Is He the One?: Courtship as a Mechanism to Predict Male Long-Term Commitment

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Fall 2012

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Human courtship is a process whereby one tries to seek the affections of another, usually with the intent of marriage (Merriam-Webster, 2012). In modern society, courtship appears to be a universal precursor to marriage: In nearly all marriages (or other formal romantic unions), males provide some form of courtship, lasting from several weeks to years (Surra, 1985). Courtship can take several forms, but in the context of long-term mating, it is nearly always characterized by a male who invests his time or resources toward a female (Surra, 1985). Although, in specific contexts females may court males though specific courtship display (Geher & Miller, 2007), this study focuses on the courtship of females by males.

Parental Investment Theory

Parental investment theory, proposed in (1972) by Robert Trivers, hypothesizes that the biological differences between sexes may have, through selective pressure, impacted human and non-human animal behaviors. Trivers hypothesized that the minimal obligatory biological investment required by a member of one sex relative to the member of another to produce a viable offspring would drive both physiological and behavioral adaptations. In most animals, the male must, at a minimum, only provide sperm, whereas a female, in addition to her own gamete(s) must also provide fetal nourishment and, in many species, additional resources beyond parturition. It follows that in nearly all species, females bear most (if not all) of the cost associated with raising their offspring. According to parental investment theory, this dynamic between males and females leads to sexually dimorphic physiological patterns in gamete production. Given the higher parental investment burden required, females produce few gametes relative to males, as the amount of viable offspring they are able to produce is limited. Conversely, for males,

because there is virtually no fitness burden associated with reproduction, they produce prodigious amounts of their own gametes. Trivers (1972) reasoned that this sexual dimorphism in gamete production confers contrasting selective pressures. Females, given their limited supply of gametes, must select male mates carefully, as offspring with inferior genes bears an opportunity cost: The resources invested in their "inferior" offspring could have instead been directed to one with superior genes. In contrast, given that males are not constrained in the amount of offspring they can sire, they incur little opportunity cost by mating with "inferior" females. As a result of the dimorphic patterns of parental investment, and in turn, gamete production, there are selective pressures for females to be discerning relative to their male counterparts in mate selection. According to parental investment theory, this fundamental biological difference between males and females accounts for why males, with their limitless supply of gametes, are largely the pursuers or "courters" of females in nearly all species.

The Evolutionary Psychology of Courtship

Several have speculated on the adaptive origins of courtship. Geoffrey Miller (2001) hypothesized that courtship evolved as a fitness display that reflected females' preference for intelligent males. He noted that recorded history is rife with examples of human courtship, and that prehistorically, paleontologists continue to find evidence of likely courtship displays. Miller speculated that because females universally prefer intelligent males, courtship served as a window of opportunity for males to demonstrate their intelligence (in various forms such as humor and creativity) – a suspected markers of gene-quality (Haselton & Miller, 2006). To account for the emphasis that males place on advertising their provisioning abilities (Buss & Schmitt, 1993), Miller speculated that

any displays that advertised marks of good parenting were likely one of the many ways a male would advertise his genetic quality. Paternal investment, Millers speculates was largely superfluous, as there is strong evidence that early humans relied on alloparenting (the communal sharing of parenting responsibilities) (Hrdy, 1999).

Despite little evidence for paternal investment in ancestral humans, across modern cultures, females report a strong preference for males who seem willing or able to invest in her future offspring (Buss & Schmitt, 1993; Buss, 1989), suggesting that male advertisements of "fathering abilities" were not merely incidental or. Buss and Schmitt (1993) cited several potential disadvantages that females without paternal investment might incur. Specifically, when faced with the burden of child rearing, females may not be able to acquire sufficient nutrition or may be vulnerable to aggressive males (Shostak, 1980; Smuts, 1991). It follows that females may have faced indeed selective pressures to select for males who were willing to provision for their offspring, which may account for why females report a desire (if not a requirement) for paternal investment.

Long-term Female Mating Strategies

In 1993, Buss and Schmitt laid out much of the groundwork for how selective pressures may have shaped sex differences related to human mating in what is now called *Sexual Strategies Theory* (SST). Using a cross-cultural survey, Buss and Schmitt tested hypotheses, drawn largely from Trivers (1972). Buss and Schmitt discovered that females prefer males who are able to provide resources as long-term mates and prefer attractive males as short-term mates. Males, they found, tend to pursue a mixture of long-term and short-term mates (Buss & Schmitt, 1993). Gangestad and Simpson (2000) expounded on

SST's framework with their theory s*exual strategic pluralism* (SSP). According to SSP, individuals may alter their mating strategies in response to environmental cues in order optimize their reproductive effectiveness. For example, if an environment necessitates greater levels of paternal investment (perhaps due a scarcity of resources), females should tend to show a greater preference for males who demonstrate superior resource-provisioning abilities. According to SSP, a strong interplay between the sexes mating strategies may occur: In response to adjusted female mating valuations, males may adjust their own balance between long-term mating (i.e., resource provisioning) and short-term mating strategies such that their own reproductive success is optimized (Gangestad & Simpson, 2000).

