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Sociosexuality from Argentina to Zimbabwe: A 48-nation study of sex, culture, and strategies of human mating

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Abstract: The Sociosexual Orientation Inventory (SOI; Simpson & Gangestad 1991) is a self-report measure of individual differences in human mating strategies. Low SOI scores signify that a person is sociosexually *restricted*, or follows a more monogamous mating strategy. High SOI scores indicate that an individual is *unrestricted*, or has a more promiscuous mating strategy. As part of the International Sexuality Description Project (ISDP), the SOI was translated from English into 25 additional languages and administered to a total sample of 14,059 people across 48 nations. Responses to the SOI were used to address four main issues. First, the psychometric properties of the SOI were examined in cross-cultural perspective. The SOI possessed adequate reliability and validity both within and across a diverse range of modern cultures. Second, theories concerning the systematic distribution of sociosexuality across cultures were evaluated. Both operational sex ratios and reproductively demanding environments related in evolutionary-predicted ways to national levels of sociosexuality. Third, sex differences in sociosexuality were generally large and demonstrated cross-cultural universality across the 48 nations of the ISDP, confirming several evolutionary theories of human mating. Fourth, sex differences in sociosexuality were significantly larger when reproductive environments were demanding but were reduced to more moderate levels in cultures with more political and economic gender equality. Implications for evolutionary and social role theories of human sexuality are discussed.

Keywords: culture; gender; mating; reproduction; sex differences; sex roles; sexual strategies; sociosexuality

Over a decade ago, Simpson and Gangestad (1991) introduced a self-report measure of human sexuality called the Sociosexual Orientation Inventory (SOI; see also Gangestad & Simpson 1990; Simpson 1998). Originally designed to capture variability in the willingness to have sex outside of a committed pair-bond, the SOI contains numerous questions about human mating behavior, romantic fantasies, relational emotions, and attitudes toward casual sex. Responses to the SOI are typically used to differentiate people along a single strategic dimension of human mating called *sociosexuality* (Simpson & Gangestad 1991). Those who score relatively low on this dimension are said to possess a *restricted* sociosexual orientation – they tend toward monogamy, prolonged courtship, and heavy emotional investment in long-term relationships. Those residing at the high end of sociosexuality are considered more *unrestricted* in mating orientation, they tend toward promiscuity, are quick to have sex, and experience lower levels of romantic relationship closeness[1] (Simpson & Gangestad 1991).

Since its introduction, the SOI has become an increasingly popular tool for measuring individual differences in basic human mating strategies (Hebl & Kashy 1995; Jones 1998; Seal et al. 1994; Simpson 1998; Simpson et al. 2004; Stephan & Bachman 1999; Wright & Reise 1997). Indeed, it appears to have become the measure of choice when attempting to relate human mating strategies to other sex-related phenomena (Allen 2000; Bleske-Rechek & Buss 2001; Clark 2004; Gangestad & Thornhill 1997; Isaacson 2001; Reise & Wright 1996; Schmitt 2005; Seal & Agostinelli 1994; Simon 1997, Simpson et al. 1999; Townsend & Wasserman 1988). Despite its widespread use, very little is known about the cross-cultural utility of the SOI, with only a handful of studies directly measuring sociosexuality outside the United States (e.g., Bailey et al. 2000). This is es-

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pecially unfortunate because a cross-culturally validated measure of human mating strategies would help to address many recent developments in evolutionary psychology and social role theory (e.g., Gangestad & Simpson 2000; Wood & Eagly 2002).

In the current study, the SOI was translated from English into 25 additional languages and administered to samples from 48 nations as part of the International Sexuality Description Project (ISDP; Schmitt et al. 2003a). The resulting ISDP database on sociosexuality was used to address four main issues. First, the psychometric properties of the SOI were examined in cross-cultural perspective. Second, theories concerning the distribution of sociosexuality across cultures were evaluated (Belsky et al. 1991; Gangestad & Simpson 2000; Pedersen 1991). Third, the cultural universality of sex differences in sociosexuality was investigated (Buss & Schmitt 1993; Symons 1979; Trivers 1972). Fourth, theories concerning the degree of sexual differentiation in sociosexuality across cultures were examined (Buss & Barnes 1986; Eagly & Wood 1999; Kasser & Sharma 1999; Wood & Eagly 2002). Because national profiles of men's and women's sociosexual mating strategies would have little value if the SOI were not reliable and valid across cultures, a review of the psychometrics of the SOI will be addressed first.

1. Psychometrics of the SOI

Simpson and Gangestad (1991) conducted several studies to evaluate the psychometric qualities of the SOI. In their original study, 204 women and 202 men from Texas A&M University completed an initial pool of 11 items related to a conceptual definition of sociosexuality. Using principal axis factor analysis, Simpson and Gangestad documented that seven of these items – the seven items eventually included in the SOI – formed a coherent unitary factor structure. They also found that the resulting seven-item SOI scale possessed adequate levels of internal reliability ($\alpha = 0.73$). In an unpublished study, Simpson and Gangestad (1989) documented the high temporal reliability of sociosexuality ($r = +0.94$) over a two-month test–retest period.

Simpson and Gangestad (1991) evaluated the validity of the SOI using standard construct validation techniques (Cronbach & Meehl 1955). In a validation study involving 144 romantic couples, participants were asked to complete the SOI along with other measures concerning their relationships. Simpson and Gangestad found that sociosexuality was related to how early in the relationship the couple had engaged intercourse, and SOI scores converged with established measures of human sexuality in predictable ways. For example, those who scored as more restricted on the SOI tended to score higher on Lund's Commitment Scale (Lund 1985), Rusbult's Investment Scale (Rusbult 1980), and Rubin's Love Scale (Rubin 1970). Data from these same couples also showed that the SOI possessed discriminant validity, in that sociosexuality was unrelated to sex drive per se. In additional studies, Simpson and Gangestad (1991) have shown that the SOI predicts whether someone has engaged in sex with more than one partner in a given time period – a key conceptual element of the unrestricted or promiscuous mating strategy (Baker & Bellis 1994; Barash & Lipton 2001; Schmitt et al. 2001b).

Although the majority of SOI validation research has proven highly supportive in American samples, it remains unclear whether the psychometric soundness of the SOI generalizes to other languages and cultures. Do the seven items of the SOI form one coherent dimension within all cultures, or do sociosexual attitudes and behaviors become disconnected in certain regions of the world? Can sociosexuality be accurately gauged using self-report methods across all cultures, or does the validity of the SOI fluctuate across language, geography, ethnicity, history, politics, economics, or religion? Do responses to the SOI correlate with similar psychological and physical attributes across different cultures, or does sociosexuality take different anthropometric forms around the world? If the SOI were proven reliable and valid across cultures, this could have important implications for advancing our understanding of the links between culture and human mating strategies. However, no study has evaluated the psychometrics of the SOI in a language other than English, nor has the SOI been administered to samples from non-Western cultures. In the current study, the reliability and validity of the SOI were evaluated across 26 languages and 48 nations, including multiple cultures from North America, South America, Western Europe, Eastern Europe, Southern Europe, the Middle East, Africa, Oceania, South/Southeast Asia, and East Asia.

2. Sex differences in sociosexuality

On average, men tend to possess more positive attitudes toward casual, low-investment sex than women do (Carrol et al. 1985; Fisher et al. 1988; Hendrick et al. 1985; Oliver & Hyde 1993; Townsend 1995; Wilson 1987). Men also report that they fantasize about having sex with multiple partners more than women do (Ellis & Symons 1990; Malamuth 1996), and men behaviorally seek short-term mateships more than women do (Blumstein & Schwartz 1994; Eysenck 1976; Laumman et al. 1994; Wiederman 1997). Experimental tests have further confirmed that men are more likely than women to consent to sex with a stranger when approached in a community setting (Clark & Hatfield 1989), even when the stranger is "vouched for" by a participant's same-sex friend (Clark 1990).

This pervasive pattern of sexual differences – across attitudes, fantasy, and behavior – implies that men should be higher or more unrestricted on sociosexuality than women. Indeed, the direct evidence on this point is unequivocal, at least in United States. In every study published to date, American men report higher levels of sociosexuality than American women based on responses to the SOI. What remains unknown is whether sex differences in sociosexuality persist beyond the borders of the United States, especially across non-Western cultures. Perhaps some cultures are so generally restrained in sexual matters that sex differences in sociosexuality have become muted. Other cultures could be sexually unrestrained to the point that a ceiling effect occurs, and both sexes "max out" on the SOI. Certainly, sociosexual sex differences will vary to some degree across cultures, and this variability itself may be of interest. Nevertheless, there are strong theoretical reasons why men are expected to sexually think, feel, and behave in a more unrestricted manner than women do across most cultures.

2.1. Parental investment theory

From an evolutionary perspective, sex differences in sociosexuality should be consistently observed across human cultures, in part because of fundamental differences in the evolved reproductive strategies of men and women. According to parental investment theory (Trivers 1972), the relative proportion of parental investment – the time and energy devoted to the care of individual offspring – varies across the males and females of different species. In some species, males tend to provide more parental investment than females (e.g., the Mormon cricket; Gwynne 1984). In other species, females possess the heavy-investing parental burdens (Alcock 1993; Trivers 1985).

Importantly, Trivers (1972) noted that sex differences in obligatory parental investment burdens are systematically linked to the processes of sexual selection in ways that may influence reproductive strategies or sociosexual orientations. Namely, the sex that typically invests less in offspring normally shows a greater eagerness to engage in mating, incurs greater costs through more intense intrasexual mating competition, and is intersexually less discriminating in mate choice than the heavier-investing parent (Andersson 1994; Bateson 1983; Clutton-Brock 1991; Maynard Smith 1977). In short, the lesser-investing sex is usually more unrestricted in sociosexual orientation than the heavier-investing sex. In support of parental investment theory applying to humans, numerous studies have shown that men possess a greater eagerness to engage in mating (Baumeister et al. 2001; Clark & Hatfield 1989; Schmitt et al. 2003b); men incur greater costs through more intense intrasexual mating competitions (Alexander & Noonan 1979; Archer & Loyd 2002; Daly & Wilson 1988); and men's mate preferences are less discriminating than women's, especially in the context of promiscuous or short-term mating (Buss & Schmitt 1993; Kenrick et al. 1990; Regan 1998a; 1998b; Regan & Berscheid 1997; Simpson & Gangestad 1992).

Human males also experience lower levels of *minimum* parental investment in offspring than females do. That is, men are not obligated to invest as much as women do in parenting to produce viable progeny (Symons 1979). Women must incur the differential costs of internal fertilization, placentation, and gestation to reproduce. All female mammals carry additional investment burdens associated with lactation. In humans, lactation can last several years in a foraging environment (Kelly 1995), years during which it is harder for women to reproduce and invest in additional offspring. Men are minimally required to do much less to reproduce. This investment differential is perhaps most conspicuous in the case of mate poaching, where a man can mate with a married woman and then have the woman's husband provide extended paternal investments to the child (Schmitt & Buss 2001). For a woman seeking to poach a married man, a similar shift of her minimum investment burdens to his wife would have been unattainable in our ancestral past. Of course, many men do invest heavily in their own children, but in all known cultures women spend much more time and effort in actively raising children than men do (Low 1989; Munroe & Munroe 1997; Quinn 1977).

According to parental investment theory, these asymmetries in men's and women's parental investment levels should lead women to have less to gain in reproductive output by engaging in indiscriminate, short-term sex with large numbers of partners (see Bjorklund & Shackelford 1999; Geary 1998; Hinde 1984). Indeed, the differences between men's and women's potential reproductive benefits from unrestricted, promiscuous mating may be substantial. Consider that one man can produce as many as 100 offspring by repeatedly mating with 100 women in a given year, whereas a man who is monogamous will tend to have only one child with his partner during that same time period. In evolutionary currencies, this represents a strong selective pressure on men's mating strategies to favor at least some unrestricted desires for multiple partners (Barash & Lipton 2001; Buss & Schmitt 1993). Of course, 100 instances of only one-time mating between a man and 100 women would rarely, if ever, produce precisely 100 offspring (Fletcher & Stenswick 2003). However, this selective pressure remains potent because a man mating with 100 women over the course of a year – particularly repeated matings when the women are nearing ovulation and are especially interested in short-term mating (Gangestad 2001) – would likely have *significantly more* offspring than a woman mating repeatedly with 100 men over the course of a year. Historically, this appears to have been the case with those men having especially large numbers of mating partners greatly outreproducing their intrasexual (and intersexual) contemporaries (Betzig 1986). This is also true among foraging cultures, the vast majority (over 80%) of whom practice some form of polygyny (Murdock 1967), whereby high-status men who mate with multiple partners have greater reproductive success than those who do not (though see Low 1988). Whether a woman mates with 100 men or is monogamously bonded with only one man, she will still tend to produce only one child in a given year. The potential reproductive benefits from desiring promiscuous or multiple mating, therefore, appear to be much higher for men than women (Symons 1979).

According to sexual strategies theory (Buss & Schmitt 1993), women can reap some evolutionary benefits from multiple mating (see also Gangestad 2001; Hrdy 1981; Shackelford & LeBlanc 2001). In Amazonian cultures that believe in partible paternity, for example, a woman can receive the extended benefits of protection and resources from multiple men by mating with them while she is pregnant (Beckerman & Valentine 2002). A woman who engages in multiple mating can also obtain immediate resources, secure a child if her current long-term mate is infertile, and gain access to high-quality genes by short-term mating with a man who is not her husband (Fedorka & Mousseau 2002; Greiling & Buss 2000; Smith 1984). Many married women appear to desire physically attractive men when having affairs, affairs that may be one source for attractive men to especially benefit from short-term mating by having their offspring raised by cuckolded husbands (Schmitt & Shackelford 2003). In short, women can reproductively benefit from promiscuous or multiple short-term mating. The pivotal sex difference in sociosexual mating psychology is *not* that women are solely designed for long-term monogamy. Instead, women possess all the hallmarks of having evolved a short-term mating strategy (Gangestad 2001; Schmitt et al. 2001a). It is, however, a strategy based on selectively desiring men of high status, dominance, and genetic quality (Gangestad & Thornhill 1997; 2003; Thornhill & Gangestad 2003). Men's short-term strategy, in contrast, is focused on more indiscriminate desires that lead to obtaining numerous sex partners in high-volume quantity (Schmitt et al. 2003b).

A clear implication of parental investment theory and sexual strategies theory is the following hypothesis: *Men should possess more unrestricted sociosexual orientations than women across human cultures*. There have been cross-cultural studies that show men possess less restrictive mate preferences than women (Buss 1989; Buunk et al. 2002) and desire multiple short-term sex partners more than women do (Schmitt et al. 2003b). However, sex differences in sociosexuality have never been directly tested across large numbers of cultures. Indeed, no studies have been conducted where the sociosexuality of both men and women were assessed in non-Western cultures. One of the objectives of the present study was to evaluate whether sex differences in sociosexuality are robust across the broad range of human cultures represented in the ISDP. Finding universal sex differences in sociosexuality would support parental investment theory (Trivers 1972), as well as other evolutionary perspectives on human mating (Alexander & Noonan 1979; Buss & Schmitt 1993; Gangestad & Simpson 2000; Hinde 1984; Symons 1979; Wilson 1987).

3. Cultural influences on sociosexuality

In addition to differences between men's and women's sociosexuality, human mating strategies also appear to vary across different forms of human culture (Broude 1983; Broude & Greene 1976; Ember 1974; Hartung 1985; Jankowiak et al. 2002; Lancaster 1989; Low 2000; Whiting & Whiting 1975). Perhaps the most well-documented links between culture and human mating strategies are those involving marriage systems. For example, Low (1990) has shown that tribal cultures with higher pathogen stress are more likely to have polygynous marriage systems (see also White & Burton 1988). Monogamous mating systems, in contrast, are relatively absent in high-pathogen environments. Marlowe (2003) recently demonstrated that monogamy is especially prevalent in cultures with low levels of pathogens and when men contribute more calories to the local diet. Indeed, anthropologists have suggested that many aspects of tribal culture – particularly warfare, kinship, residence, and inheritance patterns – are systematically related to marriage systems, as well as to rules governing premarital sex, adultery, jealousy, divorce, postpartum sex taboo, and incest avoidance (Frayser 1985; Pasternak et al. 1997).

Theories that link cultural variation with the monogamy–promiscuity dimension of sociosexuality have also been proposed. For example, Pedersen (1991) has postulated that the relative number of men versus women in a given culture should affect sociosexual attitudes and behavior. Chisholm (1996; 1999a) has argued that high mortality rates in local cultures should be associated with more promiscuous mating strategies. Gangestad and Simpson (2000) have theorized that demanding reproductive environments should increase the desire and pursuit of biparental, monogamous partnerships. To date, however, no study has examined sociosexuality across multiple cultures in a way that would reveal direct links between cultural environments and the dimension of sociosexuality. In the current study, three theories concerning culture and its effects on sociosexuality were evaluated: sex ratio theory (Pedersen 1991), developmental-attachment theory (Belsky et al. 1991; Chisholm 1996), and strategic pluralism theory (Gangestad & Simpson 2000).

3.1. Sex ratio theory

Operational sex ratio can be defined as the relative balance of marriage-age men versus marriage-age women in the local mating pool (Pedersen 1991; Secord 1983), although other formulations have been proposed (Clutton-Brock & Parker 1992; Hardy 2002; Parker & Simmons 1996). When computing operational sex ratios, marriage age is usually treated as between 15 and 49 years (Guttentag & Secord 1983). Sex ratios are considered high when the number of men significantly outsizes the number of women in a local culture. Conversely, sex ratios are considered low when there are relatively more women than men in the mating market. In most cultures women tend to slightly outnumber men, largely because of men's greater mortality rate (Daly & Wilson 1988). Nevertheless, significant variation often exists in sex ratios across cultures and within cultures when viewed over historical time (Guttentag & Secord 1983; Lazarus 2002).

