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Who Did What: A Novel Method for Investigating Human Mate Preferences

A dissertation submitted in partial satisfaction of the
requirements for the degree Doctor of Philosophy
in Psychological & Brain Sciences

by

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January 2018

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Who Did What: A Novel Method for Investigating Human Mate Preferences

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by

Rachel Louise Grillot

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ABSTRACT

Who Did What: A Novel Method for Investigating Human Mate Preferences

by

Rachel Louise Grillo

The extant literature on human mate preferences demonstrates that mate preferences are difficult to measure: findings are surprisingly contradictory across methodologies. In self-report and vignette studies, traits related to cooperative partner or parental value, such as warmth, kindness, and trustworthiness, are found to be of paramount importance. These methods also tend to find the sex differences in preferences that are predicted by evolutionary theory, with men valuing physical attractiveness relatively more than women do, and women valuing social status or cues of resource acquisition ability relatively more than men do. However, methods like these where participants must consciously evaluate different traits and report their preferences for them are problematic, because of issues like social desirability bias, demand characteristics, and the fact that humans probably have little conscious insight into the majority of their cognitive programs.

In research measuring revealed preferences, such as speed-dating studies, in which choices have real consequences for mating, cues of cooperative partner or parental value do not appear to influence attractiveness, and physical attractiveness is the main driver of mating choices, for both sexes. However, in speed-dating interactions, information about other relevant traits may be largely absent, and physical attractiveness may be the only trait that can be accurately assessed during such a brief encounter. The correlational nature of speed-dating studies also precludes the ability to make causal claims. Thus, the validity of both

self-reported preferences and revealed preferences from speed-dating research are questionable, and this literature is currently at an impasse.

Here, we attempted to solve many of the issues in these previous methodologies with a novel experimental paradigm for assessing revealed preferences. We resurrected the memory confusion protocol developed by Taylor et al. (1978) and adapted it for the investigation of human mate preferences. This method afforded us experimental control, a strong but implicit manipulation of traits via behavioral information, and a built-in manipulation check by virtue of the memory confusion data that are emblematic of this protocol. Across a series of seven studies, we manipulated cues of kindness and social status or provisioning ability and tested effects on mate attractiveness. Opposite-sex targets represented by faces, who varied in physical attractiveness, were randomly paired with sentences describing behaviors that were pre-rated as indicating various levels of the manipulated traits. After viewing these pairings, subjects rated targets' mate attractiveness, and revealed preferences were assessed from these ratings.

Results for kindness manipulations indicated that manipulated kindness positively predicted mate attractiveness ratings for both sexes. Unkind behaviors towards others were detrimental to the mate attractiveness of both sexes, and highly kind behaviors towards others had particularly positive effects on the mate attractiveness of female targets. Trends suggested that women especially valued high kindness by men when it was directed towards them compared to others.

Findings from the first resource access study suggested that cues of social standing alone did not impact the mate attractiveness of either sex. However, behavioral information

about provisioning ability had significant effects on the mate attractiveness of both sexes, with no clear sex difference in this effect. Physical attractiveness was consistently the strongest predictor of mate attractiveness, for both sexes.

These studies suggest that the conclusions from neither self-report nor speed-dating methodologies are wholly accurate: cues of cooperative partner or parental value are indeed important components of mate attractiveness, contrary to the null findings for these qualities in speed-dating studies. Cues of provisioning ability may be similarly consequential to mate attractiveness judgments. However, self-report studies may have underestimated the importance of physical attractiveness in the initial stages of mate selection. The present studies demonstrate the utility of this novel experimental method for the assessment of human mate preferences.

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1. Introduction to the Study of Human Mate Preferences

An Evolutionary Perspective on Human Mate Preferences

What makes someone desirable as a mate? An evolutionary psychological perspective on this question suggests that humans possess specialized cognitive mechanisms for selecting and pursuing mates (Symons, 1979). These mechanisms have been designed by natural selection to take as inputs cues of qualities in prospective mates that would have predicted reproductive success for the chooser, ancestrally, and produce commensurate feelings of attraction in response to these cues. Thus, it is reasonable to expect that physical and non-physical traits in a potential mate that, upon mating with this person, were reliably associated with one's own reproductive success ancestrally will generate increased feelings of attraction today relative to traits that would have been associated with a fitness deficit.

An examination of the human mating system and ancestral ecology generates predictions about what qualities might be attractive in prospective mates. Given that human mateships were likely primarily long-term cooperative relationships, we might expect that traits indicating someone will be a good cooperative partner will be prized: traits such as kindness, honesty, trustworthiness, similarity in interests and values, thoughtfulness, etc. (Cottrell, Neuberg, & Li, 2007). Given that human infants are extremely altricial, demand an enormous amount of parental investment, and have an exceptionally long childhood, we might expect cues of provisioning ability such as competence, intelligence, skillfulness, or the ability to acquire resources to be important (Gurven, Winking, Kaplan, von Rueden, & McAllister, 2009); cues of willingness to invest such resources, and of parenting ability, such as attentiveness, patience, gentleness, and selflessness might be similarly important (Brase,

2006). Physical traits might be valued to the extent that they index somatic condition, fertility, or heritable variation in genetic quality, which may improve the odds of the production of strong, viable offspring (Gangestad & Scheyd, 2005). It is intuitive that the aforementioned traits are generally attractive, and yet the measurement of these preferences turns out to be a rather complicated task, as will be discussed. Furthermore, very little known is about how the different traits may be weighted in preference mechanisms (e.g., is it more important that a mate be intelligent than be patient?), and how the relative importance of the traits may differ between the sexes.

We should expect psychological sex differences in domains where selection pressures on reproductive success diverged. Thus, if there was an asymmetry between the sexes in the fitness payoffs to valuing certain traits, then there would likely be evolved sex differences in the strength of preferences for these traits. Since women bear the larger mandatory physiological cost of producing offspring in the form of extended gestation and lactation, a mate's contribution to parental investment in the form of food, protection, or other resources might have been especially consequential to her and her offspring's success (Kaplan, Hill, Lancaster, & Hurtado, 2000; Marlowe 2001). We might therefore expect men's ability to provide resources, perhaps indexed by physical traits such as strength (Apicella, 2014), or personality traits such as competence, industriousness, or ambition, to be relatively more important to women than women's is to men (Buss, 1992). Cues of current resource control such as wealth or social status might similarly have greater effects on men's attractiveness than women's (Ellis, 1992). Since the limiting factor on men's reproductive success may have mainly been the number of offspring that his mate could successfully bear, women's

physical attractiveness, to the extent that it indexed fertility ancestrally, may be relatively more important to men than men's is to women today (Buss, 1989; Gangestad & Scheyd, 2005).

These predictions, and others, have been tested recurrently in several lines of mate preference research, which are discussed below.

Extant Research on Human Mate Preferences

Self Report

The majority of mate preference research has been conducted using self-report methods, in which individuals explicitly report what qualities they would like in an ideal mate. The most common self-report methods are to have individuals rank or rate a list of attributes (e.g., 'good looks', 'trustworthy', 'intelligent') with respect to dating desirability. This type of research has the advantage of being easy to conduct, and indeed, impressively large cross-cultural data collections have already been undertaken with self-report measures. Buss' (1989) landmark study assessed ideal mate preferences in 37 different cultures across the world, and found the sex differences predicted from evolutionary theory, with males reporting significantly greater valuation of physical attractiveness in a mate in 34/37 cultures, and females reporting significantly greater valuation of the ability to provide resources (e.g., 'good financial prospect') in 36/37 cultures. These sex differences have emerged reliably across many other samples and self-report methodologies (e.g., Buss & Barnes, 1986; Buunk, Dijkstra, Fetchenhauer, & Kenrick, 2002; Farrelly, 2013; Fales et al., 2016; Li, Bailey,

Kenrick, & Linsenmeier, 2002; Nevid, 1984; Waynforth & Dunbar, 1995; for a review, see Schmitt, 2014).

However, the self-report data also suggest that resource control and physical attractiveness are relatively low in importance relative to other dimensions of mate attractiveness. In most studies, cues of cooperative partner value such as warmth, trustworthiness, and kindness are self-reported to be more essential in long-term mates (e.g., Botwin, Buss, & Shackelford, 1997; Buss & Barnes, 1986; Evans & Brase, 2007; Fletcher, Simpson, Thomas, & Giles, 1999; Gurven et al., 2009; Howard, Blumstein, & Schwartz, 1987; Laner & Russell, 1998; Li et al., 2002; Pillsworth, 2008; Waynforth & Dunbar, 1995). For example, in all 37 cultures examined by Buss (1989), both men and women ranked 'kind-understanding' more highly than 'good financial prospect' and 'good looks'. Similarly, among a large diverse sample of Chinese women, traits associated with being a good father, such as 'considerate' and 'caring', were valued much more than traits such as 'successful career', 'ambitious', 'masculine', or 'good-looking' (Lu, Zhu, & Chang, 2015).

Thus, though physical attractiveness and cues of resource control may be differentially attractive to the sexes, cues of cooperative partner or parental value are self-reported to be of much greater importance. These traits may have indeed been the most relevant to reproductive success, ancestrally. However, there are multiple problems with measuring preferences via self-report, which call some of these findings into question.

A known issue with self-report is that participants may consciously alter their responses to provide more socially desirable answers (Crowne & Marlowe, 1964). Even if participants are not deliberately distorting their answers, it is possible that they are simply

imagining individuals who are already above thresholds on important qualities; for example, creativity may be highly desirable within the pool of mates that already satisfy your minimum criteria for social status and physical attractiveness (Ellis, 1992). However, another important issue that is rarely discussed in this literature is that evolution does not require organisms to have conscious representations of their cognitive programs: much of what drives our preferences or behaviors may be processed outside of conscious awareness. Research in many other domains has indeed demonstrated that individuals have imperfect introspective ability (e.g., Nisbett & Wilson, 1977).

So what are people self-reporting when they complete these questionnaires, if not the factors that actually influence their attraction? Stated preferences could reflect individuals' faulty theories about what they desire (Eastwick & Finkel, 2008), or qualities that people genuinely want, but that, unfortunately, do not drive their mate choice (Roney, personal communication). The design of the mind may be such that the magnitudes of these preference variables only become consciously available when tradeoffs need to be made among them (Cosmides, personal communication). Others have even proposed that language or consciousness itself may be designed for 'public relations' (Gazzaniga, 2011; Kurzban, 2010), and that our conscious perceptions of our desires may be warped as a strategy for social manipulation. At this point, it is not clear how much stock to put in self-reported mate preferences.

Revealed Preference Research

Another line of research has attempted to avoid these potential issues by measuring mate preferences in a different way. Instead of asking participants what they like, researchers present various possible hypothetical mates, have participants choose between them or rate them with respect to mate attractiveness, and then assess preferences *a posteriori* via participants' actual choices. This method is known as the revealed preference or policy-capturing approach, where individuals' mating 'policies' are inferred via their decisions, and is an attempt to elucidate the design of actual mate choice mechanisms rather than assessing conscious preferences. One common design has been to present hypothetical mates in the form of vignettes (Fletcher, Tither, O'Loughlin, Friesen, & Overall, 2004; Jensen-Campbell, Graziano, & West, 1995; Wiederman & Dubois, 1998) or mock dating profiles (Barclay, 2010; Hitsch, Hortacsu, & Ariely, 2010; Lee, Dubbs, Von Hippel, Brooks, & Zietsch, 2014) that contain trait words or descriptions (e.g., "Matt is very kind" or "Matt likes to help children"), frequently with the intent of experimentally manipulating key traits by varying specific trait words or sentences while keeping other information constant. Research using vignettes or dating profiles has yielded findings that are largely similar to self-report data: females have been found to place greater emphasis on traits associated with resource control (Fletcher et al., 2004; Hitsch et al., 2010; Ong, 2015; Townsend & Levy, 1990; Townsend & Roberts, 1993) and less emphasis on physical attractiveness than men do (Fletcher et al., 2004; Hitsch et al., 2010; Wiederman & Dubois, 1998), with both sexes highly valuing cues of kindness or prosociality in long-term mates (Barclay, 2010; Fletcher et al., 2004; Jensen-Campbell et al., 1995).

These consistencies with self-report data are not surprising; many of these revealed preference studies may in fact reduce to a form of self-report if individuals compute their conscious valuations of the trait words in the vignettes in the same way they do when rating these traits explicitly for attractiveness. Where information about behaviors is used (e.g., “he played guitar at a children’s hospital”; Barclay, 2010) instead of trait words (“he is kind”), the manipulation may be slightly more subtle and avoid some of the conscious processing issues, but there are likely strong demand characteristics. Thus, though these types of studies attempt to capture more implicit mate preferences, they have not fully escaped the issues inherent to self-report methods.

Speed-Dating Research

Another approach to measuring revealed preferences is speed-dating research. In speed-dating studies, individuals interact briefly with potential mates and then indicate in private whether they would be interested in meeting any of the individuals outside of the experiment; if there is a match in interest, the researcher will exchange contact information. The fact that these studies provide real interactions between singles, where expression of interest in the other person is done confidentially and is thus low-risk for participants, with choices having real mating consequences, suggests to some that speed-dating choices may be honest, reasonably ecologically valid reflections of mating interest.

Speed-dating studies that have assessed self-reported preferences prior to a speed-dating event have consistently found that self-reported preference data predict very little about choice behavior (e.g., Eastwick & Finkel, 2008; Todd, Penke, Fasolo, & Lenton, 2007).

Though there are many reasons why ideal preferences may not align perfectly with the actual partners people end up with (e.g., ideal preferences are limited in real life by various contextual and dyadic processes, see Conroy-Beam & Buss, 2016), it might be reasonable to expect that ideal preferences would predict reactions to mating partners in a speed-dating context. This lack of correspondence between self-reported preferences and revealed preferences has raised concerns about the validity of the self-report findings (though c.f., self-reported age preferences do predict age-at-marriage data; see Buss, 1989).

Furthermore, not only do self-reported preferences rarely align with actual speed-dating choices, but revealed preferences in these studies point to a very different conclusion: physical attractiveness overwhelmingly predicts the likelihood of being ‘yessed’ in a speed-dating setting, and equally so for both sexes (Asendorpf, Penke, & Back, 2011; Eastwick & Finkel, 2008; Fletcher, Kerr, Li, & Valentine, 2014; Kurzban & Weeden, 2005; Luo & Zhang, 2009; Selterman, Chagnon, & Mackinnon, 2015; but c.f. Fisman, Iyengar, Kamenica, & Simonson, 2006; Janz, Pepping, & Halford, 2015; and Todd et al., 2007, who did find the predicted sex difference). Some speed-dating studies have shown that cues of resource control such as education or earning prospects have small positive effects on the likelihood of being chosen, with stronger effects for men (Asendorpf et al., 2011; Fisman et al., 2006; Todd et al., 2007), but other researchers have not observed a sex difference in this effect on speed-dating choices (Eastwick & Finkel, 2008; Kurzban & Weeden, 2005; Selterman et al., 2015), even when self-reported preferences from the same speed-dating subjects do conform to the predicted sex differences from evolutionary theory (Eastwick & Finkel, 2008). A recent meta-analysis by Eastwick, Luchies, Finkel, and Hunt (2014) concluded that the

evolutionary-predicted gender differences in mate choice criteria are not supported by speed-dating choice data.

The difficulty of measuring traits related to cooperative partner or parental value like kindness, warmth, and trustworthiness in a speed-dating context has led to a paucity of data on their effects. Some studies have assessed participants' personalities through self-report personality inventories prior to the speed-dating event. These have yielded mixed results: in a German community sample, agreeableness had no effect on being chosen for either sex (Asendorpf et al., 2011), whereas among American undergraduates, women high in agreeableness were more likely to be 'yessed' (Luo & Zhang, 2009). Eastwick & Finkel (2008) found that second-person consensus ratings of how personable someone was had a positive association with the likelihood of being chosen, but this finding could plausibly result from a halo effect of physical attractiveness. In addition, effect sizes for these traits are smaller than the effects of physical attractiveness (e.g., predictors of women's romantic interest: $\beta = .07$ for 'warmth/trustworthiness' vs. $\beta = .42$ for 'attractiveness/vitality' in Fletcher et al., 2014; $r = .14$ for 'personable' vs. $r = .27$ for 'physical attractiveness' in Eastwick & Finkel, 2008). A recent revealed preference study that assessed the desirability of men and women who were videotaped talking about themselves also showed that physical attractiveness overwhelmingly predicted mate attractiveness, and that individuals' personalities and life history strategies had basically no predictive value (Olderbak, Malter, Wolf, Jones, & Figueredo, 2017). This general pattern of findings is nicely summed up in the following quotation from Kurzban & Weeden (2005): "... having an attractive personality [has] little effect on men's desirability, and none at all on women's" (p. 242).

Though this conclusion may seem startling in light of the wealth of self-report and other forms of policy-capturing evidence suggesting that cues of cooperative partner and parental value are of chief importance, several considerations may help to explain this result. First, the limited interaction time inherent to speed-dating may make many internal traits difficult to gauge, causing physical attractiveness, which is immediately apparent, to have an artificially inflated effect, perhaps via a decision-making bias toward weighting information that is more likely to be accurate. Indeed, Fletcher et al. (2014) demonstrated in their speed-dating study that individuals' perceptions of partners' physical attractiveness were in fact much more accurate than their perceptions of partners' warmth/trustworthiness or status/resources (i.e., partner-ratings more closely matched self-ratings for physical attractiveness than for the other traits), supporting this notion, though Olderbak et al. (2017) found that people could accurately perceive personality and life history traits, and yet this still had no effect on attractiveness. A second limitation of speed-dating research is that a restricted range of key traits in speed-dating samples may mask effects (Li, Yong, Tov, Sng, & Valentine, 2013). For example, college students or individuals from the community who volunteer for speed-dating studies typically represent the upper middle class, and thus samples comprised exclusively of these individuals may have insufficient low end variability in earning capacity to detect effects of this trait.

Li et al. (2013) addressed some of these issues in a clever series of modified speed-dating experiments. When participants from more varied socioeconomic groups were included at the speed-dating event (e.g., college students, fast food employees, gas station attendants), the predicted sex difference in the effect of resource control on long-term mate

attractiveness emerged: low social status reduced men's likelihood of being chosen significantly more than it did women's. Furthermore, when a large range of variation in physical attractiveness was ensured in the sample, there was also the predicted sex difference for physical attractiveness: low physical attractiveness reduced women's likelihood of being chosen significantly more than it did men's (Li et al., 2013). These results highlight the importance of providing the full range of variation for traits of interest when attempting to elucidate sex differences in preferences for these traits.

However, even with the greater effort at experimental manipulation provided by Li et al. (2013), a third issue with speed-dating research remains: that of correlated cues. Variation in specific traits may naturally covary with other traits, making it difficult to disentangle the effects of any individual dimension. For example, though variability in social status was enforced in the Li et al. (2013) study by bringing in participants with less socially desirable jobs, these individuals may have shared other traits, such as lower confidence or intelligence, which could explain their reduced attractiveness relative to college students. To make the case that social status causally influences dating desirability, social status must be manipulated in isolation from other relevant traits.

Current State of the Literature

The mate preference literature is divided: though most self-report and revealed preference research with hypothetical partners suggests that traits related to cooperative partner and parental value are the most important, with sex differences existing in preferences for physical attractiveness vs. cues of resource control, research with real mating

outcomes suggests that there are no sex differences in predictors of actual mating choices, and that physical attractiveness is the most important quality. What kind of research could clarify these issues?

There appears to be a tradeoff in extant mate preference research between ecological and internal validity. On the one hand, speed-dating research increases ecological validity because participants interact with real potential mates and make decisions that have genuine consequences, but makes it difficult for researchers to causally isolate variables of interest. These studies are also flawed in that their samples may lack low-end variability in key traits, and limited interaction times may prevent relevant traits from being accurately assessed.

On the other hand, policy-capturing research where individuals are exposed to mock dating profiles or vignettes with trait terms provide good experimental control, since researchers can experimentally manipulate traits of interest while holding other variables constant, thus allowing for causal claims. However, there are frequently important demand characteristics in these studies, as traits are often explicitly manipulated, and participants may simply respond favorably to any explicit favorable information. In addition, it is not clear that trait terms or descriptors in vignettes provide appropriately rich input cues to person-perception mechanisms. True experimental research that provides vivid but implicit cues of traits may be the best way to determine the causal predictors of mate attractiveness.

Jensen-Campbell et al. (1995) provide one example of this type of research. The researchers experimentally manipulated men's dominance and prosociality by creating videos of the same male confederate behaving more or less dominantly and agreeably towards another male confederate; women subjects viewed these videos and then rated the

attractiveness of the target male in a between-subjects design. Results suggested that males who were more agreeable towards another male were perceived as significantly more attractive than males who were less agreeable, particularly when they also behaved dominantly (Jensen-Campbell et al., 1995). This study contained the elements of strong experimental research, but consisted of only one male target actor, and investigated effects of only dominance and prosociality. Video research such as this is likely difficult to scale, given the costs of training actors and filming them across situations. There may also be some issues with correlated cues, in that even if the actors are instructed to keep other behaviors constant across conditions, they may unconsciously alter other behaviors in ways that they feel would be consistent with the manipulated behavior.

Thus, though there have been many different attempts to elucidate the architecture of our evolved mate preference mechanisms, no existing method has provided definitive answers about what people find desirable in mates. This literature is ripe for a new experimental method that can causally isolate the predictors of mate attractiveness while avoiding the limitations of previous methods highlighted above.

II. A New Method for Assessing Human Mate Preferences

Initial Tests of the Method

The present research and proposed set of follow-up experiments seek to (a) provide a novel experimental paradigm for assessing mate preferences that resolves many of the issues in previous methodologies, and (b) clarify the design of mate preference mechanisms by elucidating which traits are attractive in potential mates, and whether there are sex differences in the preferences for these traits.

Our approach was to present hypothetical mates in a modified memory confusion paradigm (Taylor, Fiske, Etcoff, & Ruderman, 1978), which afforded true experimental control, the ability to manipulate traits implicitly, and a built-in manipulation check. The general idea was to construct representations of opposite-sex targets by pairing faces varying in physical attractiveness with many different behavioral sentences that indicated high or low levels of specific traits. After viewing a succession of face-sentence pairings, participants rated targets' mate attractiveness. Revealed preferences were assessed from the ratings given to the various targets.

Experimental control was ensured by randomizing face-sentence pairings for each subject, and demand characteristics were reduced by virtue of participants seeing many more face-sentence pairings than they could remember, thus forming general impressions rather than explicit representations of the targets' behaviors. Our behavioral sentences were also constructed to provide rich but relatively implicit cues of traits that would strongly cue person-perception mechanisms. These types of 'diagnostic' behaviors are probably highly relevant to mate attractiveness but usually absent in speed-dating interactions, which may be

why speed-dating research has not found effects for the traits highly valued in the self-report literature.

The memory confusion paradigm classically includes a memory test following face-sentence pairings (i.e., “Who did what?”) to measure categorization for social categories; here, we also included a memory test, and patterns of errors made were used to assess whether the trait manipulation was successful (i.e., did participants confuse kind people with other kind people?). This allowed us to determine whether participants formed implicit representations of the targets that conformed to the manipulation, which, to our knowledge, no previous mate preference studies have attempted to measure. Thus, this design allowed us to provide a strong but implicit manipulation of targets’ traits, test whether the manipulation was encoded by participants, and then assess revealed preferences for the trait in question.

Studies 1 and 2

We first tested the method with a design that manipulated a single character trait via sentence information and pitted it against targets’ physical attractiveness. In Studies 1 and 2, we manipulated kindness towards same-sex third parties (high vs. low vs. no information) and social status (high vs. low vs. no information), respectively.

Study 1 Background: Preferences for Kindness Towards Third Parties

Kindness is a trait word that has surfaced recurrently in the extant mate preference literature. It has been shown to be an important, if not the largest component of mate attractiveness across most of the self-report and revealed preference research using vignettes

(e.g., Buss, 1989; Evans & Brase, 2007; Fletcher et al., 2004). However, it is not clear what exactly is meant when people report valuing kindness in a potential mate. This trait term may conflate distinct qualities that are differentially important to the sexes, or that change in importance across contexts or life stages. Do people want mates who are dispositionally warm and generous, or mates who are warm and generous specifically to their romantic partners and close allies? Is gentleness prized, even if it means submissiveness in the face of intragroup conflict?

Kindness in different contexts may also be attractive for different reasons. Generosity towards kin may reflect kin selection (Hamilton, 1964), which would be a favorable quality in the person you are going to have offspring with; generosity towards acquaintances may index reciprocal altruism (Trivers, 1971); and generosity towards strangers may be a costly signal of quality in the context of sexual selection (Zahavi, 1975). Altruistic behaviors in general may also be a courtship display, a signal that the person is likely to be an attentive mate and parent (Tessman, 1995). Little existing research has provided data that can adjudicate between these theoretical possibilities.

A potential mate's cooperativeness and generosity towards his or her partner is a fairly obvious predictor of possible fitness gains for the partner and offspring. Lukaszewski & Roney (2010) have convincingly argued that self-reported preferences for kindness in the existing literature likely reflect preferred kindness towards the self, and have shown that people self-report preferring somewhat lower levels of kindness from their partners when directed towards third parties. In research using economic games, perceptions of attractiveness were found to shift when sham partners behaved more or less cooperatively

towards participants, suggesting that individuals integrate information about how cooperative someone is towards oneself into attractiveness judgments (Farrelly, Lazarus, & Roberts, 2007).

Research assessing effects of kind or altruistic behaviors towards unrelated third parties on mate attractiveness has generally shown that these behaviors make individuals of both sexes more attractive, with larger effect sizes for women assessing men, particularly when women are considering a short-term relationship. This is the case for self-report studies where individuals rate the desirability of helping behaviors such as “regularly helps an elderly neighbour” (MPAT scale: Farrelly, 2013; Phillips, Barnard, Ferguson, & Reader, 2008) or the importance of altruistic acts such as “taught a stranger to use a ticket machine” and “helped a stranger who fell on the road” (SRAS-DR scale: Oda, Shibata, Kiyonari, Takeda, & Matsumoto-Oda, 2013). The same sex difference has been found in revealed preference research using mock dating profiles that differed in information about hypothetical mates’ helping behavior (short-term context only: Barclay, 2010; Moore et al., 2013). The alleged positive effect of altruistic behavior on the mate attractiveness of men may be even strong enough to overcome effects of physical attractiveness: in an experimental revealed preference study by Farrelly, Clemson, & Guthrie (2016), unattractive, highly altruistic men were rated more favorably as long-term mates than highly attractive, selfish men. Finally, individuals who report more altruistic behaviors are more likely to enter into relationships within the year (Stavrova & Ehlebracht, 2015) and also report greater mating success, again with stronger correlations for men (Arnocky, Piche, Albert, Ouellette, & Barclay, 2016).

However, other research has shown that men's altruism towards third parties may only be desirable in contexts that also signal bravery (Kelly & Dunbar, 2001), and that cooperation with other men may not be attractive if it means giving up some important resources (Price, 2006). Women also appear to be attracted to a certain level of male dominance behavior (e.g., Ahmetoglu & Swami, 2012; Sadalla et al., 1987), especially when this dominance is directed towards unrelated others (Lukaszewski & Roney, 2010), which, intuitively, seems somewhat at odds with certain conceptions of kindness or altruism. At this time, it is unclear to what extent truly 'kind' behaviors towards third parties are attractive in potential mates, and whether sex differences exist in this preference.

Here, we aimed to contribute to this literature by investigating the effects of kindness towards third parties (of the same sex as the actor) on mate attractiveness using our novel paradigm. Given that, for both sexes, behaving unkindly towards conspecifics may have had negative consequences for future cooperation and social support (e.g., Cottrell et al., 2007), and that highly kind behaviors might index good parenting qualities (Tessman, 1995), we tentatively hypothesized that:

H1a: There will be a main effect of kindness towards third parties on mate attractiveness for both sexes, such that high kindness targets will be rated as more attractive than low kindness targets.

Since commitment to offspring is less obligatory for men than it is for women (e.g., Trivers, 1972), we reasoned that women may be particularly attentive to cues of devotion and

trustworthiness in men, even when these cues are in behaviors that are directed towards other men. Previous studies have indeed generally found stronger kindness preferences in women. Thus, we further hypothesized:

H1b: There will be an interaction between target sex and kindness, such that the effect of kindness will be stronger for male targets.

Study 2 Background: Preferences for Cues of Social Status

Sex differences in preferences for traits predictive of resource access are among the most well-documented: Across self-report measures (e.g., Buss, 1989; Feingold, 1992), revealed preference research (e.g., Fletcher et al., 2004; Townsend & Levy, 1990), field experiments (e.g., Guegen & Lamy, 2012), and ethnographic data (e.g., Marlowe, 2004), women are shown to value these qualities in romantic partners more than men do (for a review, see Schmitt, 2014). Even in speed-dating studies where physical attractiveness tends to swamp other traits, there are sometimes detectable effects of status-relevant factors, such as earning prospects and education level (Asendorpf et al., 2011; Fisman et al., 2006; Todd et al., 2007). Traits such as these are thus sensible to include in the first tests of our new method.

However, like ‘kindness’, cues of resource access or resource acquisition ability are multifarious. Some research has focused on personality or character traits that may have ancestrally predicted resource acquisition or gains in status, such as physical strength or height (e.g., Dixson, Halliwell, East, Wignarajah, & Anderson, 2003; Gillis & Avis, 1980),

social dominance (e.g., Ahmetoglu & Swami, 2012; Sadalla et al., 1987), ambition and industriousness (e.g., Buss, 1989; Howard et al., 1987), or intelligence (e.g., Lee et al., 2014; Marlowe, 2004). Other research has measured preferences for predictors of modern resource acquisition, such as education level (e.g., Buunk et al., 2002) or earning prospects (e.g., Buss, 1989; Stewart, Stinnett, & Rosenfeld, 2000). Finally, some research has focused on cues of current resource access, such as current income (e.g., Fales et al., 2016; Hitsch et al., 2010) or current social level (e.g., Feingold, 1992; Townsend & Levy, 1990). These qualities are probably not independent (for example, someone with greater ambition may achieve a higher education level and a higher income), but these dimensions may not always covary, either.

An interesting question is whether social status on its own is attractive, or whether this preference is really a byproduct of a preference for character traits that would have predicted resource acquisition ancestrally. Jonason, Li, and Madson (2012) demonstrated that women self-report preferring men who have earned their resources rather than coming to possess them via inheritance or chance events like a windfall, suggesting that resource possession is less attractive without the character traits that favor their acquisition.

Experimental research has found that even when all other traits are held constant, minimal cues of social status or resource control, such as education level (Ong, 2015), employment uniform (Townsend & Levy, 1990), or possession of luxury items (Dunn & Hill, 2014; Dunn & Searle, 2010) strongly impact the attractiveness of men, but not women. Other field studies have shown that women are more likely to agree to go on a date with a man if he is standing next to a fancier car (Guegen & Lamy, 2012). Of course, these findings could still be consistent with the idea that women value the underlying traits predictive of resource

access over pure resource access, if women simply make inferences about underlying traits from the cues that are given, but these findings raise the possibility that resource possession or social position on its own is attractive.