Ultimately, according to SST, it is the individual male's relative success between short-term and long-term mating will provide cues for sexual strategy optimization. Males possessing markers of "high quality" genes should tend to have more short-term mating success, and in turn, pursue more short-term mate. Males without these markers should tend to pursue a long-term strategy as resource provisioning is a function of one's effort and commitment to provide paternal investment. This inference is empirically supported. As Buss and Schmitt (1993) observed, a long-term mating strategy was observed as an effective alternative: Females demonstrate preferences for a males who were willing and able to invest in their offspring.

Females Face a Long-Term Mating Dilemma.

In cases in which females require paternal investment, Gangestad and Simpson (2000) hypothesized that females may need to select a mate who provides a balance

between good genes and high likelihood to invest in offspring: The males with the best genes might not be the ones willing to provide sufficient paternal investment. Males with especially high indicators of genetic fitness such as height, intelligence, facial symmetry and masculine features (Gangestad & Simpson, 2000; Little, Jones, Burt, & Perrett, 2007; Oinonen & Mazmanian, 2007) may find that their resources are better served seeking short-term mates. In order to distinguish between long-term male strategists and short-term deceivers Buss and Schmitt (1993) speculated that females may employ a mechanism to identify if a male is indeed likely to provide paternal investment over a long time-period, as there is a high fitness cost for females who mate with "inferior" males if they are not compensated for this sacrifice with paternal investment. Accordingly, it is then likely that there are strong selective pressures for females to optimize both the quality of their mates and the paternal investment their offspring receive. Two well-documented mechanisms associated with addressing this dilemma have been proposed.

Cuckoldry. Concealed ovulation in humans makes it possible for females to first find a long-term mate and then seek out a short-term mate (i.e., cuckold her long-term mate) (Inge, 1993). This behavior may be adaptive because females who cuckold their mates may benefit by having both offspring who are sired by males with genes and a "paternal" investor. Female behaviors that suggest a cuckolding tendency are well-documented in the literature (Pillsworth & Haselton, 2006). However, with regard to the actual incidence of human cuckoldry, studies conducted before the widespread availability of birth control have found that as high as 10% of fathers are unknowingly the nonbiological parents of at least one of their children (Voracek, Haubner, & Fisher, 2008). These nonpaternity

studies along with data indicating that females prefer more attractive long-term mates (Waynforth, 2004), suggest that cuckoldry does not alone solve the female mating dilemma.

Deception detection. Personality researchers have noted three socially undesirable traits that tend to cluster together, narcissism, psychopathy and Machiavellianism; this cluster is known as *the dark triad* (Paulhus & Williams, 2002). Mating researchers have since hypothesized that this cluster of personality traits may help to facilitate male short-term mating success (Jonason, Li, Webster, & Schmitt, 2009) because dark triad males will show little hesitation in deceiving prospective mates for the purposes of achieving their ends. There is strong evidence that females employ a suite of mechanisms to guard against deceptive male tactics. On the neural level, fMRI's demonstrate that females who are shown images of dark triad males exhibit higher levels of activity in the amygdala, an area associated with appraisals of trustworthiness (Gordon & Platek, 2009). Keenan, Gallup, Goulet and Kulkarni (1997) found that in mating-relevant situations, females are more likely to suspect deception in males than males are to suspect deception in females. Cyrus, Schwartz and Hassebrauck (2011) found that postmenopausal women were less likely to suspect deception than their premenopausal counterparts. A related study, comparing single females with non-single females, found that the single females were better at detecting the veracity of actors' video-recorded statements (Johnson et al., 2004). One cannot, however, conclude that being in a relationship causes females to lose their deception-detection abilities; females who are poor deception-detectors may be more likely to be in relationships. In another study on female deception-detection, researchers found that that females who had prior knowledge of common deception techniques were

better at a deception-detection task in which they were exposed to videos of male actors who were either lying or telling the truth (Barnacz, Amati, Fenton, Johnson, & Keenan, 2009). Females may also look toward peripheral cues when trying to ascertain a male's mating intensions. Kruger and Fisher (Kruger, Fisher, & Jobling, 2003; Kruger & Fisher, 2005) found that females make appraisals of predominant mating strategies based on male descriptors. Expounding on Kruger and Fisher (2008), it was found that males associated with hobbies, traits or attributes that were either high in risk alone or high in a combination of risk and visibility were rated by females as being worse long-term mate prospects (Freuman, Kruger, & Geher, 2012). Specifically, females who rated a hobby, trait or attribute as risky or both risky and visibly, rated males associated with these traits as likely short-term strategists.

Lengthy Courtship May Solve the Female Mating Dilemma

Buss and Schmitt (1993) speculated that there is a likely mechanism by which females can be sure of a male's willingness to invest over the long-term. Specifically, they speculated that there should be a means of costly-signaling that only those willing to engage in a long-term commitment can afford. Unlike advertising one's genetic fitness, which can be readily broadcast via phenotypic markers (e.g., be the smartest, best-looking, most popular, etc.) (Lande, 1981), there is no foolproof advertisement to signal a males willingness to commit to a long-term mate that cannot be replicated by an opportunistic short-term strategist (either readily or through evolved mimicry). Therefore, females can, at best, maximize the possibility that their suitors are true long-term strategists by identifying deceivers.