Pedersen (1991) argued that a combination of sexual selection theory (Darwin 1871) and parental investment theory (Trivers 1972) leads to a series of predictions concerning the effects of sex ratios on human mating strategies. According to sexual selection theory, when males desire a particular attribute in potential mating partners, females of that species tend to respond by competing in the expression and provision of that desired attribute. Among humans, Pedersen had the insight that when sex ratios are especially low (i.e., there are many more women than men), men become an especially scarce resource that women must compete for with even more intensity than normal (see also Guttentag & Secord 1983). When combined with the parental investment notion described earlier in which men tend to desire promiscuous sex (Buss & Schmitt 1993; Symons 1979; Trivers 1972), this leads to the following hypothesis: *Cultures with lower sex ratios (i.e., more women than men) should possess higher levels of sociosexuality (i.e., more promiscuity)*. The logic of Pedersen's theory is that in cultures with many more women than men, men are scarce and can afford to demand from interested women that men's greater desires for promiscuous sex be fulfilled. As a result of these mating market forces, the culture as a whole should become more unrestricted in sociosexual orientation (see also Barber 2000; Ember 1974).

Conversely, when sex ratios are high and men greatly outnumber women, men must enter into more intense competition for the limited number of potential female partners (Bateman 1948). Women's preferences for long-term monogamous relationships become the key desires that must be responded to if men are to remain competitive in the courtship marketplace. In this case, Pedersen's (1991) logic suggests that *cultures with higher sex ratios (i.e., more men than women) should possess lower levels of sociosexuality (i.e., should be more monogamous)*. In this article, Pedersen's series of insights will be referred to as "sex ratio theory."

Using data from sex ratio fluctuations over time within the United States, Pedersen (1991) marshaled a compelling case for a causal link between sex ratios and human mating strategies (see also Guttentag & Secord 1983). For example, high sex ratio fluctuations have been historically associated with increases in monogamy, as evidenced by lower divorce rates and men's greater willingness to invest in their children. Low sex ratios have been historically associated

with indexes of promiscuity, such as an increase in divorce rates and a reduction in what he termed female "sexual coyness." National sex ratios were related to sociosexuality across the 48 nations of the ISDP, enabling sex ratio theory to be evaluated from a cross-cultural perspective.[2]

3.2. Developmental-attachment theory

Several combinations of life history theory (Low 1998) and attachment theory (Bowlby 1969) have suggested that certain critical experiences during childhood play a role in the development of human mating strategies (Belsky 1999; Draper & Harpending 1988; MacDonald 1997). Perhaps most prominent among these is a lifespan model developed by Belsky et al. (1991). According to this model, early social experiences adaptively channel children down one of two reproductive pathways. Children who are socially exposed to high levels of stress – especially insensitive or inconsistent parenting, harsh physical environments, and economic hardship – tend to develop insecure attachment styles. These children also tend to physically mature earlier than those children who are exposed to less stress. According to Belsky and his colleagues, attachment insecurity and early physical maturity subsequently lead to the evolutionary-adaptive development of what is called an "opportunistic" reproductive strategy in adulthood (i.e., unrestricted sociosexuality). An opportunistic strategy, it is argued, will lead to higher levels of fitness in high-stress reproductive environments. In cultures with inconsistent or stressful social relations, therefore, children adaptively respond by developing the more viable reproductive strategy of unrestricted sociosexuality.

Conversely, those children exposed to lower levels of stress and less environmental hardship tend to be more emotionally secure and to physically mature later. These children are thought to develop a more "investing" reproductive strategy in adulthood (i.e., restricted sociosexuality) that pays higher evolutionary dividends in low-stress environments. All children come equipped with the potential for unrestricted or restricted sociosexuality, in this view, and psychological adaptations that are sensitive to local environments influence sociosexual desires and behaviors in adaptive ways. Although the causal mechanisms that influence sociosexuality are most prominently located within the family, this model also suggests that certain aspects of culture may be related to sociosexual variation. Namely, this model leads to the following hypothesis: *In cultures where families are under more stress and have fewer resources, sociosexual levels should be higher than in cultures with lower stress and ample resources*.

A closely related theory has been proposed by Chisholm (1996; 1999a). Chisholm argues that local mortality rates – presumably related to high stress and inadequate resources – act as cues that contingently shift human mating strategies in evolutionary-adaptive ways (see also Weinrich 1977). In cultures with high mortality rates and unpredictable resources, the optimal mating strategy is to reproduce early and often, a strategy related to insecure attachment, short-term temporal orientations, and unrestricted sociosexuality (Chisholm 1999b). In cultures that are physically safe and have abundant resources, mortality rates are lower and the optimal strategy is to invest heavily in fewer numbers of offspring. In safer environments, therefore, one should pursue a long-term mating strategy associated with more restricted sociosexuality. This theory leads to the following basic hypothesis: *Cultures with higher mortality rates, earlier reproduction, and more prolific reproduction should have higher levels of sociosexuality than cultures with low mortality, late reproduction, and limited reproduction*. Collectively, the Belsky et al. (1991) and Chisholm (1996; 1999a) theories will be referred to as a "developmental-attachment theory" of sociosexuality. To test this theory, various indexes of familial stress, economic resources, mortality, and fertility were related to sociosexuality across the 48 nations of the ISDP.

3.3. Strategic pluralism theory

In direct contrast to developmental-attachment theory, Gangestad and Simpson (2000) have proposed strategic pluralism theory. According to strategic pluralism theory, humans possess a menu of alternative mating strategies that they can follow (see also Buss & Schmitt 1993; Gross 1996; Simpson & Orina 2003; Thiessen 1994). Which strategy individuals follow depends on the condition of local environments. When local environments are demanding and the difficulties of rearing offspring are high, the adaptive need for biparental care increases. Because both men and women are needed to successfully raise viable offspring in more demanding environments, Gangestad and Simpson argue that the importance of fidelity and heavy family investment should correspondingly increase: "In environments where male parenting qualities are needed and valued, women should be less likely to engage in short-term mating and extra-pair mating. In response to this, men should devote greater effort to parental investment" (p. 585). If true, this would suggest the following hypothesis: *In cultures with more demanding environments (e.g., higher stress, fewer resources, higher mortality), sociosexual levels should be lower (i.e., people should be more monogamous)*.

Conversely, in cultures where biparental care is less necessary for successful child-rearing, Gangestad and Simpson (2000) expect that monogamy would be less prevalent. They postulate that in cultures with lower stress and adequate resources, human psychological adaptations should facultatively cause sociosexuality to increase (i.e., people should be more promiscuous). Gangestad and Simpson reason that in ancestral environments when biparental care was not as crucial, men could have afforded to channel more of their reproductive effort into short-term mating and unrestricted sociosexuality. Women also could have benefited from short-term mating (via access to high-quality genes; Gangestad 2001) given the collateral reduction in their dependence on a long-term male's resources and investment. In this study, various indexes of environmental demand (e.g., life expectancy, gross domestic product per capita, human development) and reproductive difficulty (e.g., low birth weights, child malnutrition, infant mortality) were related to sociosexuality across the 48 nations of the ISDP.

4. Culture and sex differences in sociosexuality

As noted earlier, it follows from most evolutionary theories of human sexuality anchored in the theory of parental investment that men should score higher than women on sociosexuality (Buss & Schmitt 1993; Symons 1979; Trivers

1972). However, there may be certain aspects of culture that influence our evolved psychology in ways that accentuate or attenuate sex differences in sociosexuality. Just as the degree of sexual differentiation in body size is influenced by local diet and altitude (Gaulin & Boster 1985; Jurmain et al. 2000; Wolfe & Gray 1982), the degree of sexual differentiation in sociosexuality may vary with local ecological conditions. At times, this variability may be functional and reflect psychological adaptations specifically designed to moderate sex differences in response to particular ecological conditions.

4.1. Strategic pluralism theory

An implication of strategic pluralism theory (Gangestad & Simpson 2000) is that women's sociosexuality should be more sensitive than men's to the demands and stressors of local environments. In demanding environments that require biparental care, women's sociosexuality facultatively shifts, and they become much more restricted. Only some men react to women's sociosexual shifts, however, and become restricted themselves. Other, more robust men were "able to carry out short-term tactics successfully at all times, regardless of the environmental factors to which women were responding" (Gangestad & Simpson 2000, p. 586). Therefore, women – as a group – should be more responsive than men are to environmental influences on sociosexuality.

Several findings would seem to confirm the notion that women's sexuality is more responsive to environmental factors. For example, Barry and Schlegel (1984) examined the 186 preindustrial societies of the Standard Cross-Cultural Sample and found on nearly all measures of sexual behavior that adolescent women were more variable than adolescent men. If sexual behaviors are adaptively responsive to local ecological conditions in natural environments, therefore, the responsiveness appears to be greater for women. Baumeister (2000), in a massive review of the literature on sex and sexuality, found that the effects of acculturation, education, politics, religion, and family life on sexual attitudes and behaviors were all more potent among women than men. He concluded that "men's sexuality revolves around physical factors, in which nature is predominant and the social and cultural dimension is secondary. For women, social and cultural factors play a much larger role" (Baumeister 2000, p. 368).

Similarly, strategic pluralism theory postulates that women's sociosexuality should be highly dependent on environmental demands across cultures, but men's sociosexuality should be less correlated with environmental harshness. If true, this leads to the following hypothesis: *The demanding nature of local environments should be more closely correlated with women's sociosexuality than with men's*. Moreover, because men tend to be more oriented toward short-term mating in general (Buss & Schmitt 1993; Schmitt et al. 2002), the following hypothesis also can be derived: *The size or magnitude of the difference between men and women should be smaller in nondemanding environments*. This is because in nondemanding environments women's sociosexual shifts bring them closer to men's normally higher levels of unrestricted sociosexuality. Men may shift as well, but their overall average on sociosexuality will not shift as prominently. These hypotheses were evaluated by correlating various indicators of environmental demands with men's sociosexuality, women's sociosexuality, and the effect size of sex differences in sociosexuality across cultures.

4.2. Social structural theory

Even if sex differences in the willingness to have uncommitted sex were found to be culturally universal, the differences may not result from adaptations to sociosexuality per se. It could be the case that sex differences in sociosexuality are a side effect of some other evolved sex difference – such as sex differences in physical size (Gaulin & Boster 1985), sex differences in general sex drive (Baumeister et al. 2001), or perhaps the external location of human male genitalia (Gagnon & Simon 1973). It also could be that certain sexual trends pervade all cultures because of sociohistorical factors that are relatively unrelated to the evolutionary biology of men and women (Harris 1993; MacKinnon 1988).

According to the social structural or "biosocial" theory of Eagly and Wood (1999; see also Wood & Eagly 2002), the minds of men and women are not likely to contain sex-differentiated adaptations that are specifically designed to produce universal sex differences in sexuality per se. Instead, Eagly and Wood assume that "differences in the minds of men and women arise primarily from experience and socialization" (p. 414). Thus, when men and women appear to differ, it is because they have received dissimilar socialization throughout development – particularly those experiences and expectations associated with a society's bifurcated sex roles and manifest degree of patriarchy (Buss & Barnes 1986; Eagly 1987; LaFrance et al. 2003; Maccoby 1998; Reiss 1986).

Eagly and Wood's (1999) social structural account is still an evolutionary theory of human mating, in that it views men's evolutionary history as hunters and meat providers (among other selective factors) as having led to men's greater size, strength, and speed. In contrast, women's evolutionary history of giving birth and prolonged lactation, among other selective factors, are thought to have led to women's prominence in child rearing. These and other evolved physical features of men and women, it is argued, ultimately lead to divisions of labor (see Joseph 2000) and, in socioeconomically complex societies, to patriarchal aspects of culture (see also Lerner 1986; Smuts 1995). According to Eagly and Wood (1999), it is these divisions of labor and the regular emergence of patriarchy (including political, economic, and sexual forms of controlling women) that, in turn, give rise to sex role ideologies and social expectations that are the more proximate causes of psychological differences between the sexes.

Wood and Eagly (2002) recently extended this line of reasoning and offered a compelling rationale for why some cultures have more bifurcated or "traditional" sex role ideologies, whereas other cultures have more flexible or "progressive" ideologies. They argue that in some cultures the value of men's hunting skills, their ability to wage war, and the need for women to stay close to children, among other features of culture, are especially acute. In these cultures, the local ecological and social conditions give rise to an economy that favors men's skills of production and, as a result, provides men with social and political power that often culminates in patriarchy and more traditional sex role ideologies. Polygyny and warfare are frequently – though

not always – associated with this cluster of cultural attributes (Divale & Harris 1976; White & Burton 1988), and the advent of agriculture, industrialization, and greater cultural complexity may further exacerbate this more traditional form of sex role socialization (Korotayev & Kazankov 2003; Wood & Eagly 2002).

In many other cultures, however, women contribute a relatively greater proportion of calories to the local diet, have greater resource control and political power (e.g., as a consequence of matrilocal residence and matrilineal descent), and have greater reproductive freedom through increased contraception, the benefit of nursemaids, and other factors (Barry & Yoder 2002; Murphy 2003; Whyte 1978). In these cultures, the local ecological and social conditions give rise to an economy that favors women's skills of production more heavily and ultimately culminates in a certain degree of gender egalitarianism and more progressive sex role socialization. In essence, Wood and Eagly (2002) argue that humans have evolved to be exquisitely sensitive to local economic and sociopolitical circumstances and respond by varying the degree of sex role socialization in ways that may influence sex differences in human mating psychology. The existence of sex roles is still an evolved feature of human psychology from this perspective (see also Alexander 2003), but the degree of disparity in sex role socialization (and the degree of patriarchy) can vary in important and systematic ways across cultures.

From this social structural perspective, sex differences in sociosexuality – when they do exist – ultimately result from evolved features of human psychology that sometimes lead to patriarchy and sexual divisions of labor. More proximately, this perspective views sex differences in sociosexuality as flowing from the disparate sex role socialization that results from patriarchy and divisions of labor (Eagly & Wood 1999), "sex differences in social behavior arise from the distribution of men and women into social roles within a society" (Wood & Eagly 2002, p. 701). This social structural perspective can be used to generate the following hypothesis: *In cultures with traditional sex role ideologies (where women are more constrained in terms of economics, politics, and reproductive freedom), sex differences in sociosexuality should be larger*. Again, this is because men and women have experienced bifurcated sex roles and social constraints in these societies, with women experiencing sociosexually restricted sex roles and patriarchal social constraints (Buss & Barnes 1986; Sprecher et al. 1987). Within cultures that possess more progressive sex role ideologies – where women have more access to money, power, and the ability to make their own reproductive decisions – women are allowed to explore a wider array of social roles. Indeed, both men and women enjoy less burdensome and gender-constraining social structures in cultures with modern sex role ideologies (Williams & Best 1990), and "when men and women occupy the same specific social role, sex differences would tend to erode" (Eagly & Wood 1999, p. 413). Thus, *sex differences in sociosexuality should be smaller, or perhaps even absent, in cultures with more progressive sex role ideologies (where women have more equitable amounts of economic, political, and reproductive freedom)*.

It is important to note that the primary objective of social structural theory was to explain the origins of sex differences in human mate preferences, not sex differences in sociosexual mating strategies per se (Eagly & Wood 1999; Johannesen-Schmidt & Eagly 2002; Wood & Eagly 2002). Nevertheless, the founding logic of social structural theory clearly leads to the preceding predictions, with progressive sex role cultures expected to exhibit smaller sex differences than traditional sex role cultures. It also should be noted that some of these predictions were first proposed over 15 years ago, in what was termed the structural powerlessness hypothesis (Buss & Barnes 1986). For example, in the context of mate preferences, Buss and Barnes (1986) predicted that "men and women who have been subjected to less traditional sex role socialization will not show this [mate preference] sex difference as strongly as will those raised more traditionally" (p. 569), and "sex differences in [mate] preferences should diminish as the power balance in society approaches equity between sexes" (p. 569). Others have used similar theorizing to make predictions concerning women's relative status and the degree of sexual differentiation in a culture (Kasser & Sharma 1999), though not always with supportive results (Fletcher 2002). In the current study, social structural theory was evaluated by correlating various indicators of gender equality (political and economic), reproductive freedom, and sex role ideology with the magnitude of sex differences in sociosexuality across cultures.

5. Method

5.1. Samples

The research reported in this target article is a result of the International Sexuality Description Project (ISDP; Schmitt et al. 2003b), a collaborative effort of over 100 social, behavioral, and biological scientists. The full range of the ISDP originally comprised 56 nations. However, in eight of these nations either the SOI was not administered (i.e., India, Jordan, and South Africa), or too few participants fully completed the SOI (i.e., fewer than 25 men or fewer than 25 women; Chile, Cyprus, Indonesia, Malaysia, and Tanzania). At least 25 men and 25 women were needed to achieve the necessary statistical power for evaluating sex differences in sociosexuality (when setting $\beta = .80$, $\alpha = .05$, and looking for an effect moderate to large in size; Cohen 1988).

