1.10$), $t(917) = 3.53$, $p = .001$, $d = 0.11$. Low agreeableness ($M = 1.49$, $SD = 1.16$) was also more influential than high agreeableness ($M = 1.33$, $SD = 1.03$), $t(917) = 4.19$, $p < .001$, $d = 0.14$. Finally, low openness ($M = 1.51$, $SD = 1.31$) was more influential than high openness ($M = 1.37$, $SD = 1.15$), $t(917) = 3.89$, $p < .001$, $d = 0.12$. There were no significant differences between high and low emotionality ($p = .852$, $d = 0.01$) nor conscientiousness ($p = .454$, $d = 0.03$).

3.2. Rated preference analyses

Each of the six HEXACO domains were calculated from participant ratings. We then compared these values with a 2(sex of participants) X 2(relationship type) x 6(personality trait) mixed-model ANOVA. There was a main effect for trait, $F(5, 4510) = 509.47$, $p < .001$, $\eta_p^2 = 0.361$, such that each trait was significantly different from the other traits (all $ps < 0.001$) except extraversion and conscientiousness, which were rated as equally desirable after Bonferroni correction ($p = .225$). Extraversion ($M = 5.28$, $SD = 0.73$) and conscientiousness ($M = 5.23$, $SD = 0.71$) were rated most highly, followed by agreeableness ($M = 5.10$, $SD = 0.75$), honesty-humility ($M = 4.91$, $SD = 0.76$), openness ($M = 4.52$, $SD = 0.74$), and emotionality ($M = 3.73$, $SD = 0.65$).

There were also significant interactions between trait and relationship type, $F(5, 4510) = 22.30$, $p < .001$, $\eta_p^2 = 0.024$ and between trait and participant sex, $F(1, 902) = 33.70$, $p < .001$, $\eta_p^2 = 0.036$, which were moderated by a three-way interaction, $F(5, 4510) = 3.15$, $p = .008$, $\eta_p^2 = 0.003$ (see Table 3 for descriptive statistics and effect sizes). Each personality trait was more attractive in long-term compared to short-term relationships for women (all $ps < 0.001$), except extraversion ($p = .73$). All traits were more attractive in a long-term context for men as well (all $ps < 0.003$), except extraversion ($p = .310$) and

Table 2
Utility estimate means and SDs for each of the six personality profile dimensions for men's and women's long- and short-term partner evaluations.

	Long-term						Short-term					
	Low		Medium		High		Low		Medium		High	
	M	SD	M	SD	M	SD	M	SD	M	SD	M	SD
Men												
Honesty-humility	−2.49	2.65	0.54	1.60	1.95	2.52	−1.91	2.75	0.45	1.66	1.47	2.60
Emotionality	−0.45	1.72	0.23	1.50	0.22	1.68	−0.14	1.70	0.27	1.38	−0.13	1.75
Extraversion	−0.59	1.37	0.11	1.43	0.49	1.45	−0.53	1.65	0.11	1.43	0.41	1.63
Agreeableness	−1.00	1.67	0.18	1.42	0.82	1.62	−0.97	1.79	0.18	1.44	0.80	1.59
Conscientiousness	−0.44	1.51	−0.04	1.37	0.48	1.51	−0.40	1.68	0.21	1.26	0.18	1.70
Openness	−0.81	1.73	0.31	1.62	0.50	1.74	−0.86	1.87	0.14	1.41	0.72	1.62
Women												
Honesty-humility	−2.55	2.59	0.55	1.70	2.00	2.39	−1.87	2.73	0.45	1.61	1.42	2.54
Emotionality	−0.78	1.77	0.27	1.43	0.50	1.72	−0.25	1.90	0.30	1.55	−0.05	1.90
Extraversion	−0.64	1.55	0.14	1.33	0.51	1.56	−0.72	1.78	0.14	1.47	0.58	1.63
Agreeableness	−1.09	1.64	0.36	1.38	0.73	1.52	−0.95	1.59	0.37	1.39	0.58	1.55
Conscientiousness	−0.66	1.58	0.13	1.30	0.53	1.51	−0.52	1.60	0.12	1.43	0.40	1.58
Openness	−0.93	1.70	0.52	1.43	0.41	1.54	−0.92	1.76	0.36	1.41	0.57	1.70

agreeableness (p = .887).