Courtship to screen out deceivers. I propose that to maximize the likelihood that a male will remain committed over an extended period, a female can set for a male particular investment threshold such that males who are not truly oriented toward a long-term strategy will be unlikely to fulfill. Because females are constrained in the amount of offspring they are able to bear, and males have the potential to sire thousands of offspring (Busnot, 2002; Trivers, 1972), males who spend their time courting will incur a higher opportunity cost than a female whose time is spent as the recipient of courtship offerings. Therefore, by requiring a courtship investment period, a female can screen out males who are deceivers, or at the very least, males who are not genuine long-term strategists. Courtship as a mate screening mechanism is theoretically adaptive because the opportunity cost incurred by males who are courting is dependent on their success in the short-term mating market. It follows that for males whose time spent pursuing short-term mating opportunities is likely to result in many offspring, these males will incur a much higher opportunity cost courting a female than males who are unlikely to succeed in short-term mating. In effect, according to this framework, courtship can be used to test a male's optimal mating strategy in order to ensure that his optimal mating strategy is indeed long-term.

Courtship to optimize genes and paternal investment. Additional, courtship criteria can optimize the balance between genes and paternal investment. By first soliciting courtship from the highest value male, a female, with each failed courtship, can lower the quality of mate whose courtship overtures she will be receptive to. This type of strategy obviates the need for a female to identify her own mating value; rather, she can use the "market" to optimize her own mate choice. Females who are highly sought after are more

likely to their first choices, whereas other females who are less sought after, will find a suitable mate later in the process.

Theoretical evidence for courtship as a screening mechanism. There is both theoretical and empirical evidence to support the hypothesis that courtship serves as a screening mechanism. Seymour and Sozou (2009) modeled whereby courtship could be used as a viable screening mechanism. To summarize their model, in courtship, both males and females must pay participation cost units in time spent. The males that are able to pay these units are deemed "good," whereas those who are not, are deemed "bad." Seymour and Sozou interpret this interplay as a form of costly signaling, but it should not be inferred as "good genes" signaling. Because females are constrained in the amount of offspring they are able to bear, and males have the potential to sire thousands of offspring (Trivers, 1972), the opportunity cost of each time unit is much higher for the male, making this a comparatively costly game for him. It follows that those who win the courtship game are those with less to lose by forgoing the short-term mating market. This is not to say that females are looking for the males with the absolute lowest opportunity cost, but rather, as Seymour and Sozou's model would suggest, they are looking for a male with a sufficiently low opportunity cost, one that would enable him to pass her test.

Emperical evidence for courtship as a screening mechanism. Baxter and Wilmot (1984) conducted a study on "secret tests." Through interviews, they found a variety of ways in which females admit to "testing" the commitment of their prospective mates. One such way was through a separation test. For example, one female admitted, "to see if our relationship was really strong, I tested it by intentionally separating us by going overseas for a few months" (Baxter & Wilmot, 1984). Males also claimed that some

female behaviors seemed like unequivocal tests of commitment. For example, one male stated that "During the break, she wrote me to see if she could come and visit me for a few days. The thing was that I would have to drive 500 miles to pick her up. It was a test to see how much inconvenience I would stand in the relationship" (Baxter & Wilmot, 1984, p XX). Another secret testing phenomenon that Baxter and Wilmot reported was a fidelity tests (also termed "triangle" tests). The female in this test would observe a prospective mate with attractive alternatives (sometimes by intentionally putting him in a situation with another female) to see how he reacted to other women. In the words of one female, "I would intentionally leave him alone in the room with my roommate and then ask him when I returned, "What have you two been up to?"[to see] if he acted uncomfortable [sic]" (Baxter & Wilmot, 1984, p. XX). Of the seven clusters of tests measured, females were significantly more likely than males to employ either a separation test or a "triangle" test. The five other clusters were not employed at significantly different rates between males and females (Baxter & Wilmot, 1984).

Potential Predictors of Courtship Behaviors

Courtship psychology has been studied extensively (see Geher & Miller, 2007). According to past research, several specific evolutionarily informed variables that have been shown to predict courtship are life history strategy (the tendency to approach life either assuming a long or a short lifespan (Gladden, Figueredo, & Snyder, 2010)), narcissism (the tendency to inflate one's own importance or value (American Psychiatric Association, 2000)), mate value (one's value as a mate to a specified population (Fisher, Cox, Bennett, & Gavric, 2008)), and mating intelligence (the cognitive processes that underlie mating-relevant behaviors (Geher & Miller, 2007)). These variables were all

included in the current study, and detailed summaries of these concepts are included in

this section.

Life History Strategy. It is believed that the utilization of long-term mating strategies

are predicted for by a combination of genes and environment. According to life history

theory, specific environment influences will predict to what extent humans will engage in

a fast versus slow life strategy. A fast life strategy (low-K) is characterized by an

emphasis on mating rather than offspring provision, whereas a fast life strategy (hi-K) is

characterized by an emphasis in offspring provisioning rather than mating (Rushton,

1985). It follows that low-K individuals are more likely to have more offspring but

provide them with less paternal investment, whereas hi-K individuals are more likely to

have fewer offspring but provide them with increased provisioning. It is thought that Hi-

K strategies are predicted for by stable environments that are characterized by stability

and social support, and that Hi-K individuals are likely to be long-term strategists

because long-term strategies emphasize greater viability of fewer offspring (Gangestad &

Simpson, 2000; Kruger & Fisher, 2008; Rushton, 1985).