As seen in Table 1, a total of 48 nations from the ISDP were used in the present analyses. Three nations were sampled from North America. The Canadian national sample included three independent, English-speaking subsamples from the Canadian provinces of Ontario, Alberta, and British Columbia, and one French-speaking subsample from Quebec. The French-speaking participants were administered the ISDP survey as translated/back-translated into French. The translation and back-translation procedures will be addressed later. Thirteen subsamples were obtained from the United States. This included at least one subsample from the states of New York, Illinois, Kentucky, South Carolina, Florida, Alabama, Texas, New Mexico, Idaho, California, and Hawaii. The subsamples from mainland United States consisted of 66% European-American (non-Hispanic), 10% African-American, 8% Hispanic-American, 5% Asian-American, 2% Native-American, and 9% who either identified themselves as "other" or did not specify their origin. The North American world region was also represented by a sample from Mexico, mainly general community members who volunteered for the study. Community samples in the ISDP tended to be related to colleges and universities (e.g., many were employed by the local educational institutions), and so should not be considered as

completely independent of the college-related limitations of most ISDP national samples.

Four nations were sampled from the world region of South America, including Peru, Bolivia, Argentina, and Brazil. Eight nations from Western Europe were sampled as part of the ISDP, including one sample each from Finland, the Netherlands, Belgium (Flanders region), France, and Switzerland (German-speaking region). Multiple subsamples were collected from the United Kingdom (including Northern Ireland and multiple England samples), Germany, and Austria. The subsamples from England, Germany, and Austria included both college students and general community members. Eleven nations from Eastern Europe were sampled in the ISDP: one sample each from Estonia, Latvia, Lithuania, Poland, the Czech Republic, Slovakia, Ukraine, Romania, Serbia, Croatia, and Slovenia. The ISDP had five nations sampled to represent the world region of Southern Europe: Portugal, Spain, Italy, Malta, and Greece.

Three national samples from the Middle East world region were included in the ISDP: Turkey, Lebanon, and Israel. Five nations from Africa were sampled as part of the ISDP, including college students from Botswana, the Democratic Republic of the Congo, Ethiopia, Morocco, and Zimbabwe. Three nations from Oceania were sampled for the ISDP; they included two subsamples from Australia (one from eastern Australia containing college students and one from western Australia that included both college students and community members), one sample from New Zealand, and one sample from Fiji. Two nations from South/Southeast Asia were part of the ISDP, including national samples from Bangladesh and the Philippines. Four national samples from East Asia were included: one sample each from Hong Kong (now a part of the People's Republic of China), Taiwan (Republic of China), and Japan; and two subsamples were accumulated from the Republic of (South) Korea.

Overall, this collection of national samples represented a diverse array of ethnic, geographic, and linguistic categories. In total, SOI scores from the ISDP represent 6 continents, 10 islands (Malta, Fiji, New Zealand, the Philippines, Hong Kong, Japan, Taiwan, Hawaii, Ireland, and Britain), 26 languages, and 48 nations (see Table 1). Most samples were recruited as volunteers, some received course credit for participation and others received a small monetary reward for their participation. All samples were administered an anonymous self-report survey, most surveys were returned via sealed envelope and/or the usage of a drop-box. Return rates for college student samples tended to be relatively high (around 95%), although this number was lower in some cultures. Return rates for community samples were around 50%. Further details on the sampling and assessment procedures within each of the world regions and national samples are provided elsewhere (Schmitt et al. 2003a; 2003b) and are available from the author on request.

5.2. Procedure

All collaborators were asked to administer an anonymous nine-page survey to at least 100 men and 100 women. Some nations, such as the United States and Canada, contained numerous convenience samples, and so the national sample size was much larger than 200. All participants were provided with a brief description of the study, including the following written instructions:

> This questionnaire is entirely voluntary. All your responses will be kept confidential and your personal identity will remain anonymous. No identifying information is requested on this survey, nor will any such information be added later to this survey. If any of the questions make you uncomfortable, feel free not to answer them. You are free to withdraw from this study at any time for any reason. This series of questionnaires should take about 20 minutes to complete. Thank you for your participation.

The full instructional set provided by each collaborator varied, however, and was adapted to fit the specific culture and type of sample. Details on incentives and cover stories used across samples are available from the author.

5.3. Measures

5.3.1. Translation procedures. Researchers from nations where English was not the primary language were asked to conduct a translation/back-translation procedure and administer the ISDP measures, including the SOI, in their native language. This process typically involved the primary collaborator translating the measures into the native language of the participants, and then having a second person back-translate the measures into English. Differences between the original English and the back-translation were discussed, and mutual agreements were made on the most appropriate translation. This procedure tries to balance the competing needs of making the translation meaningful and naturally readable to the native participants while preserving the integrity of the original measure and its constructs (Brislin 1980), and it is generally regarded as an "etic" approach to cross-cultural psychology (Church 2001).

As seen in Table 1, this process resulted in the survey being translated into 26 different languages. Samples from Ethiopia, Fiji, Hong Kong, Morocco, and the Philippines were administered the survey in English, but certain terms and phrases were annotated to clarify what were thought to be confusing words for the participants. The translation of the ISDP survey into the Flemish dialect of Dutch used only a translation procedure, because this involved mainly word variant changes from the original Dutch. Finally, pilot studies were conducted in several testing sites, in part to clarify translation and comprehension concerns.

5.3.2. Demographic measure. Each sample was first presented with a demographic measure entitled "Confidential Personal Information." This measure included questions about sex (male, female), age, sexual orientation (heterosexual, homosexual, bisexual), current relationship status (married, cohabiting, dating one person exclusively, not currently involved with anyone), and current socioeconomic status (upper, upper-middle, middle, lower-middle, lower).

5.3.3. Sociosexual Orientation Inventory (SOI). The SOI is a seven-item self-report survey designed to measure a single strategic dimension – restricted versus unrestricted sociosexuality (Simpson 1998; Simpson & Gangestad 1991). The first three items of the SOI are intended to capture overt behavioral expressions of sociosexual variation. Item 1 is: "With how many different partners have you had sex (sexual intercourse) within the past year?" Item 2 is: "How many different partners do you foresee yourself having sex

Table 1. *Sample size and language of administration for men and women who completed the Sociosexual Orientation Inventory across 48 nations of the International Sexuality Description Project*

Nation	Men	Women	Total	Language
Argentina	110	136	246	Spanish
Australia	183	265	448	English
Austria	173	225	398	German
Bangladesh	73	59	132	Bangla
Belgium	129	285	414	Dutch (Flemish)
Bolivia	70	56	126	Spanish
Botswana	94	115	209	English
Brazil	39	49	88	Portuguese
Canada	335	626	961	English/French
Congo, D.R.	91	50	141	French
Croatia	101	100	201	Croatian
Czech Rep.	76	104	180	Czech
Estonia	61	84	145	Estonian
Ethiopia	107	68	175	English[a]
Fiji	66	53	119	English[a]
Finland	28	72	100	Finnish
France	47	54	101	French
Germany	229	379	608	German
Greece	39	154	193	Greek
Hong Kong	90	94	184	English[a]
Israel	139	170	309	Hebrew
Italy	92	108	200	Italian
Japan	125	86	211	Japanese
Latvia	77	78	155	Latvian
Lebanon	106	120	226	English
Lithuania	40	38	78	Lithuanian
Malta	104	119	223	English
Mexico	90	100	190	Spanish
Morocco	60	74	134	English[a]
Netherlands	94	111	205	Dutch
New Zealand	104	152	256	English
Peru	87	91	178	Spanish
Philippines	94	118	212	Englisha
Poland	214	381	595	Polish
Portugal	99	131	230	Portuguese
Romania	100	106	206	Romanian
Serbia	92	95	187	Serbian
Slovakia	55	70	125	Slovak
Slovenia	44	41	85	Slovenian
South Korea	189	289	478	Korean
Spain	81	157	238	Spanish
Switzerland	57	95	152	German
Taiwan	114	88	202	Mandarin
Turkey	190	188	378	Turkish
Ukraine	100	100	200	Ukrainian
United Kingdom	121	275	396	English
United States	948	1,707	2,655	English
Zimbabwe	96	90	186	English
Total ISDP sample	5,853	8,206	14,059	26 languages

Note: [a] = some English items were annotated for greater comprehension.

with during the next five years? (Please give a specific, realistic estimate).” Item 3 is: “With how many different partners have you had sex on one and only one occasion?” Open-ended blanks are provided after each of the first three questions of the SOI. The fourth item was designed to measure covert sociosexual behavior: “How often do (did) you fantasize about having sex with someone other than your current (most recent) dating partner?” This item was followed by an 8-point scale, ranging from 1 (never) to 8 (at least once a day).

Items 5, 6, and 7 were designed to measure sociosexual attitudes. Item 5 is: “Sex without love is OK.” Item 6 is: “I

can imagine myself being comfortable and enjoying 'casual' sex with different partners." Item 7 is: "I would have to be closely attached to someone (both emotionally and psychologically) before I could feel comfortable and fully enjoy having sex with him or her." All three attitudinal items were followed by 9-point scales ranging from 1 (I strongly disagree) to 9 (I strongly agree). Responses to item 7 are reverse-coded so that higher scores indicate higher or more unrestricted sociosexuality.

According to Simpson and Gangestad (1991), items 5, 6, and 7 are highly correlated and should be merged to form a single "attitudinal" score. This attitudinal score is then combined with the first four SOI items to form the total SOI composite measure. However, each item of the SOI composite measure is first weighted using the following formula: (5 × item 1) + (1 × item 2 [with a cap on item 2 of 30]) + (5 × item 3) + (4 × item 4) + (2 × mean of items 5, 6, and 7) = total SOI composite measure. Again, using this formula produces an SOI composite measure such that *higher scores are associated with unrestricted sociosexuality*. Higher, unrestricted individuals tend to have had sex with more partners in the previous year (item 1), foresee having sex with more partners in the next five years (item 2), engage in more one-night stands (item 3), fantasize more about having sex with someone other than their current dating partner (item 4), and possess more permissive attitudes toward uncommitted sexual relations (items 5, 6, and 7).

5.3.4. Time Known measure. The *Time Known* measure originally used by Buss and Schmitt (1993) was adapted for use in the ISDP. The Time Known measure asked participants to rate on a 6-point scale ranging from +3 (definitely yes) to –3 (definitely not) the degree to which "If the conditions were right, would you consider having sexual intercourse with someone you viewed as desirable if . . ." they had known that person for varying amounts of time ranging from five years to one hour.

5.3.5. Mate Poaching Inventory. The *Mate Poaching Inventory* originally used by Schmitt and Buss (2001) was adapted for use in the ISDP. Two items were of relevance to the present study. First, the Mate Poaching Inventory asked participants to rate on a 7-point frequency scale ranging from 1 (never) to 4 (sometimes) to 7 (always) the degree to which "Have you ever attempted to attract someone *who was already in a relationship with someone else* for a short-term sexual relationship with you?" Participants from Lebanon and Poland received a version of this measure in which they were asked if they had attempted to attract away an already-mated partner for a new *long-term* mating relationship. A second item asked, "While you were in a romantic relationship, if others attempted to obtain you as a short-term sexual partner, how *successful* have they been (if others have never tried, skip this question)?" Participants rated this item on a 7-point scale ranging from 1 (not at all successful) to 4 (moderately successful) to 7 (very successful). Again, Lebanese and Polish samples received long-term versions of this mate poaching question.

5.3.6. Archival measures. Several archival data sets were used in this article. National sex ratios were obtained from the United Nations Statistics Division (2001). Three data sets were used to evaluate the cross-cultural convergent validity of national sociosexuality scores. These include data from the World Values Survey (Inglehart et al. 1998), data from the International Social Survey Program (Widmer et al. 1998), and data from the Global Sex Survey (SSL International 2001).

Several variables were used to evaluate the level of environmental demand. The percentage of low-birth-weight infants and the prevalence of child malnutrition were from the UNICEF Global Database (United Nations Population Division 2001). Infant mortality rates were obtained from the United Nations Statistics Division (2001). Teen pregnancy rates and fertility rates were obtained from United Nations Development Programme (2001). In all cases higher scores on these variables indicate higher levels of environmental demand.

The mean age at marriage for women was obtained from the World's Women 2000 Report (United Nations Statistics Division 2001). Life expectancy and gross domestic product per capita were obtained from the United Nations Development Programme (2001). The Human Development Index, as reported in the United Nations Development Programme (2001), is defined as the achievement of a nation in basic human capabilities, including health, longevity, education, and a decent standard of living. Data on human development were obtained from the United Nations Development Programme (2001). For these variables, higher scores are indicative of lower levels of environmental demand.

Several variables were used to evaluate the level of political and economic gender equality across cultures. The Gender Empowerment Measure – a United Nations statistic based on the level of political and economic equality of men and women within a nation – was obtained from the United Nations Human Development Programme (2001). The percentage of women in parliament and the percentage of women in ministerial positions were obtained from the United Nations Statistics Division (2001). The Gender-Related Development Index reflects the degree to which men and women differ in the achievement of basic human capabilities, including health, longevity, education, and a decent standard of living and was obtained from the United Nations Human Development Programme (2001). The Women's Wage Equality measure was obtained from the World's Women 2000 Report (United Nations Statistics Division 2001). In all cases, higher scores on these measures indicate a greater degree of political and economic gender equality.

Several variables were used to evaluate the level of relational and reproductive freedom of women across cultures. The percentage of women-headed households and the percentage of women in unions who use contraception were obtained from the World's Women 2000 Report (United Nations Statistics Division 2001). The divorce rate across cultures was obtained from the United Nations Human Development Programme (2001). In all cases, higher scores these measures indicate a greater degree of relational and reproductive freedom for women.

Several variables were used to evaluate the degree of traditional versus progressive sex role ideology across cultures. Direct measures of women's and men's sex role ideologies were obtained from Williams and Best (1990). High scores on the Sex Role Ideology measure (Williams & Best 1990) indicate more progressive views on the roles of men and women in society; low scores indicate more traditional

views. Direct measures of hostile sexism were obtained from Glick et al. (2000). High levels on the Hostile Sexism measure reflect more negative attitudes toward women and may be indicative of greater cultural patriarchy (Sakalli-Ugurlu & Beydogan 2002). An index of cultural masculinity (i.e., more traditional beliefs about women's roles in the family, the workplace, and society) was obtained from Hofstede's (2001) classic IBM study of attitudes and values.

6. Results

6.1. Does the SOI psychometrically measure a single dimension within cultures?

Because the SOI contains several open-ended items, it is somewhat susceptible to extreme scores. In the present study, the upper 1% of full-scale scores were eliminated from further analyses (i.e., scale scores above 180; see Rosenthal & Rosnow 1991). The extreme scores were dispersed evenly across world regions, and most extreme scorers were men.

To evaluate whether sociosexuality consists of one basic dimension, all seven items of the SOI were subjected to a principal axis factor analysis within all nations of the ISDP. In their original validation research using a sample from the United States, Simpson and Gangestad (1991) reported that SOI items tended to form a single factor, and that the first unrotated factor of the SOI accounted for 39.2% of the variance. As seen down the first data column of Table 2, similar levels of variance were accounted for within each of the 48 ISDP nations, and 44.50% of the variance was accounted when analyzing the entire sample. In addition, a single factor was suggested for most nations based on eigenvalues above 1 and according to the scree criterion (Cattell 1966). When additional factors were suggested, these secondary factors typically provided less than 10% of additional variance to the factor solution. In sum, it was a cultural universal for responses to the SOI to form a single factor, at least across the different forms of culture represented in the ISDP.

6.2. Is the SOI psychometrically reliable within cultures?

The internal reliability of the SOI was evaluated across the 48 nations of the ISDP in two ways. First, raw scores on the seven individual items of the SOI were evaluated according to Cronbach's alpha coefficient. As seen down the second data column of Table 2, the level of internal reliability was adequate across most nations. The levels were somewhat lower than would be expected in the Democratic Republic of the Congo, Mexico, and Slovakia. However, in most cases these levels increased when the second method was used to evaluate internal reliability. The overall level of alpha reliability across all participants of the ISDP was 0.77.

The third data column of Table 2 contains the alpha coefficients of the five *weighted* items composing the SOI scale. As noted earlier, items 5, 6, and 7 of the SOI are combined when computing composite SOI scores, and all items are further weighted according to a specific formula (see Simpson 1998; Simpson & Gangestad 1991). These weighted internal reliabilities were also adequate across most cultures. Data from the Democratic Republic of the Congo were still problematic ($\alpha = 0.19$). The overall level of weighted reliability across all participants was 0.65, approaching the level reported originally by Simpson and Gangestad (1991; $\alpha = 0.73$).

6.3. Is the SOI psychometrically valid within cultures?

To evaluate the validity of the SOI within each of the 48 nations, scores from two other measures included in the ISDP were used. First, scores from the Time Known measure developed by Buss and Schmitt (1993) were used to evaluate within-culture convergent validity. One of the Time Known items asks, "If the conditions were right, would you consider having sexual intercourse with someone you viewed as desirable if you had known that person for 1 month?" The partial correlation (controlling for sex) between consenting to sex after one month and responses to the SOI within almost every nation was significant and positive. Exceptions included the Democratic Republic of the Congo, Ethiopia, and Ukraine. The sample from Bangladesh was not administered the Time Known measure.

Another avenue for evaluating within-culture convergent validity was to compare the SOI results with responses to the Mate Poaching Inventory developed by Schmitt and Buss (2001). This measure asked two questions highly relevant to the SOI. The first question asks how frequently the participant has attempted in the past to poach (i.e., romantically attract) another person's romantic partner. As seen in Table 2, the correlation between the frequency of mate poaching attempts and sociosexuality was positive in almost every culture. The only exception to this trend was the Ukraine. Notably, the convergent validity correlation within the Democratic Republic of the Congo was significant, $r(92) = +0.30$, $p < .01$.

