
Sperm Donor Selection and the Psychology of Female Mate Choice

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Women's preferences for hypothetical sperm donors were compared to preferences for long-term mates (Experiment 1) and to those for long-term mates and extra-pair copulatory (EPC) partners (Experiment 2). In Experiment 1, attributes believed likely to affect a resultant child were significantly more important in a donor than in a long-term mate. "Character," which was the most important factor in a mate, was the second most important factor after "health" in a donor, despite the belief that character had little likelihood of affecting a resultant child. These results suggest that women were partly relying on the psychology used to choose a long-term mate when they assessed attributes in a sperm donor. An additional construct ("resource potential") was introduced in Experiment 2, as well as an additional test condition (EPC). As with character, resource potential was believed to have little likelihood of affecting a resultant child, yet it was rated as moderately important to have in a donor, further supporting the hypothesis that women were partly relying on a mate choice psychology. Results did not provide support for the existence of an EPC psychology distinct from that used to select a long-term mate.

KEY WORDS: Female mate choice; Evolutionary psychology; Sperm donor.

In many species, post-zygotic investment in offspring is greater in females than in males. In humans for example, a woman is obliged to a substantial investment, such as nine-month pregnancy and postpartum lactation and care, should she become pregnant from mating. A male, alternatively, can sometimes get away with providing as little energetic effort as an ejaculate. This asymmetry in parental investment and the large potential cost associated with an ill-chosen mate creates a strong selection pressure on females to be discriminating with respect to when and with whom they mate (Trivers 1972; Daly and Wilson 1983). Accordingly, Symons (1979) proposed

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that women possess a specialized psychology, which functions to solve the problem of choosing a mate. A specialized psychology that aided a woman in responding only to those mates that would increase her reproductive success, would be selectively favored.

Trivers (1972) hypothesized that females would value specific attributes in their mates, such as the ability and willingness to invest time, energy, and provisions in offspring, which would increase the probability of successful reproduction. Additionally, where males compete for high standing within a group, high rank is also associated with greater fitness, as these males will have a greater probability of successfully competing for females. Thus females that preferred and mated with high status males would have an increased probability of having sons that were also reproductively successful (Trivers, p.170; Symons 1979, p.191). Dominance is likely to be closely associated with a male's ability to attain both status and resources (Ellis 1992; Kenrick and Keefe 1992). Women who preferred dominant, high status males, and their children might also benefit from both increased access to resources and protection from potentially harmful conspecifics, incentives that a low status male might not be able to offer (Ellis, p.274). Symons proposed that preferences such as these would form the ultimate basis of a specialized psychology for mate choice.

Evidence from pre-industrial societies suggests that women prefer men who have the most resources to offer. The Kipsigis, traditionally Nilotic pastoralists, are now settled as agro-pastoralists in south western Kenya. Borgerhoff Mulder (1990) found that among a group of these settlers, men who offered more acres of land per wife were preferred by women (and their parents) as husbands. Women's reproductive success was also found to correlate positively with this same measure of wealth (Borgerhoff Mulder 1987). This suggests that women can benefit reproductively from such a preference.

Among the Ache of Paraguay, Hill and Kaplan (1988) found similar results. Until recently (1970s), the Ache were nomadic hunter-gatherers. While living in the forest (representative of their traditional life as foragers), food acquired by the men is shared equally among the group. Women are dependent on the men, as almost all the food consumed is provided by them. Although this food is equally shared, children of better hunters have significantly greater survivorship. Hill and Kaplan suggest that this could be due to better treatment of the hunters' wives and children by members of the foraging group in order to keep these men in the group. They suggest that the increased survivorship might also be due to a heritable tendency toward better health in these hunters and their children. These men are also named as extra-pair partners and illegitimate fathers more often than less capable hunters. This suggests that women prefer and can benefit from choosing men that are better able to provide resources.

A number of studies in North America have directly questioned women about their preferences for a mate. Buss and Barnes (1986) found that some of the characteristics valued most in a mate by a sample of married couples were

considerate, honest, affectionate, dependable, intelligent, kind, and understanding, most or all of which are attributes that are likely to be indicative of a good companion (p.568) and might also be cues of useful parental abilities. Women also preferred that their spouses be fond of children, ambitious, career-oriented and have a good earning capacity; these are possible cues to a male's ability to acquire resources, as well as the willingness to invest them in offspring. Similar mate selection criteria have emerged in several other studies (e.g., Buss 1989; Buss and Schmitt 1993; Kenrick et al. 1990; Sadalla et al. 1987).

Townsend (1989) addressed one of Trivers's predictions with a somewhat different approach. He questioned whether attraction to men with high earning power was affected by women's decreased access to resources and would thus be attenuated in those women with potential for high socioeconomic status (SES) (e.g., female medical students). He found no reduction: women still preferred mates with equal or greater SES in comparison to themselves. Additionally, these women became even more discriminating in that their pool of acceptable mates shrunk with their own increasing SES.