Narcissism. Briefly, one's narcissism score corresponds to his or her level of perceived

self-importance (American Psychiatric Association, 2000). Narcissism may be related to

courtship because one's self-perceived important may influence the level of courtship he

or she is willing to provide or accept.

Mate Value. One's mate value is broadly perceived to reflect an individual's desirability.

While there are several domains which compose one's mate value, mate value is

generally considered to be the sum of all phenotypic proxies for the quality of one's

genes (Fisher et al., 2008).

Mating Intelligence. Females are thought to benefit from a suite of traits such as cross-

sex mind reading, the ability to deceive others, the ability to effectively advertise oneself

and commitment skepticism (Geher & Kaufman, 2007). It has been hypothesized, that

Mating Intelligence represents an intuitive grasp of human mating strategies in such a

manner that one is able to navigate mating relevant scenarios in such a manner that they

are able to exploit the dynamics in typical mating "markets"

Introduction to Current Study

To test for whether courtship functions as a mate screening mechanism, one must

set up an experiment such that alternative explanations for the adaptive mechanisms of

courtship can be ruled out. Courtship is commonly understood as such that a male will

provide resources in lieu of quality genes and that courtship functions as an intent to

provide resources (Buss & Schmitt, 1993). The implication of this that one may draw is

that both the quality of genes and the willingness to invest resources function as

currencies, e.g., a small gene-quality deficit will necessitate a small amount of courtship

to fill the gap, whereas a large gene-quality deficit will necessitate a large amount of

courtship. In order to test whether courtship acts as a mating-market "currency" or to

screen out short-term male strategists, it may be possible to devise an experimental

circumstance that will either lend support to courtship as a screening mechanism or

courtship as a mating-market currency.

Mate Screening Predictions

Females, I hypothesize, will hold males to time-investment thresholds in order to screen for their likelihood to provide adequate paternal investment. However, males may exhibit peripheral cues which may demonstrate an increased or decreased likelihood that he will be a good long-term mate choice. For example, a study found that females exhibited greater activities in brain areas associated with trust when shown photos of males who were more likely to be deceptive (Gordon & Platek, 2009). Females have also been shown to draw on hobbies, traits or activities associated with males to infer a mating strategy (Freuman, Kruger & Geher, 2012). It follows that females may be motivated to hold males who are visibly more likely to desert their offspring to a higher time-investment threshold.

Hypothesis 1: Males who are likely short-term strategists (or Cads) will incur higher time-investment threshold than males who are likely long-term strategists.

Males with phenotypic traits associated with quality genes are often selected for during short-term mating encounters and one such trait is facial masculinity (DeBruine et al., 2006). According to SSP, males who exhibit greater masculine facial architecture are likely to capitalize on this phenotypic indicator and therefore pursue more short-term mating opportunities. It follows that these males may arouse more suspicion in females as they are less likely to be seeking a long-term mate. In contrast, were courtship to function as a currency, the more attractive a male, the less courtship a female will require of him, as she requires less "compensation" in the form of resource provisioning.

Hypothesis 2: Males with masculine facial architecture (or Cads) will incur higher time-investment threshold than males with non-masculine facial architecture.

As females age, the number of offspring they can viably produce diminishes (Trivers, 1972). The risk associated with having fewer viable offspring, as females near menopause are predicted to outweigh the risk of reduced paternal investment. A similar prediction would arise from the courtship as a currency framework as this phenomenon may be the result of the decrease in the female's mate value in relation to her suitor.

*Hypothesis 3: Older females will exhibit a decreased time-investment threshold overall.*

Females with a high mate value are often sought as long-term mates, and as such, may have less to need to screen out deceivers who are not truly interested in a long-term commitment. If supported, this prediction will provide evidence refuting the courtship as a currency understanding. The Mate Value Inventory (MVI) (Kirsner, Figueredo, & Jacobs, 2003) is an inventory that elicits one's perceived mate value across a spectrum of qualities that are considered to be relevant from an evolutionary perspective (e.g., attractiveness, generosity, faithfulness to partner, etc.) (Gladden et al., 2010).

Hypothesis 4: Females with a higher mate value will exhibit a decreased time-investment threshold overall.

Participants

355 females (Mean Reported Age = 21.96, SD = 4.70) were recruited to take part in a study. The population was predominantly comprised of students from a mid-sized northeastern public university. The study was conducted online. Previous studies on mate

