# ORIGINAL ARTICLE

# Are Men and Women Really That Different? Examining Some of Sexual Strategies Theory (SST)'s Key Assumptions about Sex-Distinct Mating Mechanisms

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**Abstract** Sexual Strategies Theory (SST; Buss and Schmitt 1993) suggests that, typically, men more so than women are more likely to spend proportionately more of their mating effort in short-term mating, lower their standards in short-term compared to long-term mating, feel reproductively constrained, and seek, but certainly not avoid, sex if pregnancy is likely in short-term relationships. A series of 4 survey studies each containing hundreds of college student participants from the western portion of the United States were conducted to test these hypotheses. The findings are inconsistent with SST but are consistent with Attachment Fertility Theory (AFT; Miller et al. 2005) that argues for relatively few evolved gender differences in mating strategies and preferences.

**Keywords** Evolution · Sex-distinct mechanisms · Sexual Strategies Theory · Attachment Fertility Theory · Sex differences · Mating mechanisms · Mating strategies

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#### Introduction

Mating is fundamental to evolutionary processes. Therefore, for an evolutionary scientist, few domains offer as much explanatory promise. Sexual Strategies Theory (SST; Buss and Schmitt 1993; Buss 1994; Buss 1995), a well-known evolutionary theory argues for evolved sex-distinct mating mechanisms (e.g., preferences) for short-term and long-term mating due to fundamental biologically-based sex differences in minimal levels of parental investment (e.g., physical limitations of pregnancy, labor, and nourishing young versus mere insemination). An alternative view is expressed in Attachment Fertility Theory (AFT; e.g., Miller and Fishkin 1997; Miller et al. 2005) which argues that when the care of both parents increases the probability of offspring survival, males and females are apt to evolve much more homologous or similar mechanisms (Ziegler 2000) impacting parental caregiving, pair-bonding, and mate selection (Wynne-Edwards 2001). This need for bi-parental care shifts the evolved pattern from sex-distinct to sex-homologous mate selection mechanisms (Ziegler 2000).

The overall purpose of the current paper is to test several hypotheses on which SST and AFT make competing predictions. We accomplish this goal using four separate survey studies of American college students designed to assess differences between men and women in a variety of areas including the proportion of mating effort dedicated to short-term relationships (Study 1), avoidance of pregnancy in short- and long-term relationships (Study 2), reproductive constraints (operationalized as the difference between the number of different sexual partners ideally desired relative to the number realistically expected) (Study 3), and standards for short- and long-term partners (Study 4). The results are relevant to our understanding of the mating strategies and preferences of both men and women and the possible evolutionary factors underlying such behavior.

Below, we review some of the key theoretical assumptions crucial to SST and the evidence that supports them. Over the course of four studies, we then ask a series of research questions that directly test a number of these theoretical assumptions. In doing so, we contrast the predictions of SST and AFT.

# Overview of Sexual Strategies Theory

Buss and Schmitt (1993) start with two assumptions. They argue that "In human evolutionary history, both men and women have pursued short-term and long-term matings under certain conditions where the reproductive benefits have outweighed the costs" (p. 205). Then, they argue that "different adaptive problems must be solved when pursuing a short-term sexual strategy as opposed to pursuing a long-term sexual strategy" (p. 205). These first two assumptions of the theory (precis points 1 and 2) do not yield any specific hypotheses or predictions tested in Buss and Schmitt (1993).

Their next assumptions (precis points 3, 4, and 5) yield predictions regarding men's short-term (ST) mating strategies. Buss and Schmitt (1993) describe these sets of predictions as central to SST. Let us proceed then, assumption by assumption, starting with the third precis point.

Precis Point 3: Differences between Men and Women in Proportional Investment in ST relative to Total Mating Effort

Trivers' (1972) work provides the evolutionary theoretical framework for the work by Buss and his colleagues (e.g., Buss 1985, 1995; Buss and Schmitt 1993) and others (e.g., Kenrick and Keefe 1992; Kenrick et al. 1990). According to Trivers (1972), if women (or men) invest *more* in offspring, women (or men) should be more picky in choosing a mate. Furthermore, if men (women) invest *less* in offspring, men (women) should compete more (i.e., devote a greater proportion of total mating effort to) for mates with whom they might presumably minimally invest.

Buss and Schmitt (1993) argue that there are asymmetries in minimal levels of parental investment in humans such that men needn't minimally invest as much (e.g., sperm) as women (e.g., fertilization, gestation, lactation) for offspring procreation and infant survival. If men are less investing than women, men's standards in picking a mate should be lower than women's and "men [*should*, italics added] devote a larger proportion of their total mating effort to short-term mating than do women" (p. 205). This is precis Point 3 and it is a fundamental assumption of SST. Still, in humans unlike many other species — both men and women may engage in both short-term and long-term mating and both may invest a great deal in offspring. Note that SST does *not*  argue for general, non-overlapping, differences in behavioral strategy (i.e., men engage in short-term mating while women pursue long-term mating; women invest heavily in offspring while men do not). Rather, SST stresses that biological differences between men and women (i.e., in minimal levels of investment) should predict differences in men's and women's *proportional investment* in short-term mating relative to all other mating. We directly test this assumption below.

## Study 1

What if men did not "devote a larger *proportion* [italics added] of their total mating effort to short-term mating than do women," (Buss and Schmitt 1993, p. 205)? Then, the assumption that minimal parental investment differentials impact gender differences in human mating would be questionable. The theoretical link between such parental investment differentials, and reproductive constraints on men and differential opportunities in short-term relationships would be severed.

Buss and Schmitt (1993), however, did not directly test this assumption. Their prediction 1 is the prediction most directly relevant, but it is operationalized by examining the extent to which men versus women "are currently seeking a short-term mate" (p. 210). The *proportion* of short-term mating to total mating effort is not assessed. Therefore, Buss and Schmitt (1993) cannot address whether seeking a short-term mate is a "larger component of men's sexual strategy than of women's sexual strategy" (Hypothesis 1, p. 210). Nor can they address whether "men devote a larger proportion of their total mating effort to short-term mating than do women" (precis point 3, p. 205). An alternative is clear: men and women may each devote the same amount of effort to short-term mating relative to their respective total mating effort.

Subsequently, Schmitt et al. (2001b) attempted to look at proportions by asking college participants to indicate on a 7-point scale the degree to which they are seeking both a short-term and long-term mating partner with a value of 1 indicating "currently not at all seeking" and a value of 7 corresponding to "currently strongly seeking." A ratio was then formed using these two relationship types with findings supporting SST. There are two problems with this approach. First, Schmitt et al. (2001b) only looked at short-term and long-term mate seeking. They did not ask about intermediate duration relationships (e.g., dating, going steady, intermediate-length affairs, etc.). Buss and Schmitt (1993) themselves acknowledge that in addition to short-term and long-term relationships, humans also engage in intermediate-term relationships. Intermediate relationships are, in fact, quite common among college students the typical population sampled in this research. For example, in the data set employed in Study 1 we asked college participants if they have ever had a short-, intermediate, and long-term sexual relationship. Whereas 35.9% and 15.5% of participants indicated that they had a short- and long-term sexual relationship, respectively, a full 62.9% said they had an intermediate-term sexual relationship. Second, conceptually and statistically Schmitt et al. (2001a, b) are interested in proportions. But, their measures do not allow them to look at proportions because their measures do not conform to the requirements of ratio scales. A ratio scale of measurement is one in which differences between scale values can be quantified and there exists an absolute zero point (Colman 2001). For example, time and money are both ratio scales. There is an absolute zero (no money, no time) and participants can count up the amount of time or money devoted to an activity; each amount of money or time has absolute value relative to other amounts of money or time that enables division. That is, 50 dollars is half of 100 dollars; 40 min is twice as long as 20 min, etc. Furthermore, "The existence of an absolute, nonarbitrary zero point means that we can measure the absolute amount of the variable; that is, we can measure the distance from zero. This makes it possible to compare measurements in terms of ratios." (Gravetter and Wallnau 2008, p. 21). Therefore, to our knowledge, Buss and Schmitt's (1993) critical assumption has not been adequately tested.