Another factor that may influence females' mate selection criteria is the temporal duration of the liaison. A female will not directly benefit from a mate with good parenting abilities if he is not going to stick around. However, this may not be a problem if she already has a primary mate, supplying the paternal care. Although there is the significant cost of possible abandonment or physical harm caused by an enraged primary mate with decreased paternity certainty, it is possible that in past environments females benefited from extra-pair copulations (EPC). Physiological evidence suggests that polyandrous matings were a strong selection pressure on males in the evolutionary past: human males have moderately large testes (relative to body size) compared to other primates, suggesting that sperm competition was a selective force in human evolution (Harcourt et al. 1981). Smith (1984) proposed a list of possible benefits to an ancestral female who mated with one or more males other than her primary mate. The most obvious benefit would be the immediate acquisition of material resources (e.g., food) which would reduce a woman's risk of predation and time and energy associated with foraging. Additionally, an extra-pair male might also be more protective of (or at least less dangerous to) the woman and her offspring (potentially his), than of women with whom he had not copulated. More indirect benefits a woman might gain include the following: high quality genes that would increase offspring chance of successful survival; "sexy son" genes that would increase a son's chances of reproductive success through the same genes that gave his father the competitive edge; genetic diversity as an "evolutionary hedge" against an unpredictable environment; and fertility back up. Consequently if a female engages in an EPC, it is likely that her criteria will be slightly different than those used to assess a potential long-term mate. It is possible that attributes associated with parenting and companionship will decrease in importance, whereas those that increase the chances of producing reproductively viable offspring (through immediate resource acquisition and "good genes") will figure more prominently. One other

important factor should influence a female's choice of an EPC partner. The benefits listed above are associated with a woman who already has a primary mate, presumably from whom she and her offspring receive resources and care and with whom she may want to remain. She should therefore value an extra-pair male who will neither be harmful to her nor threaten the primary mateship.

Surprisingly little research has attempted to test whether women actually possess a set of criteria (i.e., a specialized psychology) for the context of an EPC. Kenrick et al. (1990) and Buss and Schmitt (1993) have investigated both female and male preferences for short-term mateships. However, an EPC differs somewhat from the short-term context in that an EPC implies you already have a long-term mate, whereas a "short-term mating" does not. Hill and Kaplan (1988) found that Ache women prefer better hunters as extra-pair partners. This preference could result in access to higher quality gametes. Recent work by Baker and Bellis (1993) suggests that the timing of a woman's orgasm can influence the outcome of sperm competition in polyandrous contexts, possibly in favor of extra-pair males. Such a mechanism would provide support for the benefits of engaging in an EPC.

Another related but evolutionary novel context is that of artificial insemination by donor. This is a potentially useful context in which to study female choice because of the similarities and differences of choice of sperm donor to mate choice. Given that decisions in both contexts often result in pregnancy and large maternal investment, similarities in responses between the contexts may reveal some of the cues that can activate mate choice decision mechanisms. Additionally, an alternative approach, such as questioning women about their preferences for a sperm donor, may circumvent certain problems associated with the traditional methodology. Much of the research has focused on directly questioning women about their preferences for a mate, which produces results consistent with Trivers's (1972) and Symons's (1979) predictions. However, it is possible that women's stated preferences may not reflect their mate choices, as the decisions upon which they make these choices are not necessarily conscious or articulate, and social desirability biases are likely to intrude (Ellis 1992). Utilizing an alternative approach in which one would expect similar responses to the aspects of donor choice that are shared with mate choice, but produced in a context which is less likely to be affected by the demand characteristics of a mate choice questionnaire, may provide convergent evidence about both Trivers' and Symons's predictions.

It has been estimated that 10% to 15% of couples in the United States experience infertility (Staub and Lipshultz 1990). The frequency of infertility in Canada is yet unknown (Achilles 1992). Therapeutic donor insemination (TDI) is the most commonly offered assisted fertility treatment (Achilles; Stephens et al. 1993), and has been in practice since the late 1800s, although it has only become widespread in the last twenty years (Shapiro et al. 1990). Literature has not addressed the question of what attributes recipient couples or

single females would want in a donor, but instead focuses on more technical aspects.

Mahlstedt and Probasco (1991) emphasize the importance of taking a more active role in choosing a sperm donor. They suggest that people would prefer to make well-informed decisions about a behavior that would require great investment if a child is produced. Some American clinics have recognized the demand for descriptive (non-identifying) information about the donors, which would allow patients more choice (Achilles 1992). If fertility clinics offer patients information about available donors, it is in the form of a list of attributes or a brief description. This can provide a somewhat controlled medium in which one might be able to identify those features that are repeatedly preferred. Exactly what attributes women value in their sperm donor has yet to be determined.

As no specific psychology for choosing a sperm donor is expected to have evolved, one might expect women to select a sperm donor as a result of the activation of one of two possible sorts of psychological mechanisms:

1. Relying on more domain general reasoning abilities, women might value only those attributes that they believe to be genetically transmittable; or
2. Women's preferences for a donor might correspond to evolved mate choice preferences. Given the importance of mate choice and its similarity to donor choice, mate preferences may generalize to related contexts like donor selection.

