Intelligence and mate choice: intelligent men are always appealing☆

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Abstract

What role does a man's intelligence play in women's mate preferences? Selecting a more intelligent mate often provides women with better access to resources and parental investment for offspring. But this preference may also provide indirect genetic benefits in the form of having offspring who are in better physical condition, regardless of parental provisioning. Intelligence then may serve as both a cue of a mate's provisioning abilities and his overall heritable phenotypic quality. In the current study, we examined the role of a man's intelligence in women's long- and short-term mate preferences. We used a rigorous psychometric measure (men's WAIS scores) to assess intelligence (the first study to our knowledge), in addition to women's subjective ratings to predict mate appeal. We also examined the related trait of creativity, using women's ratings as a first step, to assess whether creativity could predict mate appeal, above and beyond intelligence. Finally, we examined whether preferences for intelligent and creative short-term mates shifted according to a woman's conception risk. Multilevel modeling was used to identify predictors of mate appeal. Study participants (204 women) assessed the long- and short-term mate appeal of videos of 15 men with known measures of intelligence performing verbal and physical tasks. Findings indicate that both intelligence and creativity independently predicted mate appeal across mating contexts, but no conception-risk effects were detected. We discuss implications of these findings for the role of intelligence and creativity in women's mate choices.
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1. Introduction

In relatively biparental species like humans, women's mate choice criteria include preferences for traits that indicate a man will be a good provider and that he is of high heritable phenotypic quality (i.e., has "good genes"). The importance of these traits depends on the expected temporal duration of the relationship (Buss & Schmitt, 1993; Gangestad & Simpson, 2000; Scheib, 2001). In long-term relationships, men contribute gametes and often provide substantial parental assistance via help and/or resources to their mates and any potential offspring. As such, women should prefer mates with traits indicative of both better provisioning abilities and better heritable phenotypic quality.

In short-term relationships, women will bias their preferences toward traits indicative of a mate's ability to provide protection and/or resources that can be transferred to them immediately (e.g., Greiling & Buss, 2000; Hill & Hurtado, 1996; Hrdy, 1997; Li & Kenrick, 2006). In such circumstances, men may sometimes provide little more than gametes, and, accordingly, women also appear to make choices that will genetically benefit any resultant offspring. These include preferring physically attractive men who exhibit fitness indicators of masculinity and traits associated with symmetry (i.e., developmental stability; review in Gangestad & Thornhill, 2008).

1.1. Intelligence and women's mate preferences

It is not clear how a man's intelligence factors into women's decisions about their mates. Given that greater intelligence is generally associated with success in a wide variety of circumstances (Kuncel, Hezlett, & Ones, 2004), we would expect it to be highly valued in a long-term mate. For example, being more intelligent often means having better access to material goods and resources including those

associated with greater social success and standing (Gottfredson & Deary, 2004). These resources can include protection for one's family, access to social support and even resources from others (as reciprocity) when the man cannot obtain them himself. Previous studies support the idea that women attend to the social dominance and success of potential mates (Buss, 1989; Gangestad, Garver-Apgar, Simpson, & Cousins, 2007; Perusse, 1993; hunter-gatherers: e.g., Geary, Vigil, & Bryd-Craven, 2004; Hill & Hurtado, 1996; Marlowe, 2004), and as such we should also expect that women attend to and prefer greater intelligence that cues potential success and access to resources.

In one of the few studies that highlight the role of intelligence in mate choice, Li, Bailey, Kenrick, and Linsenmeier (2002) focused on the priorities women exhibit when considering potential long-term mates. Using innovative methods, Li et al. required study participants to "purchase" traits using different-sized budgets. When budgets are low, choices become constrained, and participants' preferences reveal the relative importance of traits in a mate. When women were given a low budget and forced to prioritize, they did in fact spend the highest proportion of their budget on intelligence, indicating that a man's intelligence was a "necessity" rather than a "luxury" among women's mate choice criteria.

Although greater intelligence is linked to material benefits and success, scholars have recently begun to consider whether general intelligence, or some component of it, may be a fitness indicator (e.g., Miller, 2000; Prokosch, Yeo, & Miller, 2005). If it is, then women not only gain material benefits, but also benefit by conceiving children with more intelligent mates. If the relationship is very short and/or the women gain little other than their mate's gametes, then greater intelligence should factor even more strongly in women's short-term mate preferences.

Few studies have focused on the role of intelligence in women's short-term mate preferences. In general, it appears that as the level of relationship commitment decreases (i.e., marriage vs. dating), the importance of traits such as intelligence and education decreases. This appears to be true for men's preferences, but is less clear for women's (Buunk, Dijkstra, Fetchenhauer, & Kenrick, 2002; Li & Kenrick, 2006). Some research suggests that when women are considering a prospective short-term partner, a man's characteristics related to intelligence, such as having a sense of humor and good earning capacity, are rated as some of the more important characteristics (Greiling & Buss, 2000; Stewart, Stinnett, & Rosenfeld, 2000).