A second question from the Mate Poaching Inventory asks whether the person had ever been poached away from a past partner (i.e., had ever been induced to be unfaithful). It would be expected that those who have an unrestricted sociosexuality would be more likely to go along with a mate poach. As seen in the last column of Table 2, correlations between sociosexuality and going along with a poaching attempt on oneself were positive and significant in almost every culture. Overall, the within-culture construct validity evidence of the SOI was highly favorable.

Additional analyses reported elsewhere indicate that sociosexuality is reliably associated with certain physical attributes across cultures (Schmitt 2002; 2003). For example, men's self-ratings of physical attractiveness are cross-culturally correlated with unrestricted sociosexuality – a finding that confirms portions of strategic pluralism theory (Gangestad & Simpson 2000). Among women, this relationship is less robust across cultures (Schmitt 2002). Sociosexuality also appears related to facial symmetry in men, an attribute closely linked to attractiveness (Schmitt 2003). In addition, within nearly every major region of the world, taller women report more promiscuous thoughts, feelings, and behaviors than shorter women (Schmitt 2003b). This finding may relate to sex ratio theory (Pedersen 1991), in that men's preference for shorter women (Ellis 1992) may cause taller women to have fewer options in the mating marketplace. Taller women, as a result, may be forced to fulfill men's desires for promiscuous sex to garner a mating relationship. Alternately, taller women may possess higher levels of testosterone, which in turn is linked with more unrestricted sociosexuality (Clark 2004; Udry et al. 1986). Re-

Table 2. *Psychometric properties of the Sociosexual Orientation Inventory within 48 nations of the International Sexuality Description Project*

	Factor Structure	Internal Reliability		Convergent Validity Correlations		
Nation	% Variance of First Factor	Alpha	Weighted Alpha	Consent to Sex	Attempted a Poach	Went Along with Poach
Argentina	45.36	0.75	0.66	0.39***	0.40***	0.48***
Australia	46.00	0.78	0.62	0.48***	0.38***	0.39***
Austria	45.12	0.77	0.58	0.37***	0.40***	0.43***
Bangladesh	36.49	0.61	0.60	—	0.19**	0.29***
Belgium	41.47	0.75	0.59	0.43***	0.40***	0.36***
Bolivia	45.31	0.71	0.69	0.27**	0.15*	0.02
Botswana	42.01	0.75	0.69	0.43***	0.41***	0.44***
Brazil	51.58	0.80	0.69	0.46***	0.48***	0.49***
Canada	42.92	0.76	0.64	0.43***	0.36***	0.31***
Congo, D.R.	24.11	0.36	0.19	0.14	0.30**	0.18*
Croatia	42.14	0.72	0.69	0.39***	0.30***	0.18**
Czech Rep.	43.88	0.74	0.61	0.28***	0.48***	0.50***
Estonia	47.66	0.76	0.56	0.39***	0.51***	0.35***
Ethiopia	31.96	0.52	0.36	0.14	0.27***	0.31***
Fiji	37.68	0.69	0.63	0.17*	—	—
Finland	41.07	0.70	0.33	0.30**	0.42***	0.30**
France	43.94	0.75	0.61	0.42***	0.50***	0.47***
Germany	46.01	0.78	0.57	0.39***	0.32***	0.40***
Greece	43.10	0.76	0.61	0.42***	0.24***	0.18**
Hong Kong	43.19	0.73	0.70	0.49***	0.45***	0.46***
Israel	43.52	0.76	0.62	0.44***	0.45***	0.36***
Italy	54.82	0.81	0.77	0.36***	0.53***	0.35***
Japan	38.69	0.70	0.62	0.29***	0.42***	0.41***
Latvia	42.00	0.70	0.63	0.40***	0.35***	0.48***
Lebanon	52.93	0.80	0.75	0.48***	0.33***	0.14*
Lithuania	39.23	0.66	0.62	0.27**	0.24*	0.30**
Malta	45.60	0.78	0.65	0.54***	0.42***	0.33***
Mexico	35.02	0.48	0.57	0.33***	0.36***	0.14
Morocco	51.93	0.77	0.74	0.34***	0.17*	0.15
Netherlands	40.72	0.73	0.52	0.37***	0.20**	0.08
New Zealand	49.54	0.80	0.65	0.44***	0.33***	0.23***
Peru	50.85	0.80	0.70	0.23***	0.22**	0.23**
Philippines	50.46	0.79	0.73	0.34***	0.47***	0.32***
Poland	52.86	0.83	0.71	0.40***	0.30***	0.16***
Portugal	45.66	0.78	0.68	0.29***	0.29***	0.25***
Romania	52.59	0.79	0.78	0.43***	0.41***	0.44***
Serbia	45.88	0.72	0.72	0.41***	0.53***	0.58***
Slovakia	37.93	0.31	0.54	0.39***	0.46***	0.37***
Slovenia	48.83	0.82	0.71	0.22*	0.28**	0.12
South Korea	41.58	0.75	0.56	0.43***	0.33***	0.21**
Spain	47.92	0.81	0.71	0.50***	0.39***	0.29***
Switzerland	42.01	0.74	0.58	0.35***	0.34***	0.36***
Taiwan	40.75	0.73	0.63	0.43***	0.56***	0.62***
Turkey	50.59	0.80	0.63	0.39***	0.39***	0.34***
Ukraine	58.48	0.86	0.82	−0.11	−0.10	0.02
United Kingdom	49.71	0.80	0.68	0.50***	0.41***	0.28***
United States	49.63	0.82	0.67	0.50***	0.37***	0.29***
Zimbabwe	44.52	0.75	0.72	0.29***	0.31***	0.35***
Total ISDP sample	44.50	0.77	0.65	0.44***	0.37***	0.31***

Note: ISDP = International Sexuality Description Project. * = $p < .05$, ** = $p < .01$, *** = $p < .001$, — = measure not administered.

gardless, the cross-cultural consistency of these and other anthropometric findings suggests that self-reported responses to the SOI represent more than simple response styles associated with sexual self-presentation. Instead, the SOI is apparently tapping aspects of human mating objectively connected to theoretically relevant physical attributes (Gangestad 2001; Schmitt 2002; 2003), and it does so in robust ways across a broad range of human cultures.

6.4. Is the SOI psychometrically valid across cultures?

Table 3 contains the estimated means and standard deviations of sociosexuality across the 48 nations of the ISDP. Estimated means were obtained using a factorial ANCOVA with sociosexuality as the dependent variable, nation as the independent variable, and sex of participant as a covariate. Across all 48 nations, the correlation between men's and women's mean levels of sociosexuality was significant, $r(46) = +0.56$, $p < .001$. Sex was entered as a covariate because some samples contained more men than women, whereas others contained more women than men, and it was expected that sex would have a significant within-nation association with sociosexuality. The estimated means in Table 3, therefore, represent the overall national level of sociosexuality within each of the ISDP samples after controlling for the confounding effects of sex-linked sociosexual variability.

To evaluate the validity of the national SOI profiles presented in Table 3, mean levels of sociosexuality were correlated with other measures completed by ISDP samples. For example, responses to the one month time interval of the Time Known measure were used to compute national Time Known averages for each nation (after controlling for sex within each nation). These national averages significantly correlated with national SOI scores, $r(45) = +0.79$, $p < .001$. Thus, as national SOI profiles increase, so do national tendencies to be quick to consent to sex. Similarly, the nation-level standard deviations of responses to the Time Known measure were significantly correlated with the national standard deviations of the SOI, $r(45) = +0.35$, $p < .05$. This suggests that the tendency for people within a nation to be clustered or scattered around the sexual average of their nation is robust across sex-related measures.

Relating national SOI scores to mate-poaching experiences also provided evidence that the national sociosexuality averages in Table 3 were valid. For example, the correlation between a nation's SOI and a nation's average frequency of making mate poaching attempts was positive, $r(45) = +0.54$, $p < .001$. The correlation between a nation's SOI level and a nation's average reporting of being successfully poached away from a past partner was positive as well, $r(45) = +0.47$, $p < .001$. Overall, comparing responses available from within the ISDP database strongly supported the validity of the nation-level SOI results.

A final avenue for evaluating the validity of SOI scores presented in Table 3 was to compare nation-level sociosexuality with data from external sources. The World Values Study (WVS; Inglehart et al. 1998) is based on representative samples from 43 countries, 27 of which overlap with the nations of the ISDP (Argentina, Austria, Belgium, Brazil, Canada, Czech Republic, Estonia, Finland, France, Germany, Italy, Japan, Latvia, Lithuania, Mexico, Netherlands, Poland, Portugal, Romania, Slovakia, Slovenia, South Korea, Spain, Switzerland, Turkey, United Kingdom, and the United States). The WVS asked participants the extent to which they agree or disagree with various statements, some of which were potentially related to sociosexuality. The statements used in the present analyses included whether participants believed: Marital fidelity is relatively unimpor-

Table 3. *Means and standard deviations of sociosexuality across 48 nations of the International Sexuality Description Project (controlling for sex of participant)*

Nation	Mean	SD
Argentina	40.74	28.38
Australia	37.29	23.87
Austria	45.73	31.23
Bangladesh	19.67	17.59
Belgium	32.82	18.81
Bolivia	40.90	32.87
Botswana	27.02	26.78
Brazil	37.93	31.51
Canada	34.52	22.58
Congo, D.R.	32.43	22.68
Croatia	42.98	26.46
Czech Rep.	37.52	24.01
Estonia	39.95	29.73
Ethiopia	26.55	25.63
Fiji	38.58	33.34
Finland	50.50	32.47
France	36.67	23.03
Germany	39.68	24.95
Greece	32.38	16.21
Hong Kong	22.90	16.85
Israel	40.95	26.98
Italy	34.37	26.75
Japan	24.10	18.51
Latvia	43.93	25.44
Lebanon	28.57	25.26
Lithuania	46.10	30.68
Malta	31.27	24.17
Mexico	35.69	23.29
Morocco	39.31	36.85
Netherlands	39.34	25.07
New Zealand	47.69	31.52
Peru	34.59	30.35
Philippines	32.10	28.58
Poland	34.21	25.39
Portugal	29.55	18.37
Romania	32.16	29.87
Serbia	38.72	24.08
Slovakia	34.90	24.55
Slovenia	46.26	25.71
South Korea	22.21	14.80
Spain	33.72	20.64
Switzerland	39.13	22.30
Taiwan	19.22	17.64
Turkey	36.06	31.38
Ukraine	32.27	27.03
United Kingdom	40.17	29.27
United States	37.05	25.77
Zimbabwe	22.66	26.07
Total ISDP sample	35.31	26.05

tant, individuals should have complete sexual freedom, sometimes marital affairs are justified, sometimes prostitution is justified, and sometimes divorce is justified. These five items were collapsed to form a WVS Sexual Permissiveness attitude scale. The Sexual Permissiveness scale had adequate internal reliability ($\alpha = 0.76$). Importantly, the correlation between national SOI scores from the ISDP and the Sexual Permissiveness scores from the WVS was statistically significant, $r(24) = +0.34$, $p < .05$. This finding provides external convergent validity for the nation-level SOI scores of the ISDP.

The International Social Survey Program (Smith 1992; Widmer et al. 1998) is based on representative samples from 24 countries, 16 of which overlap with the nations of the ISDP (Australia, Austria, Canada, Czech Republic, Germany, Israel, Italy, Japan, Netherlands, New Zealand, Philippines, Poland, Slovenia, Spain, United Kingdom, and the United States). The percentage of people in each nation who responded "not wrong at all" to the question, is "sex before marriage wrong?", significantly correlated with national SOI scores in the ISDP, $r(14) = +0.69$, $p < .01$. This finding provided evidence of external convergent validity for the nation-level SOI scores of the ISDP.

The Global Sex Survey (SSL International 2001) is based on convenience samples from 28 countries, 20 of which overlap with the nations of the ISDP (Australia, Canada, Croatia, Czech Republic, France, Germany, Greece, Hong Kong, Israel, Italy, Japan, Mexico, Netherlands, New Zealand, Poland, Spain, Taiwan, Turkey, United Kingdom, and the United States). The Global Sex Survey asked participants at what age they started having sex, their lifetime total number of sexual partners, and the frequency with which they have sexual intercourse. These three items were collapsed to form a Global Sex Survey index of unrestricted sexuality. The Unrestricted Sexuality scale had adequate internal reliability ($\alpha = 0.82$). Importantly, the correlation between national SOI scores from the ISDP and the Unrestricted Sexuality scale of the Global Sex Survey was statistically significant, $r(18) = +0.77$, $p < .001$. This finding provided external convergent validity for the nation-level SOI scores of the ISDP.

The psychometric properties of the SOI appeared to be adequate in cross-cultural perspective. Within nearly all cultures, the SOI comprised a single dimension, was internally reliable, and demonstrated convergent validity. Across cultures, national mean-level scores on the SOI also appeared valid. National sociosexuality scores significantly correlated with other sex-related measures from within the ISDP and with external indexes of permissive or unrestricted sociosexual attitudes and behaviors. In total, this pattern of results provides a reasonable foundation for moving to the next issue, the reasons why sociosexuality varies across cultures.

6.5. Why do nations differ in sociosexuality?

From an evolutionary perspective, there may be several reasons why cultures have different mating tendencies (Frayser 1985; Low 2000; Marlowe 2003; Mealey 2000; Pasternak et al. 1997). Hypotheses from three main theories concerning sociosexual variation across cultures were tested here: sex ratio theory (Pedersen 1991), developmental-attachment theory (Belsky et al. 1991), and strategic pluralism theory (Gangestad & Simpson 2000).

6.5.1. Sex ratio theory. According to the sex ratio theory (Pedersen 1991), higher sex ratios (i.e., more men than women) should be associated with lower sociosexuality (i.e., more monogamy). Data on sex ratio levels across the ISDP were obtained from the United Nations (United Nations Statistics Division 2001). As predicted, sex ratios were significantly correlated with national sociosexuality levels in the negative direction, $r(46) = -0.45$, $p < .001$. As shown in Figure 1, it appeared that much of this variation was caused by the low sex ratios and high sociosexual levels evident in the Baltic nations of Estonia, Latvia, and Lithuania. Low sex ratios in the Baltics are not surprising given the high rates of male suicides and deaths from accidents within these nations (e.g., Neumayer 2003). However, even without the Baltic nations, the correlation between sex ratio and sociosexuality was significant, $r(43) = -0.38$, $p < .01$. These findings are consistent with the view that cultures with more women than men possess mating systems driven, via the powers of sexual selection, by men's evolved desires for unrestricted, promiscuous sex. Figure 1 also shows that cultures with more men than women (e.g., Hong Kong, Bangladesh, and Taiwan) tend to be low on sociosexuality. In these cultures, according to sex ratio theory, the mating system is driven by women's more potent desires for long-term, monogamous mating (see also Guttentag & Secord 1983).

6.5.2. Developmental-attachment theory. According to developmental-attachment theory, cultures with high familial stress, low economic resources, and high mortality rates should possess higher levels of sociosexuality because stressful sociocultural features lead children along a trajectory of insecure attachment, early puberty, and short-term mating (Belsky et al. 1991; Chisholm 1996). Table 4 contains the intercorrelations of several sociocultural variables that provide tests of the developmental-attachment perspective. For example, prevalence of low-birth-weight infants, child malnutrition, and infant mortality can all be seen as indexes of deleterious familial stress (Goldstein & Peckham 1976; Power & Li 2000) and each should posi-

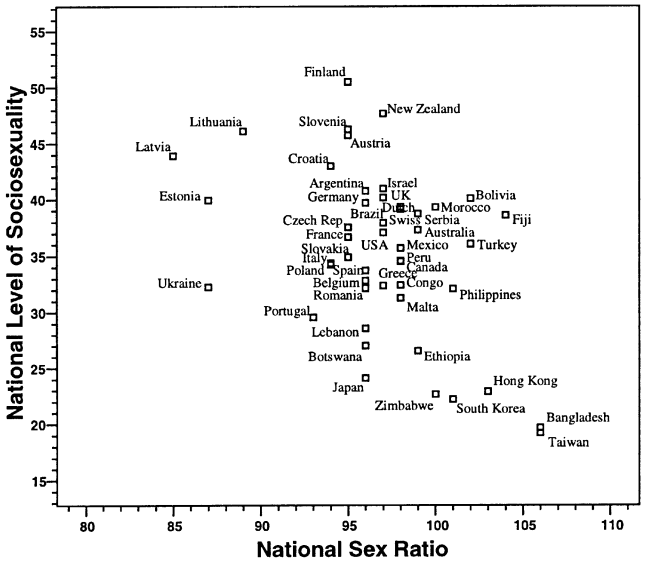

Figure 1. National level of sociosexuality related to operational sex ratio across 48 nations of the International Sexuality Description Project.

Table 4. *Intercorrelations among sociocultural variables used to predict national levels of sociosexuality*

Sociocultural Variables	OSR	LBW	CMP	IMR	GDP	HDI	LE	TPR	MAM	FR
Operational Sex Ratio										
Operational Sex Ratio (n = 47)	—									
Familial Stress										
Prevalence of Low Birth Weight (n = 44)	.64***	—								
Child Malnutrition Prevalence (n = 20)	.47*	.80***	—							
Infant Mortality Rate (n = 47)	.36**	.65***	.81***	—						
Economic Resources										
Gross Domestic Product (n = 46)	−.05	−.45**	−.46*	−.69***	—					
Human Development Index (n = 46)	−.27	−.63***	−.83***	−.96***	.82***	—				
Mortality										
Life Expectancy (n = 46)	−.18	−.50***	−.60**	−.91***	.71***	.92***	—			
Early and Prolific Reproduction										
Teen Pregnancy Rate (n = 45)	.38**	.72***	.64**	.84***	−.69***	−.82***	−.81***	—		
Mean Age at Marriage for Women (n = 41)	−.09	−.50***	−.53***	−.52***	.75***	.69***	.47***	−.65***	—	
Fertility Rate (n = 46)	.45**	.59***	.75***	.92***	−.58***	−.87***	−.85***	.75***	−.40**	—

Note: OSR = operational sex ratio; LBW = prevalence of low birth weight; CMP = child malnutrition prevalence; IMR = infant mortality rate; GDP = gross domestic product; HDI = Human Development Index; LE = life expectancy; TPR = teen pregnancy rate; MAM = mean age at marriage for women; FR = fertility rate; * = $p < .05$, ** = $p < .01$, *** = $p < .001$.

tively correlate with sociosexuality. However, as seen in Table 5, these indexes of familial stress were negatively associated with sociosexuality in every case. These were predictive failures for developmental-attachment theory.