Two experiments were conducted in order to investigate what assessment mechanisms, if any, women would use to aid them in choosing a sperm donor. In the first experiment, using a between-subjects design, subjects assessed what attributes were important to have in a donor or in a long-term mate. Preferences between groups were then compared. The second experiment was conducted in order to examine whether preferences for donors were reflective of women's preferences for an EPC partner, as the EPC context is similar to fertilization by donor in that one often gets gametes and nothing more. Again using a between-subjects design, subjects assessed what attributes were important to have in a donor, a long-term mate or an EPC partner. Preferences were then compared across conditions.

EXPERIMENT 1

Previous literature (e.g., Buss and Barnes 1986; Buss and Schmitt 1993; Townsend 1989; Kenrick et al. 1990) suggests that women have a specialized psychology for choosing their mates. Specific attributes such as kindness, understanding, intelligence, good health, and the potential to acquire resources are highly desirable in potential mates. In order to compare women's preferences for mates to those for sperm donors, a questionnaire was constructed using items from previous studies (Buss and Barnes 1986; Buss and Schmitt

1993) and items used by physicians and patients to choose sperm donors (e.g., health-related items and physical attributes). When compiled, questions could be conceptually divided into five groups (though no formal analysis was performed at the time to verify this): physical attributes, health, abilities, character, and resource-accruing potential.

As women might value only those traits in a donor that they believe to have a strong genetic component, subjects' heritability beliefs were also assessed.

METHOD

Subjects

One hundred nineteen female subjects participated in the experiment for an undergraduate psychology course credit. Their ages ranged from 19 to 45 years with a median age of 21. Sixty subjects (mean age: 23.5 ± 6.6 years) assessed attributes in a sperm donor, whereas 59 subjects (mean age: 23.9 ± 6.3 years) considered attributes in a husband/mate (both labels were used, and were by implication synonymous in this version of the questionnaire). All subjects were heterosexual. Seventy-eight percent of subjects were single, 14% had children, 3% had known fertility problems, and 6% had previously considered using TDI. Groups did not differ significantly with respect to age, marital status or parity ($p > .36$ in all cases).

Design and Procedure

Each subject completed a three-part questionnaire, which consisted of a number of demographic questions, a donor or mate choice assessment section, and questions concerning the "heritability" of the donor or mate attributes. A between-subjects design was used in order to avoid order effects. All subjects answered identical non-identifying demographic questions about such factors as age and sexual orientation. In the second part, one group of subjects ($N=60$) answered questions about their preferences in a sperm donor after reading the following:

Imagine that you are at a fertility clinic because you would like to become pregnant and you do not have a mate. A donor, from whom sperm will be taken, will be chosen according to your specifications. This clinic protects the anonymity of each donor in order to guarantee that he will not be contacted by the recipient and/or her potential offspring.

Another group ($N = 59$) considered questions about their preferences in a long-term mate after reading the following:

Imagine that you are at a dating service. A male, who will eventually become your husband, will be chosen according to your specifications.

The questionnaires were otherwise identical except where the word "donor" was replaced with "mate."

Subjects were then instructed to "rate how important each (of several attributes) is to you in selecting a donor (or mate)." A modified five-point Likert rating scale, ranging from very important to not important at all, was used. Descriptors were included on either end of the scale to increase clarity. Fifteen of the attributes were from Buss and Barnes (1986) and Buss and Schmitt (1993): affectionate, ambitious, athletic, charming, considerate, creative, dependable, easy-going, handsome, honest, humorous, intelligent, kind, self-confident, and understanding. Items that physicians and patients commonly use to select a donor were also included: eye color, hair color, height, and (information about) health background and familial health history. Musical talent was added to the category of abilities, and family longevity record was added to health-related items.

In the last section of the questionnaire, subjects were asked to rate the "heritability" of the same attributes they had previously assessed for "importance." "Heritability" was defined as "biologically inherited, that is, transmitted from parent to child via one's genes." The technical, biological definition of the word was not intended. A modified five-point Likert rating scale was used again, ranging from "highly heritable" to "not heritable at all."

The two versions of the questionnaire were randomly distributed in a classroom setting with the experiment present. Anonymity was emphasized by the experimenter and guaranteed by the lack of identification questions.

RESULTS AND DISCUSSION

Factor Analysis

Factor analyses were performed in order to reduce the number of items for comparison and to increase the interpretability of the results (Tabachnick and Fidell 1989).