Men's level of creativity also seems to be a factor in women's mate choices. Nettle and Clegg (2006) examined the relation between creative activity and mating success in a large British sample of poets and artists. In comparison to individuals who had low productivity, those who produced a high amount of creative activity, via poetry or visual art, had larger numbers of sexual partners, including short-term mates. Another study by Griskevicius, Cialdini, and Kenrick (2006) found that when men were primed with thoughts of

pursuing a short-term fling, such thoughts increased the creative displays of these individuals (similar findings were obtained for men primed with thoughts of long-term mates as well).

1.2. Conception risk and preference for intelligence

One way to test the role of general intelligence and creativity as fitness (rather than provisioning) indicators is to examine the relationship between a woman's risk of conceiving and her preference for intelligence or creativity in short-term mates. If preferences shift across the menstrual cycle, such that intelligence or creativity is deemed greater value when a woman is at highest risk of conceiving, and less value at other times, then this would provide evidence that mating with intelligent, creative men conveys fitness benefits to fertile women, likely in the form of higher-quality offspring. Such preference shifts or "fertility effects" have been found for the importance of a short-term mate's symmetry as identified through his smell (Gangestad & Thornhill, 1998), facial masculinity (Johnston, Hagel, Franklin, Fink, & Grammer, 2001; Penton-Voak et al., 1999), social presence and dominance (Gangestad, Simpson, Cousins, Garver-Apgar, & Christensen, 2004), and deeper voice (Puts, 2005).

Haselton and Miller (2006) conducted one of the only studies on mate choice and creative intelligence. By using a forced-choice trade-off methodology that obliges participants to prioritize their desires, they found that women valued creative intelligence over wealth in short-term mates, particularly when they were at the most fertile time of their cycle. This study provides the best evidence so far that creative intelligence may serve partly as a marker of good genetic quality. (Note, however, that these investigators could not determine whether their findings were driven by intelligence or creativity since the traits covaried together.) In a later study, however, Gangestad et al. (2007) found that men who were perceived to be intelligent were not rated as more attractive as potential short-term mates, and the statistical interactions between perceived intelligence, mating context and conception risk were negligible.

1.3. Empirical questions and hypotheses

In the current study, we examined the role of verbal intelligence in women's mate preferences and tested whether objective measures predicted preferences. To our knowledge, this is the first study to examine women's preferences for men with known measures of intelligence. Previous research has relied on perceived intelligence (i.e., women's ratings) rather than standardized measures to assess preference. But it is unclear how well women's ratings capture a man's actual intelligence. Indeed, if there is only a small relationship, then previous findings may improperly capture the role of intelligence in women's choices. An objective measure, then, can provide an additional test of the ideas.

In this study, we also provide extensive video-based presentations of the men in different situations. Video-recorded interviews allowed women raters to observe and

compare the men on the basis of their complex, dynamic social interactions. This is comparable to a large part of what happens in speed-dating, in which initial mate choices occur at a rapid rate (e.g., Todd, Penke, Fasolo, & Lenton, 2007). By providing visual and auditory information about the target men via video recordings and showing them in different situations (e.g., sitting talking, doing a physical activity), we were able to present women with more ecologically valid information about the men than is typically provided in mate choice studies.

Following previous studies, we first examined the role of a man's perceived intelligence (as rated by women) in women's long- and short-term mate preferences. Second, we assessed the relationship between perceived intelligence and an objective measure of verbal intelligence as measured by the Vocabulary subtest of the WAIS-III (The Psychological Corporation, 2002). This allowed us (i) to ensure that women could assess actual intelligence from the current stimuli (previous studies indicated that women can accurately do so using some of the same stimuli: Borkenau, Mauer, Riemann, Spinath, & Angleitner, 2004; Murphy, Hall, & Colvin, 2003; Reynolds & Gifford, 2001; Zebrowitz, Hall, Murphy, & Rhodes, 2002) and (ii) to examine how closely perceived intelligence was related to an objective measure. Third, we examined the role of objectively measured intelligence (i.e., WAIS scores) in women's long- and short-term mate preferences. Fourth, we examined a closely related trait to intelligence — perceived creativity as rated by women — to assess whether it acted as an independent measure that predicted mate appeal in either long- or short-term contexts. Overall, we predicted that women would prefer men with higher intelligence as long- and short-term mates than men with lower intelligence.