In Study 2, we manipulated targets' social status among their same-sex peers via information about third parties' behavior towards them. The information provided in the sentences was designed to generate strong inferences about the targets' positions in the social hierarchy. Across human societies, social position predicts privileged access to resources (Henrich & Gil-White, 2001) and greater reproductive success (von Rueden, Gurven, & Kaplan, 2011). Social status was likely also a consistent correlate of resource control across time periods and environments, causing cues of it (e.g., deference by others, respect from others, apparent popularity) to be particularly salient. Since access to resources produced by men (e.g., the spoils of hunting) would have had large consequences on women's reproductive success, whereas access to resources produced by women would probably have had relatively smaller effects on men's reproductive success, we predicted the following:

H2: There will be an interaction between target sex and status, such that the effect of status will be stronger for male targets. Specifically, status will positively predict the mate attractiveness of male, but not female, targets.

Though physical appearance may provide information about various qualities in potential mates that have fitness implications for both sexes (e.g., health, genetic quality, phenotypic condition), the strong selection pressure on men to choose fertile mates suggests that men

may place greater emphasis on physical cues that women will. A multitude of evidence from the self-report and revealed preference literature is consistent with this (Schmitt, 2014).

Thus, we predicted the following:

H3: The effect of physical attractiveness on mate attractiveness will be stronger for female targets.

General Method

Design

The design for Studies 1 and 2 was a 2 (Target sex: male vs. female) x 3 (Trait level: high vs. low vs. no information) mixed design, with target sex as between-subjects factor and trait level as a within-subjects factor. Subjects always viewed opposite-sex individuals. The pre-rated physical attractiveness of the faces was included as a covariate in the models to test effects of physical attractiveness.

Participants

The initial sample for the kindness experiment (Study 1) consisted of 82 undergraduate students at UCSB (43 males, 39 females; mean age = 18.98, S.D. = 1.08). Seventy-six undergraduate students (40 males, 36 females; mean age = 19.35, S.D. = 2.84) completed the status experiment (Study 2). Participants provided written, informed consent, and all procedures were approved by the UCSB Institutional Review Board. Nine participants (5 females) identified as non-heterosexual and were excluded from analysis. A

further five participants (1 female) were excluded due to their response patterns being characteristic of inattention or disregard for the experiment (i.e., making the same key-press for all rating questions). The final sample thus consisted of 79 participants (38 female) in the kindness experiment (Study 1), and 65 participants (31 female) in the status experiment (Study 2).

Materials

Photo Stimuli. Target photos were from a stimulus set provided by Ian Penton-Voak in 2014. Photos consisted of front-facing portraits of young men ($N = 21$) and women ($N = 22$) displaying neutral expressions. Photos from this initial set were rated for a variety of traits by 44 opposite-sex UCSB undergraduates (21 males, 23 females, mean age = 19.59, S.D. = 2.45) in exchange for partial course credit. Rated traits included physical attractiveness, attractiveness as long-term mates, competence, trustworthiness, kindness, dominance, and popularity. Ratings were completed on a 7-point scale, e.g., “On a scale of 1-7, how PHYSICALLY ATTRACTIVE is this woman(man), relative to other women(men) of the same age?” (1= Much LESS attractive, 4 = About AVERAGE, 7 = Much MORE attractive).

Between-rater agreement was high for ratings of physical attractiveness (ICC = 0.91 for male raters, 0.94 for female raters), as well as for the other trait ratings (all ICCs > .87 for both sexes). The mean physical attractiveness rating of the female faces was slightly below the midpoint of the scale (mean = 3.88, S.D. = 0.75), and the mean physical attractiveness rating of the male faces was slightly lower (mean = 3.17, S.D. = 0.97) than for female faces.

These results are consistent with findings of other studies that male facial photographs receive lower physical attractiveness ratings than female facial photographs do (e.g., Li et al., 2013).

On the basis of the physical attractiveness means from this pilot rating study, 12 faces of each sex were selected for use in the subsequent mate preference experiments. In order to provide a range of physical attractiveness in our stimuli, the three highest-rated and three lowest-rated faces were selected, as well as six faces within 0.5 S.D.s from the mean (three above and three below). The three ‘highly attractive’ targets had mean physical attractiveness ratings that were at least 1 S.D. above the sex-specific mean, and the three ‘highly unattractive’ targets were at least 1 S.D. below the sex-specific mean; the remaining six faces that were selected clustered near the sex-specific means. Thus, male and female photo stimuli used in the experiment represented an approximately equivalent range of physical attractiveness. All target faces used in the experiment were of Caucasian ethnicity.

Sentence Stimuli. Fifty-one initial statements were constructed with the aim of providing a strong sense of the target’s degree of (a) kindness towards third parties and (b) relative social status in the group. The sentences were descriptions of either the target’s behavior towards third parties, or third parties’ behavior towards the target. Following Delton et al. (2012), the statements were written to describe behaviors of individuals in a tribal foraging setting. We reasoned that trait inferences from these behaviors might be particularly accurate given that tribal foraging was likely a recurring situation over human evolutionary history. Individuals were situated within the context of having been stranded

together on an island and having to work together to survive. Behavioral statements thus depicted targets interacting in various ways with same-sex individuals within a kind of extended camping trip where survival presented a real problem. Many statements depicted behaviors of the individual during foraging expeditions, and other statements depicted life for the target back at base camp.

Thirteen statements were written to capture 'high kindness', thirteen for 'low kindness', thirteen for 'high status', and twelve for 'low status'. The statements were constructed with the aim of having equivalent effects for male and female targets. An example of a high kindness sentence was, "This man(woman) stayed up late one night talking with and trying to cheer up a young man(woman) who had been mocked by some of the other men(women) earlier that day." An example of a low status sentence was, "While out foraging, this man(woman) saw the other men(women) passing around a piece of delicious honeycomb, but no one offered him(her) any even though he(she) was standing right there."

The statements were rated for various traits by the same participants who rated the photo stimuli; as for the photo ratings, male participants viewed female statements, and female participants viewed male statements. The statements rated by male and female participants were identical except for pronoun sex. Prior to viewing the statements, rating participants learned about the island foraging scenario described above. Participants were told that they would be presented with various statements describing behaviors of different individuals on the island, with the task being to rate the extent to which the statement provided information regarding various traits of the person in question. Participants then

viewed all 51 statements in random order. Two versions of the rating survey were created to mitigate rating fatigue; participants were randomly assigned to complete one of the two versions. The two surveys contained identical sets of statements, but differed with respect to rating anchors: in one version, participants rated each sentence for ‘competent’, ‘kind’, ‘dominant’, ‘trustworthy’, and ‘high status’; and in the second version, the same sentences were rated for ‘skilled’, ‘considerate’, ‘strong’, ‘honest’, and ‘popular’. Ratings were completed on a 7-point scale, e.g., “How much does this event suggest that the person in question is competent?” (1 = Incompetent, 4 = No information/neither, 7 = Competent).

Rater agreement was high across items in both versions of the statement rating surveys, for both sexes (all ICCs > .94). Ratings of competent/skilled, kind/considerate, and high/status popularity were very similar (α s > .96) and were thus averaged to create composite ratings of Competence, Kindness, and Status. The statements appeared to capture the dimensions they were attempting to capture: high kindness statements were rated as suggesting the person in question was highly kind (mean kindness = 6.83, S.D. = 0.09 for male targets; mean kindness = 6.79, S.D. = 0.16 for female targets); low kindness statements were rated as unkind (mean kindness = 1.37, S.D. = 0.21 for male targets, mean kindness = 1.37, S.D. = 0.21 for female targets); high status statements were rated as high status (mean status = 6.63, S.D. = 0.19 for male targets, mean status = 6.31, S.D. = 0.40 for female targets); and low status statements were rated as low status (mean status = 1.65, S.D. = 0.18 for male targets, mean status = 1.63, S.D. = 0.41 for female targets). Importantly, the statements had nearly equivalent effects on trait perceptions across the sexes (ICC = .97 for ratings of kindness between the sexes, ICC = .99 for ratings of status).

Thirty-two statements were then selected for use in subsequent experiments on the basis of these mean pre-ratings. The eight statements giving rise to the most extreme scores for each category (high kindness, low kindness, high status, low status) that also were not outliers on either competence, dominance, or trustworthiness ratings were chosen. We constructed an additional 20 ‘neutral’ sentences that described various non-trait-informative events in the manner of Delton et al., (2012), such as “As the sun began to set, he(he) noticed the wind was beginning to pick up.” These statements were not pre-rated, but since they were to be randomized across conditions in the full experiment, we reasoned that any non-neutral inferences drawn from these statements would not systematically affect results. The full set of trait-relevant and neutral statements used in Study 1 and 2 is provided in Appendix A.

Experiment Software

The experiment was constructed in E-prime (Version 2.0), and was displayed on 1920 x 1080 widescreen monitor screens. Demographic and background information were collected through a securely hosted online Qualtrics survey.

Procedure

Participants were seated at individual computer terminals in a quiet testing room and were told that the experiment consisted of forming impressions of individuals that had been stranded on an island following a plane crash. Research assistants instructed participants to pay close attention to the information given about the various individuals because they would

be asked about their impressions of the various people later. After providing informed consent, participants commenced the E-prime experiment and worked through it at their own pace.

The first screen displayed the island vignette, which informed the participants about a group of people working together to survive on an island following a plane crash (for the full vignette, see Appendix B). Individuals on the island were all of the opposite sex from the participant. Participants were told that on the following screens they would learn about various people on the island. They were also instructed to pay close attention, as the screens containing information about the individuals on the island would advance automatically.

Learning Phase. Participants then viewed a series of screens, each of which displayed a photograph of a target with a behavioral sentence displayed below it. Screens were displayed for 5000ms each. The first 12 screens displayed unique targets. Once all of the targets were presented once, the faces were presented again, in random order, with a new behavioral sentence. Once all the faces were presented a second time, they were presented a third time, paired with a third sentence. Sentences were randomly paired with faces without replacement and with the following constraints: ‘high trait’ and ‘low trait’ faces were paired with 2 trait-relevant and 1 neutral sentence, and trait information was consistent within-targets. For example, if a face was randomly chosen by the computer to be highly kind, then it was randomly paired with one neutral and two high kindness sentences. Faces that were randomized to be in the no information condition were paired with three neutral sentences. Of the 12 different opposite-sex targets presented, four were randomly assigned to be High

Kind, four Low Kind, and four No Information (Study 1). Since each of the 12 faces were displayed three times with a unique sentence, participants viewed 36 face-sentence pairs total, eight of which were ‘high kindness’ pairings, eight ‘low kindness’ pairings, and 20 neutral sentence pairings. In Study 2, the learning phase was identical, except that the manipulated trait was Status instead of Kindness.

Distractor Phase. To reduce short-term memory effects, participants were given a distractor task, which consisted of viewing an unlabeled map of the United States and having to quietly think of the names of as many of the 50 states as possible within two minutes.

Memory Phase. Participants were then given a surprise memory test: all of the targets were displayed around the perimeter of the screen in a random configuration, and the sentences were displayed, one at a time, in the center of the screen, in random order. For each sentence, participants were asked to click on the target that had previously been associated with that sentence.

Target Ratings. Following the memory test, participants made a series of ratings regarding each of the targets. Targets were presented in random order, but all trait ratings were completed for a given target before a new target was displayed. The rating items relevant to mate attractiveness were always presented first, with the order of short- and long-term rating items randomized, followed by the other trait ratings. Ratings were made on a 7-point scale. Long-term mate attractiveness was assessed through the items, “Assuming you

were single, how interested would you be in the possibility of this woman(man) becoming your steady girlfriend(boyfriend)?” (1 = Not at all interested, 7 = Very interested), and “How attractive do you find this woman(man) as long-term romantic partner?” (1 = Not at all attractive, 7 = Very attractive), $r = .91$. Short-term mate attractiveness was assessed through the items, “Assuming you were single, how interested would you be in engaging in passionate kissing alone with this woman(man)?” (1 = Not at all interested, 7 = Very interested) and “How attractive do you find this woman(man) as a short-term sexual partner (even if you would not consider actually engaging in sexual acts with her(him))?” (1 = Not at all attractive, 7 = Very attractive), $r = .92$. The long- and short-term rating items were averaged to form an overall mate attractiveness composite (for which $r = .83$). After the mate attractiveness ratings, 10 additional items assessing perceptions of various traits (e.g., parenting ability, dominance) were presented in random order. Additional composites were created for perceived kindness, perceived status, and cooperative partner attractiveness. For the full list of ratings and composite variables, see Appendix C.

Background Questions. After the E-prime experiment was concluded, participants completed an online Qualtrics survey assessing demographic and other individual difference variables.

Data Analyses

Trait Categorization. To assess whether participants implicitly encoded targets’ kindness or status levels (i.e., did we successfully manipulate the trait implicitly?), the

patterns of errors made in the memory test were assessed. The logic of the analysis is as follows: if subjects were encoding trait information and forming some sort of summary variable in their minds regarding who was kind or unkind, for example, then they would have been more likely to mistakenly attribute a 'high kindness' sentence to another High Kind target (within-category error) than to a neutral or Low Kind target (between-category error). Following the procedures of Delton et al. (2012), the mean number of between-category and within-category errors for trait-relevant sentences from each subject's memory test was computed. Since there were three ways to make a within-category error (e.g., three other individuals with the same trait), but eight ways to make a between-category error (e.g., eight individuals with a different trait), the mean number of between-category errors was multiplied by 3/8 to account for this base rate difference in error probability. The mean number of within-category errors was then compared to the mean number of adjusted between-category errors in a paired-samples *t*-test. The mean difference in errors was called the Categorization Score, with larger values representing a tendency to make more within- than between-category confusions. Categorization scores were also computed separately for neutral sentences. Pearson *r* was calculated as a measure of effect size.

Effects of Manipulated Traits on Trait Ratings and Mate Attractiveness. Mixed regression models in IBM SPSS Statistics (Version 22) were used to assess the independent effects of physical attractiveness and kindness or status on mate attractiveness ratings; similar models were used to assess effects on trait ratings as explicit manipulation checks. In most models, the trait was included as a fixed effect, and pre-rated physical attractiveness as a

covariate, though to allow comparison of effect sizes the traits were entered as covariates (with values -1, 0, and 1) in some models. Pre-rated physical attractiveness ratings were standardized with respect to the mean rating for each sex. Most of the mixed regression models contained two levels, with target faces (Level 1) nested within raters (Level 2), though we also tested models where raters (Level 1) were nested within target faces (Level 2). We tested sex differences in these effects by including subject sex as an interaction term in some models. All models included a random subject-level intercept and used robust estimation of standard errors.

Results

Manipulation Checks: Study 1 (Kindness)

Male and female participants correctly attributed 29% and 37% of kindness-relevant ('trait') sentences, respectively, to the facial photos they had been associated with in the memory test. Thus, male participants misattributed 71% of trait sentences, and female participants misattributed 63% of trait sentences.

Was Kindness Information Encoded Implicitly? For errors made with respect to trait sentences, paired-samples *t*-tests revealed that significantly more within-category than between-category errors were made by both male (CatScore = 5.59, S.D. = 3.30, $t(40) = 10.84$, $p < .001$, $r = 0.86$) and female participants (CatScore = 4.50, S.D. = 2.92, $t(37) = 9.49$, $p < .001$, $r = 0.84$), suggesting that participants did implicitly encode kindness information.

When inspecting instead the neutral sentences that were paired with faces who were otherwise paired with kind or unkind information, the pattern of errors did not reveal kindness categorization by male (CatScore = -0.12, S.D. = 1.18, $t(40) = 0.66$, $p = .51$, $r = 0.10$) or female participants (CatScore = -0.41, S.D. = 1.37, $t(37) = 1.85$, $p = .07$, $r = 0.29$). This suggests that participants did not assign kindness valence to neutral sentences associated with kind or unkind individuals.

Was Kindness Information Encoded Explicitly? As a further manipulation check, a mixed regression model testing how manipulated kindness affected explicit ratings of targets' kindness was run. This model revealed a significant main effect of manipulated kindness on the perceived kindness of the targets, $F(2,867) = 166.53$, $p < .001$. The effect of manipulated kindness on perceived kindness was significant for each contrast (Low Kind = 2.80, No information = 4.21, High Kind = 4.74), such that faces paired with high kindness information were perceived as significantly more kind than faces paired exclusively with neutral information, which were in turn perceived as kinder than faces paired with low kindness information (all $ps < .001$). There was a significant interaction between sex and manipulated kindness on perceived kindness, $F(2,865) = 3.21$, $p = .04$, such that low kind behaviors depressed explicit kindness ratings more strongly for female targets. There was no main effect of sex on perceived kindness, $F(1,77) = 1.85$, $p = .18$.

These findings suggest that the manipulation of kindness via sentence information was successful: participants encoded which targets were kind or unkind both at the implicit and explicit level.

Manipulation Checks: Study 2 (Status)

In the status experiment, female participants also performed better on the memory test than did males, with a mean error rate of 60% for trait sentences compared to a 71% error rate for male participants.

Was Status Information Encoded Implicitly? For trait sentences, within-category confusions were more frequent than between-category confusions for both male (CatScore = 3.36, S.D. = 3.57, $t(33) = 5.49$, $p < .001$, $r = .69$) and female participants (CatScore = 4.95, S.D. = 2.37, $t(30) = 11.62$, $p < .001$, $r = .95$), suggesting that subjects implicitly categorized the targets on the basis of the status sentences provided. An independent samples t -test comparing male and female participants' categorization scores revealed that categorization was significantly greater for female participants, $t(63) = 2.08$, $p = .04$.

For the neutral sentences that were paired with high or low status individuals, there was no significant status categorization on the basis of the neutral sentences for male (CatScore = 0, S.D. = 1.61, $t(33) = 0$, $p = 1$, $r = 0$) or female participants (CatScore = -0.08, S.D. = 1.25, $t(30) = -0.38$, $p = .71$, $r = 0.18$). Thus, as in the kindness experiment, categorization occurred on the basis of trait sentences, but not neutral ones.

Was Status Information Encoded Explicitly? A mixed regression analysis was used to test the effect of manipulated status on the perceived status composite. The analysis revealed a significant main effect of manipulated status on perceived status, $F(2,713) = 65.55$, $p < .001$. Contrasts between each level of status were significant (Low Status = 3.12, No

Information = 3.62, High Status = 4.64), such that faces paired with high status information were perceived as significantly higher in status than faces paired exclusively with neutral sentences, which were in turn perceived as significantly higher in status than faces paired with low status information (all p s < .001). There was no interaction between manipulated status and sex on composite status ratings, $F(2,711) = 0.66, p = .52$, suggesting that the effects of status on explicit perceptions of status were equivalent for both sexes. There was no main effect of subject sex on status ratings, $F(1,63) = 0.04, p = .84$.

Thus, our manipulation of status appeared to also be successful, as it affected both implicit and explicit perceptions of the targets' status.

Effects of Kindness on Mate Attractiveness: Study 1

Did Kindness Information Affect Mate Attractiveness (H1a)?

In order to test the hypothesis that kindness would have a positive effect on mate attractiveness for both sexes (H1a), independent models that included manipulated kindness as a fixed factor, pre-rated physical attractiveness as a covariate, and overall composite mate attractiveness as the outcome variable were run separately for each sex. There were significant independent effects of manipulated kindness on overall mate attractiveness for both male targets, $F(2,415) = 5.60, p < .01$, and female targets in these models, $F(2,448) = 22.08, p < .001$, such that information about kindness increased mate attractiveness. These results were the same when analyses were re-run with faces at the unit of analyses instead of raters. Thus, our first hypothesis was supported.

Was the Effect of Kindness Stronger for Male Targets (H1b)?

We next investigated whether the effect of kindness would be stronger for male targets (H1b). A model testing the interaction between kindness and subject sex revealed a marginal interaction effect, $F(2,864) = 2.85, p = .06$, such that the effect of kindness on overall mate attractiveness was actually marginally stronger for female targets (see Figure 1). Thus, H1b was not supported by our data. An inspection of model contrasts qualifies the interaction: low kindness significantly diminished mate attractiveness relative to no information, for both sexes of targets ($\text{meandiff}_{\text{female targets}} = -.55, p < .001$; $\text{meandiff}_{\text{male targets}} = -.36, p < .01$), but high kindness enhanced mate attractiveness relative to no information only for female targets ($\text{meandiff}_{\text{female targets}} = .35, p = .01$; $\text{meandiff}_{\text{male targets}} = .06, p = .66$).

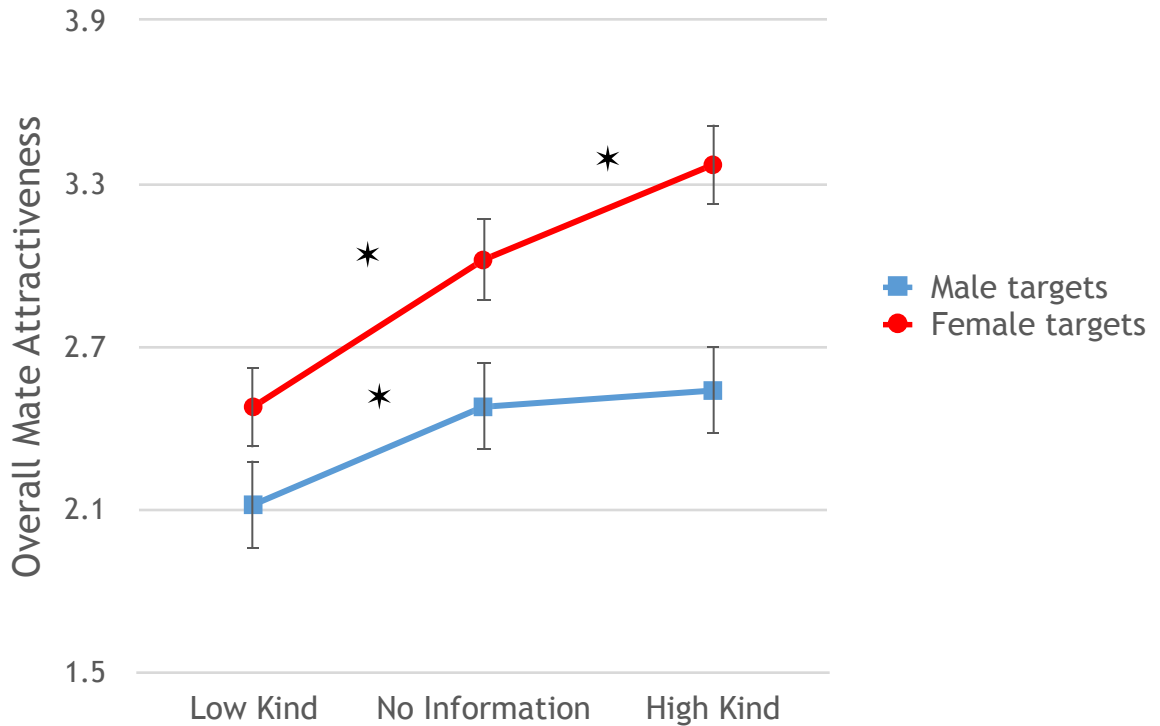


Figure 1. The effect of manipulated kindness on overall mate attractiveness, controlling for pre-rated physical attractiveness, in Study 1. Error bars represent S.E.

Did the Effects of Kindness Differ for Short-Term and Long-Term Relationship Contexts?

These analyses were repeated separately for short- and long-term attractiveness composite ratings as the dependent variables. For the long-term relationship context, the patterns were identical for both sexes. For the short-term relationship context, kindness was no longer a significant predictor of male target attractiveness, $F(2,415) = 2.36, p = .10$, and though the model was significant for female targets, the contrast from no information to highly kind was not (mean difference = 0.23, $p = .15$).

Mixed regression models including kindness as a covariate instead of as a fixed factor were run to allow comparisons of effect size across relationship contexts. As can be seen from Table 1, effect size estimates for kindness were larger in long-term than short-term relationship contexts, for both sexes. To test whether the effect sizes were statistically different, we also ran a mixed regression model testing effects of kindness information on a relationship context difference score (long-term ratings - short-term ratings). This model revealed that effects of kindness were significantly stronger for long-term mate attractiveness compared to short-term mate attractiveness ratings, for both male targets, $F(2,415) = 4.95, p = .01$, and female targets, $F(2,448) = 4.74, p = .01$.

Table 1
Models assessing independent effects of kindness information on short-term and long-term mate attractiveness ratings in Study 1.

	Model estimates		Mate attractiveness means (S.E.)		
	gamma	<i>p</i> -value	LoKind	NoInfo	HiKind
<i>Male targets</i>					
ST context	0.13	0.07	2.14 (.15)	2.41	2.40
LT context	0.27	<.001	2.06 (.15)	2.47	2.59
<i>Female targets</i>					
ST context	0.36	<.001	2.82 (.20)	3.31	3.54
LT context	0.52	<.001	2.19 (.20)	2.79	3.22

Note: Statistics are from models where kindness was entered as a covariate.

How Did the Kindness Manipulation Affect Perceptions of Other Traits?

Mixed regression analyses were used to test effects of manipulated kindness on perceptions of other target traits. Analyses revealed that information about kindness significantly affected perceptions of other traits (see Table 2), with most contrasts between levels of the manipulation being significant. Sex did interact with kindness in predicting perceptions of dominance, $F(2,864) = 3.31, p = .04$, such that kindness reduced female targets' dominance but had no effect on male targets' dominance. There were no interactions between sex and kindness in predicting cooperative partner attractiveness, parenting ability, and social status (all $ps > .14$); for both sexes, sentence kindness positively predicted ratings on these dimensions (all $ps < .001$). Though kindness was positively associated with perceptions of targets' social status, highly kind male targets were not perceived as higher in status than targets paired with neutral information ($p = .25$).

Table 2
Effects of kindness information on trait ratings in Study 1.

	Trait rating means (S.E.)			<i>p</i> -values for contrasts		
	LowKind	NoInfo	HighKind	Lvs.N	Lvs.H	Nvs.H
<i>Male targets</i>						
Cooperative partner	2.57 (.17)	4.00	4.57	<.001	<.001	<.001
Parenting ability	2.75 (.17)	4.10	4.46	<.001	<.001	0.03
Dominance	3.64 (.14)	3.53	3.72	0.50	0.37	0.12
Status	3.20 (.14)	3.94	4.10	<.001	<.001	0.25
<i>Female targets</i>						
Cooperative partner	2.92 (.14)	4.06	4.82	<.001	<.001	<.001
Parenting ability	3.25 (.13)	4.19	4.83	<.001	<.001	<.001
Dominance	4.23 (.14)	3.90	3.86	0.02	0.01	0.79
Status	3.62 (.13)	4.09	4.33	<.001	<.001	0.03

Note: Cooperative partner and status ratings were composites of two items, whereas dominance and parenting ability were single items (see Appendix C).

To compare how the manipulation affected mate attractiveness vs. perceptions of other traits, we ran models where kindness was entered as a covariate predicting these traits. These relative effect sizes are displayed in Table 3.

Table 3
Estimates from models assessing the effect of the kindness manipulation on mate attractiveness, cooperative partner, parenting ability, dominance, and status ratings in Study 1.

	Model estimates	
	gamma (S.E.)	df
<i>Outcome variable</i>		
Mate attractiveness	0.35 (.05)*	867
Cooperative partner	0.98 (.06)*	867
Parenting ability	0.83 (.06)*	867
Dominance	-0.03 (.05)	867
Status	0.42 (.04)*	867

Note: Kindness was entered as a covariate in these models.

* $p < .001$

Effects of Status on Mate Attractiveness: Study 2

Did Status Information Affect the Mate Attractiveness of Female but not Male Targets (H2)?

In order to test the hypothesis that status would positively affect mate attractiveness for male, but not female targets (H2), independent models that included manipulated status as a fixed factor, pre-rated physical attractiveness as a covariate, and overall composite mate attractiveness as the outcome variable were run for each sex. Contrary to H2, there were no effects of manipulated status on composite mate attractiveness for either male targets, $F(2,338) = 1.82, p = .16$, or female targets in these models, $F(2,371) = 1.40, p = .25$. There was likewise no significant interaction between participant sex and manipulated status, $F(2,710) = 0.07, p = .93$, suggesting that the effect of status did not significantly differ between the sexes. These findings are displayed in Figure 2. The same pattern of results was

found when analyses were re-run with faces as the unit of analysis.

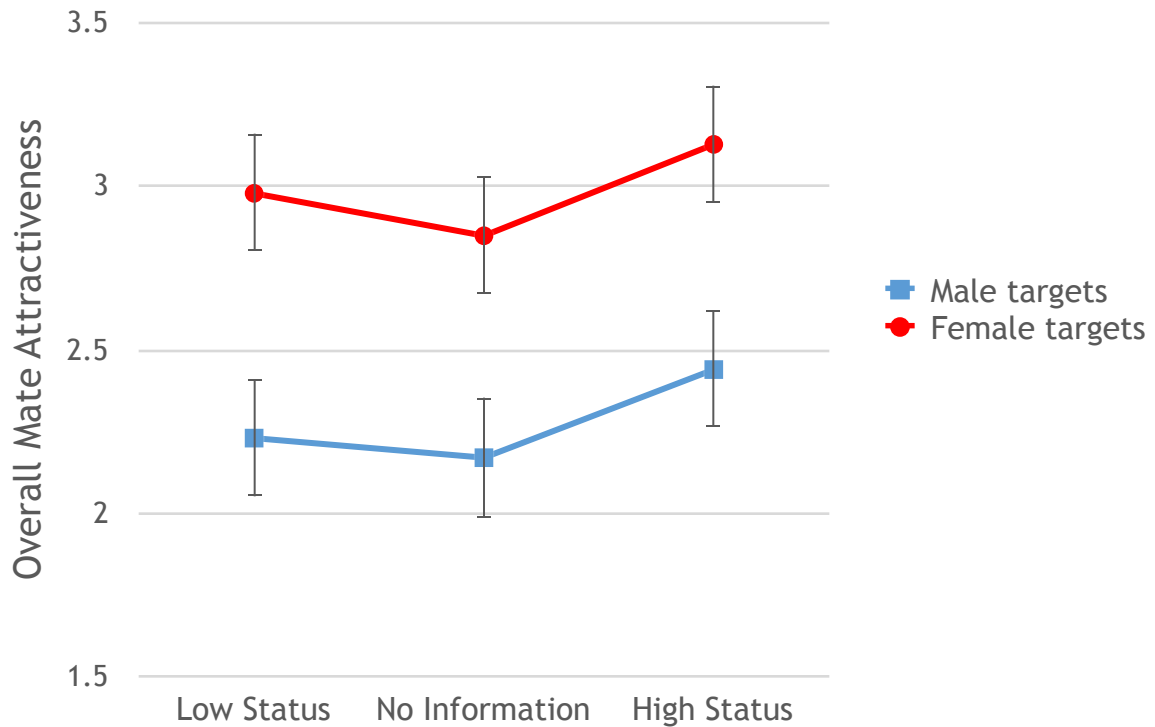


Figure 2. The effect of manipulated status on overall mate attractiveness, controlling for pre-rated physical attractiveness, in Study 2. Error bars represent S.E.