4. Discussion

Participants were asked to assess the long- and short-term desirability of hypothetical romantic partner profiles constructed from the HEXACO model of personality. Conjoint analyses revealed that a potential partner's honesty-humility was substantially more important during initial partner evaluation than each other personality dimension. The size of this effect is notable, as it shows that there is a relatively larger amount of variance in partner preference that is accounted for by honesty-humility compared to other personality dimensions. In other words, mechanisms that guide romantic decision-making appear to more heavily weigh a partner's trustworthiness relative to their agreeableness, extraversion, conscientiousness, emotionality, and openness to experience. This is consistent with prior work showing that individuals value cues to partner honesty over other traits. For example, a partner's history of committing sexual infidelity is relative more important than their physical attractiveness, financial stability, emotional investment, and partner similarity (Mogilski et al., 2014). Likewise, warmth and trustworthiness are rated higher for importance in a hypothetical partner than social status and physical attractiveness (Fletcher et al., 2004). These findings are also consistent with research showing that people will invest more points into trustworthiness when designing ideal partners using a budget allocation task (Cottrell et al., 2007). Furthermore, people who are more altruistic (i.e., a proxy for trustworthiness, see Barclay, 2004, 2006; Fehrler & Przepiorka, 2013) report having more sexual partners (Arnocky, Piché, Albert, Ouellette, & Barclay, 2017) and are preferentially selected as long-term partners (Farrelly, 2013). Together, these data support the interpretation that a potential partner's chance of exploiting a partner for personal gain is

Table 4
Bivariate correlations between long- and short-term importance values, utility estimates, and ideal attractiveness scores for each HEXACO trait.

	Importance values	Utility estimates	Ideal attractiveness
Honesty-humility	0.456**		0.635**
Low		0.405**	
Medium		0.180**	
High		0.058	
Emotionality	0.313**		0.538**
Low		0.188**	
Medium		0.066*	
High		0.176**	
Extraversion	0.236**		0.631**
Low		0.186**	
Medium		0.046	
High		0.178**	
Agreeableness	0.270**		0.650**
Low		0.247**	
Medium		0.052	
High		0.175**	
Conscientiousness	0.197**		0.576**
Low		0.196**	
Medium		0.064	
High		0.151**	
Openness	0.136**		0.692**
Low		0.250**	
Medium		0.078*	
High		0.177**	

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

Table 3
Ideal attractiveness means, SDs, and effect sizes for each of the six personality dimensions for men's and women's long- and short-term partner evaluations.

	Men					Women				
	Long-term		Short-term		d	Long-term		Short-term		d
	M	SD	M	SD		M	SD	M	SD	
Honesty-humility	4.82	0.82	4.68	0.83	0.21	5.05	0.82	4.88	0.85	0.23
Emotionality	3.83	0.75	3.62	0.77	0.28	3.85	0.68	3.61	0.69	0.33
Extraversion	5.07	0.71	5.02	0.76	0.07	5.37	0.79	5.33	0.83	0.06
Agreeableness	4.95	0.73	4.96	0.81	−0.02	5.21	0.84	5.06	0.84	0.21
Conscientiousness	5.16	0.82	4.78	0.79	0.50	5.46	0.76	5.14	0.80	0.44
Openness	4.56	0.80	4.30	0.70	0.38	4.64	0.84	4.45	0.81	0.31

prioritized over other mate characteristics.