choice have found online studies to be of similar reliability as studies performed in labs (Jones et al., 2005).
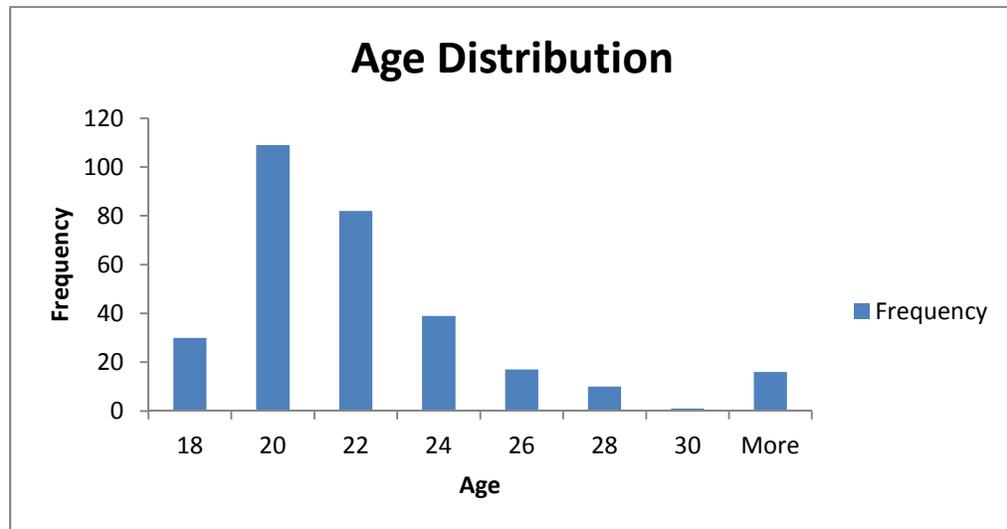
Stimuli

Facial stimuli. Two masculine and two non-masculine facial images were developed using morphometric facial manipulation software. One masculine and one non-masculine face were prototypes created by morphing either extremely masculine or extremely feminine faces together. The feminine faces that were morphed were derived from those rated by a focus group as the 10 most feminine faces of a 120 face sample. The masculine faces that were morphed were based on a focus group derived list of "masculine or sexy" males. The other two faces were created by taking the face of an average facial composite and morphing the facial architecture along dimensions that are associated with higher 2D:4D digit ratio, specifically the fullness of the lips, the breadth of the jaw and the prominence of the zygomatic arch and morphing them along the dimensions that characterized the masculine and the non-masculine prototypes. (Fink et al., 2005; DeBruine et al., 2006; DeBruine, Jones, Smith, & Little, 2010). All composites were

derived using images available on public databases. (See Appendix A for images.) A manipulation check in a factorial ANCOVA revealed that for dimensions associated with fatherhood preference (i.e., markers of quality genes), the masculine faces were rated as more desirable to sire her offspring, $F(1, 296) = 19.01$, *partial* $\eta^2 = .061$*, $p < .001$ and, weakly, as being more preferable for a *hook-up* $F(1, 296) = 5.07$, *partial* $\eta^2 = .016$, $p < .05$. Females showed a preference for the non-masculine faces as a potential *husband*, $F(1, 296) = 7.36$, *partial* $\eta^2 = .025$ $p < .01$.

Descriptive stimuli. Two personal statements were developed, one suggesting a predominantly long-term strategy and the other a predominantly short-term strategy. The statements were developed by asking 257 females to rate 40 focus-group-derived personal descriptors (i.e., hobbies, traits, etc.) one either a long-term strategist scale or a short-term strategist scale (Freuman et al., 2012). Each trait was paired with a male name in order to avoid the conflation of descriptors. All items were assessed using 9-point Likert agreement scales.

Long-term mating scale. This scale contained two items, "This man would make a good husband;" and "This man is kind generous and giving;" both items were combined to form a composite short-term strategist score (LTSR). The Cronbach's alpha for this scale was .78.

Short-term mating scale. This scale contained two items, "This might seem appealing for a short-term fling;" and "This man has probably had many sexual partners;" both were combined to form a long-term strategist score. The Cronbach's alpha for this scale was .67.

Items that were most exclusively associated with a long-term strategist were incorporated into a long-term strategist personal statement. Similarly, items that were most exclusively associated with a short-term strategist were incorporated in a short-term strategist personal statement (see Appendix B).

A manipulation check conducted via a factorial ANCOVA revealed that the faces associated with *long-term strategy statement* were strongly preferred both for as a *husband*, $F(1, 296) = 104.48$, *partial* $\eta^2 = .267$, $p < .001$, and as *hook-up* $F(1, 296) = 31.523$, *partial* $\eta^2 = .095$, $p < .001$. There was no significant difference between the two personal descriptions for the *gene rating*.

Scales.

Mating Intelligence Scale (Geher & Kaufman, 2007). This scale measure one's Mating Intelligence. Mating Intelligence has been defined the sum the non-physical skills, qualities and behaviors that enhance one's reproductive success (O'Brien et al., 2009).

Mate Value Inventory (MVI) (Kirsner et al., 2003).

Mini-K (Figueredo, 2007). The Mini-K measures where one is on the life-history strategy spectrum, also known as the K-Factor.

NPI-16 (Ames, Rose, & Anderson, 2006). The NPI-16 is an abbreviated form of the narcissism scale, the NPI-40.

Courtship Criteria Inventory (CCI). This measure consisted of 8 different items, with the dependent variable for each a unit of time. The questions were meant to represent discrete

stages of courtship in a context that is culturally relevant to American females. The Cronbach's alpha for this scale is .74.

1. You see this person at a social gathering. It appears that he would like to talk to you. How long, in minutes, would it take until you felt comfortable talking to him?

2. You are talking with this person, and it appears that he would like your phone number. How many minutes of talking would it take until you feel comfortable offering your phone number?

3. You are having a conversation with this person, and it appears that he would like to take you out on a date. How many minutes of conversing would it take before you feel comfortable accepting an offer of a date?

4. You've been dating this person. It appears that he would like to kiss you (and perhaps make out), how many hours spent on dates would it take before you felt comfortable kissing?

