Research Article

EVOLVED SEX DIFFERENCES IN THE NUMBER OF PARTNERS DESIRED?
The Long and the Short of It

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Abstract—*Do men seek more short-term mates than women? Buss and Schmitt (1993) showed a pattern of mean difference in the ideal number of sexual partners men and women desired over various time frames. We replicated these mean sex differences (e.g., ideal number over the next 30 years:* M*s = 7.69 and 2.78 for men and women, respectively), but in both data sets the sampling distributions were highly skewed. In Study 1, we found few sex differences in medians across time frames (e.g., ideal number over the next 30 years:* Mdn = *1 for both men and women). In Study 2, most college men (98.9%) and women (99.2%) said they wanted to settle down with one mutually exclusive sexual partner at some point in their life, ideally within the next 5 years. Neither medians in number of partners desired overall before settling down (replicating Study 1) nor medians in short-term partners desired before settling down (*Mdn = *0) differed significantly by gender. Rather, men and women concurred: Short-term mating is not what humans typically seek.*

Do men and women differ in the number of short-term partners that they seek? Sexual strategies theory (Buss & Schmitt, 1993) argues that the answer to this question is yes. Buss and Schmitt (1993) argued that, although men and women should seek both short-term and long-term relationships, "because of a fundamental asymmetry between the sexes in minimum levels of parental investment, men devote a larger proportion of their total mating effort to short-term mating than do women" (p. 205). According to Buss and Schmitt, one prediction that stems from this assumption is the following: "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" (p. 210). This desire for a large number of (presumably short-term) mates helps solve a problem that, according to sexual strategies theory, men confront in pursuing short-term, but not long-term relationships (viz. "the problem of partner number," p. 207). In fact, Buss and Schmitt reported a mean difference in the number of partners men ($M = 16$) versus women ($M = 4$) desire in the next 30 years.

Do these findings support the claim that men seek more short-term mates than do women? Because the question Buss and Schmitt (1993) posed to their participants did not specify the nature of the relationships men and women seek, this question cannot be answered directly. Still, the mean number of mates desired is large for men compared with women (e.g., over the next 30 years: Ms = 16 vs. 4). Therefore, this pattern might suggest, at least indirectly, that men typically desire more short-term mates than women.

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There are many problems, however, with this inference. Later, we return to the problem of directly assessing the number of relationships of each type (e.g., short term, intermediate term, long term) that men and women desire. First, however, we consider the problem with indirectly inferring differences for men and women in preferences for short-term mates from mean values of the number of mates desired.

Buss and Schmitt's (1993) indirect inferences rely heavily on t-test comparisons of means. This matters both conceptually and statistically. Buss and Schmitt did not merely argue for sex differences in expressed behavior, they argued that these are due to fundamental evolved sex differences in minimal levels of parental investment (e.g., pregnancy, labor, and nourishing young vs. mere insemination). The logic of sexual strategies theory, so tied to nonoverlapping gender differences in biological propensities (e.g., to produce sperm or not; to bear offspring or not), seems consistent with the expectation that certainly, the typical man and the typical woman would differ in their sexual strategies.

Moreover, open-ended sexual-preference and behavior data are apt to be heavily skewed (Rothspan & Read, 1996). As distributions become progressively more skewed, means become increasingly poor measures of the typical response. In such cases, it "has been argued that a comparison of medians is more appropriate . . . because medians generally lie closer to the 'bulk' of the data" (Wilcox & Charlin, 1986, p. 264). Not surprisingly, therefore, researchers who report numbers of sexual partners routinely use medians (e.g., Davies et al., 1992; King et al., 1994).

Still, the conventional wisdom has been that even when distributions are badly skewed or replete with outliers, resulting in means that are not representative of the "typical" response (Wilcox & Charlin, 1986), the inferences derived from t tests are still accurate (e.g., Boneau, 1960; Box, 1954; Glass, Peckham, & Sanders, 1972). Even if psychologists once thought this, today's statisticians certainly disagree, as t tests are sensitive to even moderate violations of the assumptions (e.g., normality and homogeneity of variance) of these tests (Cliff, 1993; Wilcox, 1992, 1994, 1996). Violations of these assumptions can affect both Type I and Type II errors. When assumptions of the t test are violated, "the actual probability of a Type I error can be substantially higher or lower than the nominal α level" (Wilcox, 1997, p. 70). Similarly, Tabachnick and Fidell (1996) noted, "Especially worrisome is that an outlier can produce either a Type I or a Type II error, with no clue in the analysis as to which is occurring" (p. 381). Furthermore, nonrobustness and statistical inferences are apt to become more problematic as "skewness or kurtosis of the sampled population departs increasingly from its normal-distribution value" (Bradley, 1982, p. 87), rendering t tests inferior to other two-sample (e.g., nonparametric) tests (Cressie & Whitford, 1986; Neave & Granger, 1968; Wilcox, 1990). Therefore, medians and inferential tests associated with them may—for a variety of conceptual and statistical reasons—provide a better vehicle to examine a hypothesis about evolved, bio-