A principal components analysis was performed using varimax rotation to orthogonal factors. To increase reliability, the analysis was performed on data pooled across Experiment 1 and a second experiment that will be more fully described later. The second experiment included many of the same items, addressed to a different group of subjects, and only those items that were common to both studies were used for the principal components analysis. A similar analysis was performed on subjects' "heritability" scores to ensure that each item loaded highly on the same factor across analyses. Four factors emerged from analyses of both the "importance" and the "heritability" ratings, using Cattell's scree test (Norman and Streiner 1993) corresponding to and thus confirming the constructs of physical, health, abilities, and character. Several items (namely athletic, charming, easy-going, and humorous) were subsequently dropped due to loading highly on different or multiple factors across analyses. Table 1 presents the factor structure from the analysis of the "importance" ratings. The internal consistency (Cronbach's alpha) for each factor was as follows: character 0.89; health 0.81; physical 0.73; and abilities

Table 1. Orthogonal Factor Structure from Principal Components Analysis Displaying Constituent Variables and Their Loadings

FACTOR 1: Character (.25)		FACTOR 3: Physical (.09)	
kind	.888	hair color	.760
understanding	.844	handsome	.700
dependable	.811	eye color	.673
considerate	.807	height	.634
affectionate	.767		
honest	.699	FACTOR 4: Abilities (.07)	
self confident	.574	creative	.791
		musical talent	.633
		intelligent	.455
FACTOR 2: Health (.17)			
family health history	.841		
family longevity record	.771		
health background	.634		

Note: Numbers in parentheses represent proportion of variance in the variables' importance ratings accounted for by each factor.

0.56. All subsequent comparisons were made using subjects' four-factor scores (instead of 22-item scores). Scores were obtained by summing each item's rating in a factor and dividing by the total number of items that comprised that factor (Wainer 1976; Streiner personal communication).

In order to reduce the familywise error rate, a significance level of .01 was used instead of a significance level of .05.

Preferences for Sperm Donor and Long-term Mate Attributes

Figure 1 presents a comparison of the mean importance ratings for the four factors given by the donor and mate groups.¹ The factors ranked from most to least important when selecting a sperm donor were health, character, abilities, and physical attributes. Character was the most important factor in a long-term mate, followed by abilities, health, and physical factors.

The donor group rated three of the four factors significantly more important than the mate group: health, $t(115) = -13.54$, $p = .0001$; physical attributes, $t(116) = -3.47$, $p = .0007$; and abilities, $t(116) = -4.79$, $p = .0001$. The character factor was rated as significantly more important by the mate group than by the donor group ($t(117) = 3.31$, $p = .0012$).

Heritability ratings given by the two groups were also compared. One would expect that these ratings would be independent of experimental condition. However subjects did complete importance assessments before rating the items' heritability and it is possible that the framing of task (i.e., donor vs. mate) would affect the heritability ratings. In fact this did not appear to be a problem. No significant differences were found: character ($\bar{X}_{\text{donor}} = 2.11$; $\bar{X}_{\text{mate}} = 1.75$), $t(117) = -2.51$; health ($\bar{X}_{\text{donor}} = 4.14$; $\bar{X}_{\text{mate}} = 3.97$), $t(117) = -1.45$; physical attributes ($\bar{X}_{\text{donor}} = 4.69$; $\bar{X}_{\text{mate}} = 4.69$), $t(117) = -.01$; and abilities ($\bar{X}_{\text{donor}} = 3.37$; $\bar{X}_{\text{mate}} = 3.35$), $t(117) = -.20$. Subjects' heritability ratings were then averaged and a mean heritability rating was calculated for each factor (see Figure 1).

¹For comparisons at the level of individual items see Appendix A.

EXPERIMENT 1

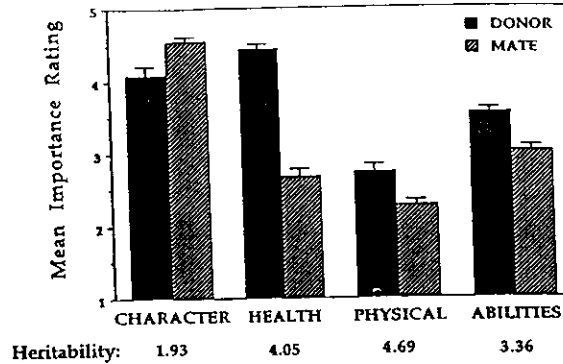


FIGURE 1. Comparison of mean importance ratings for factors in a sperm donor and a long-term mate where 1 = not important at all; 3 = moderately important; 5 = very important. Error bars indicate SE. Mean heritability ratings listed below each factor where 1 = not heritable at all; 3 = moderately heritable; 5 = highly heritable.

Factors that were believed to be moderately to highly heritable (abilities, health, and physical attributes) were significantly more important to the donor group than to the mate group. These results suggest that subjects in the donor group were able to keep a sperm donor in mind when rating the importance of different attributes, as they valued the factors that they believed likely to affect a resultant child.

Subjects in the mate group rated character as the most important factor and valued it more than did the donor group. This result is consistent with previous studies (e.g., Buss and Barnes 1986; Buss and Schmitt 1993; Kenrick et al. 1990) as the character factor consisted of attributes that subjects in these studies have identified as important in a long-term mate.