5. You've just started seeing this person. It appears that he would like to escalate the physicality of your relationship (and perhaps have sex), how many days of seeing this person would it take before you felt comfortable with being more physical?

6. You're in a relationship with this person. How long, in months, would it take before you would feel comfortable moving in together with this person?

7. You're in a relationship with this person. How long, in months, would it take before you would feel comfortable accepting a marriage proposal?

8. You live with this person, and you're married. How long, in months, would it take before you'd consider having sex without contraception (with or without the intent of getting pregnant)?

The scores of this scale are normalized using either root or log transformations and then z-scored.

Results

This analysis was designed to assess whether the Facial Masculinity and Personal Description predicted the Time-Investment Threshold. The primary analysis utilized a factorial ANCOVA. The covariates were Age, Estradiol, Mating Intelligence, Narcissism and Mate Value. These variables were included because they were all hypothesized to be predictive of Time-Investment Threshold. Sociosexuality (SOI) was measured by not included in this analysis because the stimuli were found to influence this measure, negating its potential as a covariate.

Hypothesis 1. The factorial ANCOVA revealed significant results for Personal Description ($F(1,546) = 5.89$, $p < .05$). As predicted, males who were more likely to be suspected short-term strategists ($M = 1.11$, $SD = 5.18$) were held to a higher Time-Investment Threshold than long-term strategists ($M = .06$, $SD = 5.00$). *This hypothesis was supported.*

Hypothesis 2. The factorial ANCOVA did not reveal significant effects for Facial Masculinity ($F(1,546) = 1.11$, *ns*). The results found no support for the prediction that more masculine males are held to a higher Time-Investment Threshold. *This hypothesis was not supported.*

Additionally, the ANCOVA revealed an interaction trending toward significance between Facial Masculinity and Personal Description (F(1,546) = 3.2, $p < .1$, *ns*). A follow-up ANCOVA revealed that non-masculine males associated with *cad* descriptions (M = 1.52, SD = 5.66) were held to a higher Time-Investment Threshold that non-masculine males associated with a *dad* descriptions (M = -.07, SD = 5.17), $f(1,171) =$ 9.30, $p < .01$. Another follow-up ANCOVA testing masculine *cads* and non-masculine *cads* found that masculine *cads* (M = 1.52, SD = 5.66) are held to a higher Time-Investment Threshold than non-masculine *cads* (M = .63 SD = 4.54), $f(1,167) = 4.31$, p $< .05$.

Table 1. Descriptive Statistics for Total-Time Investment Threshold across Personal Description and Face Type (Standard Deviations are in Parentheses).

	Personal Description		
Face Type	Cad Description	*Dad* Description	Total
Masculine Face	.63 (4.54)ₐ	.18 (4.87)ₐ	.37 (4.72)
Non-Masculine Face	1.52 (5.66)_b	-.07 (5.17)ₐ	.73 (5.46)
	1.11 (5.18)	.06 (5.00)	.56 (5.11)

N = 355; means with different subscripts are significantly different. Higher scores correspond to higher Time-Investment Threshold.

Table 2. ANCOVA Test of Between-Subject Effects

*Dependent Variable: Total Time Investment*

Source	df	F	Sig.
Facial Masculinity	**1**	**1.11**	**.293**
Personal Description	**1**	**5.89**	**.016**
Facial Masculinity X Personal Description	**1**	**3.20**	**.074**
Error	346		
Total	355		
Corrected Total	354		

a. R Squared = .10 (Adjusted R Squared = .08)

Fixed factors and interactions are **bold**.

Age, Estradiol, Mating Intelligence, Narcissism and Mate Value have been included as covariates.