Economic resources were indexed by gross domestic product per capita and the human development index (United Nations Human Development Report 2001). According to developmental-attachment theory, these variables should be negatively associated with sociosexuality. Instead, these variables were positively associated with sociosexuality, with more resources and greater human investment being associated with higher rates of short-term mating. Finally, national life expectancy rates (an index of low mortality) should be associated with lower sociosexuality according to the developmental-attachment view. However, life expectancy was positively correlated with sociosexuality, $r(45) = +0.38$, $p < .01$. As life expectancies increased and mortality rates decreased, sociosexuality tended to go higher, not lower as predicted by developmental-attachment theory.

Three other variables may be of interest for evaluating this perspective on sociosexuality. In the view of developmental-attachment theory, family stress, low resources, and early mortality are cultural precedents to a reproductive trajectory that includes early puberty, early reproduction, and more prolific reproduction (Belsky et al. 1991; Chisholm 1996). International data on early reproduction were available in the form of teen pregnancy rates and

Table 5. *How do sociocultural variables relate in predicted ways to national levels of sociosexuality?*

Sociocultural Variables	Predictions Based on Developmental-Attachment Theory	Predictions Based on Observed Strategic Pluralism Theory	Observed Correlation
Familial Stress			
Prevalence of Low Birth Weight (n = 44)	Positively Associated with SOI	Negatively Associated with SOI	−0.51***
Child Malnutrition Prevalence (n = 20)	Positively Associated with SOI	Negatively Associated with SOI	−0.64***
Infant Mortality Rate (n = 47)	Positively Associated with SOI	Negatively Associated with SOI	−0.38***
Economic Resources			
Gross Domestic Product (n = 46)	Negatively Associated with SOI	Positively Associated with SOI	0.22
Human Development Index (n = 46)	Negatively Associated with SOI	Positively Associated with SOI	0.39*
Mortality			
Life Expectancy (n = 46)	Negatively Associated with SOI	Positively Associated with SOI	0.38**
Early and Prolific Reproduction			
Teen Pregnancy Rate (n = 45)	Positively Associated with SOI	Negatively Associated with SOI	−0.36**
Mean Age at Marriage for Women (n = 41)	Negatively Associated with SOI	Positively Associated with SOI	0.28*
Fertility Rate (n = 46)	Positively Associated with SOI	Negatively Associated with SOI	−0.31*

Note: * = $p < .05$, ** = $p < .01$, *** = $p < .001$.

women's mean age at marriage. Contrary to expectations, both indexes of early reproduction were associated with lower sociosexuality rates across cultures. Data on more prolific reproduction were indexed by the total fertility rate across cultures. Again, contrary to theoretical expectations, higher fertility rates were associated with lower sociosexuality, $r(44) = -0.31$, $p < .05$. Overall, developmental-attachment theory failed the statistical tests implemented in this research.

6.5.3. Strategic pluralism theory. A third evolutionary explanation of national variation in sociosexuality comes from strategic pluralism theory (Gangestad & Simpson 2000). As noted earlier, Gangestad and Simpson theorize that in cultures with very harsh and difficult environmental conditions, biparental care becomes a critical component in raising viable offspring. As the need for biparental care increases, Gangestad and Simpson theorize that monogamous mateships become more important as well. Consequently, sociosexuality should be lower (i.e., more monogamous) in nations with difficult child-rearing environments. The indicators of familial stress noted earlier – prevalence of low-birth-weight infants, child malnutrition, and infant mortality – can all be seen as indexes of difficult child-rearing environments. In support of strategic pluralism theory, all three of these variables correlated negatively with sociosexuality, as seen Table 5.

Similarly, the indexes of economic resources and mortality also reflect environmental difficulty. In support of strategic pluralism theory, as resources diminish and environments become deadlier, sociosexual levels become more monogamous (see Table 5). Finally, teen pregnancy, early marriage, and prolific fertility may be related to difficulty in raising successful offspring. Although these factors are only loosely related to environmental demands, as these variables increased sociosexuality reliably decreased. Overall, strategic pluralism theory was confirmed by the statistical tests implemented in this research and should be viewed, alongside sex ratio theory, as an empirically supported evolutionary perspective on sociosexual variation across cultures.

6.6. Are sex differences in sociosexuality cross-culturally universal?

Most evolutionary perspectives on animal mating hypothesize that males and females are designed to follow somewhat different reproductive strategies (e.g., Trivers 1972). In humans, because men tend to be the lesser-investing parent of our species, they have more to gain than women do from indiscriminately engaging in short-term sex with numerous partners (see also Alexander & Noonan 1979; Buss & Schmitt 1993; Hinde 1984; Symons 1979; Wilson 1987).

A clear implication of human mating theories anchored in parental investment theory (Trivers 1972) is that men should generally be more unrestricted than women across human cultures. This hypothesis was tested in the current study by directly comparing men's and women's mean levels of sociosexuality within the 48 nations of the ISDP. As seen in Table 6, sex differences in sociosexuality were statistically significant for all cultures of the ISDP. Evolutionary theories that predict universal sex differences in sociosexuality are, therefore, consistent with the findings of the ISDP.

As noted earlier, the SOI uses open-ended responses to certain questions, making it somewhat susceptible to distributional skew. To address this issue, median tests were performed to determine whether median sex differences in sociosexuality mirror the results of mean-level sex differences. As seen in Table 7, in every culture the median man was significantly higher on sociosexuality than the median woman, though in Slovakia this difference was only marginally significant, $\chi^2(1, N = 125) = 3.54$, $p = .06$. Interestingly, in two cultures, Botswana and Latvia, the median tests for sex differences displayed higher levels of significance than the *t*-tests comparing men's and women's means.

Listed in Table 7 are Mann-Whitney *U* analyses (with corresponding *z*-tests) for differences between men's and women's distributions on sociosexuality. These analyses help to determine whether, regardless of extreme values that can affect mean-level averages, men and women display significantly different variability along the entirety of their distributions. These key distributional tests documented that men's and women's sociosexual distributions were significantly different in every nation of the ISDP. Similar to mean and median statistics, the Mann-Whitney *U* tests support the view that men's and women's sociosexual profiles reflect an evolutionary history of sex differences in parental investment.

Finally, one criticism of the SOI is its use of behavioral questions. It is possible that, although men and women fundamentally differ in sexual desire (Schmitt et al. 2003b), they do not differ in manifest sexual behavior. To address this issue, Table 7 includes the significance of sex differences in the both the behavioral items of the SOI (items 1 through 4) and the attitudinal items (items 5 through 7). As seen in the right column of Table 7, independent *t*-tests indicated that men and women significantly differed in both sociosexual behaviors and attitudes across all but three cultures. The one exception to behavioral sex differences occurred in Latvia (though this sex difference was marginally significant), and the two exceptions to the pervasive trend in attitudinal sex differences occurred in Slovakia and Switzerland (again, this was marginally significant). It appears, therefore, that sex differences in sociosexuality largely transcend both behavioral and attitudinal features of human mating psychology across cultures.

Perhaps more important than any form of statistical significance, however, is the strength or magnitude (*d*) of sexual differentiation across cultures. The *d* statistic represents the size of the difference between men's and women's means expressed in pooled standard deviation units (Cohen 1988). As seen in the right column of Table 6, for most nations the size of the sociosexual difference between men and women was moderate to large. The largest sex differences were observed in Morocco ($d = 1.24$), Ukraine ($d = 1.24$), Bolivia ($d = 1.20$), Greece ($d = 1.18$), and the Philippines ($d = 1.16$). The smallest sex differences were found in Latvia ($d = 0.30$), Botswana ($d = 0.39$), Germany ($d = 0.48$), Switzerland ($d = 0.49$), and the Democratic Republic of the Congo ($d = 0.51$). In a meta-analysis of commonly reported sex differences in sexuality, Oliver and Hyde (1993) concluded that most sex differences are only small ($d \cong .20$) to moderate ($d \cong .50$) in magnitude. These ISDP results, therefore, place sex differences in sociosexuality (overall $d = 0.74$) among the largest and culturally most robust ever documented in the domain of sex and human mating.

Table 6. *The significance and magnitude of sex differences in sociosexuality across 48 nations of the International Sexuality Description Project*

	Men		Women			
Nation	*M*	*SD*	*M*	*SD*	*t*	*d*
Argentina	55.52	31.57	30.10	19.35	7.73***	0.90***
Australia	46.52	25.02	30.73	20.81	7.17***	0.66**
Austria	55.89	36.75	38.66	23.93	5.60***	0.55**
Bangladesh	31.10	18.46	11.80	8.16	7.42***	1.09***
Belgium	39.68	21.00	26.80	16.24	6.80***	0.69**
Bolivia	61.47	31.18	21.92	18.94	8.31***	1.20***
Botswana	33.56	28.68	23.06	24.21	2.86**	0.39*
Brazil	53.96	39.14	27.13	17.32	4.13***	0.82***
Canada	44.33	25.72	27.30	18.18	11.88***	0.75**
Congo, D.R.	41.16	25.74	29.55	12.94	2.98**	0.51**
Croatia	57.35	28.76	32.15	16.29	7.61***	0.95***
Czech Rep.	48.96	28.58	29.49	15.78	5.83***	0.81***
Estonia	51.51	33.58	31.83	23.53	4.15***	0.66**
Ethiopia	37.88	28.43	18.89	14.59	5.09***	0.74**
Fiji	54.30	36.78	25.26	18.55	5.19***	0.87***
Finland	64.03	38.72	41.60	27.75	3.14***	0.69**
France	45.88	22.52	30.66	21.21	3.48***	0.66**
Germany	46.36	29.26	34.44	20.81	5.78***	0.48*
Greece	43.43	18.30	24.32	13.28	7.26***	1.18***
Hong Kong	29.88	19.45	19.21	11.86	4.52***	0.63**
Israel	53.99	28.20	31.71	21.56	7.76***	0.83***
Italy	51.73	28.57	21.39	14.58	9.65***	1.13***
Japan	32.47	19.96	20.72	13.52	4.76***	0.63**
Latvia	49.42	23.61	41.68	26.68	1.90*	0.30*
Lebanon	43.90	26.62	17.21	15.78	9.27***	1.06***
Lithuania	60.44	35.87	35.25	16.40	3.95***	0.82***
Malta	40.56	28.58	25.17	16.56	4.99***	0.64**
Mexico	49.04	27.06	25.99	11.08	7.82***	0.99***
Morocco	65.58	37.15	20.06	21.32	8.80***	1.24***
Netherlands	50.51	30.47	31.56	14.90	5.78***	0.76**
New Zealand	60.42	33.53	38.79	26.93	5.67***	0.69**
Peru	51.68	35.56	21.23	12.03	7.72***	1.00***
Philippines	51.24	33.03	17.95	10.53	10.32***	1.16***
Poland	44.29	28.96	26.90	20.75	8.44***	0.68**
Portugal	41.27	20.21	21.32	10.76	9.63***	1.09***
Romania	48.64	33.33	19.48	16.80	7.99***	0.98***
Serbia	48.99	23.81	31.89	21.28	5.16***	0.71**
Slovakia	44.27	31.75	28.52	13.54	3.74***	0.64**
Slovenia	59.45	27.01	36.45	17.99	4.59***	0.89***
South Korea	30.52	15.70	16.22	10.98	11.71***	0.97***
Spain	46.08	23.97	25.17	14.47	8.31***	1.01***
Switzerland	45.25	26.61	34.26	18.20	3.02**	0.49*
Taiwan	28.42	20.50	14.24	7.62	6.17***	0.80***
Turkey	54.16	35.44	21.71	14.58	11.58***	1.03***
Ukraine	50.79	28.92	17.36	8.65	11.06***	1.24***
United Kingdom	57.38	34.71	29.60	21.91	9.53***	0.95***
United States	48.03	29.63	29.24	20.56	19.07***	0.73**
Zimbabwe	34.80	31.22	13.98	12.11	5.92***	0.80***
Total ISDP Sample	46.67	29.68	27.34	19.55	46.32***	0.74**

Note: ISDP = International Sexuality Description Project. For *t*-values, * = $p < .05$, ** = $p < .01$, *** = $p < .001$. For *d* values, * = small effect size, ** = moderate effect size, *** = large effect size (Cohen, 1988).

Table 7. *Sex differences in sociosexual medians, distributions, behaviors, and attitudes across 48 nations of the International Sexuality Description Project*

	Nonparametric Tests		Facets of Sociosexuality	
	Medians	Mann-Whitney *U*	Behaviors	Attitudes
Nation	χ^2	*z*	*t*	*t*
Argentina	36.02***	−7.26***	7.31***	6.38***
Australia	44.71***	−7.33***	6.24***	8.90***
Austria	11.98***	−5.10***	5.23***	5.15***
Bangladesh	51.80***	−7.18***	6.39***	6.54***
Belgium	44.89***	−7.24***	5.96***	6.67***
Bolivia	57.72***	−7.81***	8.05***	5.86***
Botswana	14.15***	−3.49***	2.44*	4.67***
Brazil	8.44**	−3.74***	4.13***	2.50**
Canada	143.63***	−12.01***	11.84***	5.89***
Congo, D.R.	6.35**	−2.97**	2.75**	2.10*
Croatia	37.36***	−6.98***	7.15***	5.80***
Czech Rep.	21.24***	−5.59***	5.38***	5.40***
Estonia	12.80***	−4.38***	3.62***	5.44***
Ethiopia	29.79***	−5.76***	5.04***	2.54**
Fiji	18.19***	−5.04***	5.08***	3.12**
Finland	7.03**	−3.27***	2.84**	3.71***
France	7.87**	−3.95***	3.03**	4.21***
Germany	26.80***	−5.73***	5.41***	5.41***
Greece	19.62***	−5.81***	6.83***	5.83***
Hong Kong	11.51***	−4.43***	4.09***	4.10***
Israel	48.65***	−8.13***	7.35***	5.90***
Italy	53.45***	−8.54***	8.63***	11.75***
Japan	11.10***	−4.66***	3.84***	6.05***
Latvia	5.49*	−2.73**	1.45†	3.80***
Lebanon	48.40***	−8.66***	8.12***	10.96***
Lithuania	6.28**	−3.60***	3.76***	2.55**
Malta	17.84***	−4.22***	4.59***	5.13***
Mexico	46.63***	−7.55***	7.43***	6.02***
Morocco	58.00***	−7.81***	8.13***	8.78***
Netherlands	22.25***	−5.44***	5.63***	3.57***
New Zealand	26.37***	−5.72***	5.47***	4.71***
Peru	39.66***	−7.63***	6.90***	9.15***
Philippines	85.80***	−10.04***	9.35***	10.96***
Poland	63.08***	−8.45***	7.98***	8.34***
Portugal	50.92***	−8.42***	8.68***	8.20***
Romania	45.92***	−8.14***	6.90***	11.81***
Serbia	22.83***	−5.61***	4.43***	6.31***
Slovakia	3.54†	−3.69***	3.65***	0.30
Slovenia	17.95***	−4.83***	4.30***	3.56***
South Korea	75.35***	−10.96***	10.47***	10.03***
Spain	29.69***	−7.28***	7.56***	7.36***
Switzerland	4.56*	−2.71**	2.96**	1.91†
Taiwan	44.99***	−7.61***	4.95***	9.70***
Turkey	84.18***	−10.53***	10.50***	12.27***
Ukraine	77.65***	−10.03***	9.47***	19.39***
United Kingdom	56.90***	−8.55***	9.05***	8.70***
United States	269.23***	−18.76***	17.73***	19.09***
Zimbabwe	27.95***	−6.34***	5.78***	3.89***
Total ISDP Sample	1,690.74***	−46.27***	43.04***	42.44***

Note: ISDP = International Sexuality Description Project. † = $p < .10$, * = $p < .05$, ** = $p < .01$, *** = $p < .001$.

Within the constraints of the current methodology and sampling limitations, it can be concluded from these results that sex differences in sociosexuality are a cultural universal, supporting the basic tenets of parental investment theory (Trivers 1972). In addition, based on an ANOVA with sex of participant and nation as independent variables and sociosexuality as the dependent variable, the overall partial eta-squared effect size of sex was very large ($\eta^2 = 0.15$; Cohen 1988), more than double the moderate effect size of nation ($\eta^2 = 0.06$). Culture has an important influence on sociosexuality, but biological sex is the larger and stronger predictor of human mating strategies across the nations of the ISDP.

6.7. Why do nations differ in the magnitude of sex differences in sociosexuality?

Even though sex differences in sociosexuality appear to be culturally universal (at least across the spectrum of modern ISDP nations), and in some ways sex differences are stronger than the measurable effects of culture, this does not mean that sex differences must be the result of evolved reproductive strategies. It could be that sociosexual sex differences are a by-product of some other force that happens to permeate all human cultures, such as patriarchy, religion, or some other sociohistorical influence (Harris 1993). It also could be that sex differences in sociosexuality are the direct result of some biological difference between men and women, but the difference does not involve psychological adaptations to sociosexuality per se.