We addressed this assumption, and the inadequacies of prior attempts to assess it, in examining our first research question — Is there a difference between men and women in the proportion of mating effort devoted to short-term to all dating relationships? We operationalize "mating effort" both in terms of (a) time and (b) money spent pursuing a relationship because these are both valuable resources (requiring effort) that are expended in the context of dating relationships and they are measured on a ratio scale. Furthermore, to assess the full range of dating relationships we collected data on short-, intermediate-, and long-term relationships.

As discussed above, SST would clearly hypothesize that men should spend proportionately more of their mating effort in short-term relationships compared to women. AFT, in contrast, argues for predominately homologous (sex-similar, not sex-distinct) patterns of mating mechanisms in humans. As such, AFT would not predict differences between men and women in mating effort, neither in the proportion of time (Hypothesis 1) nor proportion of money (Hypothesis 2) spent in pursuit of short-term mating relationships.

## Method

## Participants

Three hundred forty six undergraduate students (89 males and 257 females) from the University of Southern California with

a mean age of 19.89 years (SD=3.52, range 17–57) participated for course credit. College students were the sample of interest here because college students were the sample of interest in the vast majority of empirical studies we reviewed. Furthermore, mating goals are presumably active for this group. The current sample was 42.9% Caucasian, 23.4% Asian, 15.0% Hispanic, and 7.9% African American. In addition, 8.4% of the participants responded to the ethnicity question by indicating "Other" and 2.5% did not respond at all.

## Measures and Procedure

A survey was administered in multiple sections of an Introductory Psychology class. We tested our hypotheses with two separate dependent variables. For the first we asked participants in an *open-ended format* to use numbers to indicate the average amount of *time* and *money* they devote in a typical week in pursuing short-term, intermediate, and long-term relationships (e.g., 2 hr, \$30, etc.). Relationships were defined as specified by Buss and Schmitt (1993): Short-term relationships were defined as brief affairs or one night stands, intermediate relationships were defined as a dating or "going steady," and long-term relationships were defined as potential marriage partners. These two questions produced responses that are measured on a ratio scale.

To assess whether a gender difference exists in the proportion of mating effort devoted to short-term dating relationships, we divided responses on the short-term items by the total responses to all three relationship types. For example, imagine a participant who indicated that she spends \$15, \$20, and \$10 per week pursuing short-, intermediate-, and long-term relationships, respectively. This individual therefore spends a total of \$45. The proportion of her total monetary outlay devoted to short-term relationships would be .33 (i.e., \$15 / \$45=.33 - that is, 33%).

The second dependent variable was produced by asking participants to separately answer the same two questions using a *scale format*. Specifically, responses for the time devoted to seeking each relationship type were on a 6-point scale, with each value labeled, ranging from "no time at all" to "eight or more hours a week." The questions concerning the amount of money spent each week pursuing each type of relationship were on a 7-point scale, with each value labeled ranging from "no money at all" to "over \$100".

## Results and Discussion

On the open-ended questions that produce a ratio scale, 27.4% of participants reported spending no *time* and 52.8% indicated that they spend no *money* pursuing any type of relationship. We considered only those spending time or money in pursuit of any type of relationship. Among those

who are spending time pursuing any type of relationship, Men (M=.30, SD=.34) do not differ from women (M=.24, SD=.32) in the proportion of *time* spent seeking a short-term mate, F(1,237)=1.44, p>.10 (Hypothesis 1). In a similar fashion, for those who are spending *money* pursuing some type of relationship, Men (M=.25, SD=.33) do not differ from women (M=.17, SD=.29) in the proportion of money spent seeking a short-term mate, F(1,149)=1.96, p>.10 (Hypothesis 2; see Table 1).

Although we recognize the statistical problem of using ratios here, to compare our findings with the earlier findings by Schmitt et al. (2001a, b) that used a fixed scale, we then replicated these findings using the 1-6 and 1-7 point ratio-like scales for time and money, respectively. Specifically, for both proportion of *time* (M=.32, SD=.15 men; M=.30, SD=.14 women; F(1,334)=2.50, p>.1) and money (M=.31, SD=.10 men; M=.30, SD=.08 women; F(1, 337)=.67, p>.1) spent in a short-term versus other relationships, there were no significant differences between men and women (see Table 1). We also employed a multivariate analysis of variance (MANOVA) to analyze the data, since loss of cases in doing so was not an issue (as it was for the other time and measure variables). Consistent with the univariate results, the MANOVA revealed a lack of an overall difference for men versus women, F(2,333)=1.34, p>.1.

Additional analyses revealed a difference in age with men (M=20.83, SD=5.68) being older than women (M= 19.56, SD=2.30), F(1,342)=8.64, p<.01). Although age was not correlated with any of the dependent measures (all p-values>.10) we nonetheless re-ran all the analyses above using age as a covariate. Age was not a significant covariate in any of the analyses (all p-values>.10) and the results replicated our previous findings of no significant differences between men and women.

Our findings do not show evidence for a gender difference in the proportionate amount of effort devoted to short-term mating (as is predicted by Sexual Strategies Theory). Therefore, the third precis point of Buss and Schmitt's (1993) theory was not supported. Our findings did not support the claim that "because of a fundamental asymmetry between the sexes in minimum levels of parental investment, men devote a larger proportion of their total

 
 Table 1
 Mean participant age and the proportion of mating effort (both time and money) Dedicated to short-term relationships using both Open-Ended (OE) and Fixed Scale (FS) formats (Study 1).

Gender	Age	Time (OE)	Money (OE)	Time (FS) <sup>a</sup>	Money (FS) <sup>b</sup>
Male	20.83	.30	.25	.32	.31
Female	19.56	.24	.17	.30	.30

<sup>a</sup> Scale values ranged from 1 ("no time at all") to 6 ("eight or more hours a week")

<sup>b</sup> Scale values ranged from 1 ("no money at all") to 7 ("over \$100")

mating effort to short-term mating than do women" (p. 205). As expected however, these findings are consistent with Attachment Fertility Theory (e.g., Miller and Fishkin 1997; Miller et al. 2005) that would not expect differences between men and women in the proportion of total mating effort devoted to short-term dating relationships.

## Study 2

Study 1 investigated differences between men and women in the proportion of both time and money spent pursuing shortterm relationships. We now turn to an examination of sexual opportunities and constraints. The fourth precis point of Buss and Schmitt (1993) argues that "the adaptive problems that women must solve when pursuing each strategy are different from those that men must solve, although some problems are common to both sexes" (p. 206). Although there are no specific hypotheses and predictions associated with this precis point, it is important for precis point 5. Therefore, let's take a closer look at it.

Buss and Schmitt argue for sex-differentiated adaptive problems "because the reproductive opportunities and reproductive constraints differ for men and women in these two contexts" (p. 205). That is, there is an antecedent, "reproductive opportunities" and a consequent (e.g., men, more so than women, desire more partners).

According to Buss and Schmitt (1993), the chief benefit from short-term mating is an increase in the number of offspring produced: "historically, men appear to have achieved increases in reproductive success primarily through increases in the number of sexual partners, not through increases in the number of offspring per partner (Betzig 1986; Dawkins 1986)" (p. 207). But, what does number of partners mean here (Betzig 1986)? For clarity, primatologists (Dixson 1998) differentiate monogamous and polygynous mating systems (e.g., long-term) from other systems involving more promiscuous mating systems (e.g., short-term) across primates. When men have multiple wives in polygynous matings (e.g., Betzig 1986), they are in relatively long-term relationships, and not short-term ones. It is, therefore, not at all clear what role short-term matings have historically played in increasing men's reproductive success beyond that achieved through more long-term, monogamous or polygynous, mating. Nevertheless, let us suppose, for the moment, that men — more so than women — do increase their reproductive opportunities with short-term matings. What then?

Buss and Schmitt (1993) argue, in their precis point 4, that because of these greater reproductive opportunities in shortterm mating for men, men are more likely than women to solve a specific set of problems (e.g., seek more short-term relationships). There are a number of questions here. Regarding the first part of the clause of precis point 4, "Because the reproductive opportunities and reproductive constraints differ for men and women," we can ask, "Are the reproductive opportunities for men and women different?" and "Are the reproductive constraints different for men and women?" Regarding the second part of the clause of precis point 4, if the assumptions of the first part of the clause are found to be unsupported, then the second part of the clause, "the adaptive problems that women must solve when pursuing each strategy are different from those that men must solve," is necessarily also not supported.