Did the Effects of Status Differ for Short-Term and Long-Term Relationship Contexts?

When these analyses were repeated separately for short- and long-term attractiveness ratings, they produced largely similar findings. There was no interaction between status and sex in predicting either short-term, $F(2,710) = 0.51, p = .61$, or long-term attractiveness ratings, $F(2,710) = 0.24, p = .79$. Across the sexes, status did not significantly predict long-term mate attractiveness ratings, $F(2,712) = 2.54, p = .08$, though it did predict short-term mate attractiveness, $F(2,712) = 3.90, p = .02$. An inspection of the contrasts reveals that this effect was driven by the difference from no information to high status ($p = .01$), whereas the contrast from low status to high status was marginal ($p = .07$).

As can be seen from Table 4, effect sizes for status were very similar between the sexes and across the two relationship contexts.

Table 4
Models assessing independent effects of status information on short-term and long-term mate attractiveness ratings in Study 2.

	Model estimates		Mate attractiveness means (S.E.)		
	gamma	<i>p</i> -value	LoStatus	NoInfo	HiStatus
<i>Male targets</i>					
ST context	0.12	0.14	2.19 (.19)	2.20	2.43
LT context	0.07	0.35	2.25 (.18)	2.07	2.40
<i>Female targets</i>					
ST context	0.11	0.25	3.29 (.21)	3.07	3.50
LT context	0.05	0.53	2.72 (.17)	2.64	2.83

Note: Statistics are from models where status was entered as a covariate.

Additional Analyses

Did the Status Manipulation Affect Perceptions of Other Traits?

Mixed regression analyses assessing the effect of status information on perceptions of other traits revealed that status information significantly impacted these ratings (see Table 5). Sex did not interact with status in predicting cooperative partner attractiveness, parenting ability, dominance, or kindness (all *ps* > .09). Across the sexes, there was generally a positive relationship between status information and dominance perceptions, parenting ability, and cooperative partner attractiveness (all *ps* < .001). There was no effect of status on kindness perceptions, $F(2,712) = 1.87, p = .16$.

Table 5
Effects of status information on trait ratings in Study 2.

	Trait rating means (S.E.)			<i>p</i> -values for contrasts		
	LoStatus	NoInfo	HiStatus	Lvs.N	Lvs.H	Nvs.H
<i>Male targets</i>						
Cooperative partner	3.22 (.19)	3.61	4.06	0.01	<.001	<.01
Parenting ability	3.43 (.16)	3.77	3.99	0.04	<.01	0.17
Dominance	3.04 (.18)	3.33	4.11	0.12	<.001	<.001
Kindness	3.72 (.17)	4.03	4.24	0.03	0.01	0.19
<i>Female targets</i>						
Cooperative partner	3.89 (.17)	3.82	4.44	0.68	<.001	<.001
Parenting ability	3.90 (.17)	3.83	4.12	0.66	0.15	0.06
Dominance	2.98 (.17)	3.07	4.30	0.61	<.001	<.001
Kindness	4.08 (.17)	4.04	4.31	0.79	0.12	0.07

Note: Cooperative partner attractiveness and kindness ratings were composites of two items, whereas dominance and parenting ability were single items (see Appendix C).

To compare how the manipulation affected mate attractiveness vs. perceptions of other traits, we ran models where kindness was entered as a covariate predicting these traits. These relative effect sizes are displayed in Table 6.

Table 6
Estimates from models assessing the effect of the status manipulation on mate attractiveness, cooperative partner, parenting ability, dominance, and kindness ratings in Study 2.

	Model estimates	
	gamma (S.E.)	df
<i>Outcome variable</i>		
Mate attractiveness	0.09 (.06)	713
Cooperative partner	0.35 (.05)*	713
Parenting ability	0.20 (.06)*	713
Dominance	0.60 (.07)*	713
Kindness	0.18 (.05)*	713

Note: Status was entered as a covariate in these models.

* $p < .001$

Did the Effect of Physical Attractiveness Differ Between the Sexes? (H3)

To test H3, we aggregated the data from Studies 1 and 2 and ran models with pre-rated physical attractiveness as a covariate predicting overall mate attractiveness ratings. Across the two experiments, there was a significant interaction between sex and physical attractiveness, $F(1,1582) = 11.80, p < .001$, such that the effect of physical attractiveness was actually stronger for male targets, contrary to H3. The effects of physical attractiveness on mate attractiveness were significant for both male targets, $F(1,758) = 493.60, p < .001$, and female targets, $F(1,824) = 257.50, p < .001$ (see Figure 3). For both sexes, the estimates of the effect of physical attractiveness on mate attractiveness ratings were higher in the short-term rating context ($\gamma_{\text{maletargets}} = 0.99, \gamma_{\text{femaletargets}} = 0.81$) than in the long-term rating context ($\gamma_{\text{maletargets}} = 0.84, \gamma_{\text{femaletargets}} = 0.61$). A mixed regression model testing effects of physical attractiveness on the relationship context difference score (long-

term ratings - short-term ratings) confirmed that the effect of physical attractiveness was significantly stronger in the short-term rating context, $F(1,1582) = 78.39, p < .001$.

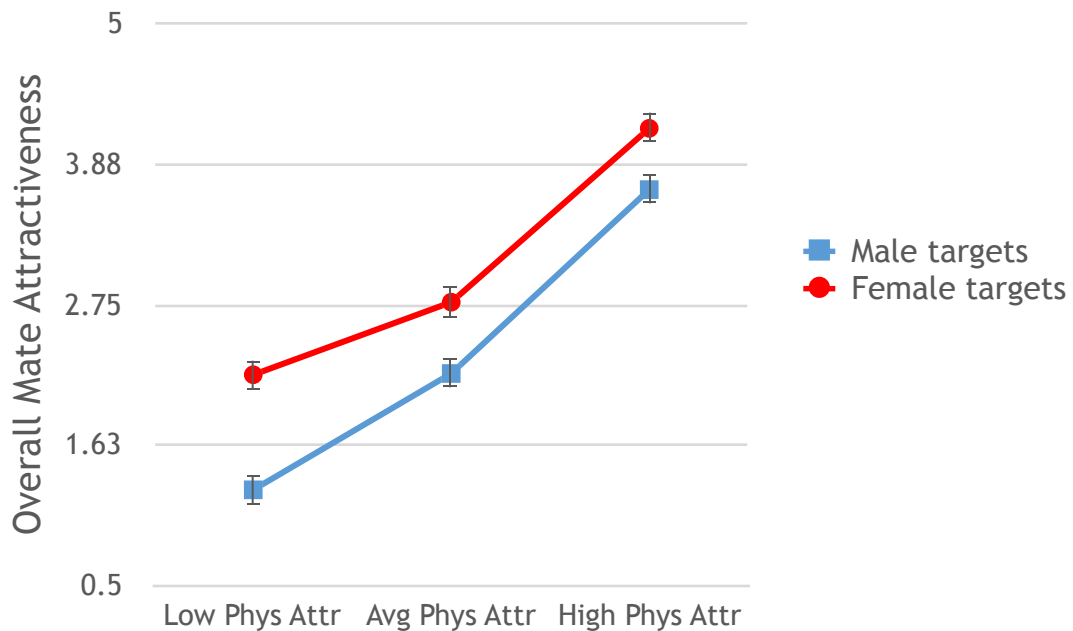


Figure 3. The effect of pre-rated physical attractiveness (standardized within sex) on overall mate attractiveness across Studies 1 and 2. Error bars represent S.E.

How Did the Effects of Physical Attractiveness and the Manipulated Traits Compare?

Models including both physical attractiveness (with values -1, 0, 1) and either kindness or status as a covariate (with values -1, 0, 1) allowed us to compare gammas, our measure of effect size, for these two predictor variables. As can be seen from Table 7, the effect of physical attractiveness was larger than the effects of the manipulated traits.

Table 7

Estimates from models assessing the independent effects of trait information and pre-rated physical attractiveness on targets' overall mate attractiveness in Studies 1 and 2.

	Model estimates	
	gamma (S.E.)	df
<i>Study 1</i>		
Kindness	0.34 (.05)*	867
Phys. Attr.	0.98 (.06)*	867
<i>Study 2</i>		
Status	0.10 (.05)	713
Phys. Attr.	1.20 (.07)*	713

Note: Traits are entered as covariates (coded -1, 0, 1) in these models.

* $p < .001$

Additional Analyses

Did the Effects of the Manipulation Differ Depending on Targets' Physical Attractiveness?

There were no significant interactions between physical attractiveness and manipulated kindness, $F(2,888) = 2.28, p = .10$, or between physical attractiveness and manipulated status, $F(1,734) = 1.73, p = .18$.

Testing Replication of Farrelly et al. (2016)

A previous experimental revealed preference study by Farrelly et al. (2016) had shown that unattractive male targets who were highly altruistic were rated as more desirable as long-term mates than male targets who were highly attractive but behaved selfishly. We were able to test replication of this finding in our study by comparing means for long-term

mate attractiveness for High Kind, Low Attractive (-1 S.D.) men vs. Low Kind, High Attractive (+1 S.D.) men within a mixed regression. Analyses revealed that highly attractive, unkind male targets (mean = 3.21, S.E. = 0.32) were rated as significantly more desirable as long term mates than highly unattractive, kind male targets (mean = 1.81, S.E. = 0.34), $F(1,43) = 9.56, p < .01$. However, highly attractive, unkind female targets (mean = 2.71, S.E. = 0.24) were equally as desirable as highly unattractive, kind female targets (mean = 2.67, S.E. = .24), $F(1,70) = 0.02, p = .89$.

General Discussion

Studies 1 and 2 revealed that our method was successful in manipulating perceptions of targets' traits. The pattern of errors made in the memory test revealed that participants categorized the targets on the basis of the trait information we gave them: e.g., kind targets were more likely to be confused with other kind targets than with unkind or neutral targets. Thus, participants appeared to implicitly encode the social categories that we provided them with. The kindness or status information also affected explicit perceptions of the targets' kindness and status levels.

Effects of Kindness Towards Third Parties

Consistent with H1a, we found that manipulated kindness significantly impacted the overall mate attractiveness of both sexes. Effect sizes for kindness were smaller than those of physical attractiveness, and were larger when ratings were made with respect to long-term attractiveness compared to short-term attractiveness, for both sexes. Interestingly, though

information about targets behaving in an unkind manner towards same-sex third parties significantly depressed the mate attractiveness of both male and female targets relative to providing no information about their kindness, information about targets behaving especially kind towards same-sex third parties significantly elevated the attractiveness of female targets, but not male targets. That information about behavioral kindness affects perceptions of mate attractiveness is consistent with the multitude of findings from the self-report literature suggesting that qualities such as ‘kind/understanding’ figure prominently into mate preferences (e.g., Buss, 1989). The lack of positive effect of high kindness on male target attractiveness is perhaps a little surprising, but is consistent with research by Lukaszewski and Roney (2010) that found that women preferred reduced levels of kindness when directed towards other men, and that male displays of high altruism towards others may be attractive to women only when also paired with bravery (Kelly & Dunbar, 2001).

Follow-up analyses revealed that, relative to no information, highly kind behaviors towards other men did increase women’s perceptions of these males’ cooperative partner attractiveness, parenting ability, and dominance, but did not make these men appear higher status among their peers. This pattern of effects, where high kindness elevated perceptions of other traits but not status, is interesting — perhaps altruism in itself is not enough to raise men’s social status, and if these behaviors cause an unnecessary diversion of time and resources away from a man’s mate and his offspring, then they may not be attractive to women (see Lukaszewski & Roney, 2010). However, we would like to see this pattern replicated before assigning much confidence to it.

Contrary to H1b and to many studies showing that women place greater emphasis on kindness than men do (e.g., Barclay, 2010; Farrelly, 2013; Oda et al., 2013; Phillips et al., 2008), we did not find that the effect of kindness on mate attractiveness was stronger for male targets. In fact, the effect was trending in the opposite direction, with male subjects being more strongly impacted by information about female targets' kindness-relevant behaviors towards other women. This was the case even when ratings were made with respect to a short-term relationship, which is inconsistent with previous research on sex differences in preferences for this relationship context (Barclay, 2010; Phillips et al., 2008), though other studies have shown that sex differences in preferences for altruism for a long-term relationship are smaller or nonexistent (e.g., Farrelly, 2013; Moore et al., 2013).

Whereas high kindness from men towards other men did not enhance attractiveness, women's high kindness towards other women did. Highly kind women were perceived as better cooperative partners, better parents, less dominant, and higher in social status. Women's high kindness towards other women may signal future attentiveness to offspring (Tessman, 1995). The same argument could apply to male high kindness, but the benefits of this display may not overcome the costs of this behavior when directed towards other men, from women's perspectives. Another possibility is that a woman's altruism or empathic behavior towards other women signals to men that she is either already part of, or good at establishing strong female social networks (Shostak, 1981), which may provide important benefits to the couple in the form of alloparenting of offspring down the line.

Effects of Third Party Status Information

Though our manipulation of status appeared to be successful according to the categorization effects and patterns of explicit status ratings, we did not observe an effect of social status on overall mate attractiveness for either sex. Thus, we received partial support for H2, which stated that there would be an effect of status on mate attractiveness for male but not female targets. There was a trending effect of high status information increasing mate attractiveness relative to low status information, but in general, effect sizes were small and did not differ between the sexes. The lack of an effect of status on men's attractiveness runs contrary to a body of evidence showing that male social status is very important to women (e.g., Feingold, 1992; Townsend & Levy, 1990). Ha, Overbeek, and Engels (2010) did not find an effect of social status on men's attractiveness in a sample of adolescents; it is possible that our participants were similarly unfazed by status information due to their youth. Though we found null effects of status information on mate attractiveness, our results demonstrated that the trait information was in fact sticking: target categorization on the basis of status information was strong (particularly so for female subjects), and status information positively predicted the perceived status of the targets (significant at each contrast). Participants were aware of which targets were popular and respected. Status also positively predicted cooperative partner attractiveness and dominance ratings, and male low status targets were perceived as having worse parenting ability and being less kind, compared to neutral targets. Thus, it was a little strange that the status information did not impact the mate attractiveness of male targets, especially since an advantageous status position would likely lead to a flow of benefits for these men's mates (e.g., von Rueden et al., 2011).

Upon reflection, our findings may have differed from those in the literature because of the manipulation of status that we used. Previous research found effects for either cues of resource possession (e.g., income: Hitsch et al., 2010) or traits that suggested resource acquisition ability (e.g., ambition: Wilbur & Campbell, 2010). Most of our status sentences described the reactions of other group members towards the targets (e.g, deference and liking towards high status targets vs. annoyance and social exclusion towards low status targets), rather than specific behaviors by the targets that would plausibly earn high or low status in the group — subjects essentially learned about targets’ existing positions in the social hierarchy. If subjects’ inferences about targets based on their faces were not aligned with the social status that was suggested in the experiment, then participants may have interpreted the other group members’ behaviors as inappropriate; there may similarly have been some ambiguity in the sentences that left it open as to whether the target in question was deserving of the social status. For example, participants may have perceived some low status targets as being unfairly treated by group members and felt sorry for them; high status information may have been similarly unimpressive if there was no additional information to justify it. Thus, the 3rd party information may not have appropriately cued inferences about the person’s ability to acquire or provide resources. The data demonstrate that status information on its own does not affect attractiveness, and raise questions about whether more direct behavioral cues of resource acquisition would have produced the same findings.

Physical Attractiveness

Studies 1 and 2 revealed a large effect of the pre-rated physical attractiveness of the targets on mate attractiveness, but contrary to H3, the effect was stronger for male targets. The majority of the mate preference literature has found the opposite effect (e.g., Buss, 1989; Fletcher et al., 2004; Hitsch et al., 2010; Wiederman & Dubois, 1998), or no sex difference (e.g., Eastwick & Finkel, 2008; Luo & Zhang, 2009; Selterman et al., 2015), so this finding was unexpected. However, it is important to keep in mind that although we took measures to make the distribution of physical attractiveness equivalent for male and females, the actual photographs we used were different and thus not perfectly comparable. Figure 4 shows that the difference in slopes for this effect is fairly minimal, and that the interaction appears to be driven by the fact that low attractiveness male targets received lower mate attractiveness ratings than low attractiveness female targets. Though it is possible that our female subjects were more sensitive to low physical attractiveness (or that our male subjects were less sensitive to it), this is inconsistent with previous research (e.g., Li et al., 2013), and we cannot rule out the possibility that the male photos used simply represented a different range of physical attractiveness. Pre-rated attractiveness was standardized within-sex in an attempt to make the distributions equivalent, but this may have also skewed significant tests in that an artificial distribution was imposed. Additional studies using different photos as stimuli are needed to validate this finding.

The effect of physical attractiveness was also larger than the effects of our trait manipulations in predicting mate attractiveness. In self-report studies, both sexes rate or rank kindness as much higher in importance than physical attractiveness (e.g., Buss, 1989;

Pillsworth, 2008). Our findings are more in line with speed-dating research, which finds that physical attractiveness figures prominently into preferences (e.g., Eastwick & Finkel, 2008; Fletcher et al., 2014). It is possible that physical attractiveness was preferentially weighted here because it was the strongest or most accurate cue available in the experiment (e.g., Fletcher et al., 2014), or that it had stronger effects because it exhibited larger variation than kindness did. Another possibility is that physical attractiveness is very important at the initial stages of mate selection, and other traits are evaluated later. Some researchers have argued that genetic quality might be the first and most important consideration, for both sexes (Miller, 1998).

Farrelly et al. (2016) found revealed preferences in women for highly altruistic, unattractive men as long-term mates over selfish, attractive men. We did not find the same effect: attractive unkind men were preferred to unattractive kind men. However, there was an effect whereby attractive unkind women were equally as attractive to men as long-term mates as unattractive, kind women. These discrepant findings may be due to differences in the recipients of the kind behaviors; in the study by Farrelly et al. (2016), men behaved altruistically towards strangers (e.g., an old man, a woman and her children), whereas here men's behaviors were directed towards same-sex third parties around the same age as the actor. Women may prefer men to behave more kindly towards vulnerable individuals than towards other men.

Chapter 2 Conclusions

In Studies 1 and 2 we demonstrated that our novel paradigm for investigating human mate preferences was successful: we were able to both implicitly and explicitly manipulate the perceived traits of opposite-sex targets and measure subjects' revealed preferences from their mate attractiveness judgements. Study 1 was the first study, to our knowledge, to experimentally demonstrate that behavioral kindness towards same-sex others increases the mate attractiveness of both men and women, and supports the refrain from the self-report literature that kind qualities are extremely important to mate attractiveness.

While Study 2 did not find effects of third party status information on either sex's mate attractiveness, the manipulation did affect subjects' implicit and explicit perceptions of the targets' social status and other traits, suggesting that the manipulation was effective, but did not impact the mate attractiveness of the targets. This interesting result suggests that mere social cues of social standing may not be enough to drive attractiveness judgments; additional information regarding underlying traits, or behavioral evidence justifying the targets' social position may be stronger predictors of individuals' ability to access resources over the long-term.

Overall, these findings fall somewhere in the middle between self-reported preferences and revealed preference data from speed-dating. The strong cues of kindness that we provided, which would rarely, if ever, be evident during a speed-date, did affect perceptions of mate attractiveness, suggesting that there may be some validity to self-reported preferences for kindness. However, physical attractiveness was still a much stronger determinant of mate attractiveness than the trait information provided, consistent

with speed-dating findings. Both of our trait manipulations impacted perceptions of other qualities (e.g., cooperative partner value, parenting ability) more strongly than they did mate attractiveness, suggesting that the information about kindness and status was digested by participants, but just had smaller effects on mate attractiveness judgments.

These first two studies demonstrated that this new method for studying human mate preferences may be fruitful, and opened the door for additional studies with more nuanced manipulations to further investigate the mysteries of human mate preferences.

III. Further Explorations of Kindness

Study 3: Replication of Study 1

Introduction

Study 1 showed that we were able to successfully manipulate the perceived kindness of hypothetical potential mates situated on an island, and that the level of kindness directed towards third parties displayed by these targets significantly impacted their mate attractiveness. Study 3 intended to replicate the findings from the kindness experiment (Study 1) with a new set of photo stimuli to ensure that effects were robust, and not due to an artifact of the specific stimuli used. We also increased our sample size.

Method

Participants

One hundred and fifty-three (63 male, 90 female) undergraduate students at UCSB participated in exchange for partial course credit (mean age = 18.69, S.D. = 1.28). These participants were drawn from the SONA Psychology subject pool, and thus represent the same study population as the participants from Studies 1 and 2. After excluding 19 participants (6 male) who identified as non-heterosexual and six participants (1 male) who made the identical key press for all rating items, the final sample was comprised of 128 participants (56 male, 72 female).

Materials and Procedure

New Photo Stimuli. A new set of facial photos of young men and women displaying neutral expressions (24 female, 25 male) was selected from our lab photo archives for pre-ratings. Photos of individuals of varying physical attractiveness were purposefully chosen in order to provide an ecologically valid range of physical attractiveness. These photos were cropped to the same dimensions as the previous stimuli, and were subject to the same set of pre-ratings from Study 1 by a new sample of 48 opposite-sex UCSB undergraduates (15 males, 32 females, mean age = 18.98, S.D. = 1.96). Between-rater agreement was high for ratings of physical attractiveness (ICC = 0.89 for male raters, 0.94 for female raters). Much like the mean ratings for the previous stimuli, the mean physical attractiveness rating of the new female faces was slightly below the midpoint of the scale (mean = 3.84, S.D. = 0.63), and the mean physical attractiveness rating of the new male faces was even lower (mean = 3.06, S.D. = 0.96).

We again selected 12 faces of each sex for use in the main experiment: three that were 1 S.D. below the sex-specific mean, three that were 1 S.D. above, and six that were within 0.5 S.D.s of the mean. The absolute ratings for these faces were roughly equivalent to those of the previous stimuli (e.g., highest rated male face in Study 1 received a physical attractiveness rating of 5.13 vs. 5.00 in Study 3), and the photo stimuli again represented approximately equivalent ranges of physical attractiveness between the sexes.

The materials, experimental procedures, and data analysis strategy were otherwise identical to those of Study 1.

Results

Manipulation Checks

Error rates for trait sentences in this replication study were 63% for female participants and 69% for male participants.

Was Kindness Information Encoded Implicitly and Explicitly? Tests of categorization on the basis of trait sentences revealed that, as in Study 1, significantly more within-category than between-category errors were made by both male (CatScore= 4.18, S.D. = 3.41, $t(55) = 9.19$, $p < .001$, $r = 0.78$) and female participants (CatScore = 4.37, S.D. = 2.78, $t(71) = 13.35$, $p < .001$, $r = 0.85$), suggesting that our manipulation of kindness was again encoded implicitly.

As in Study 1, neutral sentences that were paired with kind or unkind faces did not exhibit trait categorization. For male participants, within-category and between-category errors were equally likely (CatScore = 0, S.D. = 1.48, $t(55) = 0.01$, $p = .99$, $r = 0$), and for female participants, between-category errors were actually significantly more frequent than within-category errors (CatScore = -0.38, S.D. = 1.40, $t(71) = 2.32$, $p = .02$, $r = -0.27$).

A mixed model assessing the effect of manipulated kindness on ratings of targets' kindness revealed a significant main effect of manipulated kindness, $F(2,1405) = 174.12$, $p < .001$. As in Study 1, the effect of manipulated kindness was significant for each contrast (Low Kind = 2.98, No Information = 4.07, High Kind = 4.52). Thus, the manipulation of kindness in Study 3 replicated that of Study 1.

Effects of Kindness on Mate Attractiveness

Did the Kindness Effects from Study 1 Replicate?

As in Study 1, in separate mixed models including manipulated kindness as a fixed factor and pre-rated physical attractiveness as a covariate, kindness significantly and positively predicted the overall mate attractiveness of both male targets, $F(2,789) = 11.89, p < .001$, and female targets, $F(2,613) = 8.86, p < .01$. All contrasts between kindness levels were significant except, as before, the contrast from no information to high kindness for male targets (mean difference = .16, $p = .12$), and now in Study 3, the contrast from low kindness to no information for female targets (mean difference = -0.14, $p = .18$). There was no interaction between target sex and kindness, $F(2,1403) = 0.85, p = .43$. These replication results are shown next to those of Study 1 in Figure 4. The same pattern of results occurred when analyses were repeated with faces as the unit of analysis instead of raters.

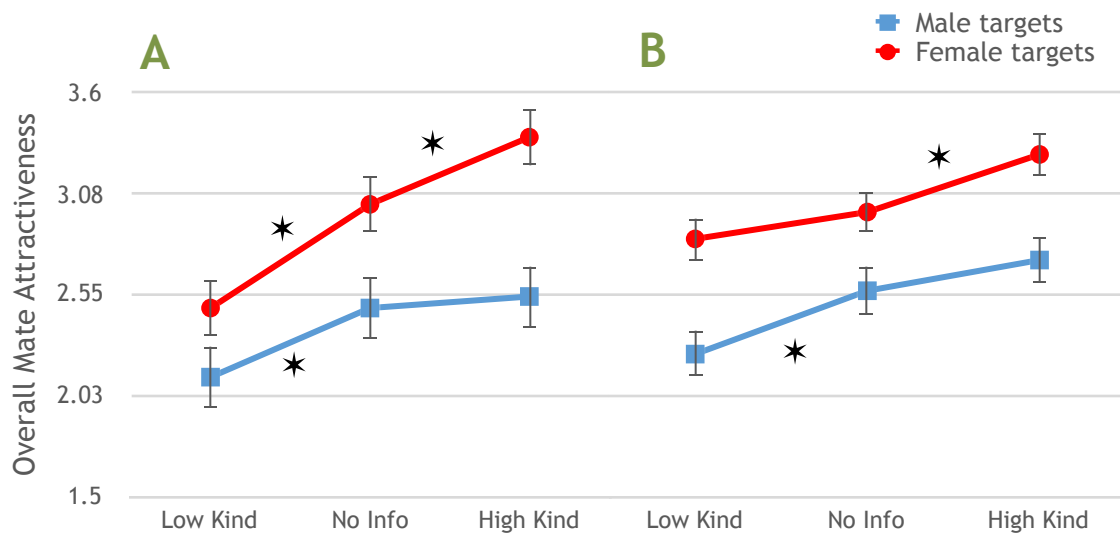


Figure 4. The effect of manipulated kindness on overall mate attractiveness, controlling for pre-rated physical attractiveness in Study 1 (A) vs. Study 3 (B). Error bars represent S.E.

Did Effects Differ Across Short-Term and Long-Term Relationship Contexts?

Patterns were largely similar when assessing effects separately for short-term and long-term relationship contexts: there were significant effects of kindness on mate attractiveness for both sexes in both contexts (all $ps < .01$). As in Study 1, effect sizes for kindness were larger in long-term ($\gamma_{\text{male targets}} = 0.32$, S.E. = 0.06; $\gamma_{\text{female targets}} = 0.29$, S.E. = 0.05) compared to short-term ($\gamma_{\text{male targets}} = 0.15$, S.E. = 0.06; $\gamma_{\text{female targets}} = 0.17$, S.E. = 0.05) rating contexts, though in general these effect sizes were smaller than in Study 1. A mixed model assessing the effect of kindness on the relationship context difference score (LT ratings - ST ratings) revealed that this difference in effect sizes was statistically significant for both male targets, $F(2,789) = 13.66$, $p < .001$, and female targets, $F(2,613) = 9.68$, $p < .01$.

How Did the Kindness Manipulation Affect Perceptions of Other Traits?

Effects of kindness on other trait ratings were very similar to those of Study 1. There were generally positive associations between kindness information and ratings of cooperative partner attractiveness, parenting ability, and social status, though high kindness information did not elevate ratings of social status for either male or female targets (see Table 8). There were no effects of kindness on dominance perceptions, $F(2,1405) = 1.60$, $p = .20$. There were interactions between sex and kindness in predicting cooperative partner attractiveness, $F(2,1403) = 5.19$, $p < .01$, parenting ability, $F(2,1403) = 8.29$, $p < .001$, and status ratings, $F(2,1403) = 9.80$, $p < .001$; specifically, low kindness negatively affected these ratings more so for male targets than for female targets.

Table 8
Effects of kindness information on trait ratings in Study 3 (replication of Study 1 with different photo stimuli).

	Trait ratings means (S.E.)			<i>p</i> -values for contrasts		
	LoKind	NoInfo	HiKind	Lvs.N	Lvs.H	Nvs.H
<i>Male targets</i>						
Cooperative partner	2.68 (.12)	3.98	4.41	<.001	<.001	<.01
Parenting ability	2.66 (.13)	3.79	4.16	<.001	<.001	<.01
Dominance	3.57 (.12)	3.73	3.85	0.25	0.05	0.39
Status	3.02 (.11)	4.00	4.20	<.001	<.001	0.11
<i>Female targets</i>						
Cooperative partner	3.18 (.12)	3.95	4.50	<.001	<.001	<.001
Parenting ability	3.60 (.11)	4.09	4.53	<.001	<.001	<.001
Dominance	3.88 (.11)	3.78	3.84	0.38	0.72	0.61
Status	3.64 (.10)	3.97	4.33	<.01	<.001	<.01

Note: Cooperative partner attractiveness and status ratings were composites of two items, whereas dominance and parenting ability were single items (see Appendix C).

To compare how the manipulation affected mate attractiveness vs. perceptions of other traits, we again ran models where kindness was entered as a covariate predicting these traits. These relative effect sizes are displayed in Table 9.

Table 9
Estimates from models assessing the effect of the kindness manipulation on mate attractiveness, cooperative partner, parenting ability, dominance, and status ratings in Study 3.

	Model estimates	
	gamma (S.E.)	<i>df</i>
<i>Outcome variable</i>		
Mate attractiveness	0.23 (.04)*	1407
Cooperative partner	0.78 (.04)*	1407
Parenting ability	0.62 (.04)*	1407
Dominance	0.07 (.04)	1407
Status	0.48 (.04)*	1407

Note: Kindness was entered as a covariate in these models.

* $p < .001$

Did the Effect of Physical Attractiveness Differ by Sex?

Unlike in Study 1, there was no interaction between sex and pre-rated physical attractiveness on mate attractiveness, $F(1,1404) = 0.06, p = .81$, suggesting that the effect of physical attractiveness on mate attractiveness was equally strong for both sexes. There was a strong independent effect of pre-rated physical attractiveness on mate attractiveness, $F(1,1405) = 1008.18, p < .001$. Figure 5 displays the effect of physical attractiveness on mate attractiveness with the new photo stimuli compared to the effect for the photo stimuli in Study 1.