Both men and women prioritized honesty-humility over each other personality trait for both long- and short-term partner evaluations, although preference was stronger for long- vs. short-term relationships. It is unsurprising that an unwillingness to exploit others for personal gain would be preferred more where commitment and continued interaction are expected features of the relationship (e.g., moving in with someone, marriage). Those with a tendency to prioritize themselves or to deceive others for self-interested goals may be more likely to exploit the vulnerability of becoming interdependent with another individual (e.g., access to shared resources). In the long-term, this willingness to exploit others may undermine partners' shared relationship goals and destabilize the relationship. However, it is unclear why honesty-humility would also be most important within a short-term relationship context (see also Mogilski et al., 2014). Low honesty-humility may be costly in a short-term context insofar as a dishonest sexual partner can exploit a relationship or impose personal cost. For example, sex with a dishonest partner may produce offspring that inherit a predisposition for interpersonal aggression and exploitation. Dishonest individuals may take more health and safety risks (Hosker-Field, Molnar, & Book, 2016; Weller & Tikir, 2011), seek revenge (Lee & Ashton, 2012; Sirianni & Vishwanath, 2016), engage in sexual coercion (Jones & Olderbak, 2014; Lee, Gizzarone, & Ashton, 2003), abuse partners (Carton & Egan, 2017), or behave violently (Westhead & Egan, 2015), which can produce personal costs even during short-term encounters. It may also be that, despite the short-term nature of brief sexual encounters, they can have long lasting negative consequences (aside from potential unwanted offspring) that are more likely when a person's partner is dishonest, such as revenge porn (Pina, Holland, & James, 2017), sexual coercion (e.g., Figueredo, Gladden, Sisco, Patch, & Jones, 2016), or other forms of partner exploitation (e.g., Holden et al., 2014). Alternatively, it is possible that aversion to exploitation in a long-term relationship is so strong that it generalizes to short-term relationships (i.e., is a byproduct of an evolved sensitivity to cues to dishonesty and partner exploitation, more generally), or that participants have difficulty discerning between a long- and short-term mating context in this task. This latter explanation seems unlikely, however, given that previous work has successfully shown differences between short- and long-term preferences when participants are asked to rate partners accordingly (e.g., Conroy-Beam & Buss, 2017) and given that preferences for traits for long- and short-term contexts were only weakly to moderately correlated (i.e., participants appear to be discriminating between relationship contexts). Extraversion was also relatively more important within a short- than long-term relationship, which suggests that individuals may be more willing to overlook a sexual partner's honesty for their social capacities or attractiveness in the short-term, but not the long-term.

Interestingly, low emotionality was preferred within a short- versus long-term context, and high emotionality was preferred within a long- vs. short-term context. This is consistent with work suggesting that emotionality predicts the tendency to invest in close relationships (Ashton & Lee, 2007). People who are seeking casual sexual encounters may not be interested in potential partners whose tendency to form intimate, invested relationships might conflict with their disinterest in commitment. Likewise, those who wish to form committed relationships may feel that a partner low in emotionality will be unlikely to reciprocate investment. Future research could examine this interpretation by comparing preference for emotionality among raters with restricted vs. unrestricted sociosexual orientations (Penke & Asendorpf, 2008).

We also assessed whether a high or low amount of each trait was more consequential to participants' long- and short-term conjoint ranking decisions by comparing the absolute values of utility estimates for high and low trait qualities. Low honesty-humility, agreeableness, and openness influenced both long- and short-term evaluations more than high amounts of each, whereas low extraversion influenced short-term evaluations more than high extraversion. This suggests that people perceive the costs of a dishonest, disagreeable, or inflexible long- or short-term partner to outweigh the benefits of a trustworthy, accommodating, or open-minded one, and the cost of a neurotic or withdrawn short-term partner to be more aversive than the benefit of having one that is emotionally stable and outgoing.