6.7.1. Social structural theory. According to social structural theory (Eagly & Wood 1999; Wood & Eagly 2002), men and women are not designed to differ in sociosexuality. Instead, pancultural sex differences in sociosexuality likely stem from ubiquitous differences in the way men and women fulfill social roles. Eagly and Wood (1999) argue that the intensity and rigidity of social roles can vary across cultures, due in part to the local ecology and its influence on the value of women's economic, political, and relational contributions (see also Low 1989). An important implication of this perspective is that in cultures where women are more severely constrained in terms of economic, political, and relational-independent social roles (i.e., cultures with traditional sex-role ideologies; see Williams & Best 1990), sex differences in sociosexuality should be larger. Within cultures that possess more modern or progressive sex-role ideologies – where women have more access to money, power, and the ability to make their own reproductive decisions – women are allowed to explore a wider array of social roles. Consequently, sex differences in sociosexuality should be smaller, or perhaps even absent, in cultures where either gender can take on the role of the other (see also Buss & Barnes 1986).

Table 8 contains the intercorrelations of several sociocultural indicators of gender equality, relational freedom, and sex-role ideology. In most cases, when women have greater access to political power and resources (e.g., Gender Empowerment Measure), they also tend to have more relational and reproductive freedom (e.g., head their own household, use contraception when married, and divorce more freely). These findings replicate several results from previous anthropological studies (e.g., Pasternak et al. 1997; Pearson & Hendrix 1979), though some studies of preindustrial cultures have failed to find robust links between all indicators of women's status and sexual freedom. Whyte (1978), for example, found only female-centered social structures (e.g., matrilineality and matrilocality) were associated with more sexual equality and freedom. Other factors, such as the degree of warfare in a culture, were not linked as expected to sexual equality. In this study, women's economic and reproductive freedom is generally associated with progressive sex role ideologies, low patriarchy (i.e., low hostile sexism), and low levels of cultural masculinity, precisely as predicted by social structural theory (Eagly & Wood 1999; Wood & Eagly 2002).

Table 9 contains the correlations between sociocultural indicators of gender equality and sex differences in sociosexuality. As seen in the right side of Table 9, the Gender Empowerment Measure was negatively correlated with magnitude of sex differences in sociosexuality, $r(32) = -.56, p < .001$. As predicted by social structural theory, increased gender equity was associated with the erosion of large sex differences in human mating strategies. Significant associations also were found between sex differences in sociosexuality and the percentage of women in parliament, the percentage of women in ministerial positions, the percentage of women-headed households, and divorce rates across cultures. Although direct measures of sex role ideology were not significantly associated with the magnitude of sex differences, the low sample sizes from Williams and Best (1990) and Glick et al. (2000) precluded ample power for fully evaluating this prediction. Overall, it appeared that when women gain more sociopolitical and relational freedom, sex differences in sociosexuality shift from large magnitudes to more moderate magnitudes of effect.

Even though sex differences in sociosexuality were more moderate in progressive cultures, it is not exactly clear from social structural theory what form this shift in sociosexuality should have taken. Is it the case that men and women are naturally restricted (Hazan & Diamond 2000), with sex roles in certain cultures causing large sex differences by promoting unrestricted sociosexuality in men – perhaps using male promiscuity as a means of patriarchal oppression? Are women designed to be more promiscuous than men (Sherfey 1966), with sex roles in certain cultures somehow reversing our naturally polyandrous mating system? Are men naturally more promiscuous than women (Symons 1979), with sex roles in certain cultures minimizing sex differences by accentuating unrestricted sociosexuality in women? Or is it the case both men and women are naturally unrestricted (Barash & Lipton 2001), with sex roles in certain cultures causing large sex differences by suppressing women's innate tendency toward sexual promiscuity? To address these questions, additional theorizing is needed.

6.7.2. Strategic pluralism theory. According to strategic pluralism theory (Gangestad & Simpson 2000), women are designed to facultatively shift their mating strategies depending on certain qualities of the local environment. In demanding environments that necessitate high levels of biparental care (e.g., cultures with high stress, few resources, and high mortality), women are hypothesized to become more sociosexually restricted. In nondemanding environments, women are able to expend additional effort on short-term mating, in part to gain access to genetically valuable males (Gangestad 2001; Simpson & Orina 2003), and so women's sociosexuality should increase or become more

Table 8. *Intercorrelations among sociocultural variables used to predict the magnitude of sex differences in sociosexuality*

Predictors of Sociosexuality	GEM	WIP	WIM	GDI	WWE	WHH	WUC	DR	WSRI	MSRI	LWHS	LMHS	LCM
Political and Economic Freedom													
Gender Empowerment Measure (n = 34)	—												
% Women in Parliament (n = 46)	.84***	—											
% Women in Ministerial Positions (n = 46)	.58***	.61***	—										
Gender Development Index (n = 45)	.78***	.50***	.34*	—									
Women's Wage Equality (n = 27)	.09	.12	.04	.30	—								
Relational and Reproductive Freedom													
% Women-Headed Households (n = 29)	.75***	.60***	.50**	.29	.17	—							
% Women Using Contraception (n = 37)	.51**	.42**	.33*	.74***	.12	.11	—						
Divorce Rate (n = 23)	.65**	.42*	.62**	.56**	−.02	.74***	.09	—					
Progressive Sex-Role Ideologies													
Women's Sex-Role Ideology (n = 8)	.61	.88**	.59	−.15	.75*	.63	.73*	.02	—				
Men's Sex-Role Ideology (n = 8)	.53	.88**	.48	−.22	.73	.51	.67	−.12	.99***	—			
Low Women's Hostile Sexism (n = 14)	.80***	.43	.43	.64**	.02	.16	.82***	.50	.66	.52	—		
Low Men's Hostile Sexism (n = 14)	.75**	.51*	.48*	.74***	.08	.18	.57*	.67**	.40	.37	.68**	—	
Low Cultural Masculinity (n = 43)	−.01	.10	−.05	−.10	.26	.25	.06	−.06	.75*	.71*	−.01	.11	—
Demanding Environments													
Prevalence of Low Birth Weight (n = 44)	−.52**	−.30*	−.18	−.64***	−.37	−.53**	−.29	−.31	−.10	−.14	−.46	−.51**	—
Child Malnutrition Prevalence (n = 20)	−.54	−.15	−.22	−.83***	−.46	−.37	−.49*	−.71*	—[a]	—[a]	−.96*	−.99**	−.17
Infant Mortality Rate (n = 47)	−.65***	−.38	−.26	−.96***	−.24	−.21	−.67***	−.48*	.13	.01	−.51*	−.63**	.09
Teen Pregnancy Rate (n = 45)	−.55***	−.34*	−.24	−.82***	−.35	−.25	−.48**	−.21	−.19	−.31	−.25	−.41	.02
Fertility Rate (n = 46)	−.39*	−.35*	−.23	−.88***	−.19	−.17	−.63***	−.14	−.05	−.19	−.55*	−.50*	.07
Nondemanding Environments													
Mean Age at Marriage for Women (n = 41)	.76***	.58***	.39**	.69***	.22	.55**	.52**	.10	.65	.73*	.16	.40	.12
Life Expectancy (n = 46)	.72***	.36*	.17	.91***	.15	−.05	.70***	.33	−.66	−.53	.62*	.66**	−.13
Gross Domestic Product (n = 46)	.80***	.56***	.44**	.82***	.06	.43*	.65***	.58**	−.40	−.49	.52*	.71*	−.14
Human Development Index (n = 46)	.78***	.49***	.33*	.99***	.30	.28	.74***	.54**	−.22	−.26	.64**	.73**	−.10

Note: GEM = gender empowerment measure, WIP = % women in parliament, WIM = % women in ministerial positions, GDI = gender development index, WWE = women's wage equality; WHH = % women-headed households; WUC = % women using contraception; WMM = women's mean age at marriage; DR = divorce rate; WSRI = women's sex-role ideology; MSRI = men's sex-role ideology; LWHS = low women's hostile sexism, LMHS = low men's hostile sexism, LCM = low cultural masculinity; * = $p < .05$, ** = $p < .01$, *** = $p < .001$; [a] = correlation could not be computed due to only one overlapping nation.

unrestricted in nondemanding environments. Although some men's sociosexuality is thought to react to women's sociosexual shifts to a certain degree, other men were "were able to carry out short-term tactics successfully at all times, regardless of the environmental factors to which women were responding" (Gangestad & Simpson 2000, p. 586).

As a result, women's sociosexuality should be highly dependent on environmental demands, but men's sociosexuality – as a group – should be somewhat less correlated with environmental stressors, resource levels, and mortality rates. Importantly, because men tend to be more oriented toward short-term mating in general (Buss & Schmitt 1993), the size or magnitude of the difference between men and women should be larger in demanding environments where women shift away from men's higher levels of unrestricted sociosexuality[3].

These hypotheses were evaluated by correlating various indicators of environmental demand with men's sociosexuality, women's sociosexuality, and with the effect size (d) of the sex difference in sociosexuality across cultures. As seen in Table 10, sex differences in sociosexuality were related as predicted to several indicators of environmental demand. For example, as the prevalence of low birth weights increased, the difference between men and women marginally increased, $r(42) = +0.23$, $p < .10$. This may support the view that a demanding reproductive environment (as indexed by a greater prevalence of low birth weights) leads to larger sex differences in sociosexuality. Similar results were found for women's mean age at marriage and GDP (gross domestic product per capita).

In addition, women's sociosexuality, in many cases, was more strongly related to environmental demand than men's sociosexuality. For example, using Fisher's r' to z test, cultural levels of GDP were found to more strongly relate to

Table 9. *Are sex differences in sociosexuality associated with women's political-economic equality, relational-reproductive freedom, and progressive sex-role ideologies?*

	Correlation with Men's SOI	Correlation with Women's SOI	Correlation with Effect Size
Political and Economic Equality Should Increase Women's Sociosexuality, Leading to Smaller Sex Differences:			
Gender Empowerment Measure (n = 34)	0.22	0.65***	−0.56***
% Women in Parliament (n = 46)	0.21	0.59***	−0.35***
% Women in Ministerial Positions (n = 46)	0.15	0.35**	−0.25*
Gender Development Index (n = 45)	0.19	0.49***	−0.15
Women's Wage Equality (n = 27)	0.44**	0.37*	−0.06
Relational and Reproductive Freedom Should Increase Women's Sociosexuality, Leading to Smaller Sex Differences:			
% Women-Headed Households (n = 29)	0.10	0.55***	−0.54***
% Women Using Contraception (n = 37)	0.03	0.30*	−0.11
Divorce Rate (n = 23)	0.23	0.53**	−0.42*
More Progressive Sex Role Ideologies Should Increase Women's Sociosexuality, Leading to Smaller Sex Differences:			
Women's Sex-Role Ideology (n = 8)	0.73*	0.80**	−0.10
Men's Sex-Role Ideology (n = 8)	0.65*	0.74*	−0.13
Low Women's Hostile Sexism (n = 14)	0.59**	0.68**	0.16
Low Men's Hostile Sexism (n = 14)	0.42	0.73**	−0.13
Low Cultural Masculinity (n = 43)	0.16	0.07	0.14

Note: * = $p < .05$, ** = $p < .01$, *** = $p < .001$.

women's sociosexuality, $r(44) = +0.43$, $p < .001$, than to men's sociosexuality, $r(44) = -0.05$; $z = 3.34$, $p < .001$. This same sex-differentiated pattern of correlations was evident for infant mortality rate, teen pregnancy rate, mean age at marriage, and the Human Development Index.

As environments become more demanding, it appears women's sociosexuality shifts and becomes more monogamous, much more so than men's sociosexuality shifts toward monogamy. As environments become less demanding, in contrast, it is women's sociosexuality that becomes more promiscuous, much more so than men's. This appears to be true even though men are generally more variable across cultures, and so the possibility for men's sociosexuality to correlate with environmental factors is greater. Overall, these findings suggest that cross-cultural shifts in sexual differentiation may be caused by the effects of environmental demand on women's sociosexuality, supporting the general view that women's sexuality is more responsive to cultural influences than men's (Baumeister 2000), and confirming a key implication of strategic pluralism theory (Gangestad & Simpson 2000).

Indeed, many of the predictions from strategic pluralism theory concerning national levels of sociosexuality were confirmed in the ISDP. In almost every respect, in cultures where rearing offspring is difficult and biparental is strongly needed (e.g., high infant mortality rates), sociosexual levels tend toward monogamy. Alongside sex ratio theory (Pedersen 1991), strategic pluralism theory should therefore be viewed as an empirically supported evolutionary perspective on sociosexual variation across cultures. Although sex ratios and indexes of environmental demand were in many cases correlated, the effects of sex ratio and strategic pluralism factors appeared to be independent and cumulative. For example, national sex ratios and infant mortality rates were positively correlated across the cultures of the ISDP, $r(45) = +0.36$, $p < .01$. Using standard multiple regression to predict national levels of sociosexuality, the semipartial correlations (which represent the unique contribution of a variable) for national sex ratios ($sr = -0.37$, $p < .01$) and for infant mortality rates ($sr = -0.25$, $p = .08$) retained at least marginal significance after the other predictor was partialed out. All told, these two factors explained approximately 26.1% of the variance in sociosexual variation across cultures, with 17.2% coming independently from either national sex ratios or infant mortality rates and 8.9% coming from shared variance.

In addition, after dividing nations with median splits on national sex ratio and infant mortality indexes, the relationships of sex ratio and infant mortality categories did not statistically interact. As shown in Figure 2, the effects of sex ratio ($\eta^2 = 0.03$) and infant mortality ($\eta^2 = 0.02$) were small main effects, with countries like Austria and Belgium (low sex ratio, low infant mortality) registering the highest sociosexual levels, and countries like Bangladesh and Bolivia (high sex ratio, high infant mortality) scoring lowest in sociosexuality. Although no unifying theory of human mating can yet account for all of these results, it appears that several evolutionary theories in combination can explain a substantial amount of cultural variability in sociosexuality.

Interestingly, the combined effects of strategic pluralism theory (Gangestad & Simpson 2000) and social structural theory (Eagly & Wood 1999) also appeared to be somewhat independent and cumulative. For example, the percentage of women in parliament and the prevalence of low-birth-weight infants were negatively associated across the cultures of the ISDP, $r(42) = -0.30$, $p < .05$. Using standard multiple regression to predict sex differences in sociosexuality, the independent effect of the percentage of women in parliament was significant ($sr = -0.32$, $p < 0.05$), though the independent effect of low-birth-weight infants failed to

Table 10. *Are sex differences in sociosexuality associated with the demanding nature of local environments?*

	Correlation with Men's SOI	Correlation with Women's SOI	r' to z test for Sex Differences in Correlations	Correlation with Effect Size
Demanding Environments Should Attenuate Women's Sociosexuality, Leading to Larger Sex Differences:				
Prevalence of Low Birth Weight (n = 44)	−0.33**	−0.53***	1.58	0.23
Child Malnutrition Prevalence (n = 20)	−0.56**	−0.44*	−0.66	−0.11
Infant Mortality Rate (n = 47)	−0.20	−0.45***	1.87*	0.09
Teen Pregnancy Rate (n = 45)	−0.17	−0.47***	2.19**	0.18
Fertility Rate (n = 46)	−0.15	−0.37**	1.55	0.05
Nondemanding Environments Should Accentuate Women's Sociosexuality, Leading to Smaller Sex Differences:				
Mean Age at Marriage for Women (n = 41)	0.04	0.48***	−2.98***	−0.42**
Life Expectancy (n = 46)	0.25*	0.41**	−1.19	0.03
Gross Domestic Product (n = 46)	−0.05	0.43***	−3.34***	−0.35**
Human Development Index (n = 46)	0.19	0.48***	−2.17*	−0.14

Note: * = $p < .05$, ** = $p < .01$, *** = $p < .001$

reach significance ($sr = 0.13$, $p = 0.38$). All told, these two factors explained approximately 14% of the variance in sociosexual sex differences across cultures, with 10.7% coming independently from either women in parliament or low birth weights and 3.3% coming from shared variance.

In addition, after dividing nations with median splits on the percentage of women in parliament and the prevalence of low-birth-weight infants, the interaction between women in parliament and low birth weights was not significant. As shown in Figure 3, the effects of women in parliament ($\eta^2 = 0.08$) and low birth weights ($\eta^2 = 0.04$) were moderate main effects, with countries like Bangladesh and Brazil (i.e., few women in parliament, frequent low birth weights) registering the largest sex differences in sociosexuality, and countries like Australia and Austria (i.e., many women in parliament, infrequent low birth weights) producing the smallest – though still moderate in size – sex differences in sociosexuality. One avenue for determining whether one theory is more compelling than the other would include studying cross-cultural shifts in social roles and demanding reproductive environments over time (e.g., Budig 2003). Depending on the timing of subsequent shifts in sociosexuality, one theory could be demonstrated as superior to the other in predicting change in sociosexual sex differences. At present, given the snapshot nature of the

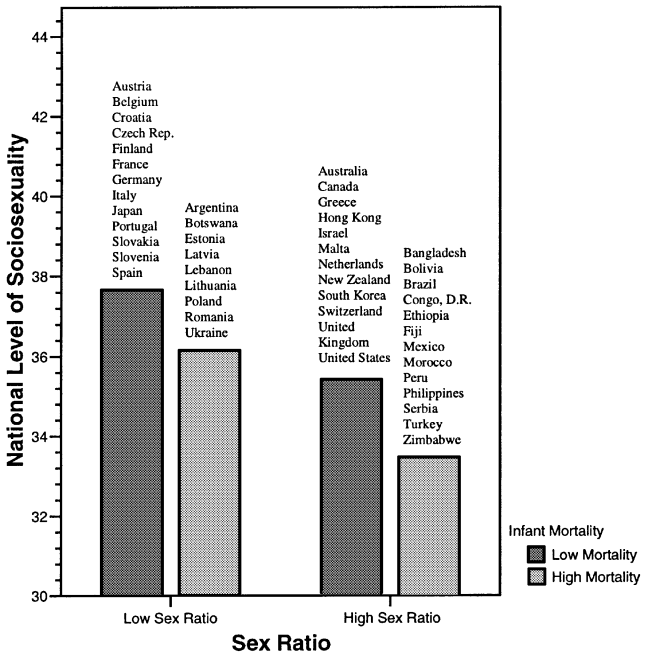

Figure 2. National level of sociosexuality related to operational sex ratio and infant mortality rate.