In the last part of the study, we examined whether women's preferences for intelligence (rated and measured) and creativity shifted across the menstrual cycle, dependent on the probability of conceiving. If intelligence or creativity cues men with good quality gametes, then we expected that women's preferences for either/both of these attributes in a mate would become especially important in short-term relationships, where it was possible that a woman could end up with little more than gametes from her mate (Gangestad & Simpson, 2000). Haselton and Miller's (2006) results on creative intelligence support this hypothesis. We complement and augment their research by using a different methodology; we also use an objective measure of verbal intelligence and separate verbal intelligence from creativity.

2. Method

2.1. Phase 1: Target men

A sample of 15 men (mean age=19.2, S.D.=1.56) agreed to participate as targets for women to evaluate. Participants were students at UC Davis. They received partial credit in undergraduate psychology classes for their participation.

2.1.1. Intelligence measures in target males

Each man was individually administered the WAIS-III Vocabulary subtest. This test assesses the individual's verbal ability to recall definitions of difficult words. It is highly correlated with both Verbal IQ and Full-Scale IQ (r=0.9 and r=0.8, respectively; The Psychological Corporation, 2002) and also with the general intelligence (g) factor (i.e., it is a highly g-loaded cognitive test). Each man was ranked based on his raw score. Men were then divided into three groups that were constructed to be roughly equivalent in score distribution (i.e., the highest scoring men in each group had similar scores, and so on down to the lowest scoring men). The average raw score for all men was 47.4 (approximately equal to the 75th rank percentile relative to the population, or about a 110 Verbal IQ; Group 1 mean=43.4; Group 2 mean=49.8; Group 3 mean=48.8) with a range from 26 to 63 (16th–99th percentile).

2.1.2. Behavioral measures of target men

Men were then videotaped performing a variety of tasks. Each task was selected in order to provide a broad range of behavioral information to the woman, including a man's verbal ability, verbal creativity, physical appearance and motor behavior. For all tasks, the man was given approximately 1 min to respond. In one task, the man was asked to read actual news headlines and their subheadings collected from various online news websites (e.g., CNN, BBC, *New York Herald Tribune*). Borkenau et al. (2004) found this task to be the best predictor of objective intelligence compared to 14 other tasks that conveyed small amounts of behavior. In a second task, the man was asked an open-ended, thought-provoking question that required some insight and creativity to answer. This question was: "If scientists were to discover simple life forms on Mars, would that alter the way that you look at life here on Earth?" In a third task, the man was told that his performance on the task would be shown to undergraduate women and was told to make the best possible impression that he could. The man was then asked: "Please give three reasons why you would be a good date." In the fourth task, the man was recorded in full-body view throwing and catching a Frisbee outdoors. (We used a man's first attempt at throwing the Frisbee and then his first successful catch, all without him moving out of the frame.) The Frisbee task was included to assess measures of physical competence and attractiveness.

All videotaped tasks were then edited to approximate 1-min segments, except for the Frisbee task, which was edited down to approximately 20 s (i.e., the time it took to throw and catch a Frisbee). Editing was done using iMovie and each segment was then converted to the highest-resolution QuickTime format for viewing.

2.2. Phase 2: women's assessments of men's attributes

A sample of 204 undergraduate women (age=19.4, S.D.=1.69) were recruited from the same college campus to participate in the study and received partial credit in their

psychology classes. Women were divided into three groups (*n*=68 each), with each group evaluating five men in one of the three groups of men. Restriction of women's assessments to only five men was based on the logistics of multiple video presentations and potential test fatigue — watching all five men perform all four tasks and then providing assessments of each man takes approximately 2 h.

Women were run in groups of approximately five at a time. Participants completed a demographic questionnaire that included questions about their sexual history, relationship status, hormonal contraceptive use and other personal information. They also completed the verbal portion of the WAIS-III (analysis of this is reported elsewhere; Prokosch, in preparation).

Finally, menstrual cycle data were obtained for each woman via self-report. Women were notified ahead of time that they would need to bring this information. Each woman reported the expected first day of her next menstruation as well as her typical cycle length. The women also reported the date of the first day of their last menstrual period. To account for the fact that there is more variation in cycle length prior to ovulation, whereas the number of days between ovulation and menstrual onset is relatively constant across women (see Fehring, Schneider, & Raviele, 2006), conception risk estimates were made by counting backwards from the expected first day of the next menstruation rather than counting forward from the last menstrual period (though both estimates are highly correlated; see Gangestad et al., 2007). Conception risk was calculated by standardizing each woman's cycle length (mean=29.3 days, S.D.=3.13) to a 29-day cycle and then estimating the cycle day for each woman the day her ratings were made (following Gangestad et al., 2004). Conception-risk estimates for the day the ratings were made were then calculated based on actuarial medical data (e.g., the mean probability of a single pregnancy with a single act of intercourse is approximately 9% on Day 12 of the cycle, whereas the probability of conceiving on the first day of the cycle is approximately 0%; Wilcox, Dunson, Weinberg, Trussell, & Baird, 2001). These probabilities of conception risk were used in subsequent analyses.