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logically based, gender differences. Thus, our goal in Study 1 was to reexamine men's and women's preferences for number of sexual partners desired over various time periods using tests appropriate to the nature of the sample data and compatible with measures of central tendency normally reported for sexual-experience data.

STUDY 1

Method

A total of 266 undergraduate students at the University of Southern California (107 men and 159 women)[1] participated for course credits. As in a study reported in Buss and Schmitt (1993), participants estimated how many sexual partners they would "ideally" like to have over a series of time intervals (i.e., during the next month, 6 months, 1 year, 2 years, 3 years, 4 years, 5 years, 10 years, 20 years, and 30 years, and during a lifetime).

Results

Replicating mean differences

Our first goal was to examine the extent to which our data replicated those reported by Buss and Schmitt (1993). Although Buss and Schmitt did not mention this in their original report, apparently in analyzing their data regarding ideal number of partners desired over various time frames, they winsorized[2] every score of 100 and above to a value of 99 (D. Schmitt, personal communication, August 16, 1999). To replicate their findings, we followed the same procedures. Furthermore, in performing *t* tests for the 11 time periods outlined by Buss and Schmitt, we conducted both standard *t* tests and Welch's tests, the latter of which do not make the assumption of homogeneity of variance (Wilcox, 1996). As is apparent in Table 1, we replicated Buss and Schmitt's pattern of mean gender differences in ideal number of partners desired across various time frames using standard *t* tests ($p < .05$). We also replicated the results for all but one time period using Welch's test ($p < .05$); that one time period, 6 months, yielded a marginal effect ($p = .081$). Thus, it is clear that we replicated Buss and Schmitt's results when using their statistical procedures.

However, as the data in Table 1 indicate, it is difficult to argue that these means represent the typical response or the bulk of the data for either men or women. For example, for the 30-year time period, 77.4% of the men and 73.4% of the women provided a response that was less than their respective group mean. The problem is even worse if the effect of outliers is not partially reduced by winsorizing values above 100 to a score of 99. In the 30-year nonwinsorized data, for example, the mean score for men is 64.32, and 97.2% of the male participants fall below this value. Even after winsorization, these data are highly skewed (e.g., $Z = 18.48$ for men and $Z = 21.22$ for women for

Table 1. *Mean ideal number of partners and percentage of observations below this mean for men and women*

	Men		Women	
Time period	Mean	Percentage below mean	Mean	Percentage below mean
1 month	1.42	82.1	0.67	42.8
6 months	2.52	82.2	0.87	32.1
1 year	3.05	86.9	1.02	88.1
2 years	3.51	80.4	1.29	77.8
3 years	4.44	79.2	1.53	70.9
4 years	5.12	80.2	1.72	67.5
5 years	5.95	77.1	2.03	74.8
10 years	6.56	78.3	2.32	70.9
20 years	8.20	79.2	2.56	72.2
30 years	7.69	77.4	2.78	73.4
Lifetime	9.90	74.0	3.80	69.8

Note. For each of the 11 time periods, standard *t* tests showed men and women significantly differed from one another ($p < .05$). Welch's test replicated these effects ($p < .05$) for all but the 6-month time period ($p = .081$).

the 30-year time period, $p < .0000000001$).[3] With increasing violations of the assumptions of *t* tests, their usefulness is undermined (Cliff, 1993), with unpredictable impacts on Type I (Brown & Forsythe, 1974; Keselman, Keselman, & Games, 1991) and Type II (Wilcox, 1996) error; this is particularly problematic for L-shaped distributions (Bradley, 1982). We encountered an L-shaped distribution in each of these 11 time frames. The problem is perhaps most readily grasped by looking at a graphic illustration of one of these nonnormal distributions. As is indicated in Figure 1 (percentage distribution of men's and women's ideal number of partners in the next 30 years), the modal response for both men and women is 1. Furthermore, 52% of men and 66% of women wanted no more than 1 partner.