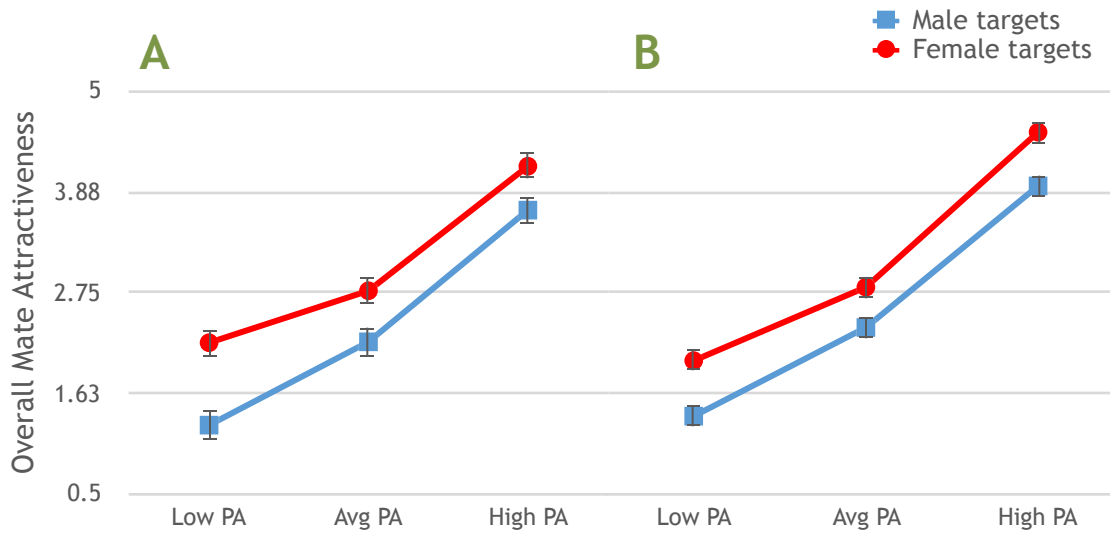


Figure 5. The effect of pre-rated physical attractiveness (standardized within sex) on overall mate attractiveness across Studies 1-2 (A) vs. Study 3 (B). Error bars represent S.E.

Effects of physical attractiveness were again stronger for short-term ($\gamma = 1.07$, S.E. = 0.03) than long-term ratings ($\gamma = 0.85$, S.E. = 0.03), as revealed by analyses testing the effect of physical attractiveness on the relationship context difference score, $F(1,1405) = 111.92, p < .001$.

How Did The Effects of Kindness and Physical Attractiveness Compare?

There was no interaction between physical attractiveness and kindness for either male targets, $F(2,818) = 1.49, p = .23$, or female targets, $F(2,627) = 1.01, p = .36$. Table 10 displays the model estimates for physical attractiveness and kindness predicting overall mate attractiveness for Study 1 vs. Study 3.

Table 10

Estimates from models assessing the independent effects of kindness and pre-rated physical attractiveness on targets' overall mate attractiveness in Studies 1 and 3.

	Model estimates	
	gamma (S.E.)	df
<i>Study 1</i>		
Kindness	0.34 (.05)*	867
Phys. Attr.	0.98 (.06)*	867
<i>Study 3</i>		
Kindness	0.24 (.04)*	1406
Phys. Attr.	1.28 (.04)*	1406

Note: Traits are entered as covariates (coded -1, 0, 1) in these models.

* $p < .001$

Additional Analyses

Were Unattractive, Highly Kind Individuals More Desirable than Attractive, Unkind Individuals? (Another Test of Farrelly et al., 2016)

As in Study 1, we found that highly attractive, low kind male targets were rated as significantly more desirable (mean = 3.07, S.E. = 0.16) in the context of a long-term relationship than highly unattractive, high kind male targets (mean = 1.67, S.E. = 0.17), $F(1,141) = 35.93, p < .001$. There was the same pattern for female targets this time, with highly attractive, low kind female targets (mean = 3.39, S.E. = 0.20) being more desirable than highly unattractive, high kind female targets (mean = 2.07, S.E. = 0.20), $F(1,91) = 32.06, p < .001$.

Discussion

The results from Study 3 largely replicated those of Study 1. First, we successfully manipulated the perceived kindness of targets, both implicitly, according to the categorization scores, and explicitly, according to patterns of kindness ratings. Consistent with H1a, information about targets' kindness towards same-sex third parties significantly affected their mate attractiveness, with stronger effects in long-term compared to short-term relationship contexts. Again, contrary to H1b, the effect of kindness was not stronger for male targets: analyses suggested that the effect was equally strong for both sexes.

The lack of an effect of high kindness compared to no information on male target attractiveness was also replicated here. As in Study 1, while high kindness information elevated perceptions of male targets' parenting ability and cooperative partner attractiveness, it did not elevate perceptions of status. There was also a null effect of kindness on perceptions of dominance. Thus, our theory that high kindness towards other men is not attractive to women because it results in unnecessary diversions of resources that are not compensated by social benefits received additional support here.

Unlike in Study 1, low kindness female targets were not less attractive to men than targets paired with no information. Low kindness females were perceived as less cooperative, having worse parenting ability, and lower in status than females in the 'No information condition', so the null contrast for mate attractiveness is somewhat difficult to explain. Interpreting individual contrasts in general may be complicated by the fact that the 'No Information' condition is somewhat unclear. In these first three studies, we treated this condition essentially as a control, but subjects are likely making inferences about targets'

traits in the absence of explicit information. Thus, findings for individual contrasts could vary from study to study depending on how subjects happen to interpret the ‘No Information’ condition.

In Study 1 we had found that the effect of physical attractiveness on mate attractiveness ratings was actually stronger for male targets, contrary to H3 and many previous findings (see Schmitt, 2014). Here, when a new set of photo stimuli was used, we found that the effect of physical attractiveness was equally strong for both sexes. This highlights the fact that effects of physical attractiveness, and sex differences therein, may vary depending on the specific photo stimuli or range of physical attractiveness present in the study.

As in Study 1, effects of physical attractiveness on mate attractiveness were larger than effects of the kindness manipulation. Unlike the pattern of results reported by Farrelly et al. (2016) that altruistic, unattractive male targets were more desirable to women as long-term mates than selfish, attractive targets, we again found the reverse effect: highly attractive, unkind male targets received higher long-term mate attractiveness ratings than highly unattractive, kind male targets. This same pattern was found for female targets (whereas in Study 1, there was no difference in attractiveness between these two groups for female targets). Overall, revealed preferences in Studies 1 and 3 suggest that though kindness is important, physical attractiveness may be weighted relatively more.

Conclusions

The general conclusions we can draw from Studies 1 and 3 are that individuals' kindness-relevant behaviors towards same-sex conspecifics appear to affect perceptions of mate attractiveness. Low kindness towards others is undesirable in a mate, whereas high kindness towards others may only be desirable in women. These findings are consistent with arguments by Lukaszewski and Roney (2010), who point out that kind behaviors are often costly, and thus should only be desired in contexts where benefits to the person's mate outweigh the costs. Behaving unkindly towards same-sex conspecifics may carry fitness costs for both sexes if it reduces the likelihood that others will cooperate with or help them (Price, 2006; Cottrell et al., 2007). Female high kindness towards other women may be attractive to men because of its relevance for establishing alloparenting networks, which were probably essential to rearing offspring over human evolution (Shostak, 1981), whereas males behaving highly kindly towards other males may not result in enough benefits in terms of status gains to warrant the costs of the behaviors, at least from the perspective of women evaluating the men as mates.

Study 4: Kind towards me? Between-Subjects Target-Specificity

Introduction

The previous kindness studies all provided information about targets' kindness towards same-sex third parties as the manipulation. This information was found to significantly impact the mate attractiveness of both sexes, except that behaving highly kindly towards other males did not elevate the attractiveness of male targets relative to a 'No

Information' condition. Studies 1 and 3 demonstrated that information about kindness towards others was integrated into mate attractiveness judgements, though the information was less predictive of revealed preferences than the targets' physical attractiveness.

The natural follow-up to these studies was to test effects of kindness on mate attractiveness when the information provided instead reflected the targets' kindness towards the participants (the 'self'). There are several reasons to expect that information about how a potential mate behaves towards the self would have more substantial effects on mate attractiveness than information about how the person behaves towards same-sex others. Research has shown that people do behave differently towards different classes of people (e.g., Shoda, Mischel, & Wright, 1994), as would be expected from an adaptationist perspective, since the fitness outcomes to behavior are immensely context- and target-specific (Lukaszewski & Roney, 2010). Not only will an individual's behaviors towards you have more immediate consequences for your welfare, but information about how the person behaves towards you is likely even more diagnostic of future behavior towards you and your offspring than information about how he or she behaves towards others (Lukaszewski & Roney, 2010).

Thus, the key question that we aimed to address with Study 4 is whether information about targets' kind behaviors towards the self would more strongly affect attractiveness judgments than information about targets' behaviors towards third parties. We hypothesized the following:

H4: The effect of kindness on mate attractiveness will be stronger when the actor's kindness is directed towards the study participant ('self') than when directed towards third parties of the same sex as the actor.

Both to reduce the ambiguity of the no-information condition, and to allow more sensitive tests of the kindness manipulation given the findings by Lukaszewski and Roney (2010) that the target-specific differences in preferences were differences of moderate vs. high kindness, we decided to use new sentences that included 'medium kindness' behaviors.

Method

Design

Study 4 was a 2 (Target sex: male vs. female) x 2 (Recipient of kindness: self vs. same-sex third parties) x 3 (Kindness level: high vs. medium vs. low) mixed design, with target sex and kindness recipient as between-subjects factors and kindness level as a within-subjects factor. Participants were randomly assigned to either a kindness towards self condition ('recipient-self': 4a), or a kindness towards others condition ('recipient-others': 4b), the latter of which was a conceptual replication of Studies 1 and 3. Pre-rated physical attractiveness was included in models as a covariate.

Participants

Two hundred and fifty-six participants (150 female, 106 male; mean age = 19.41, S.D. = 1.44) were recruited from the Psychology department subject pool. After excluding

31 subjects who identified as non-heterosexual, the final sample consisted of 69 females in the recipient-self condition, 61 females in the recipient-others condition, 44 males in the recipient-self condition, and 51 males in the recipient-others condition.

Materials

Study 4 Photo Stimuli. Since all targets would now be paired with trait information, and in condition 4a the behaviors would all be directed towards the self, to maintain plausibility we decided to reduce the number of targets from 12 (Studies 1-3) to nine. These nine target faces were a subset of the 12 photos used in Studies 1 and 2: the three highly attractive and highly unattractive faces were chosen, along with three faces average in attractiveness. The photo stimuli in Study 4 thus represented three even categories of physical attractiveness types.

Study 4 Sentence Stimuli. A new set of 66 behavioral sentences was drafted in order to create sentences that suggested the actor was either high in kindness, average in kindness, or low in kindness. To make the scenarios reasonable for condition 4a in which all of the behaviors were directed towards a single recipient (the self), the new sentences described behaviors in situations that ranged in emotional valence from negative to positive, as opposed to those used in Study 1 where the sentences typically depicted somewhat dire situations for the recipient of the behavior. Sentences were written with the intent of producing equivalent kindness inferences for each sex, and of being equally diagnostic in both recipient-self and recipient-others contexts. An example of a medium kindness sentence was, “When another

man was talking about home one night, he apologized for being too sleepy to listen right now and went bed”.

To ensure that the sentences used did indeed produce these inferences, the 66 sentence scenarios were subjected to a similar pre-rating study to that of Studies 1 and 2. Two versions of rating surveys for each sex were built online with Qualtrics survey software: one version contained only recipient-others sentences, and the other contained recipient-self sentences. As in the previous sentence pre-rating surveys, raters were first shown the introductory vignette describing the island survival scenario. Raters in the recipient-self condition were shown modified instructions that asked them to imagine that they were on the island themselves, along with the other targets, (e.g., “Please imagine that you were flying alone to another country...”). The instructions said, “On the following screens, you will read many sentences describing the behaviors of different (men/women). For each sentence, do your best to imagine a new (man/woman) doing the thing described. You will then answer questions about what the sentences suggest about each (man/woman).” Male participants rated sentences about female targets, and female participants rated sentences about male targets. Participants were shown a random subset of 22 of the 66 sentences, and made a series of ratings on a 1-7 scale for each sentence. The rating item for kindness read, “Given this information (he/she) is probably...” (1 - Much LESS kind than other (men/women), 4 - About AVERAGE in kindness, 7 - Much MORE kind than other (men/women)). Similar items were used to assess the dominance, competence, and parenting ability suggested by the behavioral sentence.

These surveys were distributed via both Facebook and Amazon Mechanical Turk. Seventy-two Facebook friends of the primary researcher (28 males, 44 females, mean age = 30.01, S.D. = 9.00) and 141 Turkers (52 males, 89 females, mean age = 39.98, S.D. = 14.42) completed the ratings. Because only a random subset of the sentences were presented to raters, and there were many subsequently missing values in the dataset, it was not possible to compute ICCs. However, the ratings appeared reliable: for example, the average S.D. of kindness ratings for all the sentences was 0.95, and the mean ratings corresponded well to the kindness categories we had intended (e.g., averaged across the four sentence versions for sex and recipient type, low kindness sentences received a mean rating of 2.17, medium kindness sentences received a mean rating of 4.46, and high kindness sentences received a mean rating of 5.99).

The six best high kindness, medium kindness, and low kindness sentences were selected using the following criteria. First, sentences were evaluated on the basis of their mean kindness ratings, and rank-ordered for each kindness type to highlight the strongest high kindness (e.g., mean rating closest to 7), medium kindness (closest to 4), and low kindness (closest to 1) sentences. Sentences were then considered eligible if they were relatively consistent across sentence conditions: e.g., they had mean ratings that were within a 1-point difference between both the sex and the recipient types. Sentences with lower word counts were prioritized over sentences with higher word counts. Finally, the situational valence of the sentences (positive, neutral, negative) for each kindness category was balanced to ensure that individuals from each kindness category were observed in a range of situations. The final set of sentences used in Study 4 is given in Appendix D.

Procedure and Data Analyses

The general procedure for Study 4 mirrored that of previous studies, with a few notable changes. The island vignette at the beginning of the computer task now asked subjects to imagine that they themselves were on the island with the other survivors. Both conditions were now depicted as consisting of a mixed-sex group, and subjects were told, “You are in an experimental condition in which you will only learn about the behaviors of (men/women) towards (you/other men/other women) on the island.” During the subsequent learning phase, subjects were shown nine different opposite-sex individuals instead of 12, each still paired with 3 unique sentences (two trait sentences and one neutral sentence). The memory test now displayed nine faces to choose between instead of 12. The trait rating section was also slightly altered: we changed the wording of the parenting item from “How good with children...” to “How good as a parent would you expect this (man/woman) to be”, and removed the items for “Count on this person as a friend” and “Popular” to reduce rater fatigue, since these items were so highly correlated with “Work in group” (the other item in the cooperative partner composite) and “Respected” (from the status composite), respectively.

The same general data analysis strategy from Studies 1-3 was used. In computing categorization scores, the mean number of between-category errors for each participant was now adjusted by $2/6$ rather than $3/8$ since there were two ways to make a within-category error, and six ways to make a between-category error. In terms of hypothesis tests, experimental condition (recipient-self vs. recipient-others) was added as an interaction term at Level 2 in the mixed regression analysis to assess whether the effect of kindness was

stronger in the recipient-self vs. recipient-others condition (H4). Pre-rated physical attractiveness was again standardized within-sex.

Results

Manipulation Checks

Participants in Study 4 were shown 27 sentences instead of 36 like in Studies 1-3. Mean error rates in the recipient-self condition were 55% for female participants and 58% for male participants; in the recipient-others condition, error rates were 53% for female participants and 62% for male participants.

Was Kindness Information Implicitly Encoded? Categorization scores were computed for each experimental condition, averaged across the sexes. With respect to trait sentences, significantly more within-category than between-category errors were made in both the recipient-self condition (CatScore = 3.53, S.D. = 2.46, $t(112) = 15.27$, $p < .001$, $r = 0.82$) and the recipient-others condition (CatScore = 3.10, S.D. = 2.21, $t(111) = 14.85$, $p < .001$, $r = 0.82$), suggesting that participants again categorized targets implicitly on the basis of the kindness information provided. Effect sizes in these two conditions were identical ($r = 0.82$), suggesting that categorization was equally strong for the two conditions.

With respect to neutral sentences, there was no evidence of categorization in either the recipient-self (CatScore = 0.58, S.D. = 1.45, $t(112) = 0.88$, $p = .38$, $r = 0.08$) or recipient-others condition (CatScore = 0.22, S.D. = 1.45, $t(111) = 1.61$, $p = .11$, $r = 0.15$), suggesting that neutral sentences were not imbued with kindness information.

Was Kindness Information Explicitly Encoded? Mixed models revealed that there was no interaction between kindness information and experimental condition in predicting the perceived kindness of targets, $F(2,1795) = 1.32, p = .27$. This suggests that the effect of kindness on explicit perceptions of kindness was also the same across the two experimental conditions. Across both conditions, kindness information positively predicted kindness ratings, $F(2,1797) = 490.21, p < .001$. The effect of manipulated kindness was significant at $p < .001$ for each contrast (Low Kind = 2.53 , Medium Kind = 3.47, High Kind = 5.06), such that individuals paired with high kindness information were perceived as significantly more kind than individuals paired with medium kindness information, who were in turn perceived as more kind than low kindness individuals.

Effects of Kindness on Mate Attractiveness

Was the Effect of Kindness on Mate Attractiveness Stronger in the Recipient-Self Condition than the Recipient-Others Condition? (H4)

To assess whether kindness had a stronger effect on overall mate attractiveness in the recipient-self condition, we tested the interaction between experimental condition and kindness (H4) in a mixed model that also contained sex as a fixed factor and pre-rated physical attractiveness as a covariate. This analysis revealed that there was no interaction between experimental condition and kindness information, $F(2,1795) = 0.06, p = .95$, suggesting that the effect of kindness information on overall mate attractiveness was equally strong, regardless of whether the recipient of the kind behaviors was the self or third parties

of the same sex as the actor (see Figure 6). This effect also did not differ between male and female targets, as there was no 3-way interaction with sex, $F(7,1271) = 1.75, p = .09$. There was a strong positive independent effect of kindness information on mate attractiveness across the sexes and conditions, $F(2,1797) = 86.37, p < .001$, a main effect of sex, $F(1,222) = 30.72, p < .001$, such that female targets received higher mate attractiveness ratings, but no main effect of experimental condition, $F(1, 222) = 0.20, p = .65$.

There was no interaction between kindness and experimental condition when ratings were made with respect to long-term attractiveness, $F(2,1794) = 0.09, p = .91$, or short-term attractiveness, $F(2,1794) = 0.11, p = .90$, suggesting that the kindness manipulation affected short- and long-term attractiveness ratings equivalently across the two experimental conditions.

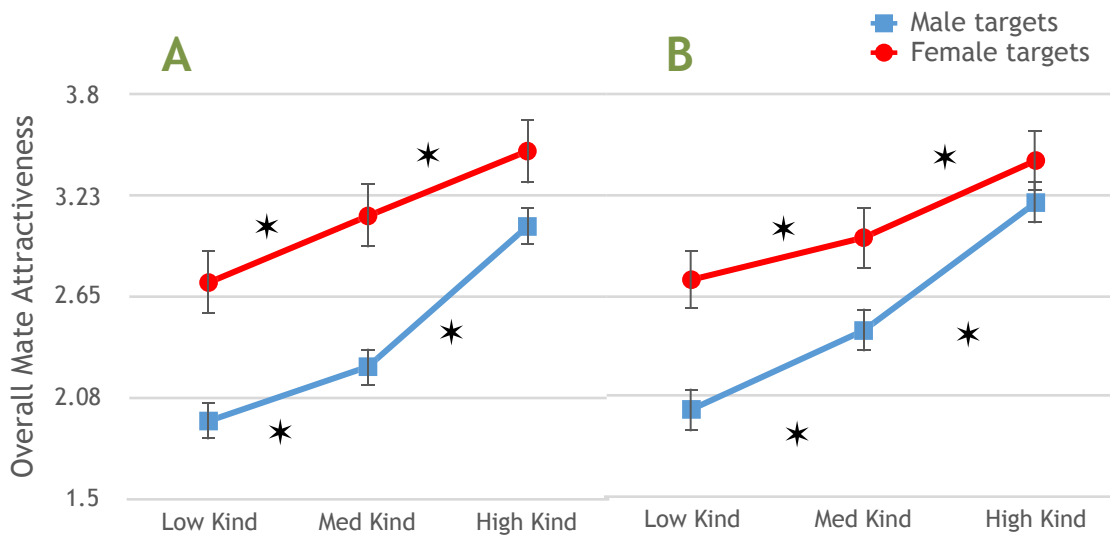


Figure 6. The effect of manipulated kindness on overall mate attractiveness, controlling for pre-rated physical attractiveness in the recipient-self condition (A) vs. the recipient-others condition (B) in Study 4. Error bars represent S.E. All contrasts were significant at $p < .001$.

Was the Effect of Kindness Stronger for One Sex?

There was a significant interaction between sex and kindness in predicting mate attractiveness, $F(2,1795) = 5.10, p < .01$, such that the effect of kindness was actually stronger for male targets. An inspection of the contrasts qualifies the interaction: specifically, the effect from medium kindness to high kindness on mate attractiveness was stronger for male targets than female targets. Even more specifically, this interaction with sex was significant in the recipient-self condition, $F(1,562) = 4.84, p = .03$, but not in the recipient-others condition, $F(1,557) = 1.71, p = .19$.

How Did the Manipulation Affect Perceptions of Other Traits?

We assessed whether experimental condition interacted with kindness in predicting the ratings of other traits. There was no interaction between kindness and experimental condition in predicting ratings of cooperative partner attractiveness, $F(2,1795) = 2.16, p = .12$, dominance, $F(2,1795) = 2.48, p = .08$, parenting ability, $F(2,1795) = 0.58, p = .56$, or perceived social status, $F(2,1795) = 1.02, p = .36$, suggesting that the effects of kindness on these trait ratings were equivalent in the two experimental conditions. The mean trait ratings, averaged across target sex and experimental condition, are displayed in Table 11. All contrasts between the three levels of kindness were significant for both sexes, in both experimental conditions, when the dependent variables were cooperative partner attractiveness, parenting ability, and social status. Kindness had no effect on female target dominance ratings, $F(2,757) = 1.26, p = .28$, but a significant effect on male target

dominance ratings, $F(2,1037) = 9.17, p < .001$, such that kinder males were perceived as more dominant.

Table 11
Effects of kindness information on trait ratings in Study 4.

	Trait rating means (S.E.)			<i>p</i> -values for contrasts		
	LoKind	MedKind	HiKind	Lvs.M	Lvs.H	Mvs.H
Cooperative partner	2.41 (.07)	3.40	4.92	<.001	<.001	<.001
Parenting ability	2.88 (.08)	3.58	5.15	<.001	<.001	<.001
Dominance	3.74 (.07)	3.61	3.88	0.12	0.08	<.01
Status	3.08 (.07)	3.58	4.69	<.001	<.001	<.001

Note: All trait means are from single items ('Work in group', 'Good parent', 'Dominance', and 'Respected').

Models where kindness was entered as a covariate predicting these trait ratings were run, averaged across the experimental conditions. The relative effect sizes for the manipulation predicting mate attractiveness vs. these other traits are displayed in Table 12.

Table 12

Estimates from models assessing the effect of the kindness manipulation on mate attractiveness, cooperative partner, parenting ability, dominance, and status ratings in Study 4.

	Model estimates	
	gamma (S.E.)	<i>df</i>
<i>Outcome variable</i>		
Mate attractiveness	0.48 (.04)*	1798
Cooperative partner	1.25 (.04)*	1798
Parenting ability	1.13 (.04)*	1798
Dominance	0.07 (.04)	1798
Status	0.80 (.04)*	1798

Note: Kindness was entered as a covariate in these models.

* $p < .001$

Did Sex Interact with Physical Attractiveness in Predicting Mate Attractiveness?

There was a significant interaction between sex and physical attractiveness in predicting overall mate attractiveness, $F(1,1796) = 30.48, p < .001$, such that the effect of physical attractiveness was again stronger for male targets (see Figure 7). The interaction again appeared to be driven by the difference from low to average physical attractiveness: males who were physically unattractive exhibited a larger decrement in mate attractiveness ratings compared to physically unattractive female targets.

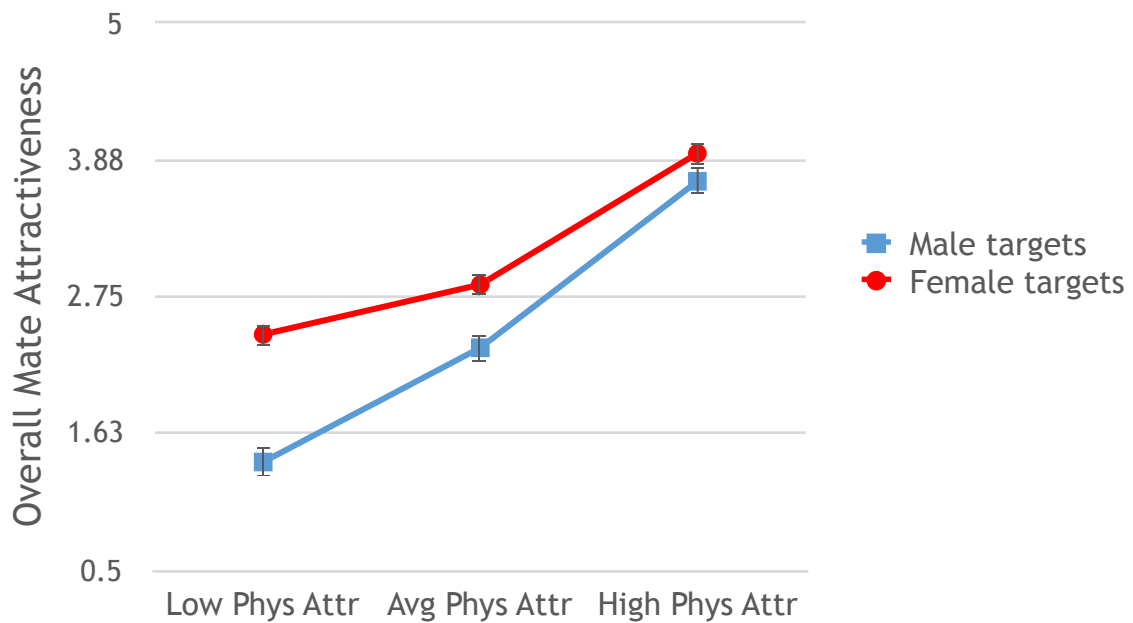


Figure 7. The effect of pre-rated physical attractiveness (standardized within sex) on overall mate attractiveness across Study 4. Error bars represent S.E.

How Did the Effects of the Kindness Manipulation and Physical Attractiveness Compare in the Two Conditions?

Table 13 displays the independent effects of physical attractiveness and kindness information on overall mate attractiveness across the first three kindness studies. Effect size estimates of kindness were nearly identical between the recipient-self and recipient-others conditions, and larger than in Studies 1 and 3 (which had a ‘no information’ rather than a ‘medium kindness’ level).

Table 13
Estimates from models assessing the independent effects of kindness and pre-rated physical attractiveness on targets' overall mate attractiveness in Studies 1, 3, and 4.

	Model estimates			Model estimates	
	gamma (S.E.)	df		gamma (S.E.)	df
<i>Study 1</i>			<i>Study 4a (recipient-self)</i>		
Kindness	0.34 (.05)*	867	Kindness	0.48 (.05)*	902
Phys. Attr.	0.98 (.06)*	867	Phys. Attr.	0.98 (.05)*	902
<i>Study 3</i>			<i>Study 4b (recipient-others)</i>		
Kindness	0.24 (.04)*	1406	Kindness	0.47 (.05)*	894
Phys. Attr.	1.28 (.04)*	1406	Phys. Attr.	0.99 (.05)*	894

Note: Traits are entered as covariates (coded -1, 0, 1) in these models.

* $p < .001$

Discussion

As in the previous studies, the manipulation of kindness was successful: in both experimental conditions, participants implicitly categorized targets on the basis of their kindness level (low, medium, high) and gave explicit kindness ratings that were consistent with the manipulation. However, our hypothesis that kindness would have larger effects on mate attractiveness when behaviors were directed towards the self vs. same-sex others (H5) was not supported by the data. The positive effect of behavioral information about kindness on mate attractiveness was equivalent in both experimental conditions.

This finding was surprising given that behaviors towards the self have larger fitness consequences and are probably more predictive of future investment than behaviors towards others (Lukaszewski & Roney, 2010). It is possible that behaviors towards same-sex others do carry equally important fitness consequences or are very predictive of behavior towards

you; however, an alternative explanation is that in the absence of information about how someone will treat you, his or her behavior towards others may be the best indicator of future behavior towards you (e.g., Krasnow, Cosmides, Pedersen, & Tooby, 2012). Participants in the recipient-others condition had no information about kindness towards the self, so information about how the target treated others may have been the best information available to make inferences from. The fact that the trait ratings for cooperative partner attractiveness and parenting ability were also equivalent between the experimental conditions is consistent with this. If this explanation is correct, then the findings from Studies 1 and 3 might also be explained in part by kindness towards others being used as a proxy for kindness towards the self, rather than the alternative arguments for why kindness towards others is attractive (e.g., Zahavi, 1975; Miller, 2007).

In Studies 1 and 3, when behaviors were directed towards same-sex third parties, high kindness had no effect on male target attractiveness relative to a no information condition. In the conceptual replication here (the recipient-others condition), high kindness did have a positive effect on attractiveness relative to medium kindness. There could be several reasons for the differences in this contrast between the present study and Studies 1 and 3. Here, there was a ‘medium kindness’ level that may have given participants a larger distribution of kindness — indeed, whereas the range of explicit mean kindness ratings for the manipulation was 1.96 in Study 1 and 1.58 in Study 3, here the range was 2.58. The medium kindness group also received lower explicit kindness ratings (mean = 3.54) than the ‘No Information’ group in previous studies (mean = 4.35 in Study 1, mean = 4.14 in Study 3), suggesting that participants in Studies 1 and 3 may have assumed a higher level of kindness in the ‘No

Information' group, which could explain the null contrast in the previous studies. Another consideration is that the sentence stimuli in general were different than those of Studies 1 and 3 (though there were many similarities), which could have generated different inferences. Indeed, unlike in Studies 1 and 3, male status ratings were in fact elevated by the high kindness information. Finally, asking subjects to imagine that they themselves were on the island might have further sensitized participants to the behaviors of the targets, even in the recipient-others condition where they were not given information about their own misadventures on the island. The larger effect sizes for kindness in Study 4 compared to the previous studies (see Table 13) are consistent with this.