The women then watched videos of five men performing the four tasks described above. The order of the video segments as well as the order in which the men were shown to the women was sequenced using a Latin squares design to control for order effects. Digital video clips of the men (head to shoulder images during question sessions and full-body images during Frisbee throwing) were projected onto a large classroom screen and all video clips were shown in the same resolution, size and duration. After watching a man perform all four tasks, women completed an assessment questionnaire about the man's performance, rating his various qualities during the performance using a seven-point interval scale. These qualities included the man's appeal as a long-term mate (defined as a monogamous, committed relationship), his appeal as a short-term mate (defined as having a brief sexual relationship) and ratings of his intelligence,

creativity, physical attractiveness, financial security and potential dependability.

3. Data analysis

Multilevel analysis was used to address the hierarchical data structure due to the repeated ratings nested within women nested within groups. The analyses were run using PROC MIXED with SAS version 9.1. PROC MIXED uses a Newton–Raphson algorithm to obtain maximum likelihood estimates (Littell, Milliken, Stroup, Wolfinger, & Schabenberger, 2006). A three-level model was used to allow statistical dependencies of the repeated measures relating to the individual men (Level 1) nested within women (Level 2) nested within groups of target men (Level 3). The groups of target men were treated as a random sample from a population of groups. At the first level, we assumed the errors relating to scores within women were independent with constant variance across the repeated measures, women and groups. At the second level, we assumed the random effects were independent between women and groups, with constant variance across women and groups. At the third level, we assumed the random group effect was independent with constant variance across groups. These assumptions were assessed using a likelihood ratio test in which a three-level model was compared with models that relaxed these assumptions and allowed the error variances to vary by women and groups of men (Raudenbush & Bryk, 2002). Predictors at the first level were centered within women to obtain within-women effects without any between-women effects (Raudenbush & Bryk, 2002).

Thus, unlike the classic regression model, the errors within individuals are not assumed to be independent (Raudenbush & Bryk, 2002). This random-effects model is capable of looking at individual characteristics taking into account the effects of clustering. Multilevel modeling has greater potential than classical single-level models of capturing the diversity of affect and behavior so typical in close relationships. Multilevel regression models are beginning to be used in mate choice research (see Gangestad et al., 2004, 2007) although, to our knowledge, this is the first mate choice study to use three-level modeling.

4. Results

4.1. Intelligence and mate choice

4.1.1. Women's mate preferences: subjective ratings of men's intelligence

Based on previous studies, we expected that men rated as more intelligent also would be rated as more appealing as a long-term mate. We regressed women's ratings of each man's intelligence on rated appeal using a multilevel model and found this to be the case (*b*=.486, S.E.=.044, *t*=10.99, *p*<.0001). Intelligence ratings predicted 13.0% of the variance in men's appeal as long-term mates. (For com-

parison purposes, in separate models, physical attractiveness alone accounted for 39.7% of the variance in long-term mate appeal, dependability ratings alone 18.2% and financial security alone 14.3%). To rule out a possible halo effect of physical attractiveness, we also examined the relationship between rated intelligence and long-term mate appeal controlling for the effect of physical attractiveness ratings. Ratings of intelligence remained a significant predictor of long-term mate appeal (b=.378, S.E.=.035, t=11.21, p<.0001; accounting for 8.1% of the variance above and beyond that of physical attractiveness ratings).

Whereas we expected greater rated intelligence to positively predict long-term mate appeal, the prediction was less clear for its importance in men's short-term mate appeal. In fact, we found that ratings significantly predicted short-term appeal (b=.22, S.E.=.046, t=4.81, p<.0001), but accounted for very little of the variance (2.8%; with the effect of physical attractiveness removed, 0.5%). (For comparison purposes, in separate models, physical attractiveness alone accounted for 59.2% of the variance in short-term mate appeal, dependability ratings alone 2.9% and financial security alone 10.1%.)

4.1.2. Relationship between women's ratings of intelligence and WAIS scores

To assess how intelligence ratings related to objectively measured verbal intelligence, we regressed men's intelligence (WAIS) scores on women's ratings of each man's intelligence using a multilevel model. Based on the model, a man's verbal intelligence was reliably predicted by women's ratings (b=4.36, S.E.=.262, t=16.61, p<.0001; the effect of women's ratings remained significant after controlling for the effect of physical attractiveness). Women's ratings accounted for 21.5% of the variance in WAIS scores (20.6% with the effect of physical attractiveness removed). This suggested that women's ratings of intelligence were based on the actual intelligence of a man. It also indicated, however, that there was a considerable amount of variability in objective verbal intelligence that was not captured by ratings. As such, WAIS scores might provide insight about the role of intelligence in mate choice that is missed when studies rely primarily on women's perceptions of intelligence.