Medians: A better measure of the typical response of men and women

For the 30-year data, using the Maritz-Jarrett procedure, a statistical test used to compare medians (Wilcox, 1996), we found the test statistic *MJ* had a value of 0 and a 95% confidence interval of −1.46 to 1.46. Thus, the median test indicated that there was not a statistically significant sex difference in the ideal number of sexual partners men and women desired over the next 30 years. Only 2 of the 11 time intervals (i.e., "over the next 3 years": *Mdn*s = 2 for men and 1 for women, $p = .043$; "in your lifetime": *Mdn*s = 3.5 for men and 1 for women, $p = .005$) yielded significant sex differences (for all others, $p > .1$). When

1. Because of missing data, the number of participants per item ranged from 104 to 107 for males and from 157 to 159 for females.

2. Buss and Schmitt's (1993) procedure is a modified winsorization procedure. Winsorization technically involves empirically determining the number of scores in the distribution identified as "outliers" and then pulling in the distribution to the value that is the next most extreme value on each end of the tail (Wilcox, 1996).

3. We were unable to find *Z*-score tables that listed *Z* scores greater than 6.0. That value (6.00) corresponds to a *p* value of .0000000001. In addition, David Buss and David Schmitt were kind enough to send us a copy of their data for this set of items used in Buss and Schmitt (1993), and we examined these data for skewness. Results indicated similar problems with skewness (e.g., $Z = 8.94$ for men and $Z = 16.8$ for women for the 30-year time period, $p < .0000000001$).

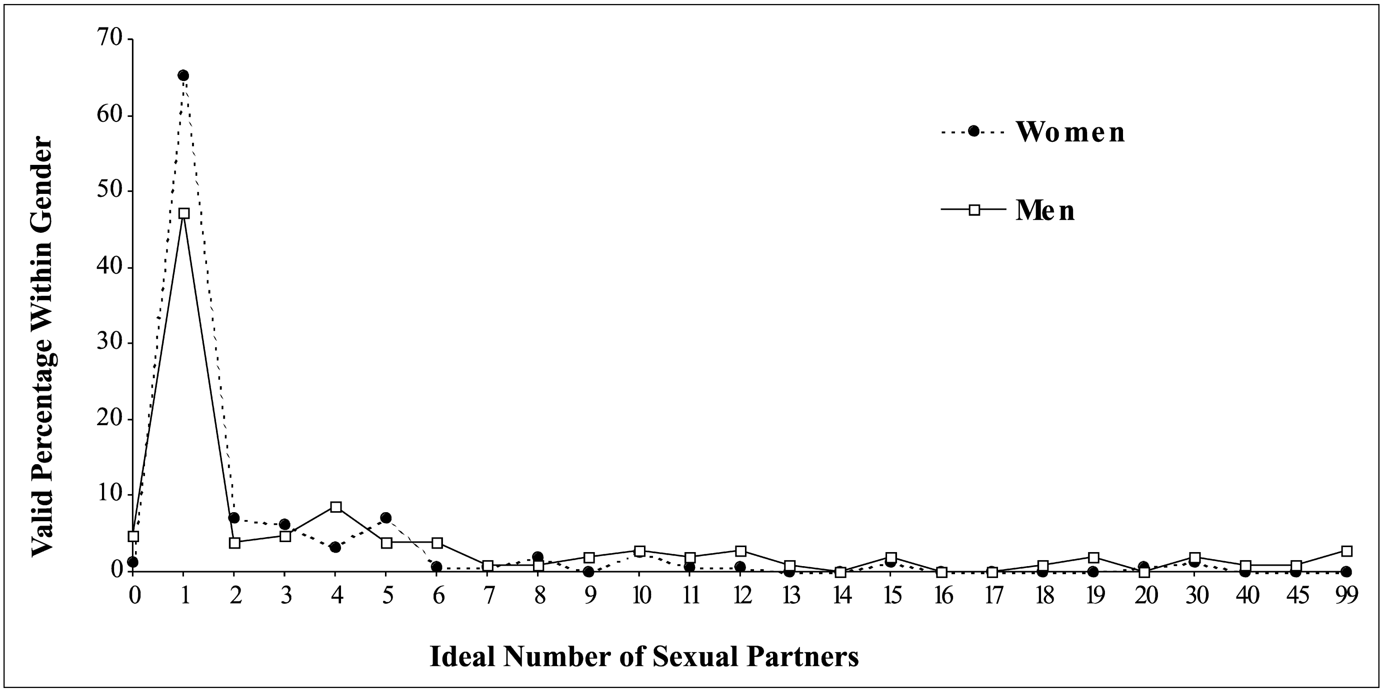

Fig. 1. Percentage of men and women desiring a specified number of sexual partners over the next 30 years. Because of spatial constraints, continuous data points are shown only up through 20 on the *x*-axis. Clearly, this tail is much longer and more extended than can be represented here.