Character was given the lowest heritability rating, suggesting that subjects believed the factor had little probability of being "transmitted from (the male) to (the) child via one's genes." It is not surprising that character need not have a heritable component to be valued in a long-term mate, but character was also rated as being important when selecting a sperm donor, from whom one would receive only gametes. In fact it was the second most important factor after health. Subjects appeared to understand the task of assessing a donor, as they rated health, physical and abilities factors more important than subjects who selected a mate. The fact that character retained considerable importance in donor selection, suggests that subjects may have been partly relying on the psychology used to choose a long-term mate when they assessed attributes in a sperm donor.

EXPERIMENT 2

Results of the first experiment suggest that women possess a specialized psychology which functions to solve the problem of choosing a mate, and that

subjects' responses to the evolutionarily novel task of selecting a sperm donor were partly but not entirely reflective of this. The second experiment served to investigate this further. In order to test the reliability of the results of the previous experiment, donor and long-term mate conditions were again compared. A number of resource-related items were added to the questionnaires to provide an additional test of the hypothesis that subjects' preferences for a donor were partly reflective of a mate choice psychology. It has been previously demonstrated that resource-related attributes are important in female mate choice (e.g., Buss and Barnes 1986; Townsend 1989). If subjects who assessed a donor were partly relying on a specialized psychology for long-term mate choice, then resource-related items, which are important when selecting a mate, should be similarly valued when selecting a donor.

Experiment 2 was also designed to further explore the meaning of women's donor selection criteria. Donor preferences in Experiment 1 were similar, but not identical, to those for a long-term mate. It is possible that preferences for a donor reflect adaptation to some other naturally occurring context. Specifically, the EPC context is similar to fertilization by sperm donor in that one often gets gametes and nothing more. The EPC context is not evolutionarily novel and there may be substantial benefits as well as costs associated with it. Thus it is possible that adaptations for assessment of men in an EPC context exist in the form of preferences distinct from those for a long-term mate and that it was these preferences that were evoked by the sperm donor scenario. In order to investigate this, the criteria important when selecting an extra-pair partner were assessed and compared to those valued by women selecting a sperm donor and women selecting a long-term mate.

METHOD

Subjects

Eighty-eight female subjects participated in the experiment for an undergraduate psychology course credit. Their ages ranged from 20 to 47 years with a median age of 22.

Subjects completed one of three versions of the questionnaire: 28 subjects (mean age: 22.8 ± 5.0 years) assessed attributes in a sperm donor, 30 (mean age: 22.7 ± 2.7 years) considered attributes in a long-term mate, and 30 (mean age: 23.8 ± 5.5 years) assessed attributes in an EPC partner. All subjects were heterosexual. Ninety-one percent of subjects were single, 6% had children, 3% had known fertility problems, and 6% had previously considered using TDI. Groups did not differ with respect to age, marital status or parity ($p > .10$ in all cases).

Design and Procedure

The design and procedure were the same as those of the previous experiment with the additional experimental condition of an extra-pair partner. Five new

resource-related attributes were added (industrious, professional degree, sophisticated, spends money freely, well-off financially), as ambitious was the only resource-related item in Experiment 1. The donor and mate groups received the same instructions as in Experiment 1. The EPC group was given the following to consider:

Imagine that you are in a long-term committed relationship (e.g., marriage). You are away on a business trip and will be spending a few days in a strange city by yourself. If you possibly can, imagine that you have a brief affair. You are not likely to ever see this man again. How would you choose this man?

Subjects were then required to rate the importance of each attribute when selecting an extra-pair partner. The three versions of the questionnaire and the procedure were otherwise identical except where the appropriate labels, “a man for the weekend,” “donor,” and “mate,” were required.

RESULTS AND DISCUSSION

Resource Construct

As a factor analysis could not be performed on Experiment 2 (due to sample size), an informal construct was formed using the resource items in order to be able to include these in subsequent analyses. The internal consistency using Cronbach's alpha was 0.72, which was similar to those found for the factors. A “resource potential” score was calculated for each subject, by averaging across scores on the six items relevant to resources.

Preferences for Sperm Donor, Long-term Mate, and EPC Partner Attributes

Figure 2 presents the mean importance ratings for each factor given by the donor, mate and EPC groups and the mean heritability ratings for each factor.² Comparing only the donor and mate conditions for Experiment 2, the pattern of results replicated those of Experiment 1. Items that subjects believed were likely to affect a resultant child, such as those represented by the health and physical factors, were significantly more important to women who assessed attributes in a donor than to women in the mate group (see Figure 2). Within the mate condition, character was again the most important factor to have in a long-term mate. Within the donor condition, consistent with Experiment 1, health was the most important factor followed by character, which still retained considerable importance when women assessed attributes in a sperm donor.

The most important factor to have in an EPC partner was character (see Figure 2). Abilities, resource potential, health and physical factors were of much less importance to women who assessed attributes in an extra-pair partner.

²For comparisons at the level of individual items see Appendix B.