4.1.3. Women's mate preferences: objective measures of men's intelligence

We then examined whether objective measures of intelligence could predict men's appeal as a mate. As expected, scoring higher on the WAIS positively predicted appeal as a long-term mate (b=.027, S.E.=.005, t=5.47, p<.0001; see Fig. 1). WAIS scores predicted 3.4% of the variance in long-term mate appeal. (We did not remove the effect of physical attractiveness, because WAIS scores would not be subject to halo effects sometimes seen in subjective rating tasks.)

We then examined whether men's WAIS scores could predict a man's appeal as a short-term mate. Higher WAIS scores also predicted men's appeal as a short-term mate

(b=.025, S.E.=.005, t=5.15, p<.0001). WAIS scores accounted for 3.2% of the variance in short-term mate appeal, similar to what was observed for long-term mate appeal. In contrast to women's ratings of intelligence, as a predictor of mate appeal, objectively measured verbal intelligence appeared less susceptible to the temporal context of the relationship (see Fig. 2).

4.2. Creativity and mate choice

4.2.1. Relationship between women's ratings of creativity and intelligence

Whereas objectively measured verbal intelligence positively predicted both long- and short-term mate appeal, it only accounted for small amounts of the variance. To explore intelligence and mate choice further, we looked at another form of intellectual ability, specifically creativity.

We first examined how much overlap there was between creativity and intelligence ratings. Creativity ratings significantly predicted intelligence ratings (b=.332, S.E.=.024, t=13.74, p<.0001; the effect of creativity ratings remained significant controlling for the effect of physical attractiveness: b=.357, S.E.=.027, t=13.44, p<.0001). Creativity ratings accounted for 18.5% of the variance in intelligence ratings (17.5% with the effect of physical attractiveness removed). This indicated some overlap between intelligence ratings and creativity ratings, but also that they were not measuring identical things.

4.3. Relationship between women's ratings of creativity and WAIS scores

We then examined how much overlap there was between creativity ratings and verbal intelligence, as measured by the WAIS. Creativity ratings significantly predicted WAIS scores (b=1.77, S.E.=.218, t=8.13, p<.0001; the effect of creativity ratings remained significant after controlling for the effect of physical attractiveness: b=1.77, S.E.=.241, t=7.35, p<.0001). But it was also the case that women's ratings only accounted for 6.1% of the variance in the WAIS scores (5.0% with the effect of physical attractiveness removed), suggesting that the creativity ratings of the men might be capturing very different aspects of intelligence.