Bonferroni adjustments for multiple tests were employed, no differences were significant. Thus, unlike *t* tests, median analysis yielded little consistent support for a significant sex difference in the number of sexual partners desired over time.

Because men and women in this sample typically desired few sexual partners over long periods of time, it seems unlikely that the relationships desired were short-term ones. Nevertheless, there is a problem in making inferences about short-term mating strategies from these data, both in our own work and in the work of Buss and Schmitt (1993). In order to make inferences about short-term mating preferences, one needs to directly ask about the numbers of short-term sexual partners men and women desire. We did so in the following study.

STUDY 2

Method

A total of 346 undergraduate students at the University of Southern California (89 men and 257 women) participated for course credits. Participants completed a survey in which they indicated whether they intended to settle down with one mutually exclusive sexual partner at some point in their life. If they answered "yes," they specified how far into the future they ideally wanted to make this commitment and the total number of sexual partners they desired in this time frame. Finally, participants indicated how many of this total number of partners desired they would ideally like to be short term (e.g., a one-night stand, brief affair, etc.), intermediate term (e.g., dating relationship, steady partner), and long term (e.g., marriage partner). Participants were reminded that the numbers of desired short-, intermediate-, and long-term relationships should add up to the number given for the total number of relationships desired.

Results

Only 1 male and 2 females reported that they did not intend to settle down with one mutually exclusive sexual partner. This represents only 1.1% of the male and 0.8% of the female sample.[4] Of those participants who did intend to settle down at some point, 15.5% of males and 18.9% of females indicated that they had already made this commitment. Results among the remainder of the participants indicated that both men and women ideally wanted a median of 5 years before settling down with one mutually exclusive sexual partner.

Among participants who intended to settle down but who had not already done so, men ($Mdn = 3$) tended to desire more sexual partners before making a commitment than did women ($Mdn = 2$), but this difference was not statistically significant, $MJ = 1.06$, $p > .20$. Furthermore, contrary to sexual strategies theory, men and women did not differ in their desired number of short-term sexual relationships. In fact, the median value for both sexes was zero. In addition, males and females indicated that they ideally wanted the same number of long-term partners (viz. $Mdn = 1$). To the extent that men differed from women, it was in desiring more intermediate-term sexual relationships (defined as a dating relationship or a steady partner). Specifically, women ideally wanted a median of 1 of these relationships before settling down with one mutually exclusive sexual partner, whereas men wanted a median of 2. This difference was marginally significant, $MJ = 1.74$, $p = .08$.

4. Because two cells had an expected value less than 5, we used a Fisher's exact test to assess whether men and women differed in their desire to settle down with one mutually exclusive partner. Results indicated no gender difference (one-sided $p = .595$).

GENERAL DISCUSSION

Do men and women differ in the number of short-term partners that they desire? Although Buss and Schmitt (1993) suggested that asking about the number of partners that men and women desire over various time frames enables one to infer desire for short-term partners, they did not directly assess the number of short-term partners sought, and whether this number differed by gender. We addressed this problem in two ways. First, Buss and Schmitt's argument is an indirect one: If the sex difference in mean number of partners was large, this might suggest that many of these additional partners might be short-term ones. But there were conceptual and statistical problems with this indirect measure; analysis of both our data and Buss and Schmitt's original data shows that the distributions are highly skewed, indicating that medians are a better measure of central tendency. Examining medians of sexual partners desired in various time frames, however, resulted in few sex differences. Second, we directly asked the question of interest: How many short-term partners (as well as intermediate-term and long-term partners) do men and women seek? In Study 2, we conceptually replicated the lack of a median difference in total number of sexual partners desired by men and women. More specifically, not only did we not find significant median differences in the number of short-term sexual partners men and women desired, but this median number was zero. These findings certainly appear contrary to the prediction of sexual strategies theory (Buss & Schmitt, 1993). Furthermore, they are even more striking if males, more than females, inflate the number of desired sexual partners because of social-desirability concerns (Laumann, Gagnon, Michael, & Michaels, 1994).