Another novel finding here was that the kindness manipulation had a stronger effect on the mate attractiveness of male targets. Though the 3-way interaction between kindness, sex and condition was not significant, trends suggested that the interaction between sex and kindness was driven by a larger difference in male mate attractiveness between the medium kindness and high kindness levels, compared to female targets, when the behaviors were directed towards the self. Essentially, males targets that were very kind towards female participants experienced greater gains in mate attractiveness than female targets that were very kind to male participants. This is consistent with evidence suggesting that women may value altruistic behavior in men more than men value it in women (Barclay, 2010; Farrelly, et al., 2016; Moore et al., 2013), and that men may engage in especially altruistic acts as a courtship display (Farrelly et al., 2007; Tessman, 1995), though here the trending sex difference appeared specific to a preference for highly kind behaviors that are directed

towards the self. Altruism from men towards women may be an honest signal of willingness to commit and invest in a long-term relationship (Barclay, 2010).

As in Study 1, the effect of physical attractiveness on mate attractiveness was stronger for female targets; this was unsurprising given that the photo stimuli were essentially the same.

Study 4 Conclusions

Study 4 demonstrated that information about behavioral kindness towards same-sex others had the same effects on mate attractiveness as information about behavioral kindness towards the self. These findings may have been a byproduct of the between-subjects design, in which participants may have inferred how kind targets would be towards themselves based on the information given (e.g., kindness towards same-sex others, in condition 4b). Study 4 also showed that information about highly kind behaviors towards the self elevated men's mate attractiveness to a greater extent than it did for women, which extends previous research demonstrating that cues of willingness to invest may be especially important to women when evaluating mates (e.g., Waynforth & Dunbar, 1995).

Study 5: Within-Subject Contrasts of Target-Specificity

Introduction

The previous study used a between-subjects design to manipulate targets' behavioral kindness towards the self vs. towards others, and found that effects on mate attractiveness were equivalent between these two conditions. However, the fact that the recipient of the

behavior was manipulated between-subjects, such that participants learned either information about targets' behaviors towards themselves or towards same-sex others, raised several interpretative issues. Was kindness towards third parties really equally desirable as kindness towards the self, or did participants simply infer how targets would treat them (or third parties) based off of the information provided? In an attempt to clarify these issues, we decided to run a within-subjects study, in which all participants would receive information about targets' behaviors towards themselves as well as information about targets' behaviors towards third parties.

This design would afford a more direct test of the target-specificity predictions raised by Lukaszewski and Roney (2010). In Study 5, we provided information about targets' behavioral kindness towards both classes of individuals: the self and same-sex third parties. Eight targets of each sex were used instead of nine, split evenly into four 'person types': individuals who were highly kind both to the self and to same-sex third parties (referred to here as 'LovesAll'); individuals who were highly kind to the self, but medium in kindness towards others ('PrefersMe'); individuals who were highly kind towards third parties, but medium in kindness towards the self ('PrefersOthers'); and individuals who were paired only with neutral sentences ('No Information').

Since these categories were somewhat subtle and nuanced, we decided to ramp up the number of trait sentences paired with each target to four instead of two to ensure that information about these fairly subtle categories would stick. However, this multiplied the total number of trait sentences needed, which is why we opted for the 'No Information' person type instead of doing a 'MediumAll' person type. We also decided to use targets that

were all around ‘average’ in physical attractiveness so as to reduce variance in mate attractiveness due to physical attractiveness, and see effects of these subtle kindness categories more clearly.

Various patterns of findings would have been reasonable to hypothesize. The previous kindness studies suggested that high kindness towards both third parties and the self were quite attractive, which could have led to the prediction that LovesAll targets would be the most attractive targets for both sexes. Likewise, if participants simply encoded ‘amount of kindness’ rather than the target-specificity of the acts, then LovesAll might have been the most attractive, with PrefersMe and PrefersOthers being equally attractive. However, based on theoretical arguments and the findings of Lukaszewski and Roney (2010), that women self-reported preferring high levels of kindness towards themselves but only moderate levels of kindness towards unrelated third parties, we ultimately hypothesized the following:

H5: For both sexes, PrefersMe will be the most attractive person type, followed by LovesAll. PrefersOthers will be the least attractive of the three kindness types.

Method

Design

Study 5 was a 2 (Target sex: male vs. female) x 4 (Person type: LovesAll vs. PrefersMe vs. PrefersOthers vs. NoInformation) mixed design, with target sex as a between subjects variable and person type as a within-subjects variable. Physical attractiveness was entered as a covariate, though targets were all around ‘average’ in physical attractiveness.

Participants

Eighty-one undergraduate students (24 males, 57 females, mean age = 19.46, S.D. = 1.39) from UCSB were recruited via the Psychology subject pool to participate in Study 5, in exchange for partial course credit. Four subjects (1 female) were excluded because they reported a homosexual sexual orientation. The final sample consisted of 21 males and 56 females.

Materials

Study 5 Photo Stimuli. The photos used in Study 5 were selected from the larger set of photos that were pre-rated for Study 1. Eight faces of each sex that received mean physical attractiveness ratings within 1 S.D. of the sex-specific mean from the initial pre-rating study were chosen for this experiment. The new stimulus set included some photos that had appeared in the previous studies, along with some that had not been used before. All faces were of Caucasian ethnicity. The female photos ranged in mean attractiveness from 3.70 - 4.05, and the male photos ranged in mean attractiveness from 2.96 - 3.43 (all photos had been initially rated for attractiveness on a 1-7 scale).

Study 5 Sentence Stimuli. There were five different categories of sentences in Study 5: ‘HK_{me}’, which described highly kind behaviors by the target towards the participant (e.g., “While you were out foraging, he noticed your shelter was about to collapse under the rain and spent an hour making it sturdier for you.”), ‘MK_{me}’, which described medium kind

behaviors by the target towards the participant (e.g., “On a day when you couldn’t find any food, he gave you one piece of fruit out of the large pile he had collected.”), ‘HK_{others}’, which described highly kind behaviors by the target towards same-sex third parties (e.g., “When he saw another man was sunburned, he went out of his way to search for some aloe plants for him.”), ‘MK_{others}’, which described medium kind behaviors by the target towards same-sex third parties (e.g. “After another man rolled his ankle on a muddy slope, he helped the man down the slope but then went ahead to make it back to camp.”), and neutral sentences (e.g., “A heavy mist descended on camp one morning and he noticed all the leaved were covered with dewdrops”). Eight ‘HK_{me}’, eight ‘HK_{others}’, four ‘MK_{me}’, four ‘MK_{others}’, and 16 neutral sentences were selected from the sentences that were pre-rated for Studies 1 and 4 for use in this experiment. We selected kindness sentences with the aim of balancing scenarios and emotional valence across the four contexts. The full set of sentences used in Study 5 is provided in Appendix E.

Procedure

The general procedure of Study 5 closely followed that of the previous studies, with a few exceptions. Participants were first shown the modified island vignette from Study 4, which asked them to imagine that they were on the island with the targets. However, participants were not told that they were in a specific experimental condition, as in Study 4. Instead, they proceeded straight to the learning phase, where they were exposed to eight different opposite-sex targets. Each face was paired with five unique sentences, giving rise to 40 unique face-sentence pairings. This number was slightly greater than that of Study 1

(36; 12 faces with three sentences each) and significantly more than that of Study 4 (27; nine faces with three sentences each), but the same number as that used by Delton et al. (2012). Six of the eight faces were randomly assigned to a kindness person type (two each in the categories LovesAll, PrefersMe, and PrefersOthers), and two faces were randomly assigned to the NoInformation condition. Faces in a kindness condition were paired with two sentences describing the target’s behavior towards the self, two sentences describing the target’s behavior towards same-sex others, and one neutral sentence. More specifically, LovesAll targets were paired with two HK_{me} and two HK_{others} sentences, PrefersMe targets were paired with two HK_{me} and two MK_{others} sentences, and PrefersOthers targets were paired with two MK_{me} and two HK_{others} sentences. NoInformation faces were paired with five neutral sentences. The order in which the five sentences were paired with faces was completely randomized. Table 14 displays the breakdown of sentence assignments by person type in Study 5.

Table 14
Sentence assignments for the four person types in Study 5.

Person type	Number of sentences paired with each person type				
	HK _{me}	HK _{others}	MK _{me}	MK _{others}	Neutral
LovesAll	2	2	-	-	1
PrefersMe	2	-	-	2	1
PrefersOthers	-	2	2	-	1
No Information	-	-	-	-	5

Note: There were two different targets in each person category, and eight targets total.

Trait ratings at the end of the experiment were the same as those in Study 4, except that the original kindness item was replaced with two modified kindness items: participants rated each target on a 1-7 scale (1 = Not at all kind, 7 = Very kind) in response to, “How KIND TOWARDS OTHER (WOMEN/MEN) does this (woman/man) seem?” and, “How KIND TOWARDS YOU does this (woman/man) seem?”

Data Analyses

Implicit Manipulation Checks

We employed a new strategy for assessing categorization on the basis of the kindness information because the social categories provided in Study 5 were considerably more nuanced than those of our previous studies, in part because sentence types were not exclusive to person types. For example, in Study 4 sentences that depicted high kindness towards the self (HK) belonged exclusively to the High Kind person category, and we could thus measure the implicit encoding of the kindness categories by assessing whether within-category errors significantly exceeded between-category errors for those high kindness sentences. Conversely, in Study 5, HK_{me} sentences were paired with *both* the LovesAll and PrefersMe person types, so a ‘within-category’ error could arguably include attributions to both the LovesAll and PrefersMe targets. The same issue existed for the HK_{others} sentences, which co-occurred across LovesAll and PrefersOthers person types. The MK_{me} and MK_{others} sentences were like the previous studies in that they were unique to their person categories, so categorization on the basis of these sentences was simpler to understand.

Our approach was to assess categorization at multiple levels of analysis. First, we assessed categorization by kindness sentence type, to see if participants recognized differences in the four sentences types. For example, we investigated whether HK_{me} sentences were more likely to be mistakenly attributed to LovesAll and PrefersMe individuals (targets who had been paired with HK_{me} sentences, so ‘within-category’) than to PrefersOthers individuals (‘between-category’); here, between-category errors were multiplied by $3/2$ since there were three ways to make a within-category error, and two ways to make a between-category error. Likewise, we investigated whether HK_{others} sentences were more likely to be mistakenly attributed to LovesAll and PrefersOthers than to PrefersMe (with the same adjustment as above for between-category errors). Finally, we tested whether within-category errors were more likely than between-category errors for the MK_{me} and MK_{others} sentences, which were exclusive to their person types (between-category errors were multiplied by $1/4$ since there was one way to make a within-category error and four ways to make a kindness between-category error).

Next, as a way of measuring which person types participants implicitly felt were kinder towards them (or other people), we compared the mean number of times that participants attributed HK_{me} sentences to LovesAll vs. PrefersMe targets, and the mean number of times participants attributed HK_{others} sentences to LovesAll vs. PrefersOthers targets. If these means were significantly different, it would suggest that participants implicitly felt that one of these person-types was kinder, even though that specific kindness information was the same for each of those pairs of person categories.

Finally, we investigated patterns of errors for specific pairs of person types (contrasts) to get a sense of whether participants implicitly understood the person type differences between LovesAll, PrefersMe, and PrefersOthers targets. We tested whether within-category errors were greater than between-category errors when analyses were restricted to specific sentence types in these contrasts. For example, we asked whether HK_{me} sentences that had been previously paired with a PrefersMe target were more likely to be mistakenly attributed to the other PrefersMe target or to one of the two PrefersOthers targets (with between-category errors adjusted by 1/2); if participants encoded the difference between PrefersMe and PrefersOthers, then there should be more within-category errors in this contrast.

Effects of Person Type on Trait Ratings and Mate Attractiveness

For the explicit manipulation check, we used mixed regression models with person type entered as a fixed factor and pre-rated physical attractiveness as a covariate to assess participants' impressions of various targets' likely kindness towards the self and kindness towards others. If the person types were consciously encoded by participants, then LovesAll and PrefersMe targets should have received equally high kindness-towards-self ratings, followed by the PrefersOthers person type; LovesAll and PrefersOthers targets should likewise have received equally high kindness-towards-others ratings, followed by PrefersMe.

To assess which person types were found most attractive, we ran mixed regression models that included person type and target sex as fixed factors, physical attractiveness as a covariate, and overall mate attractiveness as the dependent variable.

Results

Manipulation Checks

Error rates for trait sentences were 68% for female subjects, and 63% for male subjects, which were on par with error rates in Studies 1 and 3, and slightly higher than those in Study 4.

Did People Implicitly Encode that There Were Different Sentence Types?

We investigated whether HK_{me} , HK_{others} , MK_{me} , and MK_{others} sentences were more likely to be misattributed to targets who were paired with these sentence types than to other kind targets. Paired-samples *t*-tests revealed significant categorization for the HK sentences (CatScore = 1.74, S.D. = 4.14, $t(76) = 3.63$, $p < .01$, $r = 0.38$), which were each shared across two person types, and for MK sentences (CatScore = 0.46, S.D. = 1.19, $t(76) = 3.40$, $p < .01$, $r = 0.36$), which each belonged to only one person type. This indicates that participants implicitly encoded that there were four different kindness sentence types. Categorization effect sizes were stronger for male subjects than for female subjects, both for HK sentences ($r_{males} = 0.72$, $r_{females} = 0.31$) and MK sentences ($r_{males} = 0.69$, $r_{females} = 0.26$).

Whom Did Participants Implicitly Encode as the Most Kind Towards Them, and Towards Others?

When participants saw a HK_{me} sentence in the memory test, they were more likely to attribute it to a LovesAll target than a PrefersMe target (mean difference = 1.68, S.D. = 2.79, $t(76) = 5.27$, $p < .001$, $r = 0.52$). This suggests that participants may have implicitly encoded

the LovesAll targets as being kinder to the self than PrefersMe targets, even though sentence information about kindness towards the self was the same for these two person types.

Participants were also more likely to attribute HK_{others} sentences to LovesAll targets than to PrefersOthers targets (mean difference = 1.44, S.D. = 2.48, $t(76) = 5.09$, $p < .001$, $r = 0.50$).

Was the Target-Specificity Manipulation Successful at the Implicit Level?

Table 15 provides a summary of some categorization scores of interest for assessing whether participants implicitly differentiated between the three kind person types. The categorization data is quite complicated to interpret. Generally, it seems that our target-specificity manipulation did not quite take. For example, though there was general categorization on the basis of HK sentences (see above), participants were actually not more likely to mistakenly attribute HK_{me} sentences that had been paired with a PrefersMe target to the other PrefersMe target than to PrefersYou targets (see line 7 in Table 15), which raises doubts about whether participants encoded that PrefersMe targets were actually kind towards them. The general categorization effect found for HK_{me} sentences appears to have been primarily driven by the tendency of subjects to over attribute sentences to LovesAll (the null effect in line 1 makes sense if there were a lot of within-category confusions for the HK_{me} sentences that had been paired with LovesAll, and very few for the HK_{me} sentences that had been paired with PrefersMe). A similar pattern is probably true for the general categorization effects HK_{others} sentences.

There tended to be categorization effects for the MK sentences, suggesting that participants may have at least been aware that some targets were less kind towards others.

However, the effects for MK sentences in the contrasts with Loves All (lines 3 and 6) could in principle have been driven by participants encoding only that LovesAll targets were the most kind and thus that MK sentences were probably not paired with them. The MK_{me} categorization effect in the contrast for PrefersMe vs. PrefersOthers seems to be evidence that participants encoded that PrefersOthers were less kind towards the self than PrefersMe; however, the lack of categorization in this same contrast for MK_{others} (line 10) is somewhat perplexing.

In general, mean errors for some of these contrasts were very small (and exacerbated for HK sentences because of the over-attribution to LovesAll), which perhaps brings the reliability of these tests into question. The overall take-away from the categorization data appears to be that participants encoded LovesAll as kinder than PrefersMe and PrefersOthers, and were perhaps fuzzy on the target-specificity aspects of PrefersMe and PrefersOthers, aside from noticing when targets were only medium in kindness towards them.

Table 15
Categorization effects for sentences in specific person type contrasts in Study 5.

<i>LovesAll vs. PrefersMe</i>						
Sentence type	CatScore	S.D.	<i>t</i>	<i>p</i>	<i>r</i>	Categorization
1. HK _{me}	-0.07	1.16	-0.54	.59	0.06	No
2. HK _{others}	0.34*	1.11	2.66	.01	0.29	Yes
3. MK _{others}	0.31**	0.91	2.95	<.01	0.32	Yes

<i>LovesAll vs. PrefersOthers</i>						
Sentence type	CatScore	S.D.	<i>t</i>	<i>p</i>	<i>r</i>	Categorization
4. HK _{me}	0.20^	0.97	1.81	.07	0.20	Marginal
5. HK _{others}	0.19	1.24	1.33	.19	0.15	No
6. MK _{me}	0.27*	0.99	2.42	.02	0.27	Yes

<i>PrefersMe vs. PrefersOthers</i>						
Sentence type	CatScore	S.D.	<i>t</i>	<i>p</i>	<i>r</i>	Categorization
7. HK _{me}	0.12	0.84	1.22	.23	0.14	No
8. HK _{others}	-0.01	0.83	-0.07	.95	0.01	No
9. MK _{me}	0.25*	0.95	2.28	.03	0.25	Yes
10. MK _{others}	0.10	0.91	0.94	.35	0.11	No

Notes: Degrees of freedom for all tests were 76. For these computations, ‘within-category’ was always the person type who was associated with the sentence, and ‘between-category’ was the other person type from the contrast specified. The maximum total possible errors (per subject) for each of these tests was 4.

Explicit Manipulation Checks

A mixed regression analysis was used to test the effect of person type on perceptions of the targets’ likely kindness towards the self, and likely kindness towards other people.

There was no interaction between person type and sex of subject in predicting either kindness

towards self ratings, $F(3,533) = 1.20, p = .31$, or kindness towards other people ratings, $F(3,533) = 1.63, p = .18$, suggesting that the effects of person type on explicit kindness ratings were equivalent between the sexes. There were significant main effects of person type on perceived kindness towards the self, $F(3,536) = 21.49, p < .001$, and kindness towards others, $F(3,536) = 23.23, p < .001$. As can be seen from Figure 8, explicit ratings of kindness did not exactly conform to the manipulation: LovesAll received higher kind-towards-self ratings than PrefersMe, even though both of these target types were paired with two HK_{me} sentences. Likewise, LovesAll targets also were rated as likely behaving more kind-towards-others than PrefersOthers targets, even though both were paired with two HK_{others} sentences. There were no significant differences between PrefersMe targets and PrefersOthers targets for ratings of kindness towards the self ($p = .31$) or kindness towards others ($p = .68$), which suggests that participants did not explicitly detect the differences in kindness profiles between these two person types. This pattern of ratings implies that participants may have been consciously aware only of the total amount of kindness exhibited by the targets: e.g., LovesAll were always highly kind, and PrefersOthers and PrefersMe were only highly kind half of the time.

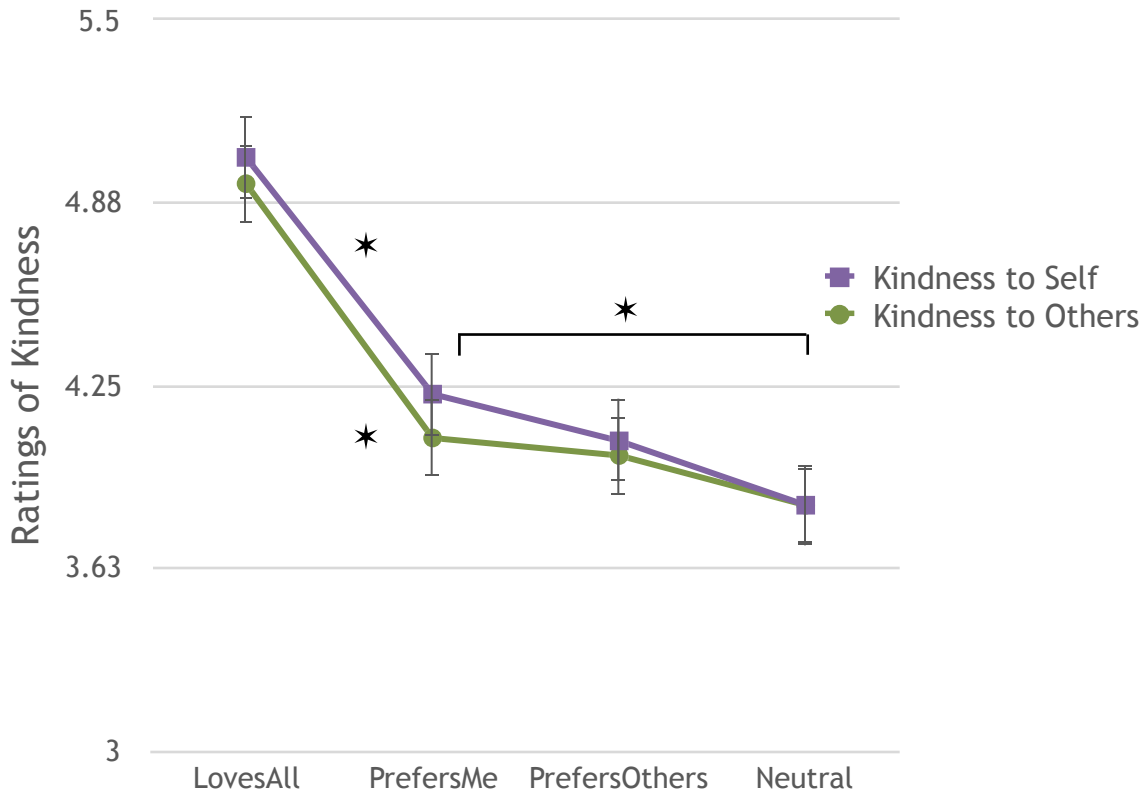


Figure 8. Means for ratings of targets' expected kindness towards the self and towards others for the four person categories in Study 5. Error bars represent S.E.

Effects on Mate Attractiveness

Mixed regression models revealed a significant main effect of person type on overall mate attractiveness, $F(3,535) = 12.68, p < .001$ (see Figure 9). Contrary to H5, for both sexes, LovesAll targets received the highest mate attractiveness ratings, followed by PrefersMe targets. PrefersYou and NoInformation targets received the lowest ratings, with no differences between these groups. There was no significant interaction between person type and sex in predicting mate attractiveness, $F(3,532) = 1.42, p = .24$, but the individual contrasts between person types did differ somewhat between the sexes. For male targets, there was no significant difference in mate attractiveness between LovesAll and PrefersMe

person types ($p = .11$), but PrefersMe targets received higher mate attractiveness ratings than PrefersOther targets ($p = .05$). For female targets, LovesAll individuals were more attractive than the other three person types ($ps < .05$), which were equally attractive ($ps > .44$).

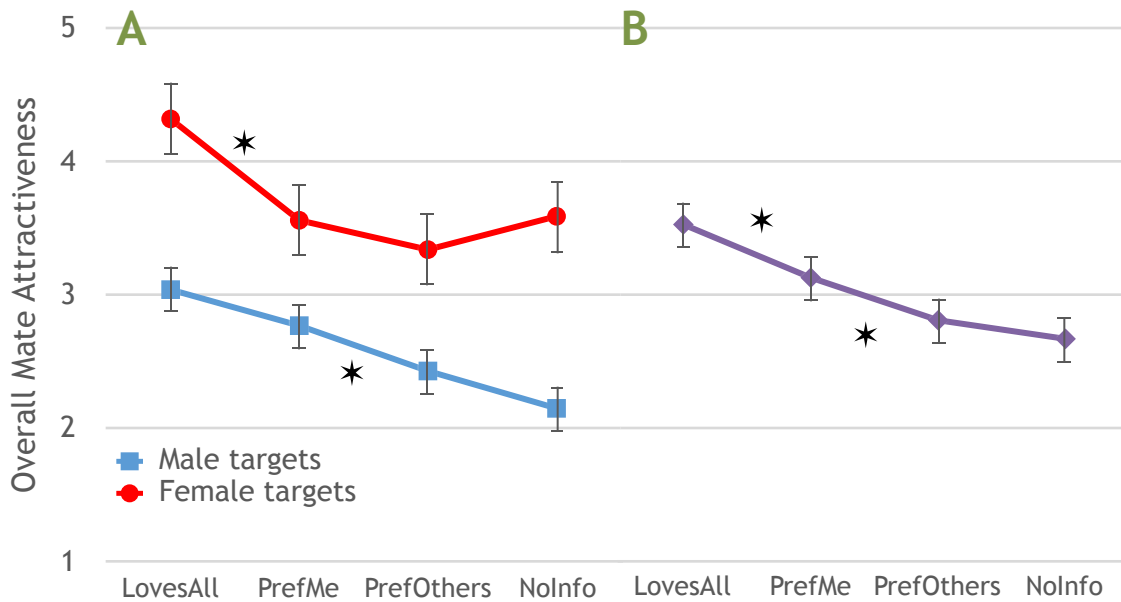


Figure 9. Mate attractiveness for the four person types in Study 5, split by sex (A) and combined across sexes (B). Error bars represent S.E.

Effects on Other Trait Ratings

There were significant effects of person type on ratings of cooperative partner attractiveness, $F(3,535) = 21.31, p < .001$, parenting ability, $F(3,535) = 21.72, p < .001$, dominance, $F(3,535) = 6.32, p < .001$, and perceived status, $F(3,535) = 18.02, p < .001$. For dominance perceptions, the effect was driven by the ‘No Information’ person type receiving lower dominance ratings, whereas the kindness groups had similar ratings. For the other traits, ratings were more varied according to person type (see Figure 10). LovesAll targets received higher cooperative partner, parenting, and status ratings than PrefersMe or

PrefersOthers (all $ps < .001$). PrefersMe targets received higher cooperative partner ratings than PrefersOthers ($p = .03$), but similar parenting and status ratings.

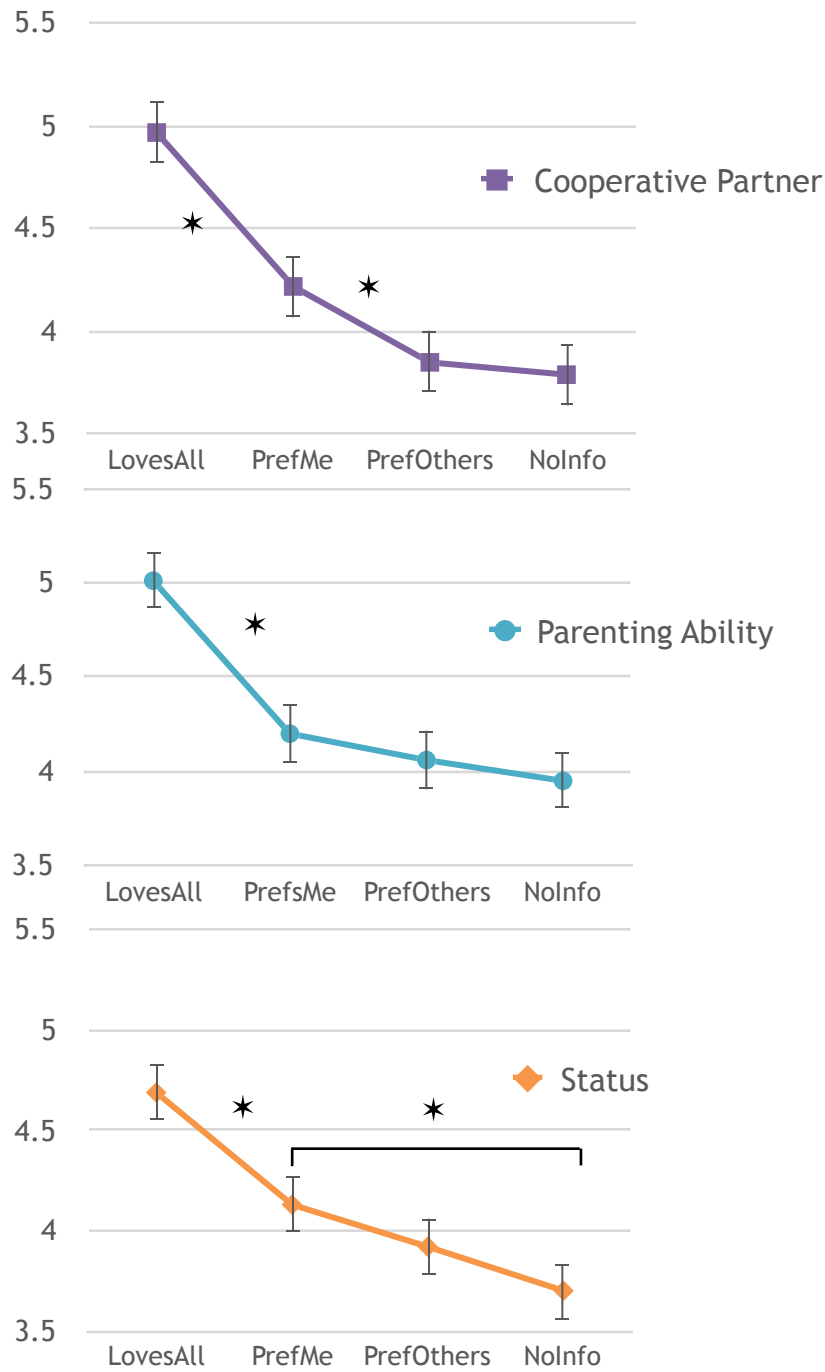


Figure 10. Mean ratings for cooperative partner attractiveness, parenting ability, and status for the four person types in Study 5. Error bars represent S.E.

Discussion

In the present study, we attempted to produce a stronger target-specificity manipulation than that used in Study 4 by providing information about targets' behaviors towards both the self and same-sex third parties. LovesAll, PrefersMe, and PrefersOthers person types were built by pairing facial photographs with sentences describing these individuals' behaviors towards the self or towards third parties; individuals in a No Information group were paired only with neutral sentences.

The categorization effects were nuanced, but generally suggest that our manipulation was not effective. Though LovesAll targets were distinguished from the other person types, there was little evidence that participants implicitly recognized the difference between PrefersMe and PrefersOthers person types, other than a few data points hinting that participants implicitly encoded PrefersOthers as being less kind towards the self. The explicit manipulation checks were consistent with this conclusion also, as LovesAll were perceived as being much higher in kindness towards the self and towards third parties than either PrefersMe or PrefersOthers targets, and PrefersMe and PrefersOthers targets had nearly equivalent explicit kindness ratings. Overall, the results of these manipulation checks suggest that the target specificity manipulation did not quite take, and that participants simply perceived LovesAll targets as much more kind towards everyone than PrefersMe and PrefersOthers targets. Perhaps there were too many sentences for participants to pay attention to, or perhaps the scenarios were too similar to detect kindness differences without the additional level of low kindness.

Contrary to H5 which predicted that PrefersMe targets would be the most desirable (see Lukaszewski & Roney, 2010), both sexes rated the LovesAll person type as the most attractive. However, across the sexes the PrefersMe targets were preferred to the PrefersOthers targets. Though the effect of person type on mate attractiveness did not statistically differ by sex, there was a trend towards a stronger preference by female subjects for PrefersMe targets over PrefersOthers targets, which suggests that females may have been more sensitive to the target-specificity manipulation, which would be generally consistent with the trend in Study 4 of females particularly valuing high kindness from men directed towards themselves. There was also a trend towards male subjects having a stronger preference for LovesAll targets than female subjects, which is consistent with the findings in Studies 1 and 2 that high kindness by women towards other women was very attractive to male participants.