## Reproductive Opportunities in Short-Term Mating

Now, let's consider the first clause of this precis point again. One might argue that, given Sexual Strategies Theory, men, compared to women, would particularly desire offspring in short-term relationships. After all, Buss and Schmitt (1993) argue that this is where the reproductive opportunities are greater for men; the costs are lower for men than for women and this is how, according to Buss and Schmitt (1993), men primarily enhance their reproductive success. Given the relative benefits and costs, wouldn't Sexual Strategies Theory predict that men would find it desirable to have offspring from such a coupling? Certainly, Sexual Strategies Theory seems inconsistent with the possibility that men would avoid sex in short-term relationships, compared to long-term relationships. This should, if anything, be more true if pregnancy seemed likely. The pattern for women, in contrast, is less clear. But, because women would have the additional benefit of men's support in long-term but not in short-term relationships, short-term matings resulting in pregnancy should generally be less favored.

It should be noted that the strategy — having short-term relationships in order to have more offspring --- would not need to be a conscious one. Rather, men who wanted more short-term relationships might not consciously seek more offspring. This seems consistent with an argument Buss and Schmitt (1993) make with their eleventh precis point that "Strategies are defined as evolved solutions to adaptive problems, with no consciousness or awareness on the part of the strategist implied."(p. 206). Nevertheless, if men knew or suspected that pregnancy was likely - consciously or not - SST would certainly not argue that this would deter them from wanting a short-term relationship. In fact, if anything, one might expect that SST would argue that men would be more likely to seek such a mating (e.g., if they suspected consciously or not that pregnancy was likely), thereby enhancing their reproductive success. Based on this reasoning, Sexual Strategies Theory would suggest that, given the relative benefits and costs, men would not be particularly likely to avoid having sex, and certainly would not be more likely to avoid short-term mating than long-term mating if pregnancy was likely. Study 2 is designed to formally test this hypothesized difference.

Attachment Fertility Theory would make an entirely different prediction. AFT argues that bi-parental care was biologically, chemically, and psychologically adapted for in human evolution. Specifically, without bi-parental care almost half of the children among hunter-gatherers do not survive childhood (for a review, see Geary 2000) and historically childhood mortality without fathers may have been even higher (Hrdv 1999). By definition, fathers are more likely to participate in care giving in the context of long-term relationships. This in turn increases the likelihood of offspring survival. AFT would therefore predict that men would avoid having sex in a short-term (relative to a long-term) relationship if pregnancy were likely to occur. What would AFT predict for women? Among mammals, when fathers matter for offspring survival, evolved homologous (gendersimilar) mechanisms prevail (Wynne-Edwards 2001; Ziegler 2000). As such, AFT would predict that women would show the same pattern as men (i.e., more avoidance of sex in shortterm relationships if sexual relations would likely result in pregnancy). Study 2 directly tested the competing predictions of SST and AFT by asking both men and women about reproductive opportunities. We operationalize this concept by asking individuals the extent to which they would avoid sex in the context of both short- and long-term relationships if pregnancy was a likely outcome. Our hypothesis was that both men and women would show the same pattern of more strongly avoiding pregnancy in a short-term relative to a long-term relationship.

## Method

#### Participants

Two hundred seventeen undergraduate students (66 males and 151 females) from the University of Southern California with a mean age of 19.38 years (SD=1.84, range 17–28) participated for course credit. The sample was 43.6% Caucasian, 18.8% Asian, 13.3% Hispanic, and 5.0% African American. In addition, 16.5% of the participants responded to the ethnicity question by indicating "Other" and 2.8% did not respond at all.

# Measures and Procedure

A survey was administered in multiple sections of an Introductory Psychology class. For short-term and long-term relationships, participants separately rated on a 7-point Likert scale the extent to which they would either very actively seek (+3) or very actively avoid (-3) having sex if they knew that there was a high probability that having sex on that particular night would result in pregnancy. A value of 0 was marked "neither actively seek or avoid".

Results and Discussion

The age of men (M=19.52, SD=1.84) and women (M=19.32, SD=1.84) did not differ, F(1,215)=.53, p>.10). Furthermore, age was not correlated with any of the dependent measures (all *p*-values>.10). As such, age was not used as a covariate in the analyses below.

Men were more likely to avoid sex if pregnancy was likely in a short-term relationship (M=-2.03, SD=1.76) than in a long-term relationship (M=-.58, SD=2.05), t (63)=6.11, p<.001 (see Table 2). Sexual Strategies Theory argues that the benefit to cost ratio in achieving a pregnancy for men is especially great in short-term compared to long-term mating. Therefore, this finding is not consistent with SST but it is consistent with the prediction of AFT. The pattern for women was similar to the pattern for men (M=-2.29, SD=1.76 for short-term relationships; M=-1.04, SD=2.07 for long-term relationships, t(148)=8.28, p<.001; see Table 2).

To further explore the role of gender and relationship length on decisions about whether to have sex if pregnancy is likely, a 2 (gender) × 2(relationship type) mixed ANOVA was performed. There was a main effect for relationship type, F(1,211)=95.48, p<.001, indicating that both men and women were significantly more likely to avoid pregnancy in a short-term compared to a long-term relationship. However, neither the main effect of gender nor the interaction of relationship type and gender were statistically significant (both p-values>.15). Therefore, it was not the case that men were more likely than women to desire sex in a short-term relationship if pregnancy was likely. Furthermore, men were more likely to desire sex if pregnancy was likely in a longterm than in a short-term relationship. These combined findings too seem incongruent with a major assumption in the underpinning logic of Sexual Strategies Theory but match our predictions based on Attachment Fertility Theory.

## Study 3

In Study 3 we continue to investigate whether men and women experience sexual constraints. In Buss and Schmitt's (1993) fourth precis point, they argue that the constraints as

**Table 2** Mean participant age and the desire to seek or avoid pregnancy in short- and long-term relationships (Study 2).

Gender	Age	Short-term relationships <sup>a</sup>	Long-term relationships <sup>a</sup>
Male	19.52	-2.03	58
Female	19.32	-2.29	-1.04

 $^{\rm a}$  Scale values ranged from +3 ("very actively seek") to –3 ("very actively avoid") pregnancy

well as the opportunities differ for men and women in shortterm and long-term relationships. Precis point 5 argues that "men historically have been constrained in their reproductive success primarily by the number of fertile women they can inseminate" (Buss and Schmitt 1993, p. 206). Thus, men according to this perspective - want many partners, but may fall short because they are constrained by women. Do men feel so constrained? If this were true, we'd expect that men's ideally desired number of partners (e.g., no reproductive constraints), within a given period of time, would be greater than men's expected real number of partners (i.e., number of partners expected given that these reproductive constraints exist). On the other hand, if men do not feel so "constrained," we might expect that, on average, they would not differ in the number of partners they realistically and ideally expect to have.

From the vantage point of Sexual Strategies Theory, the case for women seems less clear. For women, "the reproductive benefits of short-term mating as an end in itself are less direct and the potential costs more steep" (Buss and Schmitt 1993, p. 221). Viewing a short-term relationship as an entrée into a more long-term relationship (Buss and Schmitt 1993), however, might justify the costs. Nevertheless, women may realistically expect that this strategy may sometimes not result in a long-term relationship and that thereby they may end up with more partners than they might ideally desire. This not only represents time wasted looking for a long-term partner but might also lead to reputation loss (making a longer term relationship less likely). In addition, women using this strategy run the risk of investing in partners who are low in commitment and/or resources, both of which are not advantageous from an evolutionary perspective. Thus, although a hunter-gatherer woman might have many offspring with different men, those offspring might not themselves survive to childbearing age (Shostak 1981). Finally, although "promiscuous" mating maybe simply a natural step towards long-term mating (Miller et al. 2005), men who show a greater interest in and orientation towards short-term mating in general maybe more likely to also demonstrate narcissism and psychopathy (Jonason et al. 2009), qualities that certainly do not facilitate long-term pair-bonds.