One of the major predictions often cited in support of sexual strategies theory (Buss, 1999; Buss & Schmitt, 1993) is precisely the prediction of relevance here: "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 & Schmitt, 1993, p. 210). "Because of a fundamental asymmetry between the sexes in minimum levels of parental investment, men devote a larger proportion of their total mating effort to short-term mating than do women" (Buss & Schmitt, 1993, p. 205). The problem of number, according to sexual strategies theory, is a problem that pertains to short-term mating only. But, as we discussed earlier, men and women do not differ in numbers of short-term partners sought. How problematic is this finding for sexual strategies theory? As Buss and Schmitt (1993) themselves noted, "Because this first set of predictions, involving various aspects of men's solutions to the problems of short-term mating, is so central to Sexual Strategies Theory, it is perhaps expedient to examine the empirical results of the studies testing these predictions before shifting to the other three quadrants of the theory. Empirical failure of this first set of predictions would jeopardize the entire theory . . ." (p. 210).

Furthermore, we have systematically examined other predictions in the first quadrant of sexual strategies theory and found very little overall support for them (Miller, Pedersen, & Putcha, 2001). For example, Buss and Schmitt (1993) argued that "men devote a larger proportion of their total mating effort to short-term mating than do women" (p. 205). But Buss and Schmitt did not directly examine whether men and women actually differ in their proportion of effort (e.g., time or money) devoted to short-term mating relative to all mating (i.e., short, intermediate, and long term). When we did so, no sex differences emerged (Miller et al., 2001).

These findings notwithstanding, we believe that evolutionary accounts of sexual behaviors are apt to offer considerable insight into specieswide universals, as well as within-species variability. But there are numerous additional potential conceptual and methodological roadblocks that must be overcome (see Miller et al., 2001). For example, conclusions about evolutionary processes are apt to stand the test of time only to the extent that researchers can eliminate alternative explanations for their findings (DeSteno & Salovey, 1996). In addition, researchers need to address the numerous problems associated with inferring distal causal mechanisms (e.g., evolutionary processes) from proximal self-report outcome measures, including falling prey to the "fallacy of affirming the consequent" (Pedhazur & Schmelkin, 1991, p. 198). Better delineation of what is meant by mechanisms and what is evidence for distinct mechanisms is also clearly needed (Graziano, Jensen-Campbell, Todd, & Finch, 1997). How can one infer a mechanism's causal role without adequately specifying and assessing how changes in the parameters of the underlying mechanisms are linked to output?

Furthermore, as primatologists have noted, "attempts to model the evolution of human mating strategies should incorporate current primatological data sets and phylogenetic perspectives" (Fuentes, 2000, p. 602). In fact, most primatologists do not classify humans as having a short-term mating system, but instead classify humans as having a predominately long-term mating system, either monogamous or polygynous (Dixson, 1998; Hrdy, 1981/1999).[5] Humans fit with monogamous and polygynous primates, and not with short-term maters, on a variety of parameters, including small testicle size and low sperm counts (Dixson, 1998) and low white cell counts associated with low rates of sexually transmitted diseases (Nunn, Gittleman, & Antonovics, 2000).

Although one-night stands and brief affairs with strangers probably occurred from time to time in humans' evolutionary heritage, they may not have had a significant influence on evolved mechanisms for mating strategies for either men or women. The data reported here are consistent with the view (Miller & Fishkin, 1997) that both men's and women's desire to bond with their mates is an evolutionary story with long and deep roots.

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REFERENCES

Boneau, C.A. (1960). The effects of violations of assumptions underlying the t-test. *Psychological Bulletin*, *57*, 49–64.

Box, G.E.P. (1954). Some theorems on quadratic forms applied in the study of analysis of variance problems, I. Effect of inequality of variance in the one-way classification. *Annals of Mathematical Statistics*, *25*, 290–302.

Bradley, J.V. (1982). The insidious L-shaped distribution. *Bulletin of the Psychonomic Society*, *20*, 85–88.

5. "Two animals that breed and remain together to rear offspring are considered monogamous" (Hrdy, 1981/1999, pp. 34–35). "The term polygyny or polygynous mating system refers to an enduring relationship between a single male and a number of females for the purposes of mating and production of offspring" (Dixson, 1998, p. 29).