4.4. Women's mate preferences: subjective ratings of men's creativity

In comparison to verbal intelligence, it was less clear how creativity influenced a man's appeal as a long-term mate. In fact, we found that men rated as more creative were considered more appealing as a long-term mate (b=.523, S.E.=.031, t=16.98, p<.0001; ratings predicted 26.9% of the variance in mate appeal). Again, to rule out a possible halo effect of physical attractiveness, we also examined the relationship controlling for the effect of physical attractiveness. Ratings of creativity remained a significant, although weaker, predictor of long-term mate appeal (b=.306, S.E.=.029, t=10.60, p<.0001; accounting for 7.6% of the variance in appeal beyond that accounted for by physical attractiveness).
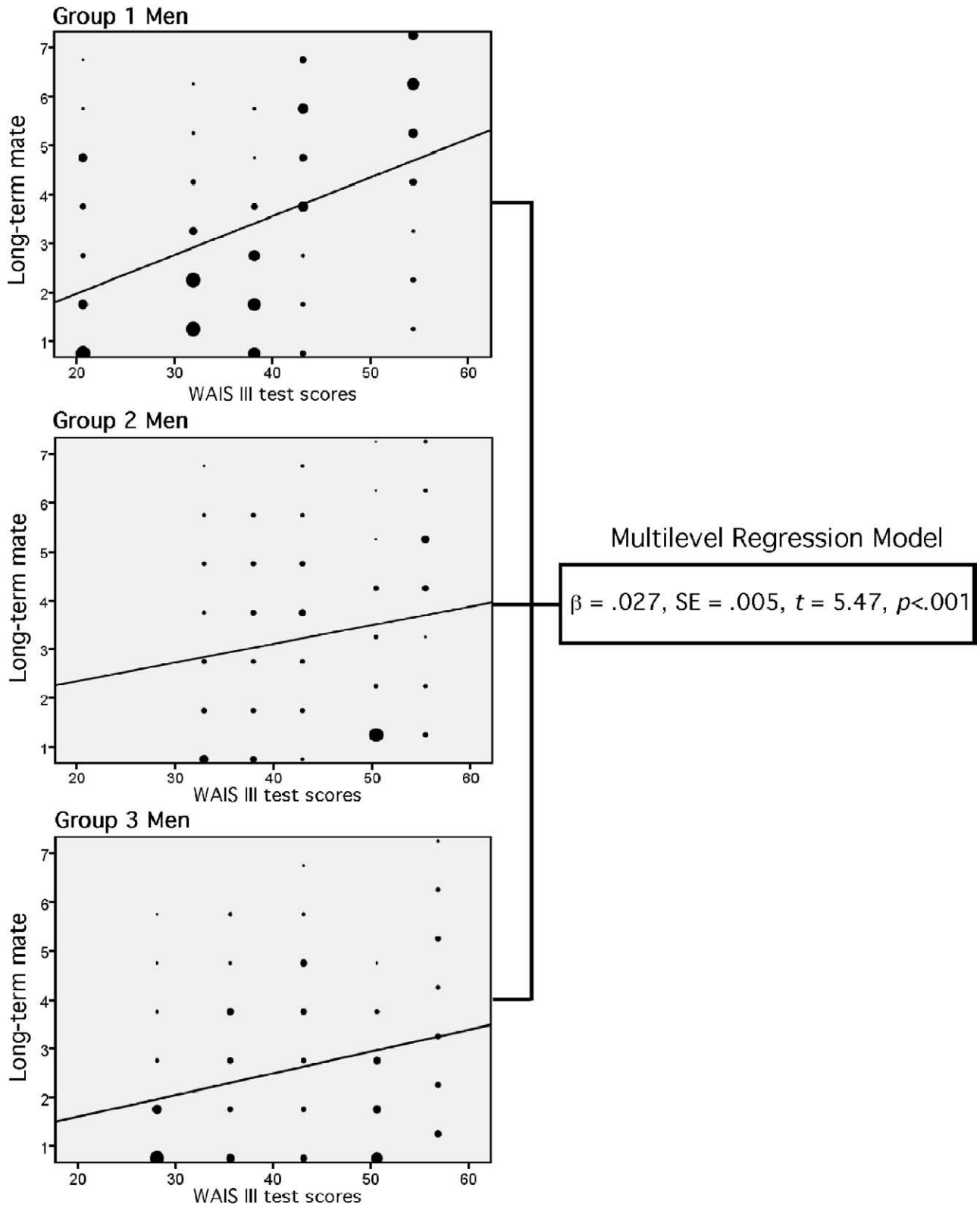
Fig. 1. Consistency of the findings across the three groups of men (*n*=5 per group) is illustrated by the three OLS regression slopes of men's WAIS scores and ratings of appeal as a long-term mate. Each group of men was rated by 68 women. Note that the size of a point reflects the number of observations.
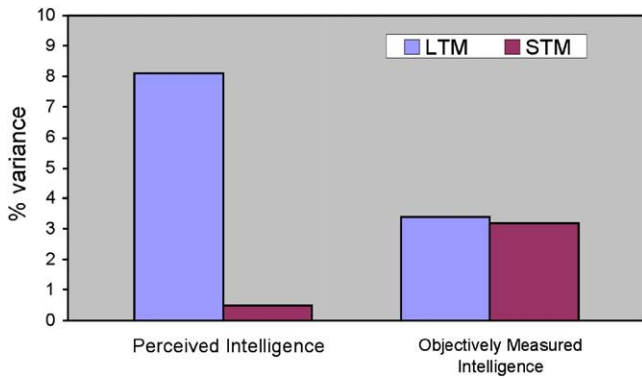
Fig. 2. Comparison of perceived (women's ratings) and objectively measured verbal (WAIS scores) intelligence as predictors of a man's appeal as a long- and short-term mate (LTM, STM respectively). The *y*-axis indicates the amount of variance each predictor accounts for in a man's appeal as a mate.

We then tested whether WAIS scores and creativity ratings could together predict long-term mate appeal. With both variables included in the model (and physical attractiveness controlled), both creativity and WAIS remained significant predictors of long-term mate appeal (creativity ratings: $b=.291$, S.E.$=.030$, $t=9.85$, $p<.0001$; accounting for 6.6% of the variance beyond that accounted for by physical attractiveness and WAIS scores; WAIS: $b=.009$, S.E.$=.004$, $t=2.26$, $p=.024$; accounting for 0.3% of the variance beyond that accounted for by physical attractiveness and creativity ratings). This added further support to the idea that WAIS scores and creativity ratings represented different aspects of a man's intelligence.