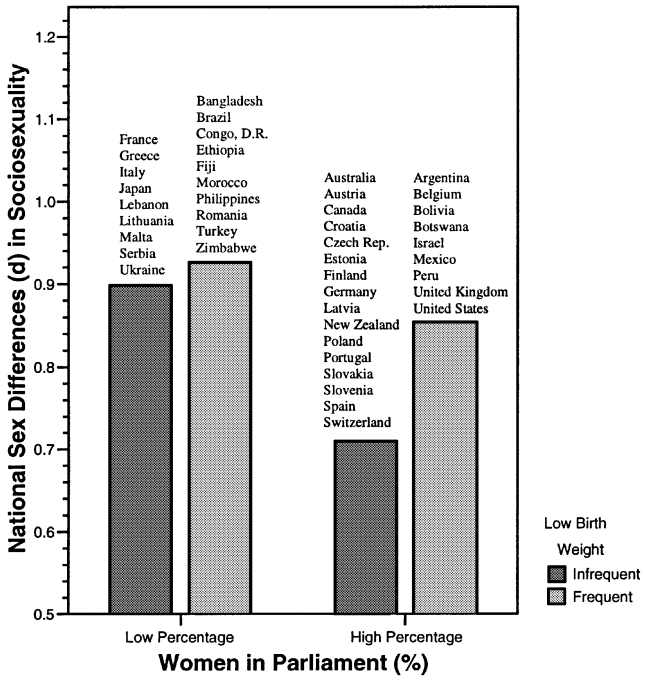

Figure 3. National sex differences (d) in sociosexuality related to the percentage of women in parliament and the frequency of low-birth-weight infants.

current study, it must be concluded that both strategic pluralism and social structural theory are needed to explain the full spectrum of cultural variability in sociosexual sex differences.

7. Discussion

The Sociosexual Orientation Inventory (SOI) is a seven-item self-report survey that measures basic human mating strategies (Simpson & Gangestad 1991). Low scores on the SOI signify that a person is sociosexually restricted and follows a more monogamous or long-term mating strategy. High SOI scores indicate that an individual is unrestricted and has a more promiscuous or short-term oriented mating strategy. In this study, the SOI was translated from English into 25 additional languages and administered to a total sample of 14,059 people across 48 nations. Responses to the SOI were used to address four main issues, beginning with a cross-cultural analysis of SOI psychometrics.

7.1. Sociosexuality and psychometrics

The SOI possesses adequate reliability and validity both within and across the diverse range of human cultures represented in the ISDP. Within nearly all cultures, the SOI comprises a single dimension, is internally reliable, and demonstrates convergent validity. Across cultures, national averages of sociosexuality are significantly correlated with other sex-related measures within the ISDP and with external indexes that are related to sociosexual attitudes from the World Values Survey (Inglehart et al. 1998), the International Social Survey Program (Widmer et al. 1998), and the Global Sex Survey (SSL International 2001).

Despite these supportive results, the SOI responses in this study are in many ways of limited value. For one, the reliance on self-report as the sole means of sociosexual assessment is a serious limitation, particularly with the highly sensitive nature of sexual self-description (Meston et al. 1998; Whitely 1996). Still, complete anonymity tends to increase the validity of sex surveys, especially when compared to other forms of assessment such as face-to-face interviews (Andersen & Broffitt 1988; Schaeffer 2000). Alexander and Fisher (2003) recently documented that sex differences in sexual attitudes as measured by the Sexual Opinion Survey are the same whether obtained through anonymous administration methods (d = 0.37) or through the bogus pipeline procedure in which participants believe they are responding while connected to a lie detector (d = 0.36). When sexuality was assessed via nonanonymous surveys, however, sex differences in sexual attitudes were much larger (d = .71), implying that sex roles and expectations detrimentally influence nonanonymous sex survey responses in socially desirable directions. In the ISDP, all participants were assessed under completely anonymous conditions. This suggests that the measurement of sexuality in the ISDP was relatively valid and free of response bias, at least compared to face-to-face sexuality interviews or other nonanonymous assessment methods.

Even though ISDP participants were measured anonymously, the cross-cultural nature of the ISDP raises additional questions about the veridicality of survey responses (Brislin 1993; Triandis 1994). Any observed cultural differences, for example, may be caused not only by a real cultural disparity on sociosexuality but also by inappropriate translations or the nonidentical response styles prevalent in various cultures (Diener & Suh 2001; Grimm & Church 1999; van Hemert et al. 2002; van de Vijver & Leung 2000). Although full validation of all ISDP survey translations is beyond the scope of this study, future research using bilingual administrations, acculturation studies, and the inclusion of response bias measures will help to verify the cultural profiles of sociosexuality found in the ISDP. At present, the lack of complete unit and scalar validity information for all ISDP translations leaves open the important question of translation quality.

Concerns over sampling issues are also critical and raise the additional caveat of generalizability. The convenience sampling techniques used in the ISDP allowed for a large number of cultures to be studied, but in turn this same sampling method seriously limited the representativeness of national SOI profiles. Because the ISDP samples were primarily college students, any generalizations beyond college-aged populations would be inappropriate. Importantly, the sociosexual lives of college-aged individuals may be quite different from older and more experienced men and women (Fisher et al. 2002; Schmitt et al. 2001b). Future research using representative sampling that includes older and more sexually experienced participants is needed to further refine our understanding of nation-level sex differences in sociosexuality.

An additional concern with the ISDP national profiles of sociosexuality involves variability in college student demographics across cultures. In the ISDP samples from Africa, as with most samples, almost all participants were college students. Unlike many Western cultures, though, college students are rather unrepresentative of many national African populations. The effect of sampling only college students renders all of the current findings tentative until more sophisticated sampling techniques can be employed. However, because all nations were represented by college-aged samples, any differences between samples may tend to elucidate the effects of culture, rather than age-related demographic confounds. In addition, once individuals enter into marriage, their sexual desires and behaviors are necessarily limited to some degree by their partners, implying that college student samples may provide fruitful testing grounds for theories of sex-specific sexual desires and the initial stages of romantic relationship formation.

A final limitation of the current study is that all of the samples in the ISDP came from nation-states. It would have been ideal to include additional samples from hunter-gatherer and tribal-horticultural societies. The ISDP findings based on nation-states do seem to mesh with at least some cross-cultural studies of sexuality in foraging cultures. For example, in a recent study of forager mating systems (Marlowe 2003), in cultures where men contributed less to local food consumption (similar perhaps to more economic gender equality in nation-states), foragers tended to possess polygynous mating systems. When men contributed relatively more (i.e., less economic gender equity), monogamy was more prevalent among foragers. Although polygynous mating systems are certainly not the same as heightened unrestricted sociosexuality in men, the findings of Marlowe (2003) were similar in some ways to the results of the ISDP. For example, as ISDP men controlled a larger portion of the national economy (i.e., less economic gender equity), monogamy was more prevalent. Ultimately, future research

taking factors such as sampling technique, local economics, age of participants, and response biases into account will be needed to fully verify the psychometric value of nation-level scores on the SOI.

7.2. Sociosexuality and culture

The second major objective of this study was to evaluate three theories concerning the systematic distribution of sociosexuality across cultures. Sex ratio theory (Guttentag & Secord 1983; Pedersen 1991) received strong support. Sex ratio theory postulated that cultures with disproportionately more men than women would be driven, via the powers of sexual selection, by women's evolved desires for monogamous, long-term mating. As displayed in Figure 1, cultures with more men than women are more sociosexually restricted than cultures with more women than men. It may seem counterintuitive to argue that women's evolved desires drive mating systems in cultures like South Korea, Hong Kong, and Taiwan, where male offspring are often considered more valuable (Hudson & den Boer 2004). However, the artificially high sex ratios that result from preferring male children seem likely to influence the dynamics of human mating for adults in these cultures, with women becoming a valued resource and many men finding themselves without mating partners. Thus, the cultural test cases of the ISDP appear to fit well within sex ratio theory as posited by Pedersen (1991).

Although these results are consistent with the notion that sex ratio drives mating behavior, equally compelling alternatives exist that could explain these findings. For example, it could be that sex ratio drives other factors associated with sexual selection that, in turn, are the determining forces in mating behavior. For example, a low sex ratio (i.e., fewer men than women) in a culture may lead men to engage in greater intrasexual competition and more intense mating effort, causing sociosexuality to increase via male–male competition and conquest rather than by men's intersexual mate preferences affecting women's sociosexual behavior. In addition, in cultures with more men than women, it may be men's desires to sequester and constrain women through chastity and marriage, rather than women's long-term mating psychology, that cause high sex ratio cultures to be more sociosexually restricted.

One area for future research will be to determine whether the effects of sex ratio are linear, or whether certain thresholds exist that might cause cascades of change in sexuality (see Low 1990). For example, based on the relationship between sex ratio and national sociosexuality levels in Figure 1, it appears that once women begin to outnumber men at a sex ratio of about 95, the national level of sociosexuality becomes especially accentuated. This finding may have implications for some social policies linked to cultural sex ratios. For example, there is currently an excess of women in many American urban environments, in large part a result of gang-related male homicides and a high rate of male imprisonment. In these environments, social policies that exacerbate the excess of females (e.g., drug laws that place large numbers of men in prison) may well serve to increase the unrestricted sociosexuality of the local population. Such a shift could have unintended secondary effects on single-parenting (Burton 1990; Draper & Harpending 1982; Lancaster 1989), sexual aggression (Malamuth 1996; Thornhill & Palmer 2000), and risky sexual behavior associated with HIV/AIDS (Seal et al. 1994; Tangenberg 2003).

Again, even if sex ratios are strongly correlated with sociosexuality across cultures, this does not mean that sex ratios necessarily cause shifts in sociosexuality. It may be that sex ratios and sociosexuality are responding to a third factor (e.g., modern contraception), or that sex ratios are a function of sociosexual mating behavior itself. For example, as unrestricted sociosexuality increases, the variance in male reproductive success may increase relative to the variance of female reproductive success. This could lead to greater developmental selection on males (e.g., in utero, early risk taking, etc.), and even greater imbalances of males to females could result. By studying shifts across cultures over time and determining whether sociosexual shifts reliably ensue after major shifts in sex ratio, researchers could take an important step toward establishing a direct causal link between these variables. Future studies should address concerns with other possible third variables (such as age-related mortality and the Trivers-Willard Effect; Grant 1998) that could underlie shifts in both sex ratio and sociosexuality, as well as looking at the different effects of sex ratio on mating behavior across the lifespan.

According to the developmental-attachment perspective (Belsky et al. 1991; Chisholm 1996), cultures with high family stress, low resources, and high mortality should have more promiscuous or unrestricted sociosexual orientations. This perspective was not supported across the ISDP. Interestingly, other attempts to validate the stress-related aspects of this model have failed (e.g., Moffitt et al. 1992; Rowe 2002). For example, recent research has speculated that in young girls it may be the pheromonal presence of a stepfather (Ellis et al. 1999; Ellis & Garber 2000), or the inheritance of an X-linked androgen receptor gene (Comings et al. 2002), rather than familial stress, that causes earlier maturation and the development of unrestricted sociosexual orientations (see also Dunifon & Kowaleski-Jones 2002). Nevertheless, there were two major shortcomings with the current manner of testing developmental-attachment theory. First, the variables used to test this perspective were only indirect measures of the constructs most central to developmental-attachment theory. For example, familial stress was represented by United Nations data on child malnutrition rates. Although this variable certainly reflects some degree of physical stress within families, it is not a measure of family stress in situ. It is only a cultural average that may have little to do with an individual participant's family history. Future research testing developmental-attachment theory within families from multiple cultures would more directly test the basic premises of developmental-attachment theory.

A second shortcoming in the current test of developmental-attachment theory is that cultures with high levels of family stress were not representatively sampled in the ISDP. For example, in the ISDP samples from Africa, most participants were college students. Unlike many Western cultures, African students from Botswana, Congo, Ethiopia, and Zimbabwe may constitute a subportion of their cultures that is especially exempt from high rates of familial stressors. Again, sampling only college students renders the current findings tentative until more sophisticated sampling techniques are employed. In addition, several nations from the full range of ISDP cultures did not complete the SOI. Nations such as Jordan, India, Indonesia, Malaysia, South Africa, and Tanzania

would have added more stress-related variability to the sample and improved the testing of developmental-attachment theory. Additional samples from foraging and tribal horticultural societies would also improve the testing of attachment theory using the current set of variables and would allow researchers to account for a wider range of demographic phenomena, including the fertility transition (Townsend 2003). In sum, future research in which truly representative samples from a wider range of cultures, as well as employing direct questions pertaining to immediate family environments, will be needed to more accurately evaluate the links between family stress and sociosexuality.

Although the ISDP data run counter to previous findings that support developmental-attachment theory (e.g., Belsky et al., 1991), it may be possible to accommodate previous findings with those of the ISDP. In a recent study, Barber (2003) documented across 85 nations that national levels of GDP were negatively related to teen birth rates. This negative association was also evident among the 45 nations of the ISDP for which data were available. In a sense, this suggests that resource-poor environments are associated with higher rates of early reproduction – a finding that could be seen as supporting the developmental-attachment perspective. However, Barber also found that resource-poor environments (i.e., lower levels of GDP) were associated with lower nonmarital or single-mother birth rates (both indicative of more restricted sociosexuality). Thus, as cultural regions possessed greater resources, rates of women giving births without being married (i.e., more unrestricted mating) actually increased, precisely as predicted by strategic pluralism theory (Gangestad & Simpson 2000). An integrated explanation of Barber's (2003) findings and those of the current study may reside in the idea that environmental resource levels affect different components of sociosexual mating strategies in different ways. The early reproduction component of unrestricted mating (e.g., high teen birth rates) appears to be activated or evoked by exposure to low resource levels (see also Ellis et al. 1999). The adult components of unrestricted mating (e.g., high single-parenthood), however, appear to be activated by high resource levels (Gangestad & Simpson 2000). Future research in which the various age-based components of sociosexuality are directly measured will help to clarify these divergent associations of culture and sexuality.

According to strategic pluralism theory (Gangestad & Simpson 2000), in cultures where rearing offspring was difficult and biparental care was more strongly needed (e.g., high infant mortality), sociosexual levels should tend toward monogamy. This perspective is consistent with nearly all the ISDP findings. For example, low birth weights, high child malnutrition, high infant mortality, poor human development, and low life expectancies were all associated with higher rates of monogamy or restricted sociosexuality across cultures. High rates of teenage pregnancy, women's young age at marriage, and high rates of fertility were also associated with greater monogamy. Strategic pluralism theory, therefore, should be viewed as a well-supported evolutionary perspective on sociosexual variation across cultures.

7.3. Sociosexuality and sex differences

The third major goal of this research was to determine whether sex differences in sociosexuality are cross-culturally universal across the 48 nations of the ISDP. The hypothesis that men should be more unrestricted than women across cultures is fundamental to several evolutionary theories of human mating (e.g., Buss & Schmitt 1993). In support of this perspective, men were more unrestricted than women across all nations of the ISDP. This tended to be true when looking at means, medians, and distributions; when looking at sociosexual attitudes and behaviors; and – most importantly – the magnitude of this difference was moderate to large in size regardless of the moderating effects of culture. Overall, the average mean-level man scored about three-quarters of a standard deviation higher on the SOI than the average mean-level woman – one of the largest and most robust cross-cultural differences ever documented in the sexuality literature (Oliver & Hyde 1994). In addition, based on ANOVA methods, the overall effect size of biological sex is quite large ($\eta^2 = 0.15$), more than double the more moderate effect size of nation ($\eta^2 = 0.06$). Finally, because some SOI items are constrained (e.g., the behavioral item regarding one-night stands should show similar levels for men and women of closed populations), the size of these sex differences should be viewed as conservative estimates of the true degree of sexual differentiation in sociosexual orientation.

Of course, there could be cultures in which extreme sociocultural pressures mute evolved sex differences in sociosexuality. For example, the well-documented sex differences in homicide and physical aggression (Daly & Wilson 1988; Eagly & Steffen 1986; Hyde 1986) appear to require cultural milieus in which aggression is tolerated for strong gender differences to materialize (Goldstein 2001). In cultures that have recently been subjugated by larger groups, for example, aggressive behaviors are often muted, and sex differences can retreat from view (Keeley 1996). Nevertheless, this appears not to be the case with sociosexuality, and it can be concluded that men's higher levels of sociosexuality are a cultural universal that spans the limited range of nations represented in the ISDP.