Brown, M.B., & Forsythe, A.B. (1974). The small sample behavior of some statistics which test the equality of several means. *Technometrics*, *16*, 129–132.
Buss, D.M. (1999). *Evolutionary psychology: The new science of the mind.* Needham Heights, MA: Allyn & Bacon.
Buss, D.M., & Schmitt, D.P. (1993). Sexual strategies theory: An evolutionary perspective on human mating. *Psychological Review*, *100*, 204–232.
Cliff, N. (1993). Dominance statistics: Ordinal analyses to answer ordinal questions. *Psychological Bulletin*, *114*, 494–509.
Cressie, N.A.C., & Whitford, H.J. (1986). How to use the two sample t-test. *Biometrical Journal*, *28*, 131–148.
Davies, P.M., Weatherburn, P., Hunt, A.J., Hickson, F.C., McManus, T.J., & Coxon, A.P. (1992). The sexual behaviour of young gay men in England and Wales. *AIDS Care*, *4*, 259–272.
DeSteno, D.A., & Salovey, P. (1996). Evolutionary origins of sex differences in jealousy? Questioning the "fitness" of the model. *Psychological Science*, *7*, 367–372.
Dixson, A.F. (1998). *Primate sexuality: Comparative studies of the prosimians, monkeys, apes, and human beings*. Oxford, England: Oxford University Press.
Fuentes, A. (2000). Human mating models can benefit from comparative primatology and careful methodology. *Behavioral and Brain Sciences*, *23*, 602–603.
Glass, G.V., Peckham, P.D., & Sanders, J.R. (1972). Consequences of failure to meet assumptions underlying the analysis of variance and covariance. *Review of Educational Research*, *42*, 237–288.
Graziano, W.G., Jensen-Campbell, L.A., Todd, M., & Finch, J.F. (1997). Interpersonal attraction from an evolutionary perspective: Women's reactions to dominant and prosocial men. In J.A. Simpson & D.T. Kenrick (Eds.), *Evolutionary social psychology* (pp. 141–167). Mahwah, NJ: Erlbaum.
Hrdy, S.B. (1999). *The woman that never evolved*. Cambridge, MA: Harvard University Press. (Original work published 1981)
Keselman, H.J., Keselman, J.C., & Games, P.A. (1991). Maximum familywise Type I error rate: The least significant difference, Newman-Keuls, and other multiple comparison procedures. *Psychological Bulletin*, *110*, 155–161.
King, V.L., Brooner, R.K., Bigelow, G.E., Schmidt, C.W., Felch, L.J., & Gazaway, P.M. (1994). Condom use rates for specific sexual behaviors among opioid abusers entering treatment. *Drug and Alcohol Dependence*, *35*, 231–238.
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 "windows" on the "adapted-for" human-environmental interface. In J.A. Simpson & D.T. Kenrick (Eds.), *Evolutionary social psychology* (pp. 197–235). Mahwah, NJ: Erlbaum.
Miller, L.C., Pedersen, W.C., & Putcha, A.D. (2001). *Distinct mating mechanisms for men and women? From smoke, mirrors, and leaps of faith . . . toward an embodied evolutionary dynamics*. Unpublished manuscript, University of Southern California, Los Angeles.
Neave, H.R., & Granger, C.W.J. (1968). A monte carlo study comparing various two-sample tests for differences in mean. *Technometrics*, *10*, 509–522.
Nunn, C.L., Gittleman, J.L., & Antonovics, J. (2000). Promiscuity and the primate immune system. *Science*, *290*, 1168–1170.
Pedhazur, E.J., & Schmelkin, L.P. (1991). *Measurement, design, and analysis: An integrated approach*. Hillsdale, NJ: Erlbaum.
Rothspan, S., & Read, S.J. (1996). Present versus future time perspective and HIV risk among heterosexual college students. *Health Psychology*, *15*, 131–134.
Tabachnick, B.G., & Fidell, L.S. (1996). *Using multivariate statistics*. New York: HarperCollins.
Wilcox, R.R. (1990). Comparing the means of two independent groups. *Biometrical Journal*, *32*, 771–780.
Wilcox, R.R. (1992). Comparing the medians of dependent groups. *British Journal of Mathematical and Statistical Psychology*, *45*, 151–162.
Wilcox, R.R. (1994). Some results on the Tukey-McLaughlin and Yuen methods for trimmed means when distributions are skewed. *Biometrical Journal*, *36*, 259–273.
Wilcox, R.R. (1996). *Statistics for the social sciences*. San Diego: Academic Press.
Wilcox, R.R. (1997). *Introduction to robust estimation and hypothesis testing*. San Diego: Academic Press.
Wilcox, R.R., & Charlin, V.L. (1986). Comparing medians: A monte carlo study. *Journal of Educational Statistics*, *11*, 263–274.

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