In Study 3 we test the idea of sexual constraints by asking men and women both the ideal number of different sexual partners they desire and the number of partners they realistically expect to have. The prediction of Sexual Strategies Theory seems clear — the number of sexual partners desired by men will exceed the number they realistically expect (viz. they are sexually constrained). From the perspective of SST, the situation for women is somewhat less apparent. Furthermore, it seems reasonable that SST would predict a gender difference in constraint with men perceiving themselves as more constrained than women. As discussed above, Attachment Fertility Theory argues that bi-parental care was adapted for in human evolution. In contrast to SST, AFT hypothesizes that fathers played a greater role in caring for their offspring and devoted fewer resources to obtaining numerous short-term partners. As such, AFT would predict that while we might expect variability within women or variability within men in feeling more or less constrained in achieving the number of partners desired, neither men nor women should, on the average, feel particularly constrained. We directly test these competing hypotheses of SST and AFT below.

## Method

## Participants

Two hundred seventy two undergraduate students from the University of Southern California participated for course credit. Of these 109 were males and 163 were females. The average age of participants was 19.37 years (SD=2.08, range 17–36). The sample was 39.3% Caucasian, 30.5% Asian, 16.5% Hispanic, and 7.7% African American. In addition, 5.5% of the participants responded to the ethnicity question by indicating "Other" and .4% did not respond at all.

#### Measures and Procedure

A survey was administered in multiple sections of an Introductory Psychology class. As in a study reported in Buss and Schmitt (1993), participants were first asked to estimate how many sexual partners they would *ideally* like to have over a series of time intervals: during the next month, 6 months, 1 year, 2 years, 3 years, 4 years, 5 years, 10 years, 20 years, 30 years, and a lifetime. In addition, participants were also asked to estimate how many sexual partners they thought they could *realistically* have over the same time intervals, a series of questions Buss and Schmitt (1993) did not ask. Constraint was computed as the difference between partners desired and partners expected for each time period. High positive numbers reflected constraint with ideal scores greater than expected scores.

## Results and Discussion

The distributions of constraint for men and women were significantly skewed. For the 30 year period, for example, skew was quite high for both men (Z=9.79, p<.0000000001) and women (Z=14.31, p<.0000000001). In such cases medians are a better measure of central tendency than are means (Wilcox 1997). The median response for the 30 year period for both men and women was "no difference" between the number of partners ideally desired and realistically expected (MJ=0, p=1.00, 95% confidence



Fig. 1 Frequency of the Constraint values (viz. ideally desired number minus expected number of sexual partners) for the 30-year time period (Study 3). High positive numbers reflected constraint with ideal scores greater than expected scores.

interval of -.0017, .0017) (see Fig. 1). Consistent with this finding, the median value was also zero for both men and women for the other 10 time periods as well. In addition, the average age of men (M=19.66, SD=2.33) and women (M=19.19, SD=1.89) did not significantly differ so age was not employed as a covariate.

Consistent with our hypothesis and the expectations of Attachment Fertility Theory, these findings suggest that both men and women, typically, are not constrained in achieving the number of partners they desire. These findings, however, do not support Sexual Strategies Theory. Specifically, if men are not "constrained in their reproductive success primarily by the number of fertile women they can inseminate" (Buss and Schmitt 1993, p. 206), can there be evolutionary-based gender differences in the problems that follow from this nonconstraint? Obviously not.

Precis point 5 specifies four problems that according to Buss and Schmitt (1993) men had to overcome *because they were "constrained."* Despite lack of support for the assumption of "constraint" found in Study 3, we nevertheless want to consider the first set of these predictions from Buss and Schmitt (1993) which involve the first of these problems, the "problem of number" (p. 210).

Distinct Patterns of Numbers of Short-Term Partners Desired for Men Versus for Women?

"Men may have evolved over human evolutionary history a powerful desire for sexual access to a large number of women (cf. Symons 1979)" (p. 208). This leads them to their prediction 2, which is, "for any given period of time (e.g., a month, a year, a decade, or a lifetime), men will desire a larger number of mates than will women (solution to the problem of number)" (Buss and Schmitt 1993, p. 210). Do most men ideally desire a large number of mates?

Buss and Schmitt (1993) found statistically significant differences between the means for men and the means for women at all 11 time intervals from a month to a lifetime. In fact, we replicated this effect (Miller and Fishkin 1997; Pedersen et al. 2002). As strong as these findings may appear, Buss and Schmitt's (1993) inferences rely heavily on *t*-test comparisons of means. We have argued that this matters both conceptually and statistically (Pedersen et al. 2002). First, these data are heavily skewed. For example, even in Buss and Schmitt's (1993) original data which they provided to us, for the "next 30 years" time frame, the skew for men was highly significant (Z=8.94, p<.000001). Given that these data violate the assumptions of parametric tests, medians rather than means are a more appropriate measure of central tendency (Wilcox 1997). As we have reported elsewhere (Pedersen et al. 2002), although we readily replicate Buss and Schmitt's findings for mean differences between men and women in number of partners desired per time frame, the story is different when we look at medians.

We (Pedersen et al. 2002) find at the 30-year time frame, for example, that over 50% of both men and women desire no more than 1 sexual partner. Across time frames there are few gender differences in these median values. Our sample medians, especially for men, differ however, from those reported by Buss and his colleagues (Buss 2000; Greiling and Buss 2000). For example, calculated median values for the 30 year time frame using the Buss and Schmitt (1993) data set are 8 for men and 3 for women whereas our values were 1 and 1. More recent cross-cultural work by proponents of SST (see Schmitt 2003) indicates that medians for men and women (except for men in Oceania - i.e., Australia, Fiji & Pacific Islands, and New Zealand) were also 1. Although medians were not explicitly presented in Schmitt (2003), information about the medians can be deduced from Fig. 2 in that article. Although there maybe differences in the distributions for men and women, and differences among men and among women are interesting ones to examine (see Miller and Fishkin 1997), the medians (that would seem critical to SST) do not appear to differ. The logic of Sexual Strategies Theory, so tied to nonoverlapping biological propensities (e.g., sperm production; bearing offspring), seems consistent with the expectation that at the very least, most men would differ from most women in their sexual strategies. Medians therefore, could provide a particularly useful measure of central tendency with which to examine a hypothesis about evolved, biologically-based, differences between men and women.

But this type of data cannot address the question of whether the relationships desired are actually short-term ones, intermediate term ones, or more long-term relationships. Additional research (Pedersen et al. 2002) provides convergent findings. In that work, we more directly addressed men and women's desire for short-term and long-term mates, and the dating trajectory that would be considered ideal by men and women. First, virtually all men (98.9%) and virtually all women (99.2%) desire to eventually settle down in a long-term mutually exclusive sexual relationship. Second, of those who have not yet found such a partner, the median desired time frame for ideally dating before finding this person is 5 years into the future. Third, when asked how many short-term and long-term partners men and women ideally desired, we replicated both a mean difference, and no median difference between men and women. Fourth, both men and women desired a median number of 0 short-term partners. Additional partners sought before the long-term partner, were intermediate dating partners — not short-term dating partners.

Taken together, these findings are consistent with the possibility that for most of our lives, after an initial promiscuous seeking and dating phase in the teens and 20's in the U.S., men and women would ideally prefer to focus on a long-term relationship that typically lasts for decades (Laumann et al. 1994). These data, as well as our own from various studies reported here (see also Miller and Fishkin 1997), suggest that most men and women eventually seek relatively enduring pair-bonds (e.g., from sometime in their 20's forward). This time period is consistent with that found in national representative samples regarding the time prior to marriage or first cohabitation (Laumann et al. 1994). If children are desired, it seems likely that, in general, they would tend to be desired in the context of such a more enduring emotionally close pair-bond. This suggestion seems consistent with our finding, reported earlier, that both men and women would be more likely (less unlikely) to have sex in a long than short-term relationship, if pregnancy was likely.

In summary, Study 3 showed no evidence that men are constrained in their search for sexual partners. In addition, our previous work discussed above indicates that it is not the case that most men and women differ in their desired number of partners. Furthermore, to the extent that individuals want additional partners before settling down with a long-term partner, these desired partners were in the context of intermediate-term (not short-term) dating relationships.