Based on Haselton and Miller (2006), we expected creativity to positively predict men's short-term mate appeal. In fact, higher creativity ratings did predict short-term appeal ($b=.424$, S.E.$=.032$, $t=13.29$, $p<.0001$). Creativity ratings accounted for 18.1% of the variance in short-term mate appeal (this was reduced to 1.1%, however, after controlling for the effect of physical attractiveness).

We then tested whether WAIS scores and creativity ratings could together predict short-term mate appeal. With both variables included in the model (and physical attractiveness controlled), both creativity and WAIS remained significant predictors of short-term mate appeal (creativity ratings: $b=.101$, S.E.$=.025$, $t=4.02$, $p<.0001$; accounting for 0.7% of the variance beyond that accounted for by physical attractiveness and WAIS scores; WAIS: $b=.011$, S.E.$=.003$, $t=3.29$, $p=.0011$; accounting for 0.5% of the variance beyond that accounted for by physical attractiveness and creativity ratings). This added further support to the idea that WAIS scores and creativity ratings were picking up on different aspects of a man's intelligence.

4.5. Conception risk and mate choice

To address whether conception risk moderated women's preference for intelligence, we entered men's WAIS scores as a Level 1 predictor and probability of conceiving (Concep-

tion Risk) as a Level 2 predictor of both short-term mate appeal and of the effect of WAIS score on short-term mate appeal. (Level 3 was group of target men.) We focused on men's appeal as a short-term mate, because this would be the context in which shifts might occur in women's preferences. We used the following multilevel model:

Level 1: Short-term mate appeal$_{ijk}$=y_{0jk} +y_{1jk} (man's WAIS score$_{ijk}$)+e_{ijk}
Level 2: y_{0jk}=a_{00k}+a_{01} (conception risk$_{jk}$)+u_{0jk}, y_{1jk}=a_{10} +a_{11} (conception risk$_{jk}$)
Level 3: a_{00k}=g_{00}+r_k .

In fact, no interactions were detected (for Conception Risk: $b=.010$, S.E.$=2.50$, $t=0.00$, $p=.9967$; for Conception Risk∗WAIS, $b=-.242$, S.E.$=.184$, $t=-1.32$, $p=.1883$). In other words, conception risk did not predict or moderate the effects of preference for measured verbal intelligence in short-term mates.

Using the same model, we also tested whether conception risk moderated women's preference for rated intelligence or (separately) creativity. Again, we found no reliable effects: conception risk did not predict or moderate women's preferences for rated intelligence or rated creativity in a short-term mate.

5. Discussion

Women's assessments of a mate's quality involve a complex, context-dependent process in which a man's verbal intelligence and creative expression play important roles. First, we found that men's behavioral cues of intelligence could be accurately assessed at above-chance levels. This is consistent with findings from previous studies (e.g., Borkenau et al., 2004; Murphy et al., 2003; Reynolds & Gifford, 2001), but with the inclusion of additional tasks, and thus indicated that our stimuli conveyed sufficient information to raters. We also found that women's ratings of a man's intelligence predicted their preferences for both long-term and short-term partners. Perceived intelligence predicted only a small amount of the variability in the appeal of a short-term mate. As expected, it accounted for a slightly larger portion of the variability in the appeal of a long-term mate.

Whereas women's ratings reflected actual intelligence to a degree, there was considerable unexplained variability. One possibility was that women's ratings reflected only a current-day, stereotypical view of intelligence, of being smart, but unattractive (e.g., reading glasses, poor social skills; Gangestad et al. (2007) also found that men rated as intelligent were perceived as more studious), thereby reflecting only part of what constitutes intelligence. Consistent with this, the relationship between rated and actual verbal intelligence did not change much when the effect of physical attractiveness was removed. This finding supports the idea that it would be useful to test the role of actual intelligence in women's mate preferences.

Actual intelligence, as measured through WAIS scores, positively predicted mate appeal in both long-term and short-term mates. Nonetheless, WAIS scores only predicted a small amount of the variability in mate appeal, especially in comparison to rated physical attractiveness. The effect of intelligence on appeal was more like that seen for rated financial security and dependability. Often in studies we only know whether a trait predicted mate appeal, but not to what degree. In this case, with variance measures, we could better assess how important the traits were. Before a mate's intelligence is relegated as inconsequential, however, it is important to consider the goal of the video stimuli — to convey information typical of a first meeting with a potential mate. Miller and Todd (1998) argue that mate choice is regulated by an assessment filter in which women first evaluate and select on visual information, such as a man's physical attractiveness, and then consider other attributes such as social status, intelligence and personality, for which additional information comes from subsequent meetings and interactions. Our findings are consistent with this model — that physical attractiveness best predicted mate appeal and intelligence accounted for less, at least initially. Using this model, we would expect that as potential mates subsequently interacted, a mate's intelligence would contribute a larger portion of what defines mate appeal.