Figure 1.
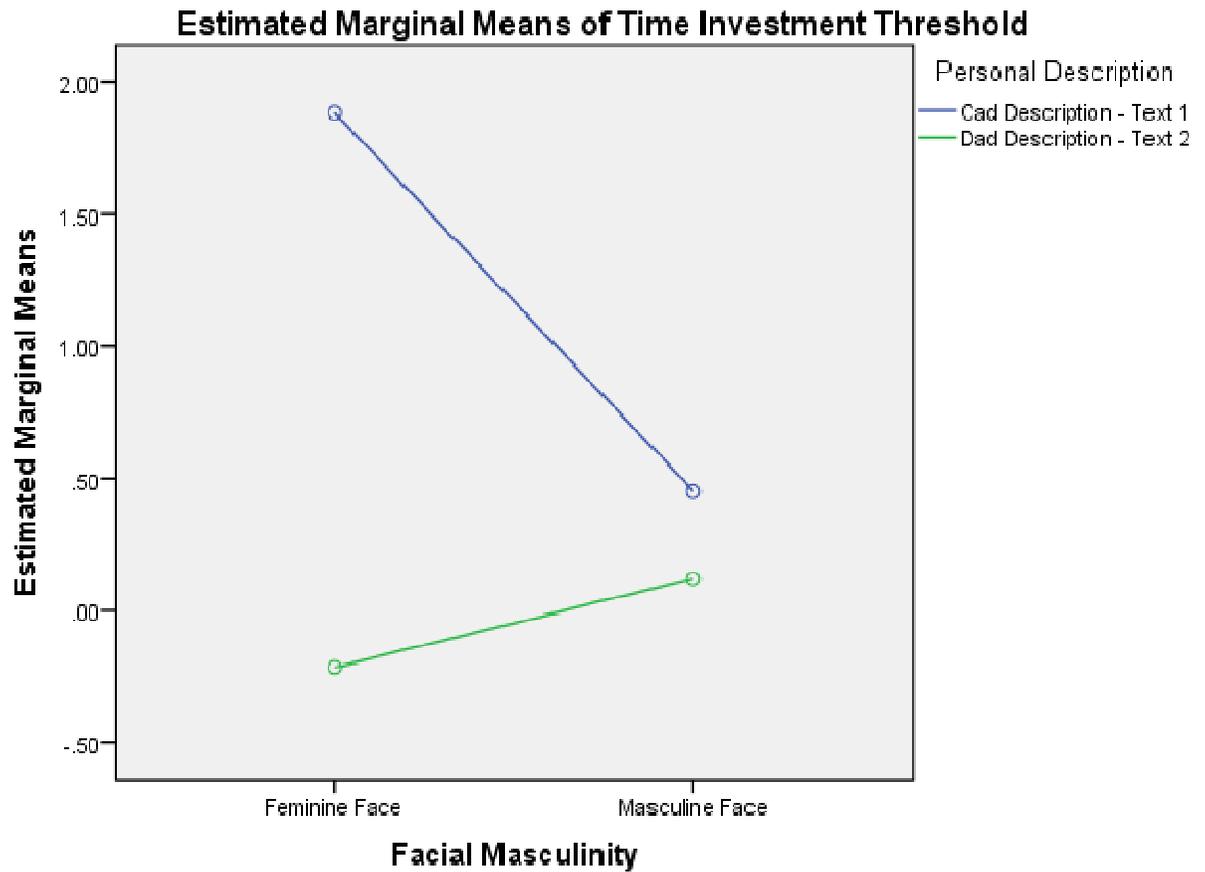
Covariates appearing in the model are evaluated at the following values: SMEAN(MateValue) = 94.8675, SMEAN(MatingIntelligence) = 13.1205, SMEAN(MiniK) = 102.8917, SMEAN(q0036) = 21.96

Hypothesis 3. As predicted, Age was shown to predict a lower Time-Investment

Threshold (r^2 = -.06, $p < .01$). *This hypothesis was supported.*

Hypothesis 4. After controlling for the effects of Age, Mate Value was shown to predict

a lower Time-Investment Threshold (R^2 = -.014, $p < .05$). *This hypothesis was supported.*

Table 3. Correlations between scales

	Age	SOI	Mate Value	Mating Intelligence	Mini-K
Age					
Sociosexuality	.214**				
Mate Value	-.056	.002			
Mating Intelligence	.064	.096	.281**		
Mini-K	-.028	-.234**	.390**	.111	
Narcissism	.015	.112	.226**	.350**	.063

**. Correlation is significant at the 0.01 level (2-tailed).

Discussion

The purpose of this study was to determine whether courtship is used by females to screen out males who are unlikely to provide paternal investment. Specifically, the study was designed to test whether females adjust their courtship thresholds in accordance with the perceived risk that a potential mate will desert his offspring. As predicted, females rated the amount of courtship (as a function of time) they would require before accepting various males' courtship overtures based on the males' mating strategy. Findings from a factorial ANCOVA lent support to the overall hypothesis that courtship serves as a mechanism to screen out mates who are unlikely to carry out their commitment to providing paternal investment.

Females were found to require *increased* courtship from males who demonstrated traits that are generally characteristic of short-term mates (or *cads*), e.g., males who engage in risky and visible activities (Freuman et al., 2012). It is important to note that while these males were considered less likely to be good long-term mates (or *dads*), a manipulation check found that they were *not* considered inferior with regard to gene-

quality. Additionally, it was predicted that facial masculinity (a proxy for gene-quality) would predict greater courtship (Folstad & Karter, 1992); however no significant effects were found. This may be because mistakes made with high gene-quality males are less costly and may even confer a fitness benefit: It is not always necessary for a female to obtain paternal investment if she is able to draw sufficient help from her kin or community (e.g., Hrdy, 1999; Miller, 2001). In other words, the marginal risk to paternal investment that a female incurs by mating with a very attractive male is offset by the benefit offered by his gene quality. It should be noted that the manipulation check found that participants expected both the masculine and the non-masculine males to remain faithful at equal rates, suggesting that this null finding should have been expected. Although SSP predicts that males who are of especially high mate value pursue a short-term mating strategy, follow-up research found that the assumption that masculinity would ultimately lead to more short-term mating strategies is not supported by the literature (Putz, Gaulin, Sporter, & McBurney, 2004). To reconcile why the prediction of SSP (that males with higher mate values will favor short-term mating strategies) did not find support, it is possible that it takes an especially high level of short-term mating success for one to entirely forgo long-term mating. It follows that college-age males (who faces composed the composite images) may have not yet obtained the status to warrant such a shift in mating strategy. It is also possible that facial masculinity alone is insufficient to provide cues of *caddishness.*

Across the conditions, there was trending support for an interaction between the variables. Specifically, the differences in courtship between *dad*s and *cads* were most pronounced in the non-masculine condition. In fact, within the masculine condition, there

was no significant difference between the *dads* and *cads*. By far, the condition that incurred the highest courtship requirement was the non-masculine *cad* condition. This finding may reflect the costliness of the mistake of being wrong about a male with inferior genes because the female both high quality genes and paternal investment. If a female is mistaken regarding the true intentions of a male with superior genes, her mistake is less costly, because she at least benefits from his higher gene quality.