# Study 4

Study 4 is designed to test an additional research hypothesis proposed by Sexual Strategies Theory. Specifically, do men, more so than women, lower their "standards" in shortterm compared to long-term contexts? Buss and Schmitt's (1993) Prediction 4 is that, "Across all desired attributes in potential short-term mates, men will impose less stringent standards than women impose." Part of the argument here is that men evolved an adaptive strategy involving a "relaxation of standards imposed for acceptable short-term partners. Elevated standards, by definition, preclude a large number of women from exceeding them. The relaxation of standards should apply to a wide range of mate characteristics" (p. 208). By lowering their standards in short-term contexts, men thereby could, according to this argument, solve the "problem of number" (e.g., finding numerous short-term partners). Understanding whether men "relaxed" their standards in short-term relationships more so than women requires a comparison with what men do when they do not have to solve the "number" problem: what men do in long-term contexts. Buss and Schmitt (1993) do not give us the comparison with long-term contexts for men and women against which to gauge if "standards" have, in fact, been "relaxed" for one gender more so than for the other.

Sexual Strategies Theory, in essence, predicts an interaction. There should be more of a difference between short-term and long-term contexts for men than for women on attributes of the same polarity (positive or negatively valued). But, that comparison is not examined by Buss and Schmitt (1993). We directly test this hypothesis in Study 4. Furthermore, although SST would predict an interaction such that relationship context differentially affects preferences for men and women, consistent with Attachment Fertility Theory we predict similar patterns for both men and women (viz. the absence of an interaction) for both positive (Hypothesis 1) and negative (Hypotheses 2) valenced partner traits.

#### Method

#### **Participants**

An undergraduate college sample of 342 women and 243 men from the University of Southern California participated in the study for course credit. The average age of participants was 19.28 years (SD=2.23, range 17–43). The sample was 43.5% Caucasian, 28.1% Asian, 15.9% Hispanic, and 7.5% African American. In addition, 5.0% of the participants responded to the ethnicity question by indicating "Other".

#### Measures and Procedure

A survey was administered in multiple sections of an Introductory Psychology class. Participants rated a number of preferences provided to us by David Buss including 24 positive characteristics that were of the same polarity for short-term and long-term contexts for men and women and 13 negative preferences using a 7-point Likert scale from–3 (highly undesirable) to +3 (highly desirable). These items were

designed to cover a broad range of human characteristics so as to assess for gender differences in standards for a romantic partner. The positive items included: good financial prospects, physically attractive, kind and understanding, sexually loval, creative and artistic, exciting personality, likely to earn a lot of money, college graduate, good heredity, easygoing, likely to succeed professionally, intelligent, reliable future career, gives me gifts early on, good looking, sex appeal, healthy, good housekeeper, emotionally close, emotionally warm, honest, ambitious, able to protect me from physical harm, and athletic. The negative items included: prudish, financially unsupportive, low sex drive, unfaithful, promiscuous, sleeps around a lot, lacks ambition, uneducated, financially poor, stingy, emotionally cold, unemotional, and emotionally distant. To parallel the analyses of Buss and Schmitt (1993), we formed a composite of the 24 positive items (Cronbach's alphas = .86 and .84 for short- and long-term, respectively) and a separate composite of the 13 negative items (Cronbach's alphas=.79 and .69 for short- and long-term, respectively) to look at overall "lowering" of standards. Specifically, averages were computed using the relevant items so that the resulting scores would reflect the original 7-point Likert scale discussed above.

## Results and Discussion

For the *positive* items, in both short-term *and* long-term contexts, overall, there was a main effect such that men (M=1.14, SD=.63 short-term; M=1.61, SD=.51 long-term) had less extremely positive ratings than women (M=1.41, SD=.68 short-term, M=1.87, SD=.57 long-term; F (1,574)=36.10, p<.001) (see Table 3). There was also a context main effect such that evaluations for both men and women were more positive in long-term than short-term contexts, F(1,574)=326.85, p<.001. This latter finding suggests that both men and women appear to "lower their standards" in short-term compared to long-term contexts. But, do men lower them more than women? No, there was not a significant interaction here, F(1,574)=.06, p>.10.

We also examined negatively valued items in shortterm and long-term contexts. Were these less negatively evaluated in short-term than in long-term contexts? And

**Table 3** Mean participant age and the desirability of positive and negative traits<sup>a</sup> in a romantic partner for both Short-Term (ST) and Long-Term (LT) relationships (study 4).

		(ST)	(LT)	(ST)	(LT)
Male 1 Female 1	9.58 9.07	1.14	1.41 1.87	-1.53 -1.91	-2.03

<sup>a</sup> Scale values ranged from -3 ("highly undesirable") to +3 ("highly desirable")

was this "lowering of standards" greater for men than for women? Men generally were less negative in both short-term and long-term contexts regarding negatively valued characteristics (M=-1.53, SD=.79 short-term; M=-2.03, SD=.56 long-term) than were women (M=-1.91, SD=.71 short-term; M=-2.35, SD=.52 long-term; F(1,573)=55.44, p<.001) (see Table 3). And, these evaluations are more negative (pickier in long-term than in short-term relationships) following the logic of Buss and Schmitt (1993), F(1,573)=266.94, p<.001. But, do men drop their standards more than women? No, even with a large sample size, there is not a significant interaction, F(1,573)=1.26, p>.10.

We also employed a mixed multivariate analysis of variance (MANOVA) to analyze the overall effects across both shortand long-term relationship contexts. Consistent with the univariate results, the mixed MANOVA revealed a lack of an overall interaction: That is, both men and women showed the same pattern of differences across context, F(2,572)=.69, p>.1.

Additional analyses revealed a difference between men (M=19.58, SD=2.30) and women (M=19.07, SD=2.16) in age, with men being significantly older than women, F (1,579)=7.40, p<.01). Although age was not correlated with any of the dependent measures (all *p*-values>.10) we nonetheless re-ran all the analyses above using age as a covariate. Age was not a significant covariate in any of the analyses (all *p*-values>.10) and the results replicated our previous findings of no significant gender differences.

Thus, we replicated this "standards effect" difference for men and women for short-term relationships. But, by pointing to the same effect in long-term relationships, and no difference in this pattern for men and women for neither positive (Hypothesis 1) nor negative (Hypothesis 2) traits, these findings overall do not support the proposition of SST that men, more so than women, "lower" their standards in short-term compared to long-term relationships. The similarity of men and women in their patterns of responses, however, is consistent with the viewpoint of AFT.

## **General Discussion**

#### Summary

Analyses across 4 studies, aimed mostly at some of Sexual Strategies Theory's original core assumptions (Buss and Schmitt 1993), are not consistent with the claim that men and women have distinct mating mechanisms. We recognize that sometimes theories may morph over time: In that case, as some have suggested (e.g., Higgins 2004), the new "morphed" theory is essentially a new theory, and should be designated with a new label. Meanwhile the original theory, in this case Sexual Strategies Theory, as specified in Buss and Schmitt (1993), is what is being evaluated here.

Inconsistent with SST's (Buss and Schmitt 1993) precis point 3, most men are not more apt to spend proportionately more of their mating effort in short-term mating. Nor are they more apt, compared to women, to lower their standards in short-term compared to long-term mating. Furthermore, in short-term mating, most men are not more apt to seek sex if pregnancy is likely or feel, on the average, reproductively constrained: And, in any event women and men exhibit the same pattern of constraint.

Instead, these findings suggest that when it comes to patterns of preferences and behavior in short-term versus other mating where Buss and Schmitt (1993) postulated or specifically predicted that there would be gender differences, there is far more overlap and similarity between men and women than difference. That pattern of greater gender similarity than difference in the current findings, is more consistent with Attachment Fertility Theory (AFT) (Miller and Fishkin 1997) that would postulate that there would generally be more similarity than differences between men and women in their evolved mating mechanisms. These findings are also consistent with the Gender Similarities Hypothesis which states that men and women are very similar on most variables (Hyde 2007). Not only has this similarity been shown in the areas of cognitive abilities and self-esteem, but more relevant to the current paper is the meta-analytic evidence that most gender differences in sexual behaviors and attitudes are small in magnitude (Petersen and Hyde 2010).