It is noteworthy that our measure of rated partner preference revealed a different pattern of results. Extraversion and conscientiousness were rated as more attractive than each other characteristic, followed by agreeableness, then honesty-humility, then openness, and finally emotionality. Compared to conjoint analyses, this pattern suggests that participants ideally prefer partner qualities that indicate sociability, attentiveness, and easy-goingness (although honesty-humility was still rated as more important than openness to experience and emotionality). One possible interpretation is that when choice is constrained by other partner qualities, as it is in real-life partner choice, participants are more likely to prioritize “necessities” (Li et al., 2002). Although these partner necessities differ for men and women (e.g., physical attractiveness and social status, respectively; e.g., Buss, 1994), recent evidence suggests that cues to a partner's trustworthiness (e.g., their history of infidelity; Mogilski et al., 2014) are prioritized over these traits by both men and women. This study is consistent with and expands on these findings to suggest that a relatively greater proportion of variation in men's and women's mate preference is due to a partner's tendency to exploit interpersonal or romantic relationships.

We predicted that a partner's honesty-humility would be more important to women given that women's greater minimum obligatory investment in offspring compared to men (Buss & Schmitt, 1993; Trivers, 1972) makes it costlier to select a partner who might defect from childcare or drain in-pair resources. We observed predicted sex differences for neither rated nor conjoint preference measures; women reported greater long-term attraction to all traits except extraversion. Men reported greater long-term attraction to all traits except extraversion and agreeableness. One explanation for why there were no sex differences in how men and women prioritized honesty-humility in the conjoint analysis task may be that a partner's honesty has a broader impact on relationship quality and mating success than strictly the likelihood that a partner will parasitize in-pair resources, and is thus a more salient priority in general. For example, both men and women who score lower on honesty-humility are more likely to be sociosexually unrestricted and prefer romantic non-exclusivity (Bourdage, Lee, Ashton, & Perry, 2007). Certainly, men may desire honesty because a dishonest partner is more likely to pursue extradyadic sexual relationships that expose him to the risk of cuckoldry. People with low levels of honesty-humility are also more likely to use manipulative or deceptive mate retention strategies (i.e., inter- and intrasexual negative inducements; Holden et al., 2014), whose deployment is associated with violent behavior, partner abuse, and pathological personality (Tragesser & Benfield, 2012). They are also more likely to take ethical risks or risk their health and personal safety (Weller & Tikir, 2011) and behave impulsively (Witt, Donnellan, & Blonigen, 2009). A partner's honesty-humility may therefore indicate a constellation of romantic behaviors and tendencies that are generally costly within romantic relationships for both men and women.

4.1. Limitations and future directions

Despite the present study having numerous strengths (e.g., large sample size, a statistical analysis that accounts for trade-offs during partner selection), it has a number of potential limitations that should be considered. The first limitation is that the present study did not assess participants' self-report HEXACO scores. Future research should examine the role of rater personality because honesty-humility may be especially desirable to people who have high levels of honesty-humility themselves. Recent evidence (Liu et al., 2018) finds that people prefer partners who are similar to them in honesty. In economic games, such as the Prisoner's Dilemma, individuals who pursue a cooperative

strategy (i.e., choosing to remain loyal to their partner) maximize the payoff of cooperation when they select a partner who is unlikely to defect (Axelrod & Hamilton, 1981). That said, an individual who is less honest may likewise prefer a cooperative partner who is unlikely to mutually defect, or who may be more easily exploited. However, a dishonest person may have a relatively greater tolerance for a dishonest partner if they prioritize physiological or psychological qualities (e.g., social standing, physical and mental health) that can be exploited through short-term interaction, such as valuable social connections (e.g., extraversion), or attractive offspring traits like intelligence and creativity (e.g., openness to experience; Christensen, Cotter, & Silvia, 2018), or perseverance (e.g., conscientiousness).