Higher Mate Value (when controlling for age), as predicted, corresponded to decreased courtship. For those who understand courtship to be a "currency" of the mating market rather than a mechanism to screen out short-term strategists, this finding is counterintuitive. If one considers, however, that as the gap widens between a female's mate value and her mate's, her mate may be more prone to "trade-up" for a high quality female if the opportunity presents itself, this finding should be expected. While there were results trending toward significance which suggested that the gap between male gene-quality and female mate value predicts increased courtship, it is still possible that overall, females with lower mate value will ultimately require increased courtship regardless of her suitor's mate value. To rule out the possibility that narcissism accounted for both greater levels of courtship and higher mate value, a follow-up analysis was conducted. Even when partialling out narcissism, this effect was still present ($p < .05$).

Finally, age was shown to negatively predict courtship. According to the screening mechanism framework of courtship, one might initially predict that because age predicts lower mate value (due to the nearing of menopause and the increase in the probability of birth defects (Gill et al., 2012)) females would have increased need for courtship; However, the urgency of the closing fertility window was ultimately

hypothesized to predict less courtship above and beyond and effects of reduced mate value. In other words, the risk of having fewer children (or none at all) outweighs the risk of receiving insufficient paternal investment. It is also possible that as females age they are more confident in their ability to predict the future fidelity of mates and therefore lean less on courtship to screen out deceivers.

While these analyses provide some of the earliest known quantitative evidence supporting courtship as a mate-screening mechanism, they do not provide conclusive evidence, as there were several limitations associated with this study. Although great care was taken to systematically develop the manipulations, ultimately participants were exposed to four photos. Embedded within a single face are numerous markers that may cause individuals to make unwitting assumptions. For example, in one study, females were able to detect faces associated with deceptive males (Gordon & Platek, 2009). These trait differences were so minute that the experimenters were unable to discern which particular facial patterns accounted for this effect. It follows that perhaps females were responding to personality inferences made from the faces rather than the facial masculinity. Follow-up studies should utilize a suite of composite images ranging in masculinity to more conclusively test for the effects of masculinity on courtship. Likewise, although the personal statements were systematically developed, follow-up studies should utilize a range of personal statements in to assess that these stimuli's affects are mediated through the same mechanism.

Another limiting factor may correspond to the Time-Investment Threshold scale that was developed to measure courtship. Although the scale appears reliable, there are two concerning issues of note. Participants, when using the scale, were exposed to one of

four conditions. Because the items are relatively abstract, it is possible that the participants construed questions differently depending upon which condition it was associated with. For example, when asked how long it would take for a female to feel comfortable cohabiting with her mate, depending on the condition she was assigned to, she might have envisioned herself in a contextually different relationship. To test for this possibility, within-condition factor analyses were performed. While the factor analyses demonstrated some variation, it was difficult to determine whether these variations were due to statistical noise or they were due to significantly different construals of the scale items. Also of concern with regard to reliability was, given the young age of the population and that some items attempted to elicit stages related to marriage and planned pregnancy, it is unknown whether participants at this age are able to accurately predict their future behaviors. Follow-up studies should invite females who have experienced all stages of courtship to verify whether the memories of their courtship converge with the predictions of younger adults.

Finally, it is unclear whether time-investment threshold ultimately predicted courtship. It is instead possible that reduced courtship simply corresponded to increased desirability. However, if one takes a look at the manipulation check, it should be noted however, that while *cads* were rated less desirable as husbands, they were rated as more desirable for a hook-up. That is to say, the desirability of these males was domain-specific.

Conclusion. This study provides initial evidence that courtship requirements may serve as a female adaptation to solve a dilemma facing a dual-strategist: How does a female ensure that a potential long-term mate is not instead a deceptive short-term strategist? By

setting a specific courtship threshold, females can devise a scenario such that only males who are genuinely committed to long-term pair-bonding will be willing to meet her courtship criteria. By setting this courtship threshold, females can screen out short-term strategist males because the time spent courting a female who is only amenable to a long-term pair bond can instead be spent pursuing females who are amenable to short-term mating. This tactic may have conferred important reproductive advantages during ancestral conditions because females had the option to select a mate who was willing to provide paternal investment toward her offspring. Such a tactic may be especially adaptive in resource poor environments or in situations in which a female does not have a strong network of social support to draw upon.

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Appendix A

Appendix B

Short-Term Strategist Statement

Life is what you make of it, and so I do my best to enjoy it. These days I make ends meet bartending. To keep active, I lift weights at my local gym. On my free nights, I generally go out to bars or salsa clubs. When I find the time to travel, I usually visit more than one destination. I have several tattoos, and I'm thinking of getting another one soon.

Long-Term Strategist Statement

I try to enjoy the present but make sure to invest in the future. After working for several years, I started my own business. It's hard work, but I've finally found some time to take a vacation. I plan on going somewhere with good kayaking. I'm more of a morning person. I've written several short stories, and I just finished one about my nephews. I spend time with them regularly.