Targets that were highly kind towards both the self and third parties received significantly higher ratings of cooperative partner attractiveness, parenting ability, and status than the other person types. This is further evidence that participants perceived these targets as having more desirable traits all around, and may be indicative of generalized altruism having positive social repercussions, which in turn may elevate mate value. The contrast between PrefersMe and PrefersOthers was significant with respect to cooperative partner ratings, which is interesting, because this item is the most target-specific of the ratings: the wording is, “How much would you like to work with this (man/woman) in a group?”. We might have predicted that this rating item would show the strongest difference between PrefersMe and PrefersOthers. However, it is important to keep in mind that the explicit

kindness ratings did not conform to patterns expected by the manipulation, and that type I errors are likely given that there was no adjustment for multiple contrasts in these studies.

There are a few different possible interpretations of the mate attractiveness findings in this study. If participants did not really encode the manipulation (as is arguably suggested by the pattern of explicit kindness ratings and the lack of categorization for HK_{me} sentences between PrefersMe and PrefersOthers), then the explanation for the preference for LovesAll could be that participants were simply more confident that LovesAll was a kind person — they may just have had a stronger signal of how kind that person would be towards them.

However, if participants did encode the manipulation on some level, then the reasons for why LovesAll targets were preferred would have to be related to the fact that these targets were highly kind towards others *in addition* to being highly kind towards the self. The argument that behavioral instances of high kindness towards others might have been reliably predictive of kindness towards the self ancestrally, such that these behaviors have an additive effect in computations of expected future kindness towards the self, could still apply here, though we might generally expect information about behavior towards the self to override information about behavior towards others in these computations (e.g., Krasnow et al., 2012). Alternatively, individuals may in fact have a preference for generalized altruism, if it is a costly signal of phenotypic quality (Zahavi, 1997; Miller, 2007) or of qualities that predict attentive parenting (Tessman, 1995). Prosocial behaviors towards others has also been argued to result in long-term gains in social status (Kafashan, Sparks, Griskevicius, & Barclay, 2014) — though high kind behavior by men towards other men in Studies 1 and 3 did not affect perceptions of current status.

The uncertainty surrounding the effect of the manipulation was a main limitation of this study. Without knowing for sure whether participants encoded the kindness profiles of the different targets, it is difficult to draw conclusions about why the LovesAll person type was most preferred by each sex. Future research with a stronger target specificity manipulation is needed to clarify this issue. The manipulation may have had greater success if the information about how the targets treated the two classes of recipients (same-sex others and the self) was given in each sentence instead of across different sentences. For example, a better sentence might be, “When another man couldn’t find any food he gave him one piece of fruit out of the pile he has collected, but when you couldn’t find any food he shared all of his best items with you”. Until someone comes up with a strong experimental manipulation of this nature, it will be difficult to adjudicate between the theoretical possibilities raised above.

Chapter 3 Conclusions

The further explorations of kindness in this chapter revealed some interesting findings, but also left many mysteries unsolved.

Study 3 replicated the findings from Study 1 that kindness had important effects on mate attractiveness for both sexes, and that highly kind behaviors towards third parties is more attractive in female targets than in male targets.

The key question we aimed to address in Studies 4 and 5 was whether participants would exhibit a stronger revealed preference for kindness directed towards the self than kindness directed towards third parties of the same sex as the actor. These studies

demonstrated that information about behavioral kindness towards third parties was essentially as important to mate attractiveness judgments as information about behaviors towards the self, but the design of these studies left it unclear as to why this occurred. Information about kindness towards others may have been used to infer kindness towards the self in Study 4; in Study 5, the target specificity manipulation may not have been effective.

That said, Study 4 did demonstrate a trend of high kindness directed towards the self having a larger impact on the mate attractiveness of male targets than of female targets. To our knowledge, this was the first experimental research to substantiate this important sex difference. The trends in Study 5 showing that the difference in attractiveness between LovesAll and PrefersMe targets was larger for male targets than for female targets were also consistent with this.

Additional research with context- and target-specific manipulations of kind or altruistic behaviors would clarify the design of preferences for kindness.

IV. Further Explorations of Resource Control

Study 6: Provisioning Ability

Introduction

In our first investigation of how resource control might affect mate attractiveness (Study 2), we manipulated the perceived social standing of targets by providing information about how third parties treated them. There were null effects of this manipulation for both male and female targets, and our hypothesis that social status would affect male targets' attractiveness was not supported.

We used cues of social status in an attempt to manipulate information about the resource control of the targets, but these cues might not have been the proper inputs to cognitive mechanisms assessing the likely provisioning ability of these targets. The findings from Study 2 raised the question of whether more direct cues of resource acquisition would have stronger effects on mate attractiveness.

We had strong reason to believe that information about resource acquisition ability would have an effect on mate attractiveness, and particularly so for male targets. The evolution of human life history traits, including our enormous brain size, is thought to have been made possible in part by pair-bonding and male provisioning of his mate and offspring (Benshoof & Thornhill, 1979; Kaplan et al., 2000; Lovejoy, 2009). In addition, across hunter-gatherer societies, males typically provide the majority of dietary calories, including nearly all of protein (Kaplan et al., 2000; Marlowe, 2001), which may be essential for women to meet the energetic demands of pregnancy and lactation (Hurtado & Hill, 1992). Though both sexes contribute food resources to the family (e.g., Marlowe, 2001), there was likely

stronger selection on women to seek mates that are strong provisioners, given the value of meat, and the larger consequences of the extra provisioning to her reproductive success.

Here, we aimed to manipulate the provisioning ability of male and female targets by providing behavioral information about their provisioning competence. In reality, a single day's foraging success is affected by many chance variables and does not necessarily predict long-term foraging competence (e.g., Kaplan, Hill, & Hurtado, 1990), so sentences were written with the intent of cueing longer-term provisioning success. Study 6 thus manipulated direct cues of resource acquisition, rather than the indirect cues of resource access suggested in Study 2. Based on previous research, we hypothesized:

H6: The effect of provisioning ability on mate attractiveness will be stronger for male targets.

Method

Design

Study 6 was a 2 (Target sex: male vs female) x 3 (Provisioning ability: high vs. low vs. no information) mixed design, with target sex as a between-subjects factor and provisioning ability as a within-subjects factor. Physical attractiveness was included as a covariate. This study had essentially the same design as Studies 1 and 2, but with a different manipulated variable.

Participants

One hundred twenty-six participants (82 female, 44 male, mean age = 18.71, S.D. = 1.30) were recruited from the UC Santa Barbara Psychology subject pool, and participated in exchange for partial course credit. One female and three males identified as homosexual and were excluded from analyses. The final sample of participants was thus comprised of 81 females and 41 males.

Materials

Sentences were initially adapted from Delton et al. (2012), which described hunting and foraging situations where individuals were successful at bringing back food or not. We modified several of their sentences, and brainstormed an additional list of foraging or hunting scenarios that strongly suggested various provisioning competencies (e.g., stamina, speed, memory, agility, technique with a weapon, etc.). Our final, revised list was comprised of sentences that seemed intuitively to give rise to strong inferences about the target's provisioning ability, rather than chance variables having caused the outcome. For example, instead of describing a target's success or failure at obtaining a food item in a single instance, we wrote sentences such as, "Over the course of a week, she brought back the most rabbits compared to everyone else."

Eight 'High Provisioning' sentences and eight 'Low Provisioning' sentences were selected from the larger set. High and low provisioning sentences contained equal numbers of hunting and foraging situations. Examples of High Provisioning sentences were, "She couldn't explain how she did it, but she was consistently able to predict which dirt patches would conceal edible roots", and "She was able to move quickly enough to grab spiny lobster

before they darted under rocks, and brought home more lobster than anyone else”. Examples of Low Provisioning sentences were, “Unlike the others, she could not throw her spear far enough to hunt some small antelope”, and “She had trouble differentiating small markings on leaves and consistently confused edible plants with poisonous ones”. The full set of provisioning sentences used in Study 6 is provided in Appendix F.

Photo stimuli were the same set of faces used in Studies 1, 2, and 4. Other measures were identical to those of previous protocols.

Procedure and Data Analyses

The general procedure mirrored that of Study 2. In the learning phase, participants learned about 12 opposite-sex individuals, who were each paired with three unique sentences. There were four high provisioners, who were randomly paired with two High Provisioning sentences and one neutral sentence; four low provisioners, who were paired with two Low Provisioning sentences and one neutral sentence; and four individuals who were each paired with three neutral sentences.

Data analysis strategy was also largely identical to that of Study 1. Categorization scores were computed separately for each sex to determine whether participants implicitly categorized targets on the basis of their provisioning ability. Between-category errors were again adjusted by $3/8$ since there were three ways to make a within-category error, but eight ways to make a between-category error. Mixed regression models with provisioning ability and sex as fixed factors, and pre-rated physical attractiveness (z-scored within sex) as a covariate, were used to assess effects on composite mate attractiveness and other trait ratings.

Results

Error rates for trait sentences in Study 6 were 63% for female subjects, and 73% for male subjects.

Was Provisioning Information Encoded Implicitly?

Paired-samples *t*-tests revealed significant categorization on the basis of trait sentences for both male (CatScore = 2.22, S.D. = 3.27, $t(40) = 4.35$, $p < .001$, $r = 0.57$) and female participants (CatScore = 2.38, S.D. = 2.39, $t(80) = 8.97$, $p < .001$, $r = 0.71$), suggesting that participants implicitly encoded provisioning information.

Did Provisioning Ability Affect Mate Attractiveness?

A mixed regression model revealed that there was a significant interaction between target sex and provisioning ability in predicting overall mate attractiveness, $F(1,1337) = 4.52$, $p = .01$. However, the interaction was actually in the opposite direction from that predicted by H6: the effect of provisioning on mate attractiveness was actually stronger for female targets (see Figure 11). In separate analyses assessing main effects of provisioning ability on overall mate attractiveness, there were main effects of provisioning for both male targets, $F(2,888) = 3.56$, $p = .03$, and female targets, $F(2,448) = 11.24$, $p < .001$, such that provisioning ability increased mate attractiveness. For male targets, the only significant contrast was between low provisioning and high provisioning ($p = .01$), whereas for female targets, both neutral targets and high provisioners were more attractive than low provisioners ($p < .001$), with no differences between the neutral targets and high provisioners.

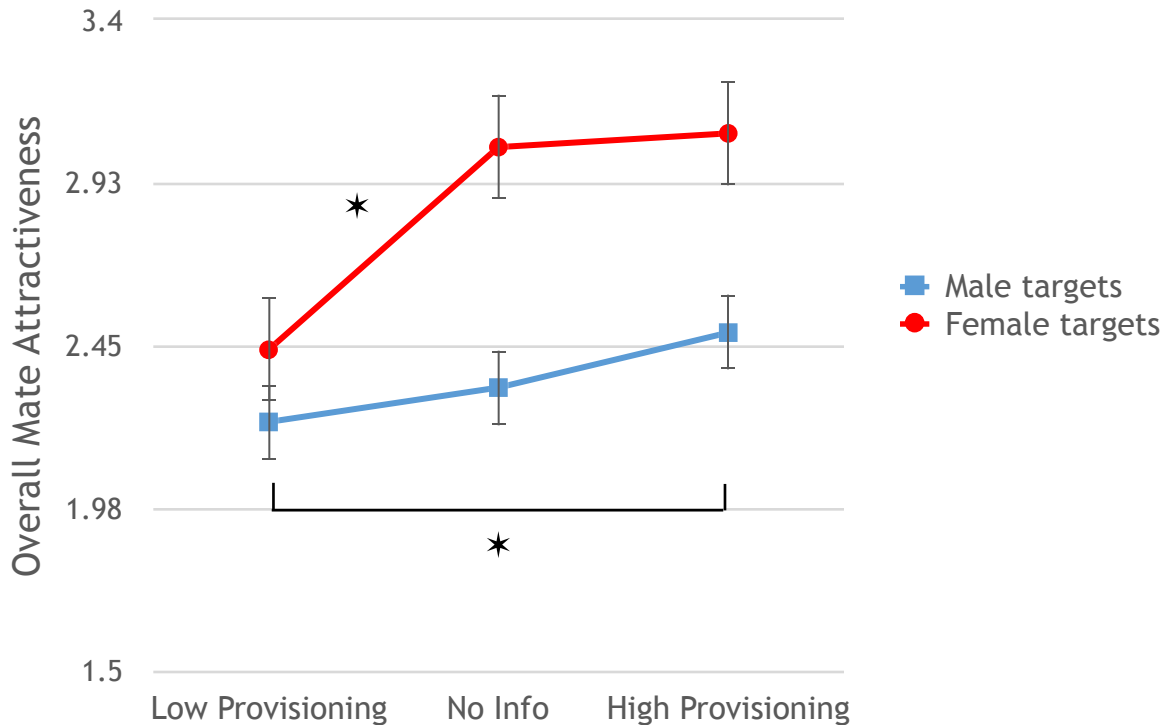


Figure 11. Effects of provisioning ability on overall mate attractiveness, controlling for physical attractiveness, in Study 6. Error bars represent S.E.

Did Effects Differ for Short-Term and Long-Term Mate Attractiveness?

When looking at effects separately for long-term and short-term attractiveness ratings, there were main effects of provisioning on long-term attractiveness for male targets, $F(2,888) = 5.49, p < .01$, and female targets, $F(2,448) = 11.80, p < .001$. For the long-term mating context, patterns were very similar to the results for overall attractiveness, except that the contrast from no information to high provisioning was significant for male targets ($p = .04$). For the short-term mating context, there was an effect of provisioning on mate attractiveness for female targets, $F(2,448) = 9.15, p < .001$, but no effect for male targets, $F(2,888) = 1.82, p = .16$.

How Did the Manipulation Affect the Perception of Other Traits?

There were no interactions between target sex and provisioning ability in predicting any of the trait ratings (all $ps > .17$), suggesting that the provisioning manipulation affected perceptions of traits in a similar way for both sexes. There were significant main effects of provisioning ability on perceptions of targets' dominance, $F(2,1339) = 19.85, p < .001$, parenting ability, $F(2,1339) = 27.44, p < .001$, cooperative partner attractiveness, $F(2,1339) = 52.73, p < .001$, kindness, $F(2,1339) = 20.06, p < .001$, and social status, $F(2,1339) = 27.99, p < .001$. The majority of the contrasts were significant (see Table 16), and provisioning ability positively predicted all of the rating dimensions.

Table 16
Effects of provisioning ability information on trait ratings in Study 6.

	Trait means (S.E.)			<i>p</i> -values for contrasts		
	LowProv	NoInfo	HighProv	Lvs.N	Lvs.H	Nvs.H
Cooperative partner	3.27 (.10)	3.73	4.20	<.001	<.001	<.001
Parenting ability	3.81 (.09)	4.18	4.41	<.001	<.001	0.01
Dominance	3.40 (.09)	3.62	3.97	<.001	<.001	0.01
Kindness	3.93 (.09)	4.29	4.42	<.01	<.01	0.09
Status	3.70 (.09)	4.04	4.32	<.001	<.001	<.01

Note: All trait means are from single items ('Work in group', 'Good parent', 'Dominance', 'Kindness', and 'Respected').

To allow comparison of the effect sizes of the provisioning manipulation on mate attractiveness vs. the other traits, we ran models where provisioning ability was entered as a covariate. Effect sizes are displayed in Table 17.

Table 17

Estimates from models assessing the effect of the provisioning manipulation on mate attractiveness, cooperative partner, parenting ability, kindness, dominance, and status ratings in Study 6.

	Model estimates	
	gamma (S.E.)	<i>df</i>
<i>Outcome variable</i>		
Mate attractiveness	0.19 (.04)*	1340
Cooperative partner	0.37 (.04)*	1340
Parenting ability	0.30 (.04)*	1340
Kindness	0.25 (.04)*	1340
Dominance	0.29 (.04)*	1340
Status	0.31 (.04)*	1340

Note: Provisioning ability was entered as a covariate in these models.

* $p < .001$

Did the Effect of Physical Attractiveness Differ Between the Sexes?

As in the previous studies using these face stimuli (Studies 1, 2, and 4), there was a significant interaction between sex and pre-rated physical attractiveness, $F(1,1338) = 13.95$, $p < .001$, such that the effect of physical attractiveness on mate attractiveness was slightly stronger for male targets — again apparently driven by a larger decrement in mate attractiveness for low physically attractive male targets compared to female targets (see Figure 12).

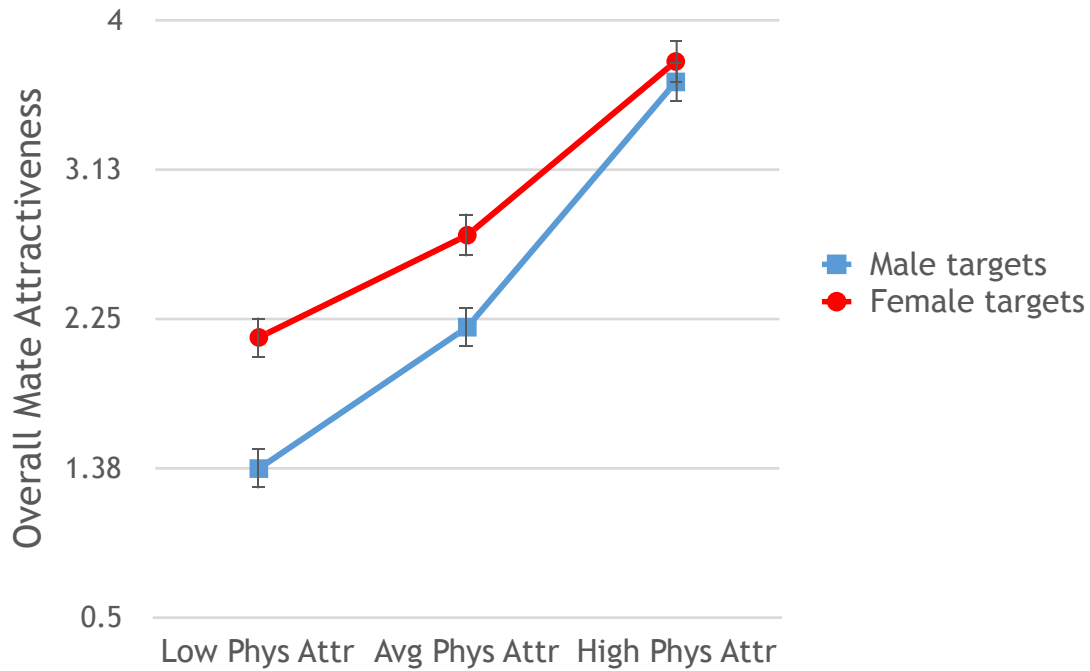


Figure 12. The effect of pre-rated physical attractiveness (standardized within sex) on overall mate attractiveness in Study 6. Error bars represent S.E.

How Did the Effects of the Manipulation and Physical Attractiveness Compare?

The effect of provisioning ability was smaller than the effect of physical attractiveness; Table 18 displays the effect size estimates for manipulated traits and physical attractiveness for the original kindness study, the original status study, and the present study, for comparison. The effect sizes for provisioning ability were larger than those of status in Study 2, but smaller than the kindness effect sizes from Study 1.

Table 18

Estimates from models assessing the independent effects of trait information and pre-rated physical attractiveness on targets' overall mate attractiveness for Studies 1, 2 and 6.

	<i>Male targets</i>			<i>Female targets</i>		
	Model estimates			Model estimates		
	gamma (S.E.)		<i>df</i>	gamma (S.E.)		<i>df</i>
<i>Study 1</i>						
Kindness	0.21 (.07)**		416	0.44 (.07)***		449
Phys. Attr.	1.14 (.08)***		416	0.86 (.08)***		449
<i>Study 2</i>						
Status	0.12 (.08)		339	0.08 (.08)		372
Phys. Attr.	1.23 (.09)***		339	1.17 (.09)***		372
<i>Study 6</i>						
Prov. Ability	0.12 (.05)*		889	0.32 (.08)***		449
Phys. Attr.	1.14 (.06)***		889	0.80 (.09)***		449

Note: All traits were entered as covariates (coded -1, 0, 1) in these models.

* $p < 0.05$

** $p < .01$

*** $p < .001$

Discussion and Conclusions

In the present study, there was significant categorization of targets on the basis of their provisioning ability, and significant effects of provisioning ability on mate attractiveness, for both sexes. This suggests that behavioral information about provisioning ability is more important to mate attractiveness judgments than third-party status information on its own (Study 2). The differences in effects between these two studies might have been due to the provisioning sentences providing stronger cues of the targets' ability to acquire resources in the future. Though the two manipulations had similar effects on ratings of

cooperative partner attractiveness, parenting ability, and kindness, there were likely other inferences made from the provisioning information that we did not measure via trait ratings; intuitively, the sentences used here gave a stronger sense of the targets' general competence, intelligence, and physical fitness. Findings that these qualities are valuable to both sexes is consistent with the mate preference literature (e.g., Buss, 1989).

However, contrary to our prediction that provisioning ability would have a greater effect on the mate attractiveness of male targets compared to female targets (H6), the effect of provisioning was actually stronger for female targets. Specifically, women who were poor provisioners experienced a greater reduction in mate attractiveness than men who were poor provisioners. The finding was baffling, to say the least. The primary researcher even went back to the raw data files to confirm that 'sex' was coded correctly, as we had predicted the exact opposite effect.

Interpreting the reversed sex difference is challenging. Evolutionary theory and decades of research are inconsistent with this pattern (e.g., Feingold, 1992). Why were female targets who were poor provisioners judged more harshly than male targets who were poor provisioners? The effect of the provisioning manipulation on trait ratings did not differ between the sexes, though it is possible that dimensions not included among the trait ratings (e.g., intelligence, competence) would have captured sex differences in relevant inferences. One possibility is that male subjects thought that the provisioning tasks (e.g., digging, gathering mangos, spearfishing, hunting) were relatively easier to do than female subjects did, and so may have drawn stronger negative inferences when female targets failed at these tasks.

Here, we manipulated provisioning ability via behavioral information signaling various hunting and gathering competencies, instead of via the modern predictors of resource acquisition (e.g., income, education level) that are frequently used in mate preference research. Perhaps the actual procurement of food resources is less important to modern women than it is to modern men, though it is not clear why this would be the case, and Pillsworth (2008) did find the predicted sex difference in self-reported preferences for the item ‘ability to provide food resources’ in a UCLA sample. Another possibility is that the hunting sentences cued negative inferences in the women in our sample, many of whom may have been vegetarian. If so, then women may have been less bothered, or even pleased, when a man failed at hunting. In general, UCSB undergraduates are completely disconnected from the sources of their food, and may be averse to animal violence. The finding that good provisioners were not more attractive than ‘no information’ targets, for either sex, supports the hypothesis that hunting successes may have been somewhat off-putting in this modern sample.

Last, though the revealed effect of provisioning ability on mate attractiveness was statistically significant, its effect size was smaller than the effect sizes of kindness in our previous studies. This is in line with findings from the self-report literature that cues of cooperative partner or parental value are considered more important than cues of resource acquisition (e.g., Howard et al., 1987; Li et al., 2002; Waynforth & Dunbar, 1995).

Study 7: Contrasts Between Hunters and Gatherers

Introduction

Study 6 demonstrated that cues of provisioning ability impacted the mate attractiveness of both sexes, with stronger effects on female targets. The direction of this sex difference was unexpected and difficult to reconcile with the existing literature. However, because hunting and gathering abilities were combined in the manipulation in Study 6, it was impossible to determine whether effects of the manipulation were caused by effects of hunting ability vs. gathering ability. Females who were poor provisioners were more aversive to male subjects than male poor provisioners were to female — was this because male subjects had an aversion to cues of low gathering ability, or to low hunting ability?

Across human forager societies, men tend to do the majority of hunting, while women tend to do the majority of gathering of plant foods (Ember, 1978; Kaplan et al., 2000). This sexual division of labor in food procurement was probably the result of a confluence of factors, including the long dependency of human offspring, which would have limited women's ability to go on hunting trips, the need for a diverse diet to meet nutritional needs, and the fact that distinct, specialized skills are required for both hunting and foraging activities and take a long time to hone (Gurven & Hill, 2009). The resulting sexual division of labor likely had fitness benefits to both sexes in nuclear families (Gurven et al., 2009).

An evolutionary history of sexual division of labor suggests that preferences for food procurement ability may be sex-differentiated. To our knowledge, no previous experimental study has directly tested whether there are sex differences in preferences for hunting vs. foraging ability. Though many traits are likely shared between good foragers and hunters

(e.g., intelligence, perseverance, physical fitness), others may diverge somewhat. For example, hunting may be more likely to require bravery (Gurven & Hill, 2009), hand-eye coordination, agility, and physical strength (Apicella, 2014; von Rueden et al., 2008), whereas gathering may require superior attention to detail, memory for landmarks (Silverman & Eals, 1992), and perseverance with repetitive tasks.

In Study 7, we manipulated provisioning ability by creating four person types: good hunters, bad hunters, good gatherers, and bad gatherers. Based on the importance of male hunting in human evolution, and the historical sexual division of labor across human societies, we hypothesized the following:

H7a: The effect of hunting ability on mate attractiveness will be stronger for male targets than female targets.

Also, given evidence that male hunters are highly desirable (Pillsworth, 2008), we predicted:

H7b: Male targets that were bad hunters would receive lower mate attractiveness ratings than male targets who were bad gatherers.

Finally, due to the importance of female gathering over evolution, we tentatively hypothesized:

H7c: For female targets, the effect of gathering ability on mate attractiveness will be stronger than the effect of hunting ability.

Method

Design

The design of Study 7 was a 2 (Target sex: male vs. female) x 4 (Person type: good hunter vs. bad hunter vs. good gatherer vs. bad gatherer) mixed design, with target sex as between-subjects factor and person type as a within subjects factor. Physical attractiveness was entered as a covariate, though targets were all around ‘average’ in physical attractiveness.

Participants

The participant sample for Study 7 was comprised of 174 UCSB undergraduates recruited from the Psychology subject pool (100 female, 74 male, mean age = 18.53, S.D. = 1.16). Three females and six males identified as homosexual and were excluded from analyses. The final sample of participants was thus comprised of 97 females and 68 males.

Materials

Study 7 Sentence Stimuli. Thirty-two sentences describing behavioral instances of high or low competence at both hunting and gathering (eight of each person type) were used in Study 7. Some of the sentences were the same as those used in Study 6, but we also created additional ones to better capture the essence of hunting and gathering abilities. In

some cases, sentences from Study 6 were modified to be more clearly in the domain of either hunting or gathering (e.g., collecting oysters became collecting berries).

Good hunter statements described mainly instances of physical strength and coordination (“He was able to throw his spear far enough to hunt some small antelope”), bravery (“He waded carefully through a dangerous brackish river and hunted the duck he had seen”), speed (“He ran fast enough to catch a pheasant he spotted by the stream, and brought it back to camp for the group”), or technique with hunting weapons (“When he glimpsed a wild chicken, he expertly loaded and fired his slingshot in a split second, catching it successfully); conversely, bad hunters lacked in physical strength and coordination (“Whenever he tried to throw a spear, he always missed his target by a wide margin”), were cowardly (“He wanted to spearfish like the others, but was too frightened to swim in the rocky coves”), and slow (“A quail landed near him, but he was not quick enough to grab it”). Good gatherers were resourceful (“He was able to find more edible tubers than any other group member”), methodical (“He methodically harvested blueberries all afternoon, carefully separating them from branches without bruising them”), had strong landmark memory (“He was very good at remembering which trees were near good foraging patches, and thus found food easier than other people did”), and had superior attention to detail (“He quickly learned to differentiate small markings on leaves to find edible and medicinal herbs”); whereas bad gatherers were not resourceful (“He saw other people dig up edible tubers, but was somehow never able to find them”), unfocused (“He tended to daydream while collecting mangos and so usually returned with less than others”), lazy (“He gathered the least amount of fruit of anyone because he kept taking breaks every few minutes”), and lacked attention to detail

(“He usually failed to notice edible plants as he move about the island”). The full set of sentences from Study 7 is given in Appendix G.

Study 7 Photo Stimuli. The same set of faces from Study 5 were used in Study 7: eight faces of each sex that were pre-rated as around average in attractiveness.

Procedure

The general procedure was the same as in the previous studies. The learning phase and memory test for Study 7 mirrored that of Study 5, in that participants learned about eight different targets. Unlike Study 5, all four person types were categories of provisioning ability (there was not a person type who was paired exclusively with neutral sentences). Each face was paired with five unique sentences, four of which provided information consistent with their person type (good hunter, good gatherer, bad hunter, or bad gatherer), and one neutral sentence.

A provisioning rating item was added to the trait rating phase as an explicit manipulation check. It read, “How GOOD AS A PROVIDER does this (woman/man) seem?” (1 = Not at all good as a provider, 7 = Very good as a provider).

Data Analyses

Categorization was assessed at multiple levels. First, it was computed for the four individual person types, as well as in aggregate across person types, to determine whether generally there was categorization for these four categories of people. For these analyses

there was one way to make a within-person-type error, and six ways to make a between-person type error, so between-category errors were adjusted by 1/6. We also assessed categorization at the provisioning ability level: were strong hunters and gatherers confused, and poor hunters and gatherers confused? Here, there were three ways to make a within-category error, and four ways to make a between-category error, so between-category errors were adjusted by 3/4. Finally, we looked at error patterns in analyses restricted to the specific contrasts within good or bad provisioners (e.g., good hunter vs. good gatherer, and bad hunter vs. bad gatherer) to see if these categories were differentiated. For these analyses, there was one way to make a within-category error and two ways to make a between-, so between-category errors were adjusted by 1/2.

Mixed regression models were again used for hypothesis tests. These models included person type as a fixed factor, pre-rated physical attractiveness as a covariate, and composite mate attractiveness as the dependent variable. To test the hypothesis that bad male hunters would receive lower mate attractiveness ratings than bad male foragers (H7b), we investigated the contrast between these two person types in the analysis of male targets. The hypothesis that the effect of hunting ability would be stronger for male targets than for female targets (H7a) was assessed by inspecting the interaction effect between sex and person type in a mixed model analysis that was restricted to targets paired with information about hunting ability. To test the hypothesis that hunting ability would have a stronger effect than gathering ability on the attractiveness of female targets (H7c), we compared the effect sizes of the hunting effect to the gathering effect for female targets.

Results

Error rates for trait sentences were 57% for female subjects, and 63% for male subjects.

Was There Categorization on the Basis of the Four Person Types?

Paired-samples *t*-tests revealed significant categorization, both for the four person types and for high vs. low provisioning ability. Table 19 provides a summary of the categorization results for these different analyses. Across the board, female subjects tended to exhibit stronger categorization than male subjects. The weakest categorization effects were for the ‘bad hunter’ person type for male subjects.

Did People Implicitly Differentiate Between Good Hunters vs. Good Gatherers, and Between Bad Hunters vs. Bad Gatherers?