EXPERIMENT 2

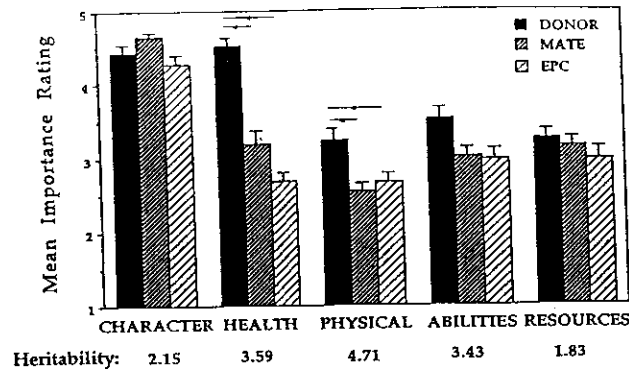


FIGURE 2. Comparison of mean importance ratings for factors in a sperm donor, long-term mate and an extra-pair partner, (where indicated: $p \leq .001$ for differences among groups; post-hoc pairwise comparisons significant at .01), where 1 = not important at all; 3 = moderately important; 5 = very important. Error bars indicate SE. Mean heritability ratings listed below each factor where 1 = not heritable at all; 3 = moderately heritable; 5 = high heritable.

Comparison of Preferences for Sperm Donor, Long-term Mate and EPC Partner Attributes

Analyses of variance were performed on the factor scores to compare preferences for attributes in a sperm donor, long-term mate and EPC partner (see Figure 2). A significant difference was found among the groups for the importance of health ($F(2,85) = 44.90, p = .0001$) and physical factors ($F(2,85) = 8.01, p = .0006$). Subsequent pairwise comparisons (Tukey tests) revealed that subjects in the donor condition valued both these factors significantly more than subjects in either the long-term mate or EPC conditions (all $p < .01$), but the differences between the latter two groups for these two factors were not significant.

The mean importance rating for character was slightly greater for the long-term mate group than for either the donor group (direction consistent with Experiment 1) or the EPC group, but the difference was not significant ($F(2,84) = 3.46$). Although the direction of the difference between the importance of abilities in a donor and a mate was replicated across experiments, the difference among conditions (and between a donor and a mate) was not significant ($F(2,84) = 4.80$). No difference was found among conditions for resource potential ($F(2,84) = 1.19$).

Results did not support the hypothesis that preferences for a sperm donor might reflect those for an extra-pair partner. Little difference existed between ratings given by women in the long-term mate group and those given by women in the EPC group. Additionally, the difference in the importance of health among the three groups suggests that preferences for an extra-pair

partner, in comparison to preferences for a mate, were even more different from preferences for a donor.

Heritability ratings given by the three groups were also compared. No differences were found: character ($\bar{X}_{\text{donor}} = 2.30$; $\bar{X}_{\text{mate}} = 2.12$; $\bar{X}_{\text{EPC}} = 2.04$), $F(2,85) < 1$; health ($\bar{X}_{\text{donor}} = 3.82$; $\bar{X}_{\text{mate}} = 3.53$; $\bar{X}_{\text{EPC}} = 3.43$), $F(2,85) < 1$; physical attributes ($\bar{X}_{\text{donor}} = 4.78$; $\bar{X}_{\text{mate}} = \bar{X}_{\text{EPC}} = 4.71$), $F(2,85) < 1$; abilities ($\bar{X}_{\text{donor}} = 3.60$; $\bar{X}_{\text{mate}} = 3.30$; $\bar{X}_{\text{EPC}} = 3.41$), $F(2,85) < 1$; and resource potential ($\bar{X}_{\text{donor}} = 1.82$; $\bar{X}_{\text{mate}} = 1.81$; $\bar{X}_{\text{EPC}} = 1.86$), $F(2,85) < 1$. Hence, heritability ratings were averaged across conditions and a mean score was calculated for each factor (see Figure 2).

Of all the factors, physical attributes and health were again rated as the most likely to be “transmitted from the parent to the child via one’s genes.” As in Experiment 1, they were also significantly more important when selecting a donor than when selecting either a mate or an extra-pair partner. This again suggests that subjects were able to keep the sperm donor task in mind when rating the importance of different attributes.

Subjects rated resource potential as the least heritable of all factors. Nevertheless, no difference emerged between the importance of resource potential in the donor and mate groups. Although the ability to invest in offspring through access to resources is quite important when choosing a long-term mate, it is unlikely that this would be important when assessing a sperm donor from whom one would receive gametes and nothing else. However, this finding would be expected if subjects who assessed a donor were partly relying on the psychology for long-term mate choice.

GENERAL DISCUSSION

Factors believed to be moderately to highly “heritable” were more important to women in the donor group than to women in the mate group. Further comparison revealed however that character, which was rated as having little chance of being “transmitted from parent to child via one’s genes,” was very important when assessing a donor, as well as when assessing a mate. This similarity in responses suggests that subjects who assessed attributes in a sperm donor may have relied on the psychology used in mate choice, at least in part.