SST Versus AFT: Key Theoretical Differences Underlying Hypotheses

# Different Parental Care Assumptions Yield Different Predictions Regarding Sex-distinct or Sex-similar Mating Mechanisms

Sexual Strategies Theory and Attachment Fertility Theory both stress the role of paternal caregiving. As stated above, Trivers (1972) argues for a type of "trade-off" between investing in mating and investing in parenting. That is, if men (women) devoted more care to their offspring than women (men), men (women) would be expected to devote less effort to mating than the other gender. Sexual Strategies Theory (SST), although acknowledging that human fathers often provide considerable care to their offspring, focuses, as Parental Investment Theory does, on the relative investment that males and females make (Buss and Schmitt 1993). For SST, these relative care differentials produced distinct evolved mating mechanisms for men and women with the emergent outcome, it is argued, that men devote more of their total mating effort than women to short-term mating (Buss and Schmitt 1993). The findings in the current work fail to support this claim.

AFT claims that instead of *distinct* critical problems for men and women leading to sex-distinct evolved mating mechanisms, humans *shared* one of the most fundamental problems that shaped human evolution, the survival of extraordinarily dependent and vulnerable offspring (Miller and Fishkin 1997). Such shared evolved problems for men and women were solved with evolved mechanisms that operated more similarly than differently for men and women (e.g., pair-bonding mechanisms; parental caregiving mechanisms). These evolved mechanisms afford the formation and maintenance, in humans, of long-term pairbonds that support survival of offspring so that offspring might themselves reproduce.

AFT, in contrast to portrayals of AFT (e.g., Schmitt et al. 2001a), does not argue for or require two parents to be equally engaged in childcare and emotional nurturance. Rather, AFT argues that biparental care (the contribution of both parents in childcare, protection, support, and socioemotional nurturance) in humans rather than the care of one parent enhanced the survival of offspring (Miller and Fishkin 1997). AFT argues that in humans, as across mammals (Wynne-Edwards 2001), where paternal — as well as maternal — investment in offspring enhances their survival (see Miller and Fishkin 1997; Miller et al. 2005), predominately homologous rather than sex-distinct caregiving, pair-bonding, and mating preference mechanisms are likely. Assuming that mating behaviors are not constrained by cultural factors, AFT predicts greater gender similarity than gender differences in emerging patterns of mating behavior. The current findings are consistent with those predictions.

#### What is the Place of Short-term Mating in Human Mating?

SST and AFT do not differ in assuming that humans exhibit short-term, as well as long-term mating (Miller and Fishkin 1997). SST, however, unlike AFT, posits distinct evolved short-term mating mechanisms and that these were distinct for men and women. In the past, various proponents of SST (e.g., Schmitt et al. 2001a) have argued that specific physiological design features of human males and females are consistent with short-term mating as an important evolved mating strategy. This has included pointing to claims regarding so called "kimizakee sperm" (Baker and Bellis 1993). However, these claims were subsequently systematically tested and debunked (Moore et al. 1999; see also Simmons et al. 2004).

Furthermore, the evidence for underlying biology and chemistry that might support such sex-distinct mechanisms and how these fit into broader systems of mechanisms is unspecified, controversial or unclear. We also don't know how these short-term and long-term systems might interact (and what would operate for intermediate and other relationships) and exactly how these distinct underlying biological and chemical mechanisms would differ for men and women. Furthermore, it is not clear how these sexdistinct sets of mechanisms would develop and manifest themselves differentially over the life span for human males and females.

In contrast, AFT posits that short-term mating and other forms of mating outside of pair-bonds are natural byproducts of a suite of attachment and caregiving mechanisms that, among other things, were selected for in human evolutionary history to ultimately enable men and women to seek, select, create, and maintain a pair-bond within which to rear offspring who would themselves survive to reproduce. There is a growing body of literature across numerous literatures both for humans and other pair-bonding species that is pointing to an increasingly coherent picture of the underlying biological and chemical systems involved in mating and parenting (e.g., Curtis and Wang 2003; Ziegler 2000). The attachment and caregiving systems provide parsimonious suites of underlying biological, chemical, and psychological mechanisms that generally operate similarly for men and women (Dixson 1998; Insel 1997; Goldstein 2000). These same suites of mechanisms are likely to have analogs in the development of child attachments to caregivers (Hazan and Zeifman 1999).

As we discuss elsewhere (Miller et al. 2005), consistent with the work by Hazan and Zeifman (1999), men and women appear to have similar mechanisms that can afford (but not guarantee) more long-term pair-bonding. This full suite of mating mechanisms differs from the suites of mating mechanisms available to many other species (e.g., chimpanzees), for which full-fledged pair-bonding is not an option. These processes leading up to a long-term pair-bonding include mechanisms for promiscuous seeking, partner selection, and pair-bond formation (as well as mechanisms for relationship repair and dissolution). That is, promiscuous seeking of a mate, that can result in short-term mating, involves the same mechanisms designed to result in better partner selection: At any point, however, the relationship may fail to advance to a full pair-bond or even when a pairbond is formed, may not be maintained over time.

As we have also argued (Miller et al. 2005), differential parameter settings on these mechanisms and universal motives (e.g., approach and avoid systems) due to a combination of genetic and experiential factors (e.g., differential caregiving experience and thereby attachment styles) can make it more or less likely that individuals will forge, maintain, repair and sustain long-term pair-bonds. For example, when men or women do not feel comfortable being close in relationships or trusting of their partner (or have a low threshold for rejection), they may promiscuously seek partners but have more difficulty moving into or being selected into the more intermediate phase of later pairbonding stages of relationships. Even if they achieve such ends, relationships maybe more tenuous, more difficult to repair, or they maybe quicker to disengage from the relationship and begin anew (i.e., seeking promiscuously again). The net effect for this type of individual over time is more time devoted to the promiscuous seeking phase and more lifetime short-term partners (Miller and Fishkin 1997; Miller et al. 2005).

We should note that AFT has from its inception (e.g., Miller and Fishkin 1997) argued that when critical parameters are absent (e.g., a lack or loss of emotional closeness in the relationship), human evolved mechanisms would reduce the probability of retaining a single mate and/ or enhance the probability of seeking a different mate. This emotional signal, "feelings of closeness" (or its absence) is apt to provide an important indicator for both men and women as to whether the pair-bond is apt to last, and therefore the likelihood that a pregnancy would result in a secure biparental environment within which to rear an offspring to adulthood. The attachment system provides evolved mechanisms for detaching from relationships when those relationships are less likely to support offspring survival and when seeking new relationships are more apt to do so. Still, the bottom line in evolution is offspring survival and their own reproduction of offspring as adults. Clearly, more systematic work is needed to assess in huntergatherers the links between pair-bonding patterns and lifetime offspring survival to reproduction.

The Impact of Sexual Experience, Culture, and Social Roles

AFT argues that we would expect relatively few evolved differences between men and women in underlying mechanisms producing emergent outcomes in mating behavior. However, we may still find gender differences in mating behavior and this may vary across cultures. What might be responsible for such differences if they are not due to evolutionary factors?

Obviously it is important to disconfound biological sex from experiential factors. What are those experiential factors? First, if men are exposed to more sexual materials (Kenrick et al. 1994), and cultural stereotypes differentially prepare males and females for sex, *sexual experience* might be an important moderator of gender difference reactions to sexual stimuli. With sexual experience, both males and females are apt to adjust their beliefs, goals, and reactions to sexual and emotional stimuli to be more in line with their actual experiences: Prevailing cultural norms and stereotypes are apt to play less of a role in their reactions.

Harris (2000) examined this possibility. She found that women who had experience with a committed sexual relationship displayed greater physiological reactivity to sexual relative to emotional infidelity (a pattern similar to men) whereas the opposite pattern tended to hold true for females without such experience. Thus, this work suggests an important control or moderator variable (e.g., sexual experience) for researchers examining gender differences in this domain to examine. Contrary to predictions from Sexual Strategies Theory, men and women with sexual experience showed a similar pattern of physiological reactivity.