Do objective measures of verbal intelligence provide us with anything more than women's ratings? In contrast to findings with perceived intelligence, we found that WAIS scores accounted for similar amounts of variability in the appeal of long- and short-term mates. It is not clear why the two measures differ, but it is reasonable to argue that objectively measured intelligence appears less susceptible to the temporal context of the relationship. If WAIS scores are not as impacted by any negative and/or potentially inaccurate stereotypes being used in women's ratings, then an objective measure will better reflect the good-genes component of intelligence and provide a better test of the ideas. Indeed, individuals need not be able to accurately detect (or even be aware of) a trait for the trait to still impact their mate choices [e.g., see test of the relationship between perceived symmetry, actual symmetry and physical attractiveness in Scheib, Gangestad, and Thornhill (1999)]. For whatever reason, the objective measure likely provided a better estimate of true intelligence and these differences emphasize the benefits of including objective as well as subjective measures of a trait.

Women's choices indicated that greater verbal intelligence was an important attribute in a mate, regardless of relationship duration. Two nonmutually exclusive reasons are most obvious: (1) intelligence indicates the individual's potential provisioning abilities, consistent with the "good provider" paradigm in human mate choice research; and (2) intelligence is a reliable cue of the individual's "good genes" in that it provides an accurate assessment of the individual's overall mutation load and fitness.

If intelligence cues a mate's heritable quality, we would expect shifts in the extent to which it is deemed important in a short-term mate according to a woman's probability of conceiving. Yet we found no evidence for such shifts. On initial examination, this appears to contradict findings from Haselton and Miller's (2006) study of creative intelligence. These investigators used the forced-choice trade-off methodology that has proven sensitive to detecting subtle differences in women's mating preferences (see also Scheib, 2001). But it is not clear that the difference was due to differences in methodology or in the trait being tested. Haselton and Miller's effects may have been driven more by creativity than by intelligence.

It may be that traits such as intelligence, which are important in both long- and short-term relationships, are not going to be subject to preference shifts across the menstrual cycle. In fact, it is possible that any trait that is desirable in the short-term context that provides significant immediate benefits, such as material resources, as well as heritable phenotypic benefits for offspring, will be less susceptible to variations in importance due to conception risk (e.g., compare the trait of the smell of symmetrical men to the trait of intelligence in men). Thus, these traits may be less modified by conception risk because the trait is always desirable (see also Gangestad et al., 2007). On the other hand, it remains to be seen whether creativity cues heritable phenotypic quality, as discussed below.

Findings from the last part of the study indicated that being perceived as creative positively predicted men's appeal as both long- and short-term mates. Little overlap existed between rated creativity and men's WAIS scores, suggesting that the traits were measuring different aspects of intelligence. Indeed, unlike WAIS scores, rated creativity was considerably more susceptible to the influence of physical attractiveness, suggesting that participants might be equating creativity with sexiness. When entered simultaneously with WAIS scores, both creativity and verbal intelligence independently predicted mate appeal. Interestingly, in almost all instances, whether considered alone or with verbal intelligence (and with the effects of physical attractiveness removed), perceived creativity accounted for more of the variability in mate appeal than intelligence. Despite this, we found little evidence that women's preference for perceived creativity varied according to conception risk. While this suggests creativity is not a fitness cue, we provide only a first examination using women's perceptions and video stimuli designed to capture displays of men's verbal intelligence (e.g., reading news headlines). If the link between rated and actual creativity is limited as it was with intelligence, then the next step is to examine women's choices when an objective measure is available and when stimuli include tasks that display facets of creative behavior that acted as historical sources of selection on women's choices. Overall, these results make clear that the influence of creativity and more general/verbal intelligence needs to be considered separately when looking at women's mate preferences. These results,

along with those of Haselton and Miller (2006), suggest that creativity may play a bigger role in women's mate choices than previously suggested.

Together these findings address several issues and suggest further avenues for study. As with previous studies, intelligence clearly plays a role in women's long-term mate choices. But interestingly by using a more reliable measure of intelligence than women's ratings, and stimuli from which effects can be generalized beyond the current sample of men, a man's verbal intelligence also appeared to be important in women's short-term mate choices, unlike findings with more standard ratings. Whereas we found little evidence that verbal intelligence cues fitness, further research is needed into the role of creativity. That creativity appeared to play a stronger role than verbal intelligence in mate appeal, and that it might be tapping men's sexiness, suggests it is a better candidate for future studies on fitness indicators and women's mate choices.

Acknowledgments

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