These results were replicated in the second experiment. Health and physical attributes were again significantly more important to women in the donor group than to women in the mate group. Character was again the most important attribute to have in a long-term mate, but this factor again retained considerable importance in a sperm donor too. Additionally, no difference was found between the importance of resource potential in a long-term mate and in a sperm donor, even though resource potential was rated as having little chance of affecting a resultant child. This result, in addition to the consistent importance of character, regardless of type of male assessed, provides further support

for the possibility that a mate choice psychology was accessed when attributes were assessed in a sperm donor.

One might argue that the preference for good character and perhaps resource potential in a donor reflects a general tendency to dispense benefits to those who deserve them and to see the opportunity to father one's child as a benefit. However, it is unlikely that this generalized response would have such an influence as to make character of equal or greater importance than the attributes one believed would be transmitted to, and thus influence the well being of, the resultant child. Another possibility is that preference for good character and resource potential in a donor may reflect a woman's desire for those attributes in her child. If it is very important to have good character in one's child and the factor is believed to have a small chance of being "biologically transmitted" to the child, then the importance of character in a donor would be a product of these influences. However good health, which is very important to have in a child and is believed to have a great chance of being "transmitted" to the child, would be expected to have far greater importance than character when selecting a donor. In fact, health was only slightly more important than character in both experiments.

The results of the second experiment provided little support for the existence of a separate psychology for the context of EPC partner selection. No significant differences were found between the importance ratings for factors in a long-term mate and in an extra-pair partner. It is possible that modifications to the scenario used in the EPC condition might elicit differences between preferences for a long-term mate and an extra-pair partner. In the present study, the EPC scenario was designed to maximize the differences between the contexts of choosing a long-term mate and an extra-pair partner. For example, the possibility of assessing the EPC partner as a replacement for one's present mate was eliminated, as one was "unlikely to ever see this man again," whereas the functional significance of an EPC as an alternative source of gametes was retained. A scenario might be used which more closely resembled an ancestral environment, such as having an EPC with someone living in the same village. This however might decrease the possibilities of finding differences between preferences for a long-term mate and an extra-pair partner as mate replacement would now become possible. An additional change to the EPC scenario might elicit responses more like those for a sperm donor and less like those for a long-term mate. Emphasizing the possibility of pregnancy in the EPC condition might increase the importance ratings for attributes likely to affect a resultant child.

In the present study, preferences for a sperm donor were used to investigate mate selection criteria. An alternate approach might be to investigate the effects of fluctuating asymmetry on long term mate and EPC partner selection. If a better source of gametes is one possible function of engaging in an EPC, then phenotypic quality as evidenced through developmental stability and parasite resistance should be very important in this context. Fluctuating asymmetry, or random deviations from ideally symmetrical, bilateral characters, is thought to be the result of an individual's reduced ability to withstand develop-

mental perturbations (Thornhill and Gangestad 1993). Facial attractiveness ratings of men have been found to negatively correlate with an index of fluctuating asymmetry (Gangestad et al. in press), where attractiveness is proposed to be an indicator of heritable fitness (Gangestad 1993). In contexts where the likelihood of receiving parental investment is low, such as in some cases of an EPC, heritable pathogen resistance and developmental stability should be highly valued, as this would enhance offspring viability (Hamilton and Zuk 1982). Thus physical attractiveness might be expected to be highly valued in an extra-pair partner (Gangestad 1993). Additionally in environments of high pathogen prevalence, pathogen resistance and phenotypic quality should be highly valued in any type of mate—extra-pair or not. Gangestad and Buss (1993) found a positive relationship between the importance of physical attractiveness in a mate and the prevalence of pathogens across 29 societies. A study that could provide cues of fluctuating asymmetry (such as through the use of photographs) might provide an alternative way of investigating the psychology for extra-pair partner and long-term mate selection.

Much research suggests that an evolved psychology exists to solve the problem of choosing a mate (e.g., Buss 1989, Buss and Barnes 1986; Kenrick et al. 1990; Symons 1979; Townsend 1989). Previous studies found that many of the items that constituted the character factor (e.g., kindness, dependable) were important when selecting a long-term mate (e.g., Buss and Barnes 1986; Kenrick et al. 1990). Consistent with this, character was highly valued in a long-term mate across experiments. Additionally, character was also very important when assessing attributes in a sperm donor. Historically, choosing a mate and producing offspring have been inseparable for women (except perhaps in the case of an EPC). When subjects were given the task of choosing a donor, women valued donor attributes that were most likely to affect a resultant child, but they also valued attributes that only would be useful if the male were to help with subsequent child rearing, such as in a long-term mateship. This similarity to long-term mate preferences suggests that subjects who selected a sperm donor may have used assessment mechanisms similar to those used to choose a long-term mate. Thus it is possible that women partly relied on the psychology used for mate choice when attributes were assessed in a sperm donor.

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Appendix A. Comparison of mean importance ratings for a sperm donor and a long-term mate for factors and their constituent items where 1 = not important at all; 3 = moderately important; 5 = very important.