Second, individuals may differ in their experience due to culturally imposed constraints. A number of authors have argued (Eagly and Wood 1999; Hrdy 1999; Kasser and Sharma 1999), that a variety of cultural factors may impact gender differences in the focus on a mate's resources (e.g., money, status). For example, Kasser and Sharma (1999) noted that a number of theorists (e.g., Caporael et al. 1989; Hrdy 1999) have proposed females may value a partner with money and status because these women live in societies where they are unable to obtain these resources themselves. But, Buss argued that the earlier "structural powerlessness" hypothesis (Buss and Barnes 1986), i.e. "the notion that in cultures where females have economic equality, the differences between men's and women's mate preferences should diminish" (Kasser and Sharma 1999, p. 374) has not been supported and findings to date have been inconsistent with hypotheses of culture-based differences. For example, Buss (1989) found no relationship between economic inequality and mate preferences. And Wiederman and Allgeier (1993) and Townsend (1989) found, in fact, a positive rather than negative correlation between economic equality and education and desire for mate wealth.

However, Kasser and Sharma (1999) argue that those testing the cultural hypothesis have under emphasized the means by which women around the globe may enhance their economic equality. They argue that in order to be financially self-sufficient, women need to be able to control their fertility (e.g., plan pregnancies) and have access to education (e.g., the means by which they can gain economic security). Without the ability to control their own fertility and gain access to education, women maybe more dependent upon men for the resources that they need for themselves and their offspring. In such cases, Kasser and Sharma (1999) argue that women will particularly value cues signaling such economic potential in a mate.

Kasser and Sharma's (1999) data, collected from 37 cultures, supported the hypothesis that a lack of other sources of power, such as education or reproductive care, might lead women to feel they lack control over their own lives. As a result, they would be inclined to value cues in a mate which signal resource acquisition. Indeed, they find that women are more likely to desire resource acquisition characteristics in mates when: they have less educational equality, use contraception less, don't have laws regarding domestic violence, and have lower literacy equality.

Eagly and Wood (1999), concurrently examining the same data set, also examined a variety of indicators of women's gender empowerment. This included the number of managerial positions, proportion of earned income, and number of parliamentary seats. They also assessed gender related development propensity (e.g., ability of nations to provide health care, access to educational and financial equality for women). Those mating preferences that were associated with traditional gender role divisions of labor (e.g., good earning capacity of male bread winner; good housekeeper) showed sharper gender differences in those cultures where there was less gender empowerment and related development. Kasser and Sharma (1999) found similar results when they examined similar cultures. Wood and Eagly (2002) assessed the importance of economic and socio-structural factors in societies (in particular, female reproductive capacity), and conclude that men and women are able to adapt to a variety of labor roles that do not fall along stereotypical gender lines (2002). Relatedly, Eagly and Wood found that with more gender equality across nations, gender differences in the preferred age differential of a mate were reduced (1999). More generally, traditional gender ideology appears to be positively related to sex-typed mate preferences (Johannesen-Schmidt and Eagly 2002; Koyama et al. 2004).

Overall, while it is apparent that women (and probably men as well) have probably always been concerned with securing resources for themselves and their children, their environment and cultural situation may determine exactly where and how women plan for and secure those resources (Hrdy 1999). That is, if the culture restricts women's access to resources to those provided by men, then women will value characteristics in men that afford those resources; this is especially likely to be the case when women do not have control over their own reproduction.

Yet another factor that can impact mating behavior are gender schemas. As discussed in Signorella and Frieze (2008), gender schemas may influence behavior, attitudes, and preferences by providing ideas for what is appropriate for both males and females. In a related vein, Social Role Theory (Eagly and Wood 1999) attributes gender differences in mating preferences largely to the gender roles imposed or promoted by society. Consistent with this viewpoint, Alexander and Fisher (2003) tested whether gender differences in self-reported sexual behavior might be influenced by gender norms. They found that gender differences were attenuated in a bogus pipeline condition where participants believed that false responding could be detected. In addition, not only do these roles vary across culture (and can thus account for some cross cultural variance in mating behavior and preferences) but individuals within a culture can vary in the extent to which they believe in or adopt such roles.

#### Conclusions and Future Directions

Several important assumptions of Sexual Strategies Theory dealing with proportional mating effort, sexual constraints, and standards for a mate were not supported by findings reported in the current work. If we are to develop useful evolutionary models of psychological phenomena, we must insist on more thorough, adequate, and direct tests of a given evolutionary theory's basic assumptions regarding differences between men and women - let alone evolved sex-differences. When doing so, it might be useful to better delineate if and how the distributions for men and women overlap: That is, is the amount of overlap in distributions for men and women high and the within gender variability greater than between gender variability? And, where there is large within gender variability, what are the dynamics that produce this? To the extent that this is the case it behooves researchers to explain the underlying system of sex-distinct mechanisms that can produce such variability. For example, as we noted in our earliest AFT work, those men who had more distant relationships with their fathers (lowest quartile) had remarkably higher levels of desired sexual partners compared to other men and compared to most women (Miller and Fishkin 1997). Similar to these findings, Willis and Clark (2009) report that higher levels of paternal caregiving and warmth are associated with an increased likelihood of men being in a monogamous relationship relative to men with cold or absent fathers.

Where theorists make claims about underlying evolved differences in sex-distinct mechanisms, those claims clearly — at some point — need to be accompanied with (and linked to) evidence for corresponding underlying differences (for men *and* women) in human biological and/or chemical design and mechanism. Our evolutionary approaches to human mating psychology, must be embodied and fit with our knowledge of sexual functioning, fertility, and related systems.

In this regard, it is noteworthy that there has been some increased attempt to look at changing preferences, for example, during the menstrual cycle and their implications for extra-pair mating that take biological and chemical parameters better into account (e.g., Gangestad et al. 2004). These findings, however, are likely to fit with the argument we made earlier (Miller and Fishkin 1997) that when longterm relationships are not possible or difficult to forge and maintain, both women and men may engage in short-term relationships. As such, individuals may seek both types of relationships over time, in part, because either at a specific point in time or chronically they were not able to maintain enduring, emotionally close, long-term relationships. Nevertheless, these emergent outcomes are unlikely to require distinct evolved design features beyond those afforded by the same basic evolutionary designed suites of attachment and caregiving systems that afford mate seeking, selection, and long-term pair-bonding. Understanding human psychological, biological, and chemical systems as systems is key — as are the needed tools (e.g., computational modeling) to achieve better understanding of the underlying system dynamics.

In doing so, we must also more systematically consider how environmental and experiential factors interact with differences found for men and women (either in terms of measures of central tendency and in distributional differences) and how human systems depart from those of other species systems, and why. A useful evolutionary dynamics will be one that systemically considers and predicts the mutual influences between design and our changing social and material worlds, and the affordances, constraints, and challenges that our past presents for our present and future.

## References

- Alexander, M. G., & Fisher, T. D. (2003). Truth and consequences: Using the bogus pipeline to examine sex differences in selfreported sexuality. *Journal of Sex Research*, 1, 27–35.
- Baker, R. R., & Bellis, M. A. (1993). Human sperm competition: Ejaculate adjustment by males and the function of masturbation. *Animal Behaviour*, 46, 861–885.
- Betzig, L. (1986). *Despotism and differential reproduction: A Darwinian view of history*. Hawthore: Adline de Gruyter.
- Buss, D. M. (1985). Human mate selection. American Scientist, 73, 47–51.
- Buss, D. M. (1989). Sex differences in human mate preferences: Evolutionary hypotheses tested in 37 cultures. *The Behavioral* and Brain Sciences, 12, 1–49.
- Buss, D. M. (1994). The strategies of human mating. *American Scientist*, 82, 238–249.
- Buss, D. M. (1995). Psychological sex differences: Origins through sexual selection. *The American Psychologist*, 50, 164–168.
- Buss, D. M. (2000). The evolution of happiness. *The American Psychologist*, 55, 15–23.
- Buss, D. M., & Barnes, M. (1986). Preferences in human mate selection. *Journal of Personality and Social Psychology*, 50, 559–570.
- Buss, D. M., & Schmitt, D. P. (1993). Sexual strategies theory: An evolutionary perspective on human mating. *Psychological Review*, 100, 204–232.
- Caporael, L. R., Dawes, R. M., Orbell, J. M., & van de Kragt, A. J. C. (1989). Selfishness examined: Cooperation in the absence of egoistic incentives. *Behavioral and Brain Sciences*, 12, 683–739.
- Colman, A. (2001). *A Dictionary of Psychology*. New York: Oxford University Press.
- Curtis, J. T., & Wang, Z. (2003). The neurochemistry of pair bonding. Current Directions in Psychological Science, 12, 49–53.
- Dawkins, R. (1986). Wealth, polygyny, and reproductive success. Behavioral and Brain Sciences, 9, 190–191.
- Dixson, A. F. (1998). Primate sexuality: Comparative studies of the prosimians, monkeys, apes, and human beings. Oxford: Oxford University Press.
- Eagly, A. H., & Wood, W. (1999). The origins of sex differences in human behavior: Evolved dispositions versus social roles. *The American Psychologist*, 54, 408–423.