When analyses were restricted to the contrasts of good hunter vs. good gatherer and bad hunter vs. bad gatherer, we found that both male and female subjects encoded good hunters and good gatherers as two separate categories (see bottom two rows in Table 19). However, whereas female subjects implicitly differentiated between bad hunters and bad gatherers, male subjects did not.

Table 19
Categorization effects for various categories of targets in Study 7.

	<i>Female subjects</i>			<i>Male subjects</i>		
	CatScore	<i>t</i>	<i>r</i>	CatScore	<i>t</i>	<i>r</i>
All person types	4.48**	18.00	0.88	3.51**	9.37	0.75
Good hunter	1.18**	9.13	0.68	1.23**	7.24	0.66
Bad hunter	0.86**	7.57	0.61	0.44*	2.84	0.33
Good gatherer	1.20**	9.68	0.70	1.11**	6.24	0.61
Bad gatherer	1.25**	8.46	0.65	0.73**	4.67	0.50
All provisioner types	8.70**	17.74	0.88	7.90**	12.22	0.83
Good provisioner	2.46**	9.79	0.71	2.69**	10.55	0.79
Bad provisioner	6.24**	18.41	0.88	5.21**	8.94	0.74
Good hunter vs. Good gatherer	1.54**	7.38	0.60	1.51**	5.15	0.53
Bad hunter vs. Bad gatherer	0.92**	4.62	0.43	0.02	0.10	0.01

Note: $df=96$ for female subjects and 67 for male subjects.

* $p < .01$

** $p < .001$

How Did the Manipulation Affect Explicit Ratings of Provisioning Ability?

We assessed effects of the provisioner person type manipulation on explicit ratings of targets' ability to provide for a family. Mixed models revealed a significant interaction between person type and target sex, $F(3,1148) = 8.05, p < .001$. There were main effects of the manipulation on ratings of 'good provider' for both male, $F(3,675) = 189.89, p < .001$, and female targets, $F(3,472) = 69.35, p < .001$. Figure 13 shows that effects were quite similar between the sexes, except that male targets that were strong hunters were perceived as

better providers compared to female targets who were good hunters, and male targets that were poor gatherers were perceived as worse providers compared to female targets who were poor gatherers.

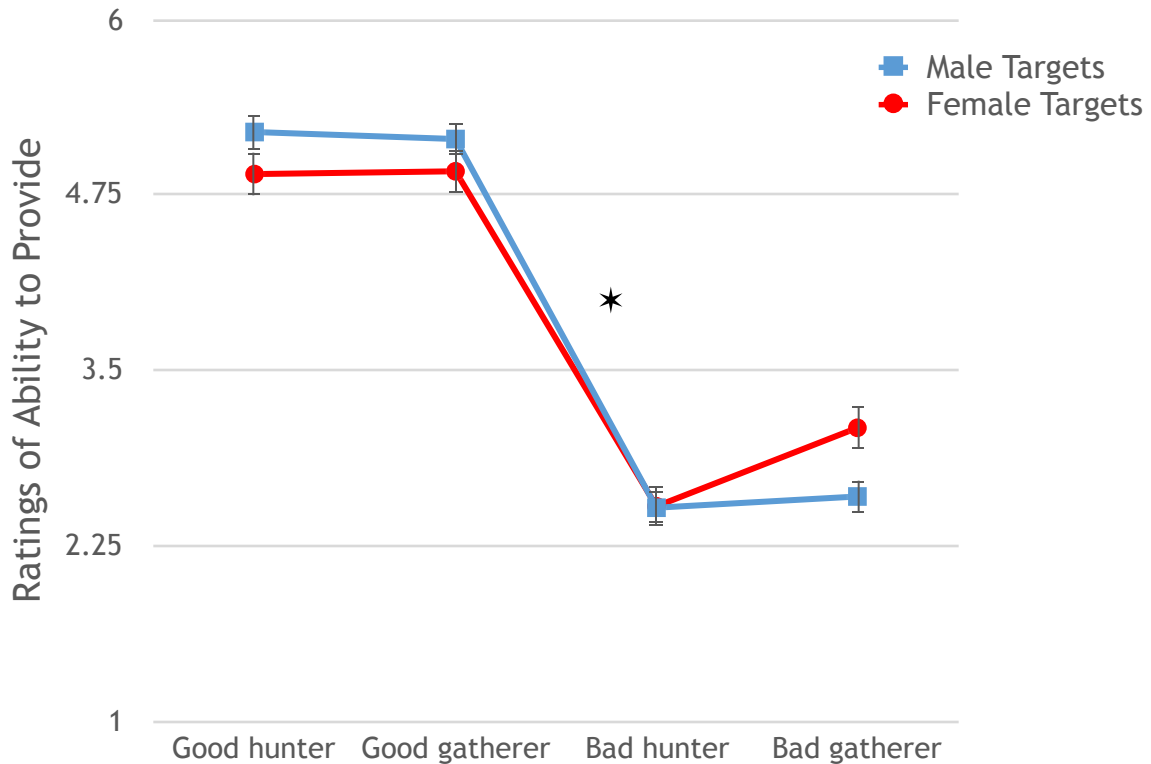


Figure 13. Effects of provisioning person type on explicit ratings of targets' provisioning ability in Study 7. Error bars represent S.E.

Effects on Mate Attractiveness

What Person Types Were Most Attractive?

There was a main effect of person type, $F(3,1151) = 44.16, p < .001$, and a significant interaction between sex and person type in predicting overall mate attractiveness, $F(3,1148) = 3.20, p = .02$. When analyses were run separately for each sex, there was a significant

effect of person type on overall mate attractiveness for both male targets, $F(1,675) = 17.00, p < .001$, and female targets, $F(1,472) = 11.13, p < .001$ (see Figure 14).

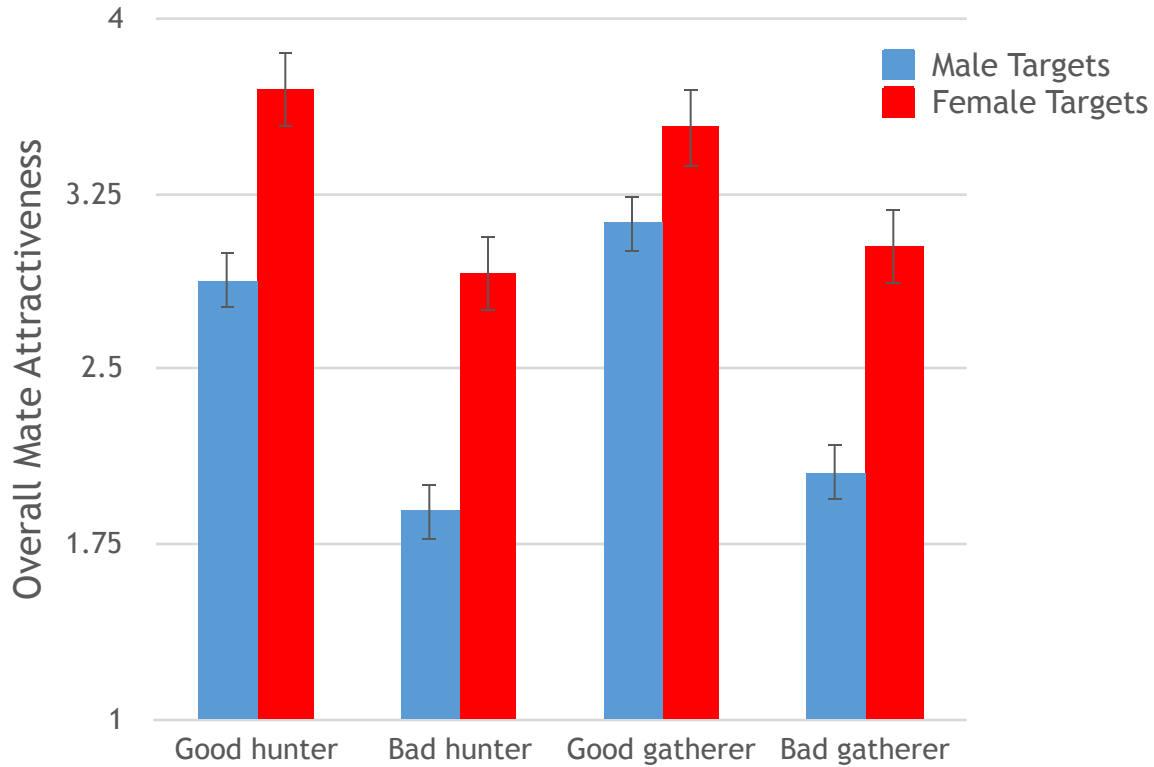


Figure 14. Effects of provisioning person type on overall mate attractiveness in Study 7. Error bars represent S.E.

The contrasts between the person types for each sex are shown in Table 20. For both male and female targets, good hunters and good gatherers were equally attractive, and both significantly more attractive than bad hunters and bad gatherers ($ps < .001$). There were no significant differences in mate attractiveness between good hunters and good gatherers, or between bad hunters and bad gatherers, for either sex. Thus, although effects were trending in the right direction, the hypothesis that bad male hunters would receive lower mate attractiveness ratings than bad gatherers (H7b) was not supported.

Table 20

Mean differences in overall mate attractiveness ratings between person types for male and female targets in Study 7.

	<i>4. BG</i>	<i>3. BH</i>	<i>2. GG</i>	<i>1. GH</i>
1. Good hunter	0.83**	0.99**	-0.24	-
2. Good gatherer	1.07**	1.23**	-	-0.16
3. Bad hunter	-0.17	-	-0.62**	-0.78**
4. Bad gatherer	-	0.11	-0.51*	-0.67**

Notes: Mean differences represent mean ratings from person types in the left column minus mean ratings from person types in the top row. Contrasts for male targets are on the left diagonal, and contrasts for female targets are on the right diagonal.

* $p < .01$

** $p < .001$

In an additional analysis, good hunters and good gatherers were collapsed into a ‘good provisioner’ variable, and bad hunters and bad gatherers were collapsed into a ‘bad provisioner’ variable. Effects of this ‘provisioning ability’ variable on mate attractiveness were then assessed, mirroring the analysis from Study 6. There was a significant interaction between provisioning ability and sex, $F(1,1152) = 6.20, p = .01$, such that the effect of provisioning ability on mate attractiveness was stronger for male targets this time (see Figure 15).

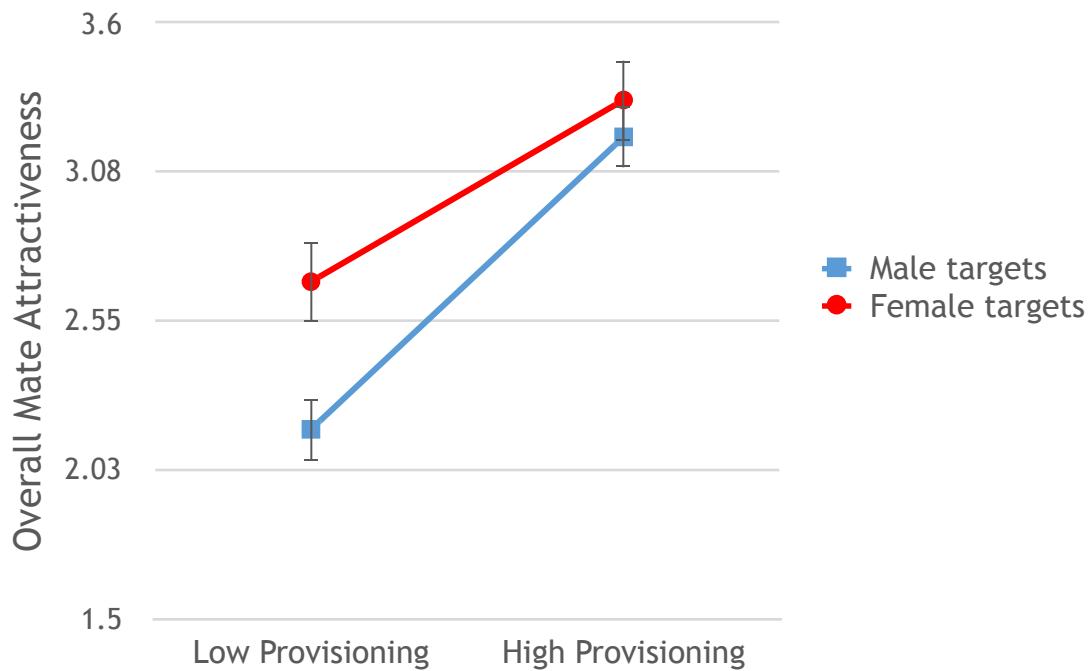


Figure 15. Effect of provisioning ability on overall mate attractiveness in Study 7. Error bars represent S.E.

Was the Effect of Hunting Ability Stronger for Male Targets than for Female Targets (H7a)?

There was no interaction between person type and target sex in predicting overall mate attractiveness for good hunter vs. bad hunter, $F(1,492) = 1.10, p = .29$. Thus, we failed to find support for H7a, though effects were trending in the right direction (the contrast in overall mate attractiveness ratings between good and bad hunters was .99 for male targets and .78 for female targets). There was, however, an unexpected significant interaction between person type and target sex in predicting overall mate attractiveness for good gatherer vs. bad gatherer, $F(1,492) = 5.49, p = .02$, such that the effect of gathering ability on mate attractiveness was stronger for male targets (contrasts for gathering ability were 1.07 for male

targets and .51 for female targets). These patterns were identical when analyses were repeated with respect to long- and short-term mate attractiveness.

For Female Targets, Was the Effect of Gathering on Mate Attractiveness Stronger than the Effect of Hunting (H7c)?

As can be seen from Table 20, both the effects of good vs. bad hunter and good vs. bad gatherer were significant for female targets (both $ps < .001$). Models where hunting ability or gathering ability (coded 0, 1) were entered as a covariate predicting female target mate attractiveness revealed an effect size of $\gamma = 0.80$ for hunting, compared to $\gamma = 0.51$ for gathering. The effect of gathering was thus not stronger than the effect of hunting, contrary to H7c.

How Did the Manipulation Affect Perceptions of Other Traits?

There were significant effects of the manipulation on ratings of all traits (all $ps < .001$). There was a significant interaction between person type and target sex for ratings of status, $F(3,1148) = 4.55, p < .01$, and marginal interactions for parenting ability, $F(3,1148) = 2.27, p = .08$, and cooperative partner attractiveness, $F(3,1148) = 2.51, p = .06$. As can be seen from Figure 16, the general patterns were very similar between the sexes, though it appears that male targets who were poor provisioners were perceived as having worse parenting ability, cooperative partner attractiveness, and social status than female targets who were poor provisioners. These effects appeared particularly strong for the gathering manipulation.

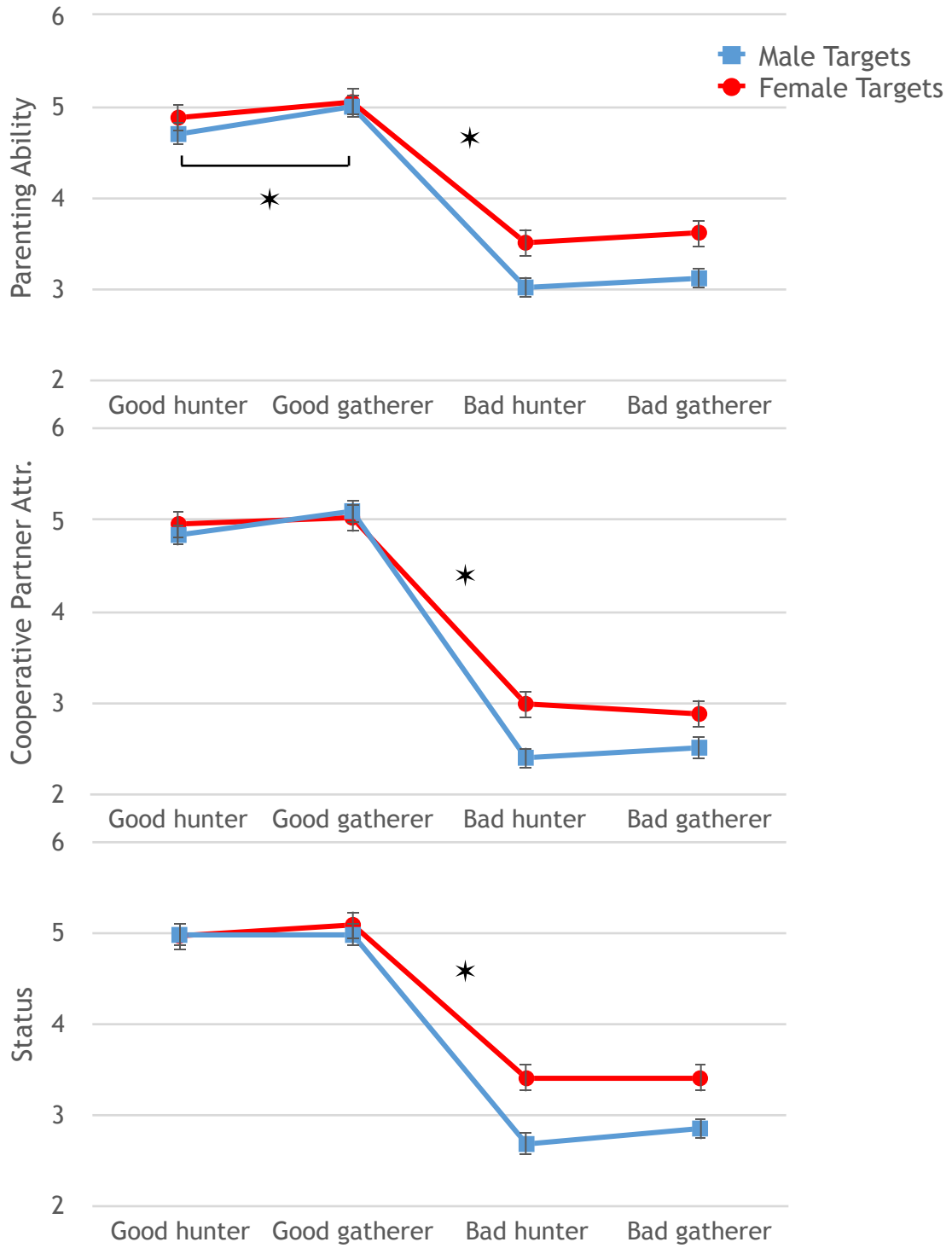


Figure 16. Effect of provisioner person type on ratings of parenting ability, cooperative partner attractiveness, and status in Study 7. Error bars represent S.E.

Discussion

In the provisioning manipulation in the present study, we created four person types (good hunters, bad hunters, good gatherers, or bad gatherers) by pairing photographs of opposite sex faces with sentences describing various foraging behaviors. The categorization effects suggested that our manipulation was successful: each of these person types was implicitly differentiated by both sexes, with the exception of male subjects failing to observe a difference between bad female hunters and bad female gatherers. The explicit ratings for 'ability to provide' further confirmed the manipulation, in that both good hunters and good gatherers both procured many food items, and received equally high 'provider' ratings which were significantly higher than ratings for bad hunters and bad gatherers.

Though effects were trending in the right direction, our first hypothesis, that the effect of hunting ability would have stronger effects on male target attractiveness than female target attractiveness (H7a), was not supported: the effect of hunting ability on overall mate attractiveness was equally strong for both sexes. This suggests that the traits associated with hunting ability (such as strength, bravery, hand eye coordination) may actually be equally attractive in women, perhaps because they are reliably associated with other desirable traits, such as good genes, good condition, youth, or intelligence. The fact that the effect of gathering on female target attractiveness was not stronger than the effect of hunting (opposing H7c), is further support for this idea.

Unexpectedly, the effect of gathering on mate attractiveness was stronger for male targets than for female targets. Furthermore, bad male gatherers were equally as unattractive as bad male hunters, contrary to our second hypothesis (H7b). Male targets that were good gatherers received the highest ratings for parenting ability, so the qualities that might have

been inferred from the gathering behaviors (e.g, resourcefulness, attention to detail, perseverance) were perhaps particularly attractive to women because these are predictive of a good, attentive father. Looking more closely at the sentences we used, intuitively the hunting ones suggest more boyish qualities of running, jumping, spearing, and tackling, whereas the gathering ones suggest a greater sense of industriousness and maturity. These different inferences about underlying traits between the two conditions may have masked any effects of food type we were hoping to uncover.

However, these interpretations for these sex differences are completely speculative. A main limitation of this study was that the sentences were not pre-rated in advance to gauge inferences about other relevant traits; these trait ratings would have been useful for interpreting the results. A second limitation of this study was that though hunting and gathering behaviors were, by definition, behaviors that involved the procurement of either meat or plant foods, the actual scenarios described in the sentences required a large variety of skills and attributes. We attempted to differentiate the sets of skills in the hunting vs. gathering categories as much as possible, but in all likelihood these abilities are highly correlated within individuals, such that good hunters are probably likely to be good gatherers, and vice versa. Future research with more deliberate manipulations of individual key traits associated with food procurement might help us better understand mate preferences for various provisioning competencies.

When person types were combined into good provisioners vs. bad provisioners, we found a stronger effect of provisioning ability on mate attractiveness for male targets compared to female targets. This is the exact opposite pattern from what we observed in Study 6, but is consistent with predictions from evolutionary theory, given that a partner with

strong provisioning ability would have probably have had larger consequences for the reproductive success of women, compared to men, ancestrally. The differences in this pattern across the two studies are somewhat difficult to interpret. Study 6 used different sentences that were perhaps less indicative of specialized hunting/gathering skills (and more indicative of general foraging success); perhaps women's cognitive evaluative mechanisms required these more specific descriptions of skills to activate the inferences about provisioning ability that were relevant to computations of mate attractiveness. Study 6 also used photo stimuli that ranged in physical attractiveness, whereas Study 7 used photos that were 'average' in physical attractiveness; it is possible that cues in the low physically attractive and high physically attractive male faces interacted in some way that masked effects of provisioning ability in Study 6.

Chapter 4 Conclusions

Studies 6 and 7 were undertaken to further investigate revealed preferences for traits predictive of resource acquisition ability in potential mates. In the original status experiment (Study 2), there were null effects of cues of social status that were presented without accompanying information about targets' underlying traits. Studies 6 and 7 demonstrated that when direct information about provisioning competence was provided as the cue, the manipulation strongly impacted the mate attractiveness of both male and female targets. These findings suggest that individuals care more about character traits predictive of resource acquisition ability than individuals' current positions in the social hierarchy, which would be consistent with self-report research by Jonason et al. (2012) demonstrating that women prefer individuals who have earned their resources rather than coming by them because of chance

events, assuming that status is indeed sometimes earned via chance events. Alternatively, the positive effects of provisioning competence could be explained via inferences made from these behaviors about other relevant qualities, such as parenting ability or cooperative partner value.

Contrary to predictions, Study 6 found stronger effects of the provisioning manipulation on the attractiveness of female targets. In Study 7, the reverse effect was found: collapsed across hunting and gathering competencies, provisioning ability had a stronger effect on the mate attractiveness of male targets. Differences in sentences used, and in inferences drawn from them may account for these differing effects; additional research is needed to disentangle the heterogenous effects of these manipulations.

Study 7 showed that participants' provisioning preferences were not domain-specific for the types of skills for which there was an ancestral sexual division of labor: men did not have stronger preferences for women who were good gatherers compared to hunters, and women did not have stronger preferences for men who were good hunters compared to gatherers. This may suggest that our mechanisms for assessing provisioning ability have highly open parameters that are calibrated over ontogeny. Individuals may tailor their preferences to skills or attributes that seem predictive of resource acquisition in the present ecology, and this conjecture could be tested in future research that manipulates modern vs. ancestral cues of resource acquisition ability.

In general, these manipulations of food procurement ability may have been more effective with a study population from a subsistence or hunter-gatherer society. UCSB undergraduate students are very well fed, have likely never had to procure their own food, and may be generally averse to animal violence. Our sample was also quite young and

probably nulliparous. There may be much stronger preferences for cues of resource acquisition in populations where individuals work hard for their food, and where calories are harder to come by. Indeed, anthropological research has demonstrated that men's preferences for women's provisioning competence are much greater in societies where women have a greater role in food production (Gurven et al., 2009; Marlowe, 2004; Pillsworth, 2008), suggesting that preferences for provisioning may indeed be calibrated over ontogeny.

V. Conclusions and Future Directions

What Do People Desire in Mates?

Someone unfamiliar with the mate preference literature might think that this question is easy to answer. Why not just ask people? Or see who they choose as partners? Or look at the most successful Tinder accounts?

As it turns out, measuring individuals' mate preferences entails a very complicated measurement problem. A cursory literature search on the topic of human mate preferences will unearth a multitude of conflicting findings. The refrain from the self-report research is that personable qualities such as 'kind', 'warm', and 'trustworthy' are of chief importance to both sexes when evaluating mates (Buss, 1989; Howard et al., 1987). There are sex differences in the relative importance placed on physical attractiveness and cues of resource control that are consistent with evolutionary theory (Buss & Barnes, 1986; Li et al., 2002), but overall these are ranked much lower in importance than 'kindness' (Buunk et al., 2002; Waynforth & Dunbar, 1995). Meanwhile, findings from speed-dating research suggest that these 'personable' traits matter very little in actual dating decisions, and instead, physical attractiveness is the ruling factor (Eastwick & Finkel, 2008). At the onset of this research project, we realized that there were some mysteries here that needed to be solved.

Good experimental research that focused on illuminating revealed preferences (rather than self-reported preferences) was bound to be the way to clarify these mysteries. There was already a smattering of experimental research, but these studies tended to either manipulate traits via explicit trait words embedded in mock dating profiles or vignettes (e.g., "John is very kind. John also has a high salary.") (Fletcher et al., 2004; Wiederman &

Dubois, 1998), which may not have been the correct inputs to our evolved psychological mechanisms for evaluating others, and also may have just reduced to self-report if individuals consciously evaluated the traits listed in the vignettes. Other experimental research used videotaped behavior of the same person acting in different ways (Jensen-Campbell et al., 1995), but this type of research is difficult to scale, as well as to maintain experimental control over the variables.

This dissertation research set out with the intention of establishing a new experimental method for assessing revealed mate preferences. We adapted the classic memory confusion protocol (Taylor et al., 1978) to manipulate information about potential mates by pairing photographs of individuals with many sentences describing various behaviors. This method provided complete experimental control, and allowed us to manipulate the information on a more implicit level than had previously been done, reducing demand characteristics. The memory test midway through the experiment served as an implicit manipulation check: even if people could not remember exactly who did what, did they remember which people were ‘kind’, or ‘unkind’, for example? This feature was a particularly innovative contribution to the mate preference literature. We were then able to assess individuals’ revealed preferences from the mate attractiveness ratings they made for the different targets.

Investigations into ‘Kindness’

Across four studies of kindness with our new method, we were able to uncover some novel findings concerning men and women’s revealed preferences for kindness in mates.

Study 1 and 3 demonstrated that behavioral information about potential mates' kindness towards same-sex third parties significantly impacted their mate attractiveness. Both men and women targets who behaved unkindly towards others were less attractive as mates than targets who were paired only with neutral information. Women who behaved with especially high kindness towards other women received gains in attractiveness to men, whereas men who behaved with especially high kindness towards other men did not. We proposed that men may find these highly kind behaviors in women attractive because they may be predictors of attentiveness to offspring, and cues that these women will be good mothers. Men may also value women who have close-knit female social networks that could produce benefits in terms of alloparenting in the future. High kindness towards other men might be, from the perspective of women, an unnecessary diversion of resources (Lukaszewski & Roney, 2010).

In Study 4, we randomly assigned subjects to learn about targets' low kindness, medium kindness, and high kindness behaviors either towards third parties or towards participants (the 'self'). Contrary to our predictions, effects of kindness on mate attractiveness were equally strong in both conditions — kindness towards the self did not have larger effects on mate attractiveness. Though it is possible that these behaviors towards others were attractive because they are costly signals of quality (Zahavi, 1975; Farrelly et al., 2007), or that they might predict parenting ability (Tessman, 1995), we also considered that participants may use whatever information is available to make their best guess about how kind a person will be to them in the future. This study did find an interesting effect whereby women tended to be more attracted to targets that had been highly kind towards the self, compared to men. This may suggest that the women's self-reported preferences for high

kindness in the literature perhaps refer to kindness directed towards the self, which is what was initially proposed by Lukaszewski and Roney (2010).

In Study 5, we aimed to further investigate the target-specificity idea by manipulating recipient-type in a within-subjects design. We built three types of ‘kind’ targets: individuals who were highly kind towards others as well as the self, individuals who were highly kind towards the self but moderate in kindness towards others, and individuals who were highly kind towards others but moderate in kindness towards the self. Unfortunately, it was unclear whether our target-specificity manipulation worked, as both the categorization results and patterns of explicit ratings suggested that participants simply perceived the first category of target as much kinder to everyone than the other two targets. This person type was also the most attractive, but the manipulation check results made the interpretation of the mate attractiveness data unclear. Either the highly altruistic targets were most attractive because participants were simply most confident that these targets had been nice to them, or there was something about the targets being altruistic towards others, in addition to kind towards them, that was elevating their mate attractiveness.

The revealed preferences for kindness in these four studies effectively rescued kindness from the speed-dating literature. These findings are much closer to the results from self-report research, which suggest that cues of cooperative partner value are integral components of mate attractiveness. The present studies suggest that the lack of effects for these traits in the speed-dating research may be due to insufficient information during the speed-date about the person’s kind tendencies.

Investigations into 'Resource Acquisition Ability'

In our first investigation of how resource control affects mate attractiveness (Study 2), we manipulated the perceived social standing of targets by providing information about how third parties treated them. The only information provided was the targets' current standing in the social hierarchy. Though we had predicted that social status would impact the attractiveness of male targets, we found null effects of this manipulation on the mate attractiveness of both male and female targets. This was surprising, given that social status was probably a consistent correlate of privileged access to resources across time periods and societies. This finding suggests that information about mere social standing may not be the inputs that generate attraction, or that additional behavioral evidence that justifies the social position may be needed to bolster these cues. Or, perhaps it is that current social status on its own is not that relevant of a predictor for long-term resource access, especially in situations where social status might change somewhat rapidly. Our island scenarios described a group of individuals that had known each other for only a few days, so maybe the social position was not assumed to be as significant as one from an established social group.

In Study 6, we tested whether more direct cues of resource acquisition, namely, behavioral evidence of provisioning competence, would have larger effects on mate attractiveness. This study demonstrated that provisioning ability did significantly impact mate attractiveness, for both sexes, though effect sizes were smaller than effect sizes for kindness in the other studies. This is a novel contribution: no previous studies have assessed these ancestrally-relevant determinants of resource generation; instead, previous research has focused on modern determinants of resources, such as earning prospects (e.g., Buss, 1989).

Contrary to predictions, we found that the effect of provisioning ability was stronger for female targets than for male targets. This unexpected finding may have been caused by certain particularities of our UCSB sample, or might demonstrate that men do care about women's provisioning ability more than has been suggested in previous research.