	Donor \bar{X} (SE)	Mate \bar{X} (SE)	<i>t</i>	<i>p</i>
Character	4.10 (.12)	4.55 (.06)	3.31	.0012
kind	4.13 (.14)	4.56 (.11)	2.38	.0189
understanding	4.02 (.15)	4.61 (.09)	3.39	.0010
dependable	4.10 (.15)	4.48 (.12)	1.98	.0496
considerate	4.12 (.15)	4.64 (.07)	3.25	.0015
affectionate	3.97 (.13)	4.42 (.10)	2.84	.0054
honest	4.36 (.13)	4.95 (.03)	4.50	.0001
self confident	4.03 (.14)	4.19 (.11)	.87	.3885
Health	4.44 (.06)	2.67 (.12)	-13.54	.0001
family health history	4.75 (.07)	2.51 (.16)	-13.03	.0001
family longevity record	3.67 (.13)	1.85 (.14)	-9.51	.0001
health background	4.92 (.04)	3.62 (.17)	-7.73	.0001
Physical	2.73 (.10)	2.27 (.08)	-3.47	.0007
hair color	2.05 (.15)	1.64 (.12)	-2.18	.0313
handsome	3.58 (.12)	3.24 (.12)	-2.07	.0406
eye color	2.02 (.14)	1.35 (.09)	-3.90	.0002
height	3.27 (.12)	2.84 (.14)	-2.33	.0216
Abilities	3.54 (.07)	3.01 (.09)	-4.79	.0001
creative	3.48 (.10)	2.92 (.14)	-3.39	.0009
musical talent	2.47 (.14)	1.72 (.13)	-3.92	.0001
intelligent	4.67 (.07)	4.38 (.12)	-2.09	.0393

Note: Factors are presented in bold followed by the individual items. When considering these results, a more stringent significance level than .05 should be used as multiple comparisons were carried out.

Appendix B. Comparison of mean importance ratings for a sperm donor, a long-term mate and an extra-pair partner for factors and their constituent items where 1 = not important at all; 3 = moderately important; 5 = very important.

	Donor \bar{X} (SE)	Mate \bar{X} (SE)	E.P.C. \bar{X} (SE)	<i>F</i>	<i>p</i>
Character	4.45 (.11)	4.66 (.06)	4.27 (.13)	3.46	.0359
kind	4.43 (.14)	4.73 (.08)	4.40 (.17)	1.88	.1590
understanding	4.32 (.13)	4.67 (.09)	4.24 (.18)	2.88	.0619
dependable	4.50 (.16)	4.73 (.08)	3.72 (.24)	9.44	.0002
considerate	4.50 (.12)	4.80 (.07)	4.62 (.14)	1.82	.1685
affectionate	4.54 (.15)	4.60 (.11)	4.45 (.18)	.27	.7649
honest	4.58 (.15)	4.97 (.03)	4.14 (.22)	7.68	.0009
self confident	4.25 (.16)	4.10 (.13)	4.31 (.17)	.52	.5971
Health	4.54 (.10)	3.19 (.19)	2.68 (.12)	44.90	.0001
family health history	4.75 (.13)	3.07 (.22)	2.30 (.21)	41.11	.0001
family longevity record	3.86 (.23)	2.47 (.22)	1.47 (.13)	36.71	.0001
health background	5.00 (.00)	4.03 (.21)	4.27 (.17)	9.88	.0001
Physical	3.24 (.16)	2.54 (.11)	2.67 (.12)	8.01	.0006
hair color	2.93 (.25)	1.93 (.19)	1.93 (.20)	7.20	.0013
handsome	4.04 (.17)	3.47 (.16)	3.93 (.17)	3.36	.0394
eye color	2.50 (.24)	1.57 (.17)	1.67 (.20)	6.21	.0030
height	3.50 (.19)	3.20 (.12)	3.17 (.17)	1.28	.2825
Abilities	3.52 (.15)	3.01 (.12)	2.97 (.15)	4.80	.0106
creative	3.57 (.18)	3.10 (.19)	3.07 (.23)	1.87	.1607
musical talent	2.43 (.25)	1.67 (.15)	1.69 (.17)	5.01	.0088
intelligent	4.57 (.12)	4.27 (.15)	4.14 (.20)	1.90	.1556
Resources	3.26 (.12)	3.16 (.11)	2.97 (.16)	1.19	.3100
ambitious	4.00 (.16)	4.37 (.11)	3.41 (.22)	8.15	.0006
industrious	3.63 (.18)	3.20 (.18)	2.93 (.23)	3.19	.0463
professional degree	3.61 (.20)	3.07 (.27)	2.35 (.21)	7.45	.0010
sophisticated	3.14 (.23)	3.10 (.22)	3.47 (.17)	.96	.3858
spends money freely	2.21 (.18)	2.27 (.17)	2.79 (.21)	2.85	.0635
well off financially	2.96 (.20)	2.93 (.20)	2.87 (.22)	.06	.9435

Note: Factors are presented in bold followed by the individual items. When considering these results, a more stringent significance level than .05 should be used as multiple comparisons were carried out.