- Gangestad, S. W., Simpson, J. A., Cousins, A. J., Garver-Apgar, C. E., & Christensen, P. N. (2004). Women's preferences for male behavioral displays change across the menstrual cycle. *Psychological Science*, 15, 203–206.
- Geary, D. C. (2000). Evolution and proximate expression of human paternal investment. *Psychological Bulletin*, 126, 55–77.
- Goldstein, I. (2000). Male sexual circuitry. *Scientific American, 283*, 70–75.
- Gravetter, F. J., & Wallnau, L. B. (2008). *Essentials of statistics for the behavioral sciences* (6th ed.). Belmont: Thomson.
- Greiling, H., & Buss, D. M. (2000). Women's sexual strategies: The hidden dimension of extra pair mating. *Personality and Individual Differences*, 28, 929–963.
- Harris, C. R. (2000). Psychophysiological responses to imagined infidelity: The specific innate modular view of jealoyst reconsidered. *Journal of Personality and Social Psychology*, 78, 1082– 1091.
- Hazan, C., & Zeifman, D. (1999). Pair bonds as attachment: Evaluating the evidence. In J. Cassidy & P. Shaver (Eds.), *Handbook of attachment: Theory, research, and clinical applications* (pp. 336– 354). New York: Guilford Press.
- Higgins, E. T. (2004). Making a theory useful: Lessons handed down. Personality and Social Psychology Review, 8, 138–145.
- Hrdy, S. (1999). Mother nature: A history of mothers infants, and natural selection. New York: Pantheon Books.
- Hyde, J. S. (2007). New directions in the study of gender similarities and differences. *Current Directions in Psychological Science*, 16, 259–263.
- Insel, T. R. (1997). A neurobiological basis of social attachment. *The American Journal of Psychiatry*, 154, 726–735.
- Johannesen-Schmidt, M. C., & Eagly, A. H. (2002). Another look at sex differences in preferred mate characteristics: The effects of endorsing the traditional female gender role. *Psychology of Women Quarterly*, 26, 322–328.
- Jonason, P. K., Li, N. P., Webster, G. D., & Schmitt, D. P. (2009). The dark triad: Facilitating a short-term mating strategy in men. *European Journal of Personality*, 23, 5–18.
- Kasser, T., & Sharma, Y. (1999). Reproductive freedom, educational equality, and female's preference for resource acquisition characteristics in mates. *Psychological Science*, 10, 374–377.
- Kenrick, D. T., & Keefe, R. C. (1992). Age preferences in mates reflect sex differences in human reproductive strategies. *The Behavioral and Brain Sciences*, 15, 75–133.
- Kenrick, D. T., Sadalla, E. K., Groth, G., & Trost, M. R. (1990). Evolution, traits, and the stages of human courtship: Qualifying the parental investment model. *Journal of Personality*, 58, 97–116.
- Kenrick, D. T., Neuberg, S. L., Zierk, K. L., & Krones, J. M. (1994). Evolution and social cognition: Contrast effects as a function of sex, dominance, and physical attractiveness. *Personality and Social Psychology Bulletin*, 20, 210–217.
- Koyama, N. F., McGain, A., & Hill, R. A. (2004). Self-reported mate preferences and feminist attitudes regarding marital relations. *Evolution and Human Behavior*, 25, 327–335.
- Laumann, E. O., Gagnon, J. H., Michael, R. T., & Michaels, S. (1994). The social organization of sexuality: Sexual practices in the United States. Chicago: University of Chicago Press.
- Miller, L. C., & Fishkin, S. A. (1997). On the dynamics of human bonding and reproductive success: Seeking a window on the adapted-for-human-environmental interface. In J. Simpson & D. Kenrick (Eds.), *Evolutionary social psychology* (pp. 197–235). Mahwah: Erlbaum.
- Miller, L. C., Pedersen, W. C., & Putcha-Bhagavatula, A. (2005). Promiscuity in an evolved pair-bonding system: Mating within and outside the pleistocene box. *The Behavioral and Brain Sciences*, 28, 290–291.

- Moore, H. D. M., Martin, M., & Birkhead, T. R. (1999). No evidence for killer sperm or other selective interactions between human spermatozoa in ejaculates of different males in vitro. *Proceedings* of the Royal Society of London. Series B, 266, 2343–2350.
- Pedersen, W. C., Miller, L. C., Putcha, A. D., & Yang, Y. (2002). Evolved sex differences in the number of partners desired? The long and the short of it. *Psychological Science*, 13, 157–161.
- Petersen, J. L., & Hyde, J. S. (2010). A meta-analytic review of research on gender differences in sexuality, 1993–2007. *Psychological Bulletin*, 136, 21–38.
- Schmitt, D. P. (2003). Universal sex differences in the desire for sexual variety: Tests from 52 nations, 6 continents, and 13 islands. *Journal* of Personality and Social Psychology, 85, 85–104.
- Schmitt, D. P., Shackelford, T. K., & Buss, D. M. (2001a). Are men really more 'oriented' toward short-term mating than women? A critical review of theory and research. *Psychology, Evolution & Gender, 3*, 211–239.
- Schmitt, D. P., Shackelford, T. K., Duntley, J., Tooke, W., & Buss, D. M. (2001b). The desire for sexual variety as a key to understanding basic human mating strategies. *Personal Relationships*, 8, 425–455.
- Shostak, S. (1981). *Nisa, the life and words of a !Kung woman.* Cambridge: Harvard University Press.
- Signorella, M. L., & Frieze, I. H. (2008). Interrelations of gender schemas in children and adolescents: Attitudes, preferences, and self-perceptions. *Social Behavior and Personality*, 36, 941– 954.

- Simmons, L. W., Firman, R. C., Rhodes, G., & Peters, M. (2004). Human sperm competition: Testis size, sperm production and rates of extrapair copulations. *Animal Behaviour*, 68, 297–302.
- Symons, D. (1979). *The evolution of human sexuality*. New York: Oxford University Press.
- Townsend, J. M. (1989). Mate selection criteria: A pilot study. *Ethology and Sociobiology*, 10, 241–253.
- Trivers, R. L. (1972). Parental investment and sexual selection. In B. Campbell (Ed.), Sexual selection and the descent of man, 1871– 1971 (pp. 136–179). Chicago: Aldine.
- Wiederman, M. W., & Allgeier, E. R. (1993). Gender differences in sexual jealousy: Adaptionist or social learning explanation? *Ethology and Sociobiology*, 14, 115–140.
- Wilcox, R. (1997). Introduction to robust estimation and hypothesis testing. San Diego: Academic.
- Willis, L. A., & Clark, L. F. (2009). Papa was a rolling stone and I am too: Paternal caregiving and its influence on the sexual behavior of low-income African American men. *Journal of Black Studies*, 39, 548–569.
- Wood, W., & Eagly, A. H. (2002). A cross-cultural analysis of the behavior of women and men: Implications for the origins of sex differences. *Psychological Bulletin*, 5, 699–727.
- Wynne-Edwards, K. E. (2001). Hormonal changes in mammalian fathers. *Hormones and Behavior*, 40, 139–145.
- Ziegler, T. E. (2000). Hormones associated with non-maternal infant care: A review of mammalian and avian studies. *Folia Primatologica*, 7, 6–21.