Anthropological research on mate preferences has found that men do report valuing women's food production in ecologies where women contribute significantly in this regard (e.g., the Tsimane of Bolivia: Gurven et al., 2009; remote villages of the Shuar of Ecuador: Pillsworth, 2008), but that it is less important to men when they are responsible for most of the food production, as in cases where food is purchased and men are the ones who earn the money to buy it (e.g., integrated villages of the Shuar of Ecuador: Pillsworth, 2008). UCSB men might expect their partners to contribute to food procurement, given that both sexes tend to work and make money in our society. However, given that UCSB students are not hunters and gatherers, and acquire food almost entirely via buying it, it is interesting that the 'ancestral' ability to procure food that was depicted in our experiment had such strong effects on mate attractiveness ratings. Perhaps the design of the mind is such that where women contribute to household food procurement, men value traits ancestrally predictive of food procurement. An alternative explanation is that it is not the food provisioning ability itself that the participants found attractive, but the other traits signified by these behaviors, such as intelligence, health or competence; that ratings of parenting ability and cooperative partner value were positively correlated with provisioning ability is consistent with this idea.

Since both hunting and gathering sentences were combined in the provisioning manipulation in Study 6, we conducted an additional experiment (Study 7) where we built

four types of provisioners: bad hunters, good hunters, bad gatherers, and good gatherers. We had expected to find stronger effects of hunting ability on male target compared to female target attractiveness, given the importance of male hunting over human evolution (Kaplan et al., 2000), but this was not the case: the difference in mate attractiveness between good and bad hunters was statistically equivalent for both sexes. Interestingly, gathering ability had larger effects on male attractiveness, and when the categories were collapsed into good vs. bad provisioners, the effect of provisioning ability was stronger for male targets than for female targets. These findings were thus opposite those of Study 6, but were consistent with our initial hypotheses. The differences in findings between these two studies may have resulted from the way our sentences were constructed, which may have produced different inferences: the sentences in Study 6 tended to describe general provisioning success or failures, whereas the sentences in Study 7 focused on more specialized skills requisite to hunting and gathering. Overall, the opposing findings from these two provisioning studies were somewhat bewildering, but present interesting opportunities for future research. It is not implausible that preferences for resource acquisition ability have been greatly simplified in the extant mate preference literature. We would be interested to see future research aiming to identify which provisioning competencies are attractive and why, and whether these preferences reflect an evolved domain-specific preference for resource acquisition abilities or preferences for general traits associated with increased reproductive success, such as intelligence, competence, or health.

Effects of Physical Attractiveness

Across all seven studies, the physical attractiveness inherent to the faces of the targets had stronger effects on mate attractiveness than any of our behavioral manipulations. When studies were run with one set of photo stimuli, the effect of physical attractiveness appeared to have stronger effects on the mate attractiveness of female targets, but when another set of photo stimuli was used, effects were equally strong between the sexes. This suggests sex differences in this preference may be dependent on the specific range of physical attractiveness present in a study. An additional, important consideration is that age-related influences are typically a major determinant of women's physical attractiveness (e.g., Andrews, Lukaszewski, Simmons, & Bleske-Rechek, 2017), and since all of our target faces were approximately the same age, these cues may have been absent, diluting the typically stronger effect of physical attractiveness for female targets.

The fact that effects of physical attractiveness were stronger than effects of our trait manipulations is consistent with speed-dating research, which demonstrates that physical attractiveness is a tremendous predictor of dating desirability, for both sexes. The classic predictions from evolutionary theory (e.g., Buss, 1989) suggest that physical attractiveness ought to be more important to men when evaluating mates than to women, whereas resources ought to be more important to women, and one look at Donald and Melania Trump seems to confirm this. However, it could be that physical attractiveness is more relevant to women than we initially suspected; some have argued that there may have actually been stronger selection on women to seek high genetic quality compared to cues of provisioning in mates (Miller, 1998). Another explanation could be that physical attractiveness was heavily

weighted in this study since it was a stronger cue or carried more information. A related argument is that physical attractiveness is weighted more heavily in initial stages of courtship, since it may take longer to gather accurate information about internal traits.

Strengths and Limitations of This Method

This experimental method has many strengths. It affords true experimental control, since we can randomize the face-sentence pairings and control all other variables; allows us to manipulate traits implicitly rather than explicitly; has the built-in manipulation check by virtue of the memory confusion data; and elucidates revealed rather than self-reported preferences. It is also scalable, in that virtually any trait manipulations could be made with the behavioral sentences, and multiple traits could even be combined, memory load permitting. The advantage over the speed-dating research is that we can provide rich behavioral information that is likely never available in speed-dating contexts. A man may be found attractive in 5-minute speed-date, but if you knew he had noticed your shelter about to collapse under the rain and chosen not to do anything about it, this might have caused you to immediately lose interest. This method allows one to provide the rich input cues that are diagnostic of internal traits; individuals otherwise may typically need a long interaction time in order to form accurate summary impressions of these traits.

With the exception of the subtle manipulation attempted in Study 5, this method allowed us to successfully manipulate various social categories of people. For the kindness manipulations, categorization scores were very high ($r = \sim .80$), comparable to or even higher than effect sizes for social categories like age ($r = \sim .78$; Lieberman, Oum, & Kurzban, 2008)

or free-riders ($r = .60$; Delton et al., 2012). Categorization scores for social status and provisioner types were somewhat lower, but still comparable ($\sim r = .60$). This suggests that even though behavioral sentences only appeared on screen with a target for five seconds at a time, and participants were incorrect in the majority of their attributions in the memory test, they implicitly encoded that there were different types of targets with different qualities.

One limitation of this method is that there is somewhat of a delicate balance in choosing sentences for this experiment. If the manipulation is too strong, and the categories are too obvious, then the experiment is at greater risk for demand characteristics. We also tended to find fewer sex differences in preferences when the manipulation was more extreme (e.g., high vs. low kindness), since the differences in preferences may be at more intermediate levels or for subtle differences in some traits. However, if the manipulation is too subtle (as might have been the target-specificity manipulation in Study 5, or the differences between ‘good hunter’ and ‘good gatherer’ in Study 7), participants may miss the manipulation entirely, and effects on mate attractiveness might be difficult to interpret.

Another clear limitation is that the potential mates are all hypothetical, and there are no real mating consequences to decisions in this experiment. Though the data suggest that our manipulations of participants’ perceptions of the targets’ traits were successful, the cues we provided still likely pale in comparison to in-person behavioral information.

Future Directions

This method can be taken in many different directions. Once strong trait manipulations have been established through pilot tests and validated through other

measures, virtually any behavioral traits could be manipulated in this design. And once effects for a single trait have been conclusively demonstrated, multiple traits could be contrasted within the same design, and these types of studies could shed light on how different traits are integrated into attractiveness judgments

With respect to studies of kindness, a fruitful area of research could be to further investigate what specific ‘kind’ behaviors are attractive, and why. Our sentences included gentle behaviors, thoughtful behaviors, heroic behaviors, and compassionate behaviors; future research could tease apart which of these traits are driving attractiveness judgments. In terms of research regarding resource acquisition and provisioning, it would be interesting to contrast modern cues of resource control with more ancestral cues of provisioning competence to see the extent to which our mate preferences are calibrated over ontogeny to cues predictive of resources in the present environment vs. cues that were predictive of resource control, ancestrally.

Concluding Thoughts about the Mate Preference Literature

At the outset of this dissertation research, the mate preference literature was at an impasse, with different study methodologies producing very different findings about human mate preferences. Self-report style research suggested that cues of cooperative partner or parental value, like kindness, warmth, and trustworthiness, were of utmost importance to both sexes. While there were sex differences in the relative valuations of cues of resource control and physical attractiveness, these traits were reported to be much lower in importance. Conversely, speed-dating research suggested that cues of cooperative partner or

parental value mattered little if at all, and that physical attractiveness was the overwhelming driver of mating decisions, for both sexes.

This innovative method is moving towards resolving this impasse. We established a new paradigm for experimentally manipulating character traits of hypothetical mates and assessing revealed preferences for these traits. The data from these initial studies suggest that kindness may in fact be an integral component to mate attractiveness, as was suggested by the self-report literature but quashed by the speed-dating literature. In our study, faces paired with highly kind behaviors were perceived as better parents and cooperative partners, and more respected by others. Behaving altruistically and attentively towards others in need probably signals many qualities that would make someone a good parent and long-term cooperator. Our impression, after synthesizing the extant findings as well as our own data, is that kindness is, in fact, a very desirable quality in a mate. However, its importance may be driven mostly by the difference between someone who is relatively unkind and someone who is relatively kind — it may not be the case that over-the-top kind behaviors have much incremental value in terms of mate attractiveness beyond moderately high kindness, at least when directed towards third parties. We suspect that the reason why speed-dating studies failed to find evidence for this is because reliable cues of these traits are largely absent during such brief, artificial encounters, and researchers have not found good ways of even measuring these traits in individuals prior to the speed-date.

The literature contains a majority of findings demonstrating a sex difference in preferences for cues of resource control. Our studies suggested that social status on its own may not be particularly attractive, and that cues of provisioning competence are desirable to

both sexes. After observing the results of our studies, we have less confidence that there are strong sex differences in preferences for cues of provisioning ability — this may have been an important evaluative dimension for both sexes, ancestrally, since both sexes were often involved in food procurement. Instead, the sex differences from the self-report literature may be more related to cues of the ability to gain social status, such as the ability to inspire others, gain prestige, and earn leadership roles. It is clearly the case that women with the highest mate value today tend to mate with men in powerful social positions. Though in our studies we did not find effects of men's social position on their mate attractiveness, it could be that women value cues of the ability to gain social status to a greater extent than men do. Future iterations of this method could test this idea.

Drawing conclusions about sex differences in preferences for physical attractiveness is quite difficult. In part, this is because it is not even clear what 'physical attractiveness' means — it may be a summary variable of mate attractiveness, the output of a mechanism that integrates the assessment of someone on many different characteristics. Physical attractiveness judgments of the same person do change over time, as individuals learn more information about each other (Kniffin & Wilson, 2004), suggesting that it is probably a subjective read-out that is malleable. If it is a summary variable, how do we interpret the fact that there are self-reported sex differences in its valuation? The argument that fertility ought to be a main consideration for men evaluating women, and that fertility information is present in physical features, is powerful. Perhaps physical attractiveness is a summary variable, but for men, the largest component of this summary variable is fertility information, which is immediately apparent. The data of Kniffin and Wilson (2004) do indicate that

perceptions of the physical attractiveness of the same individuals change much more from women's perspectives than from men's perspectives, over time.

Our studies suggest that physical attractiveness is a more important component of mate attractiveness than other traits (effect sizes were always at least double those of the manipulated traits), for both sexes. While it is possible that these effects are an artifact of physical attractiveness cues being stronger than those of our trait manipulations, other evidence from the revealed preference literature confirms that physical attractiveness does play a major role, at least in the early stages of mate selection. Our intuition is that when people complete self-report questionnaires, they imagine an individual that is already acceptable in terms of physical attractiveness. When actually confronted with a mate, physical attractiveness (and all of the information it represents) does figure importantly into evaluations, at least in the initial ones. It remains to be seen whether effects of physical attractiveness would be in fact stronger for female targets when a full range of age variation is provided. Another interesting study design might be to vary the amount of trait information provided (regarding kindness, say), to see if with increasing evidence or cues of trait information, mate attractiveness judgments change, with perhaps women's judgments changing more than men's. The take-away from the present studies does seem to be that the importance of physical attractiveness for women's judging men has been understated in the extant self-report literature.

Still, the present set of studies have highlighted that many traits beyond physical attractiveness figure into mate attractiveness judgments, suggesting that the conclusions of speed-dating studies may be false. However, these studies also show that experimental

revealed preference methods illuminate many aspects of our mate preference cognition that are not apparent when using pure self-report methods. We feel that our new methodology presents an exciting opportunity for future research on human mate preferences, and hope that many will put our paradigm to use in tackling the multitude of fascinating unsolved mysteries in this literature.

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Appendix A

List of statements used in Study 1 and Study 2 (female pronouns are shown)

High Kindness

1. She allowed another woman to share her shelter when the wind knocked down the other woman's shelter, even though this meant she slept more poorly.
2. She came across a fruiting tree but intentionally passed it to allow the woman behind her to find it, since the other woman had been criticized for not finding enough food.
3. She found a patch of wild strawberries, but instead of eating them, she carefully wrapped them up to bring home to a group member who had been badly injured the day before.
4. She gave her jacket to another woman who had fallen into a stream and caught a chill, even though she herself was cold at the time.
5. She stayed up late talking with and trying to cheer up a young woman who had been mocked by some of the other women earlier in the day.
6. When another group member developed a serious fever one night, she spent the entire evening at the woman's side, looking after her.
7. When another woman injured her ankle while foraging, she spent the entire afternoon helping her hobble back to camp.
8. While foraging, she shared the water from her canteen with another woman who was especially thirsty, even though her canteen was almost empty.

Low Kindness

1. One day another woman confided to her that she was very frightened; later that night, she secretly made fun of the woman to some other group members.
2. One day when the rest of the group was out foraging, she intentionally broke the shelter of a woman that she didn't like.
3. She heard someone whimpering in her sleep one night, as if experiencing a nightmare. The next morning, she loudly re-enacted the whimpers she heard the previous night to embarrass the woman.
4. She told another woman that there was an excellent strawberry patch on the other side of a big log, when really she knew there was an enormous hornet's nest there and no strawberries.
5. When group members asked everyone to contribute food to a sick member, she said she had none left when in fact she had extra food hidden away.
6. When her foraging partner dislocated her shoulder and seemed to be struggling to carry the pack, she didn't offer to help carry it because she didn't feel like it.
7. When her foraging party found some especially good fruit, she suggested that they eat most of it on the spot so that they wouldn't have to share it equally with the others.
8. While on a foraging party, she started a rumor about a group member she didn't like having stolen food from the base camp.

High Status

1. At dinner one night, she went to sit by her usual spot by the fire, and several people hurried over to get seats next to her.
2. When she and her foraging party returned to camp, they found the rest of the group members relaxing and chatting casually. She walked up to them to report what the group had found that day, and when they saw her everyone quickly stopped talking and listened attentively.
3. When the foragers were getting ready to set out one morning, she told everyone that today they would be exploring a new area North of the stream. Several people nodded and everyone gathered their packs.
4. One night, two people got into an argument about who should get the last sleeping spot under the tarp. They called her over and agreed to go with whatever she decided.
5. After dinner one night, everyone in the group quieted down as she outlined the foraging strategy for the following week.
6. When a few people wanted to cut down one of the trees close to camp for firewood, they came to her first to ask for permission.
7. After the hunt, the boar was roasted whole over the fire. Someone suggested that she be the one to have the first taste and several people said, “hear hear!”
8. When she was lying awake in bed one night, she overheard two women whispering about her. One said, “we are really lucky to have her here”, and the other said, “Yeah, I don’t know what we would have done without her”.

Low Status

1. During dinner, she took her share of food and went to sit with the others but every available spot by the fire seemed to be taken. As usual, she was forced to sit furthest from the fire, in the dirt, while she ate.
2. At camp one night, she tried to tell the group about the tropical bird she’d seen while foraging, but no one seemed to be listening.
3. When the group was deciding where to forage for the day, she suggested they return to the valley from the previous day. The group members continued their conversation as if she hadn’t spoken.
4. One evening the group was deciding who should be responsible for the last two emergency flares. She suggested that she be the one, but no one even turned their head to look at her when she was speaking.
5. When her shelter was knocked down by the wind one day, she asked if she could sleep under someone else’s that night, but no one volunteered.
6. When she asked some people if they were heading down to the stream to wash their clothes, they said “No, we are just going for a walk”. Later that night, though, she noticed a bunch of clean clothes drying on the tarp.
7. While out foraging, she saw the other women passing around a piece of delicious honeycomb, but no one offered her any even though she was standing right there.
8. After the boar hunt, the group roasted the meat over the fire. She was forced to wait until everyone else had received their share before she could get her own portion.

Neutral Statements

1. A heavy mist descended on camp one morning and she noticed all the leaves were covered with dewdrops.
2. After a heavy rain, she hung her wet clothes out to dry on a nearby tree branch.
3. As the sun began to set, she noticed the wind was beginning to pick up.
4. During dinner, a beetle crawled onto her foot and she swept it off.
5. During dinner, she tried a bite of the roasted boar and was surprised by how good it tasted.
6. During lunch one day, she noticed a seagull perched nearby was eyeing the coconut she was eating.
7. In the morning she walked over to meet up with her foraging group. They were discussing where to forage for the day.
8. On her way into the forest, she walked past a giant spider web.
9. One day while foraging, she thought she saw a monkey jump between the branches above her.
10. One morning she woke up to the snores of some of the other group members.
11. One night after dinner, she stayed up like a few others did to watch the fire burn into coals.
12. She and her foraging party noticed the clearing in the trees and knew they were close to camp.
13. She stepped over a fallen log to see if any mushrooms were growing behind it.
14. The night of the wild boar hunt, she formed a line with the others to get her portion of the roasted boar.
15. When a big storm began, she, along with everyone else, hurried to make sure her belongings were protected from the rain.
16. When she and her hunting party passed a pool at the base of a waterfall, she briefly stopped to skip a stone.
17. When she passed by a banana tree she peered up into the branches to see if any were ripe.
18. When she saw the water had receded, she walked down to the tide pools to rest her feet in the cool water.
19. When she was gathering mangos she enjoyed the cool breeze on her hot, sunburnt neck.
20. While she was out foraging, she noticed that the weather seemed to be improving as days went by.

Appendix B

Island vignette for Studies 1-2 (female pronouns shown)

You are about to learn about a group of women who were traveling together on a small, chartered plane. While crossing the Pacific Ocean, the plane hit a violent storm and was forced very far off course. A bolt of lightning ripped through the plane and damaged the electrical system as well as one of the engines. With no radio and failing power, the pilot managed to crash land on a small island.

-

For two days the passengers waited by the plane for help. They eventually ate all the food they had. Realizing that they might be on the island for a while and that they needed supplies, those who were not injured decided to go out and collect food.

-

They knew that they needed to work together and cooperate so that everyone, including those who were seriously injured, would survive. Everyone who was going out searching agreed that most of the food that they found they would bring back and share with the entire group, although they could also keep a little for themselves.

-

On the following screens, you will learn about the activities of different women on the island.

The screens will advance automatically, without your having to press anything.

Please pay careful attention as you will be asked about your impressions of these women later.

Appendix C

Trait rating items

Assuming you were single, how interested would you be in going on a date with this woman? (1 = Not at all interested, 7 = Very interested)

Long-term attractiveness composite

Assuming you were single, how interested would you be in the possibility of this woman becoming your steady girlfriend? (1 = Not at all interested, 7 = Very interested)

How attractive do you find this woman as a long-term romantic partner? (1 = Not at all attractive, 7 = Very attractive)

Short-term attractiveness composite

Assuming you were single, how interested would you be in engaging in passionate kissing alone with this woman? (1 = Not at all interested, 7 = Very interested)

How attractive do you find this woman as a short-term sexual partner (even if you would not consider actually engaging in sexual acts with her)? (1 = Not at all attractive, 7 = Very attractive)

Cooperative partner attractiveness composite

How much would you like to work with this woman in a group? (1 = Not at all, 7 = Very much)

Would you be able to count on this woman if she were your friend and you needed help with something important? (1 = Definitely not, 7 = Definitely yes)

Kindness composite

How TRUSTWORTHY does this woman seem? (1 = Not at all trustworthy, 7 = Very trustworthy)

How KIND does this woman seem? (1 = Not at all kind, 7 = Very kind)

Status composite

How RESPECTED does this woman seem?(1 = Not at all respected, 7 = Very respected)

How POPULAR does this woman seem? (1 = Not at all popular, 7 = Very popular)

Perceived parenting ability

How GOOD WITH CHILDREN do you expect this woman to be? (1 = Not at all good with children, 7 = Very good with children)

Other ratings:

Would you trust this woman as the leader of a group you were in? (1 = Definitely not, 7 = Definitely yes)

How PHYSICALLY ATTRACTIVE is this woman? (1 = Not at all physically attractive, 7 = Very physically attractive)

How DOMINANT does this woman seem? (1 = Not at all dominant, 7 = Very dominant)

New ratings from Study 4:

How GOOD AS A PARENT would you expect this woman to be? (1 = Not at all good as a parent, 7 = Very good as a parent)

Study 5:

How KIND TOWARDS OTHER WOMEN does this woman seem? (1 = Not at all kind, 7 = Very kind)

How KIND TOWARDS YOU does this woman seem? (1 = Not at all kind, 7 = Very kind)

Study 7:

How GOOD AS A PROVIDER does this woman seem? (1 = Not at all good as a provider, 7 = Very good as a provider)

Appendix D

List of kindness statements used in Study 4 (male pronouns are shown)

High Kindness (4a: Self as target // 4b: Other as target)

1. When you developed a serious fever one night, he spent the entire evening at your side, looking after you. // When a group member developed a serious fever one night, he spent the entire evening at the man's side, looking after him.
2. When group members asked everyone to contribute food to you when you were too sick to forage, he gave you all of his best items and kept only a few small things for himself. // When group members asked everyone to contribute food to a sick man, he gave all of his best items and kept only a few small things for himself.
3. When your canteen was empty, he shared the last of his water with you even though he was thirsty at the time. // He shared the last of his water with another man whose canteen was empty, even though he himself was thirsty at the time.
4. On your birthday, he found some delicious honeycomb while out foraging, but instead of eating it, he brought it back to camp to share with you. // He found some delicious honeycomb while out foraging, but instead of eating it, he brought it back to camp to share with another man whose birthday it was.
5. When you lost your hat while collecting crabs under the blazing sun, he offered you his to wear, even though he was also in the sun. // He offered his hat to another man who was collecting crabs under the blazing sun, even though he was also in the sun.
6. He gave you his blanket when you were chilled from foraging in the rain, even though he was cold as well. // He gave his blanket to another man who was chilled from foraging in the rain, even though he was cold as well.

Medium Kindness (4a: Self as target // 4b: Other as target)

1. One day you confided to him that you felt a little frightened; he listened politely but then left to join his foraging group. // One day another man confided to him that he felt a little frightened; he listened politely but then left to join his foraging group.
2. When you caught a big lobster, he gave you a thumbs-up like the others did, but then continued foraging. // When another man caught a big lobster, he gave the man a thumbs-up like the others did, but then continued foraging.
3. When you were talking about home one night, he apologized for being too sleepy to listen right now and went to bed. // When another man was talking about home one night, he apologized for being too sleepy to listen right now and went to bed.
4. When you were trying to wash your clothes in the stream, he gave you a tiny piece of the soap he had found, but kept most for himself. // He gave a tiny piece of soap to another man who was trying to wash clothes in the stream, but kept most for himself.
5. On a day when you couldn't find any food, he gave you one piece of fruit out of the large pile he had collected. // When another man couldn't find any food, he gave him one piece of fruit out of the large pile he had collected.

6. When you developed blisters and couldn't walk very fast, he gave you a sympathetic look but went ahead with the others to hang out at the waterfall. // When another man developed blisters and couldn't walk very fast, he gave the man a sympathetic look but went ahead with the others to hang out at the waterfall.

Low Kindness (4a: Self as target // 4b: Other as target)

1. When you were struggling to walk after rolling your ankle on a muddy slope, he told you that you were slowing him down, and he left you behind. // When another man rolled his ankle on a muddy slope and was struggling to walk, he said the man was slowing him down and left him behind.
2. While on a foraging party, he started a rumor that you had stolen food from base camp, which wasn't true. // While on a foraging party, he started a rumor that a group member had stolen food from base camp, which wasn't true.
3. Ahead of you on the trail, he came across a fruiting tree and hurriedly collected all the fruit, leaving none for you. // He came across a fruiting tree and hurriedly collected all of the fruit, leaving none for the woman walking behind her on the trail.
4. When you asked him for help gutting your fish, he refused, even though he was really good at it. // When another man asked him for help gutting a fish, he refused, even though he was really good at it.
5. When you said you were going out to look for fresh water, he didn't tell you about the good stream he had found nearby. // He didn't tell a man about the good stream he had found when the man said he was going out to look for fresh water.
6. While you were out foraging, he noticed your shelter was about to collapse under the rain, but chose to take a nap rather than do anything to help you. // While some people were out foraging, he noticed a man's shelter was about to collapse under the rain, but chose to take a nap rather than do anything to help.

Appendix E

List of kindness statements used in Study 5 (male pronouns are shown)

HK_{me}

1. When you developed a serious fever one night, he spent the entire evening at your side, looking after you.
2. When someone started a rumor that you had stolen food from base camp (which wasn't true), he immediately defended you.
3. When you lost your hat collecting sand crabs under the blazing sun, he gave you his to wear, even though he was also in the sun.
4. After dinner one day, despite being tired from foraging, he led you to a difficult-to-find source of fresh water, so you would know where it was.
5. When your canteen was empty, he shared the last of his water with you even though he was thirsty at the time.
6. When you injured your knee while out foraging, he spent the entire afternoon helping you hobble back to camp.
7. On your birthday, he found some delicious honeycomb, but instead of eating it, he brought it back to camp to share with you.
8. While you were out foraging, he noticed your shelter was about to collapse under the rain and spent an hour making it sturdier for you.

HK_{others}

1. He stayed up late one night helping another man sew a foraging bag back together after it had split open.
2. He gave his blanket to another man who was chilled from foraging in the rain, even though he was cold as well.
3. He allowed another man to share his shelter when the wind knocked down the other man's shelter, even though this meant he slept more poorly.
4. When group members asked everyone to contribute food to a sick man, he gave all of his best items and kept only a few small things for himself.
5. He came across a fruiting tree but intentionally passed it to allow the man behind to find it, since he knew the man hadn't found any food that day.
6. After taking the guts out of his fish, he gutted another man's fish for him also, because he knew the man hated doing it.
7. When another man was frustrated after spending all afternoon unsuccessfully trying to spearfish, he offered the man the last of the fresh coconut water to cheer him.
8. When he saw another man was sunburned, he went out of his way to search for some aloe plants for him.

MK_{me}

1. One day you confided to him that you felt a little frightened; he listened politely but then left to join his foraging group.

2. He found a hidden grove with banana trees one day and ate a few of the best bananas himself before telling you about the grove.
3. On a day when you couldn't find any food, he gave you one piece of fruit out of the large pile he had collected.
4. When you were talking about home one night, he apologized for being too sleepy to listen right now and went to bed.

MKothers

1. When another man caught a big lobster, he gave the man a thumbs up like the others did but then continued foraging.
2. When a man developed blisters and couldn't walk very fast, he gave the man a sympathetic look but went ahead with the others to hang out at the waterfall.
3. He gave a tiny piece of soap to another man who was trying to wash clothes in the stream, but kept most for himself.
4. After another man rolled his ankle on a muddy slope, he helped the man down the slope but then went ahead to make it back to camp.

Appendix F

List of provisioning statements used in Study 6 (female pronouns are shown)

High Provisioning Ability

1. She was able to move quickly enough to grab spiny lobster before they darted under rocks, and brought home more lobster than anyone else.
2. She waded carefully through a dangerous brackish river and hunted the duck she had seen.
3. Over the course of a week, she brought back the most rabbits compared to everyone else.
4. Even on days when other people couldn't find any shellfish, she consistently returned to camp with a bag filled with mussels.
5. Out of all the women, she picked up the technique for making a fishnet the fastest.
6. Even though she was exhausted, she continued collecting oysters to get as many as possible before dark.
7. She couldn't explain how she did it, but she was consistently able to predict which dirt patches would conceal edible roots.
8. She was very good at remembering where distant foraging patches were, and thus found food easier than other people.

Low Provisioning Ability

1. She noticed some papaya up in a tree but could not figure out a way to get the fruit down.
2. Whenever she tried to throw a spear, she always missed her target by a wide margin.
3. She watched a large crab scurry into a hole and walked away without considering ways of luring it out.
4. Unlike the others, she could not throw her spear far enough to hunt some small antelope.
5. She gathered the least amount of avocados of any of the women because she kept needing to take breaks every few minutes.
6. She didn't collect a cluster of berries because she didn't want to have to walk through some prickly bushes to reach them.
7. She had trouble differentiating small markings on leaves and consistently confused edible plants with poisonous ones.
8. Her eyesight was so poor that she couldn't spot game even if it was very close by, which made her a liability on hunting parties.

Appendix G

List of hunting and gathering statements used in Study 7 (male pronouns are shown)

Good Hunter

1. He was able to move quickly enough to grab spiny lobster before they darted under rocks, and brought home more lobster than anyone else.
2. Unlike many of the others, he had enough stamina to track a deer for several hours through the dense underbrush.
3. He ran fast enough to catch a pheasant he spotted by the stream, and brought it back to camp for the group.
4. He waded carefully through a dangerous brackish river and successfully hunted the duck he had seen.
5. He was able to throw his spear far enough to hunt some small antelope.
6. He ambushed a wild pig and was able to knock it out with a large stick.
7. He designed a hole trap that successfully caught many rabbits.
8. When he glimpsed a wild chicken, he expertly loaded and fired his slingshot in a split second, catching it successfully.

Bad Hunter

1. Whenever he tried to throw a spear, he always missed his target by a wide margin.
2. A quail landed near him, but he was not quick enough to grab it.
3. Over the course of a week, he brought back the least rabbits compared to everyone else.
4. He started tracking a deer, but was out of breath within fifteen minutes and had to stop and rest.
5. His eyesight was so poor that he couldn't spot game even if it was very close, which made him a liability on hunting parties.
6. He wanted to spearfish like the others, but was too frightened to swim in the rocky coves.
7. He clumsily made loud noises when walking that scared away small animals that his group was hunting.
8. When others drove a small pig towards him, he was not strong enough to hold it and it got away.

Good Gatherer

1. He was able to find more edible tubers than any other group member.
2. He gracefully collected honey from a bee hive in a fallen log without upsetting the resident bees.
3. He worked tirelessly all afternoon to gather fruit on a steep hill, and gathered more than anybody.
4. He quickly learned to differentiate small markings on leaves to find edible and medicinal herbs.
5. He was very good at remembering which trees were near good foraging patches, and thus found food easier than other people did.

6. Even on days when others couldn't find any wild carrots, he consistently returned to camp with a bag filled with them.
7. He methodically harvested blueberries all afternoon, carefully separating them from branches without bruising them.
8. He couldn't explain how he did it, but he was consistently able to predict which dirt patches would conceal edible roots.

Bad Gatherer

1. He usually failed to notice edible plants as he moved about the island.
2. He gathered the least amount of fruit of anyone because he kept taking breaks every few minutes.
3. He tended to daydream while collecting mangos and so usually returned with less than others.
4. He didn't collect a cluster of berries because he didn't want to have to walk through some prickly bushes to reach them.
5. Although others eventually picked up this skill, he was never able to predict which trees would bear fruit soon.
6. His memory for the location of foraging patches was particularly bad, and he spent a lot of time wandering around, aimless.
7. He saw other people dig up edible tubers, but was somehow never able to find them.
8. He had trouble differentiating small markings on leaves and consistently confused edible plants with poisonous ones.