The second limitation is that the present study focused on short- and long-term relationships, and personality desirability may vary across other relationship types, such as between platonic friends, friends with benefits, open relationships (for definitions, see Wentland & Reissing, 2014), or consensual nonmonogamy (CNM; Mogilski, Memering, Welling, & Shackelford, 2017; Mogilski et al., 2019; see also Balzarini et al., 2017). For example, CNM relationships often entail explicit agreements wherein partners consent to forming extra-pair relationships (reviewed in Loue, 2006; Haupert, Gesselman, Moors, Fisher, & Garcia, 2017). Individuals within these relationships may attribute even greater importance than monogamous individuals to a potential partner's honesty inasmuch as open and honest communication is a hallmark of CNM relationships. Examining how preference for partner trustworthiness varies across different relationship configurations and mating strategies may reveal how preferences for a potential partner's personality changes with respect to the goals and agreements that define each type of relationship. Furthermore, future research should examine how individuals assess potential partners who vary in other socially aversive subclinical dimensions or sub-domains of personality. For example, it may be revealing to ask participants to assess profiles comprised of Dark Tetrad (Paulhus, 2014), PID-5 personality dimensions (Krueger et al., 2012), or features of the dark core of personality (Moshagen, Hilbig, & Zettler, 2018). Likewise, conjoint analysis of profiles that vary on each facet of honesty-humility (i.e., sincerity, fairness, greed, avoidance, modesty) would reveal which specific features of honesty are more or less consequential to how romantic partners are initially screened.

Finally, people may have prioritized a partner's honesty because dishonesty was explicitly noted within each profile. This is an important limitation to address considering that self and observer ratings of honesty-humility tend to be discordant relative to other personality traits, particularly at low acquaintance (Lee & Ashton, 2017), suggesting that a potential partner's honesty is difficult to accurately judge. Within a natural context, most people may assume that a potential partner will be trustworthy enough as to not warrant special consideration of their honesty relative to other features. Examining how sensitivity to cues of honesty shifts across contexts where trustworthiness may be more easily assumed (e.g., within low- versus high-population environments, in-person versus online), and how this interacts with other markers of perceived trustworthiness (e.g., facial appearance; e.g., Todorov, Baron, & Oosterhof, 2008), may reveal how honesty is naturally assessed and prioritized within a potential partner. It is also possible that an individual's previous experiences with romantic betrayal (e.g., how often someone has been cheated on) may influence their sensitivity to a partner's honesty. Lastly, we did not include a comprehension check to ensure that participants understood the trait descriptions provided for the conjoint ranking tasks. Future research could take additional steps to confirm participant understanding of compared traits. Furthermore, it is possible that differences between conjoint and rated preferences is not due to constrained choice, as we suggest above. Research that uses this technique should confirm whether constrained choice or some other feature of a conjoint design is producing the observed results.

4.2. Conclusion

Our data suggest that a potential romantic partner's proclivity for interpersonal exploitation is weighed more heavily than other dimensions of personality during initial mate selection. Mate preferences have been shaped to enhance identification of quality mates (see Sugiyama, 2015). However, compared to the challenge of identifying a high-value mate, the threat of succumbing to interpersonal predation may have been a relatively stronger selection pressure during the evolution of human mate preference. Certainly, humans possess complex adaptations for identifying, avoiding, and confronting interpersonal predation and romantic exploitation (see Barrett, 2015; Duntley, 2015). Puts (2010) suggests that intrasexual selection, which requires successful navigation of competitive same-sex contests, has shaped human mate preference more strongly than intersexual selection, though sexual conflict also frequently occurs between romantic partners (e.g., Barbaro & Shackelford, 2016; also see Goetz & Shackelford, 2009). Furthermore, recent literature has demonstrated how the threat of inter-group competition has shaped human mate preference (McDonald, Donnellan, Cesario, & Navarrete, 2015; McDonald, Navarrete, & Van Vugt, 2012). Our findings support and extend these arguments by showing that a partner's willingness and tendency to exploit others outweighs other mate value qualities. Although men and women may differ in preference across reproductively relevant domains (e.g., social status among men; physical attractiveness among women), particularly for long-term relationships, both men and women may first screen partners who seem unlikely to reciprocate relational effort, who may exploit shared in-pair resources, or who otherwise compete − rather than cooperate − with a romantic partner to achieve relationship goals. Further research on how information about partner trustworthiness is assessed, identified, and integrated with other cues of partner attractiveness may reveal how psychological systems for evaluating romantic partners and other allies have been shaped by natural selection to permit effective avoidance of interpersonal predation.

Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.evolhumbehav.2019.04.001.

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