If men do possess psychological design features that reliably lead to higher levels of sociosexuality, this would in no way justify their unrestricted sexual behavior in a moral sense (Barash & Lipton 2001). Such a conclusion would be the result of faulty reasoning known as the "naturalistic fallacy" or "because something is (natural), it ought to be." There are myriad examples of unpleasant behaviors that are to some degree natural, in that they probably occurred with some frequency over our evolutionary history (e.g., high child mortality, intergroup conflict, perhaps even warfare). Just because something is natural does not justify it. Instead, understanding the *way* that a behavior is natural – especially the underlying psychological adaptations that give rise to the behavior – may help to control the behavior if that is what a culture decides is preferable (see Nesse & Williams 1994). Indeed, increasing our scientific knowledge about the theoretical links between culture and sexuality may prove crucial to alleviating the public health problems of overpopulation, reproductive dysfunction, sexually transmitted diseases, HIV/AIDS, and – seemingly at the heart of most health concerns – gender inequity (David & Russo 2003).

7.4. Sociosexuality, sex differences, and culture

The final objective of the current study was to test theories concerning cultural variation in the size of the difference between men's and women's sociosexuality. Social structural

theory (Eagly & Wood 1999; Wood & Eagly 2002), the structural powerlessness hypothesis (Buss & Barnes 1986), and strategic pluralism theory (Gangestad & Simpson 2000) all received empirical support. In favor of social structural theory and the structural powerlessness hypothesis, it appears that women's access to greater political, economic, and relational freedom is cross-culturally linked to more moderate sex differences, primarily because of women's marked increase in sociosexuality. Indicators of greater gender equity are sometimes associated with higher sociosexuality in men, but to a lesser degree than among women. The ISDP results also demonstrate that liberal or progressive sex role ideologies are linked with increases in both men's and women's sociosexuality. These findings run parallel to those of Hendrix and Pearson (1995), who found that gender equality is positively associated with nonmonogamous mating behavior in both sexes. When progressive sex roles give them the opportunity, it appears, both men and women tend toward sexually promiscuous attitudes and behaviors.

The ISDP finding of gender equity having a greater impact on women's sexuality is consistent with previous research on historical shifts in sexuality. For example, Laumman et al. (1994) found that the percentage of individuals who had five or more sex partners increased across age cohorts in a national probability sample of the United States. Among men raised before the liberalizing sexual revolution of the 1960s, 22% had engaged in sexual intercourse with five or more partners by age 20. Among men who came of age during the sexual revolution, 29.8% had engaged in sex with five or more women by age 20, a significant but limited impact. For women, the effects of gender equity via the sexual revolution appeared much more profound. Among women raised before the sexual revolution, 1.1% had engaged in sex with five or more partners by age 20. Among women coming of age during the sexual revolution, 11.5% had engaged in sex with five or more partners by age 20, a nearly 1000% increase. Overall, the ISDP findings suggest that the cross-cultural attenuation of sex differences in sociosexuality is driven mainly by women's increased promiscuity – an increase that seems to stem from women's greater access to political, economic, and relational freedom.

It should be noted that the current ISDP findings do not suggest that men and women will soon become *equally* promiscuous in both attitudes and behaviors, even when women are eventually treated as the social equals of men across all cultures. For example, the sexual double standard, in which men are allowed to be promiscuous but women are confined to chastity before marriage and monogamy during marriage, is beginning to decrease or even disappear in cultures such as China, Iran, Morocco, Russia, and Thailand (see Hatfield & Rapson 1996). It is often found completely lacking (or even reversed) in more progressive cultures such as the United States (DeLamater & MacCorquodale 1979; Milhausen & Herold 2001; Sprecher 1989). Even so, sociosexual sex differences are generally large in the ISDP samples from United States (overall $d = 0.73$). A recent study in Japan found that gender role differences are diminishing over time to the point that Japanese men and women no longer differ on the Japanese Gender Role Index (Sugihara & Katsurada 2002). Nevertheless, sociosexual sex differences in the ISDP sample from Japan are moderate to large in size ($d = 0.63$). Among the 48 nations of the ISDP, the five nations with the highest levels of gender equity ratings on the United Nations Gender Development Index are Australia ($d = 0.66$), Canada ($d = 0.75$), the United States ($d = 0.73$), Belgium ($d = 0.69$), and the Netherlands ($d = 0.76$). In each nation, sex differences in sociosexuality are conspicuous, ranging from moderate to large in size. Relatively egalitarian sexual standards and gender role beliefs for men and women in modern cultures, therefore, may attenuate sex differences in sociosexuality, but they appear unlikely to reduce them to less than moderately-sized magnitudes of effect. According to sexual strategies theory (Buss & Schmitt 1993), a possible cause of men's and women's continued sociosexual dissimilarity may reside in the evolved differences in men's and women's fundamental short-term mating desires (see also Schmitt et al. 2003b).

The current findings do suggest that women's sociosexual attitudes and behaviors will get closer to men's as gender equality becomes more common, but it seems unlikely that men and women would ever possess precisely equal levels of sociosexuality. Such a conclusion must remain speculative, however, because of the limited variability of ISDP nations. The ISDP only sampled modern nation-states. In many foraging cultures, women appear to have much greater sexual freedom than in most modern nation-states (Broude & Greene 1976; Frayser 1985; Pasternak et al. 1997). This level of freedom was not adequately represented in the current investigation. Moreover, some modern cultures in the ISDP with high levels of women in parliament have high levels because of quota laws that artificially compel them. Although the passage of such laws by governments must to some degree reflect the greater polity's views on gender equality, the high levels of women's political participation in the ISDP nations may falsely portray the reality of gender relations in those cultures. In any event, one implication of the current findings is that reaching a cultural plateau where women sociosexually think, feel, and behave in a manner identical to men may be extraordinarily difficult to attain in modern cultures.

The findings on sex differences from the perspective of strategic pluralism theory (Gangestad & Simpson 2000) are highly supportive. It appears that harsh and demanding reproductive environments (e.g., high rates of low-birthweight infants) are associated with a decrease in sociosexuality. As with sociopolitical gender equality, this effect of culture on mating strategies appears to manifest itself primarily through changes in women's sociosexuality. As cultures become harsher, women move toward monogamy – while men tend to remain relatively promiscuous – and the resulting sex differences in sociosexuality become more conspicuous. As cultural demands decrease and environments become less harsh, women appear to move closer to men's levels of sociosexuality. However, as predicted by parental investment theory (Trivers 1972), women never actually match men's overall level of unrestricted sociosexuality. It appears, therefore, that men and women are designed to follow conditional mating strategies, and at times the adaptive responses to local environments reduce sex differences in sociosexuality to relatively modest levels.

8. Conclusions

The current investigation accomplished four main objectives, each of which represents an advance in our understanding of culture and human mating. First, the SOI was shown to be psychometrically sound across the nations of

the ISDP, ensuring future researchers that reliable and valid assessments of sociosexuality are possible within non-Western cultures. Second, national levels of sociosexuality were linked to sociocultural variables in ways that ruled out some evolutionary theories, while providing important – though limited – confirmations of others. Third, sex differences in sociosexuality were shown to be culturally universal across the ISDP, supporting one of the defining features of parental investment theory (Trivers 1972), sexual strategies theory (Buss & Schmitt 1993), and other evolutionary perspectives on human mating. Fourth, sex differences in sociosexuality displayed clear patterns across nations, with women's political, economic, and relational equality, as well as undemanding reproductive environments, reliably associated with more moderate levels of sexual differentiation.

In the history of science, the more valued studies are often those that provide a direct contrast among competing theories and are able to rule out some theories in favor of others. In the present study, the most consistent finding was that men scored higher on sociosexuality than women across cultures. Several different theories were evaluated concerning why men and women differ in this way. They all received at least some empirical support. As a result, we are left with the relatively unsatisfying conclusion that sociosexual sex differences are predictable from several theoretical perspectives, none of which is conspicuously superior to the others. Perhaps future investigations with additional measures and variables, carried out over the course of several years, will be able to determine whether one of these competing theories is superior to the others. At present, it appears that multiple perspectives are required to more fully explain the cultural and gender-linked variance in sociosexuality.

If several of the theories evaluated in present study are partially correct, it would be desirable to integrate the most powerful features of these varying perspectives into a cohesive explanatory framework. This may be achieved by acknowledging that sociosexual tendencies across cultures – both overall levels and sex differences – depend on a several interrelated psychological adaptations. The patterning of sociosexuality across nations suggests that human mating systems as a whole are adaptively responsive to at least two aspects of the local ecology. In cultures with male-biased sex ratios, the mating system adaptively shifts toward monogamy, perhaps in response to the sexually selective desires of women. In cultures with female-biased sex ratios, the system tends to shift toward promiscuity in response to the sexually selective desires of men. Human mating systems further appear to adaptively respond to ecological stress. In high-stress or demanding local environments, the mating system adaptively shifts toward monogamy; whereas in undemanding environments the system tends to shift toward unrestricted sociosexuality – at least those aspects of sociosexuality linked to adult forms of sexual promiscuity.

Although adaptive shifts in sociosexuality occur across mating systems as a whole, the evolved mating desires of men and women within those systems are not necessarily identical. The universal sex differences evident in the present study suggest that men and women possess psychological design features that cause at least moderately sized sex differences in sociosexuality to reliably emerge across all ecological contexts (at least those tested in the ISDP). The degree of sexual differentiation, however, depends on several sociopolitical factors, including aspects of gender equity such as women's political, economic, and relational equity; progressive sex role ideologies; and the degree of patriarchy. More equitable treatment and valuation of women tend to attenuate sex differences, particularly by increasing women's sociosexual attitudes and behaviors. When women are provided with the opportunity to more freely pursue their sexual desires, therefore, evolved facets of women's short-term mating psychology appear to become activated. Women never precisely match the sociosexual psychology of men, but women's overall level of sociosexuality comes closer to men's when it is given the chance. The current findings support the view that women's sexuality is often constrained by cultural values and social institutions, and the "true" nature of women's sexuality includes short-term mating desires and some degree of sexual promiscuity (Barash & Lipton 2001; Hrdy 1999; Schmitt et al. 2001a).

The demanding nature of the local environment also plays a role in determining the size of sex differences in sociosexuality. If the local ecology is demanding, sex differences in sociosexuality are accentuated, primarily through the dampening of women's unrestricted sociosexuality. That is, when low birth weights, child malnutrition, and infant mortality are prevalent, women adaptively shift toward a more monogamous mating strategy and the natural gap between men's and women's sociosexuality widens. When resources are plentiful, life expectancies are long, and cultures invest heavily in human development and welfare, women adaptively shift toward more promiscuous mating strategies and the natural gap between men's and women's sociosexuality narrows. In this way, the effects of culture on sex differences in sociosexuality may be viewed as a series of environmentally contingent psychological adaptations.

This evolutionary framework of human mating psychology – based on adaptations that cause cultural and sex-linked variations in sociosexuality – is far from complete. For one, twin studies suggest that heritable factors may play a role in causing individual differences in sociosexuality. Dunne et al. (1997) examined a large sample of Australian twins and found that age at first intercourse (a likely facet of sociosexuality) was highly heritable. Among those twins under 40 years old, the heritability of age at first intercourse was estimated at 72% for men and 40% for women. Although this reinforces the perspective that women's sociosexuality may be more responsive to culture, it also suggests that the adaptations postulated earlier will have a limited influence compared to inherited baseline levels of sociosexuality, especially in men (see also Lyons et al. 2004; Rowe 2002). Second, many established physiological substrates of sexuality, such as the relationship of testosterone to unrestricted sociosexuality (Dabbs 2000; Udry & Campbell 1994), are not included in the current framework. Third, religion has been shown to influence sociosexual tendencies (Goodwin 1999; Wellings et al. 1994), particularly among women (Baumeister & Twenge 2002; Sheeran et al. 1996). The same appears to be true for political ideology (DeLamater & MacCorquodale 1979; Pratto 1996), sexual orientation (Bailey et al. 1994; Blumstein & Schwartz 1983), education level (Laumann et al. 1994; Wilson 1975), and pathogen stress (Gangestad & Simpson 2000; Low 1990). None of these factors have been fully integrated into the analyses presented here. The current perspective, in which sociosexuality is seen as resulting from a collection of psychological adaptations, is quite limited in scope. Still, this evolutionary framework may have some use as a heuristic for future theorizing on the psychology of human sexual strategies.

The cross-cultural profiles of sociosexuality generated by the ISDP also may function as an empirical resource for testing other theories concerning the links among sex, culture, and the strategies of human mating. For example, theories concerning religious, political, and geographic origins of human mating strategies could be evaluated given the data in the ISDP (Barber 2002; Mealey 1990; Reynolds & Tanner 1983; Rushton 1995). According to Rushton's (1995) theory on race and character, East Asian samples should have scored lowest on the SOI, followed by "Caucasoids," and then African samples. To the contrary, people from African cultures scored precisely the same as East Asians in the ISDP, and people of European ancestry scored significantly higher than any other ethnic category.

The current data set also can be used to rule out evolutionary theories that postulate women (and men) are designed solely for long-term mating (e.g., Hazan & Diamond 2000; Miller & Fishkin 1997; Zeifman & Hazan 1997). More than 22% of women and 36% of men in the ISDP reported having sexual intercourse with more than one partner in the previous year (i.e., SOI item one). Almost half of women (43%) and most men (62%) reported that they foresee having sex with more than one partner in the next five years (i.e., SOI item 2). Perhaps most compelling, in cultures where women possess more political, economic, and relational power to make their own sexual decisions, women appear to preferentially choose a more unrestricted form of sociosexual expression. Clearly, the notion that women are designed solely for lifelong pair bonding, and that any deviation from long-term monogamy represents a maladaptive response of our pair-bonding system (Miller & Fishkin 1997), is at odds with the prevailing evidence that multiple mating is a relatively common – and in some ways preferred – sexual strategy (see also Schmitt et al. 2003b). Evolutionary theories that postulate that women and men fundamentally differ in sociosexuality (Buss & Schmitt 1993), and that ecologically sensitive mating adaptations cause sex-specific and culture-level shifts to occur along the monogamy-promiscuity dimension (Gangestad & Simpson 2000; Pedersen 1991; Wood & Eagly 2002), provide more powerful accounts of the robust sociosexual sex differences and cultural variabilities observed in the ISDP.

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NOTES

1. The SOI captures individual difference variation along a single dimension ranging from restricted (i.e., more monogamous) to unrestricted (i.e., more promiscuous) mating orientations. Actual mating behavior involving formal marriage systems; rules and norms of acceptable sexual conduct; and clandestine forms of sexual expression may or may not be represented by the terms *monogamous* and *promiscuous* mating orientations. Although nearly all forms of mating behavior are likely related to sociosexual variation in some way, throughout this article references to individual differences in monogamy versus promiscuity will be limited to variability as operationalized by the SOI.

2. In this article, an emphasis is placed on Pedersen's (1991) evolutionary logic of sex ratio and human mating. Other theories of sex ratio and sexuality may make similar predictions (e.g., Guttentag & Secord 1983). However, Pedersen's views are more consistent with what is known from decades of research on animal mating systems (Hardy 2002). Pedersen's sex ratio predictions are able to explain both human and nonhuman animal mating systems, making it the more parsimonious account of sex ratio and mating behavior.

3. One factor that may weaken support for this prediction is that men's variability in sociosexuality is generally greater than women's. This is true both within and across the cultures of the ISDP. As a result of these range-related differences, national levels of women's sociosexuality may have less potential for correlating with nation-level cultural factors than do the more variable levels of men's sociosexuality.

Open Peer Commentary

A mature evolutionary psychology demands careful conclusions about sex differences

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Abstract: By comparing alternative evolutionary models, the International Sexuality Description Project marks the transition of evolutionary psychology to the next level of scientific maturation. The lack of final conclusions might partly be a result of the composition of the Sociosexual Orientation Inventory and the sampled populations. Our own data suggest that correcting for both gives further support to the strategic pluralism model.

The evolution of evolutionary psychology. During the past 15 years, evolutionary psychology has made enormous progress toward becoming a widely accepted approach for the study of human behavior, especially in the sexuality domain (Okami 2004). This level of acceptance includes not only the endorsement of the neo-Darwinian theory of evolution as a tenable metatheory but also of midlevel evolutionary theories derived from that metatheory (see Buss 1995), such as Trivers' (1972) parental investment theory, on which most of the target article's reasoning is based. The arrival at this state is the true achievement of evolutionary psychology so far.

Comparing evolutionary models. According to Holcomb (1998), the next step of scientific maturation must include rigorous empirical testing of alternative evolutionary models and hypotheses deduced from these midlevel theories, in order to abduce the most predictive and explanatory one for a given issue. The International Sexuality Description Project (ISDP) is, as Schmitt impressively demonstrates, the first large-scale attempt capable of meeting the forthcoming challenge. Though he mourns that his results are not clear-cut enough to allow for the rejection of all but one of the competing models, the ISDP surely is a step in the right direction. We hope that many studies will follow this example. However, comparing models requires careful operationalization of the model parameters and testing them in a context where they will yield different predictions. Under this perspective, we see two problems with Schmitt's conclusion of universal sex differences.

Problem 1: The heterogeneity of the Sociosexual Orientation Inventory (SOI). Although it is likely that the different reproductive challenges faced by men and women during phylogenesis channeled the evolution of sex-specific strategy dispositions (Buss & Schmitt 1993), socioenvironmental constraints prohibit the straightforward conclusion of behavioral sex differences (Gangestad & Simpson 2000). For example, as Schmitt notes, the number of sex partners reported by men should equal those reported by women in an unbiased heterosexual sample. The SOI is a heterogeneous measure of sexual strategies that blends attitudinal, affective, and behavioral aspects, with various extents of sex differences expectable for each. Even though Schmitt attempts to circumvent this problem by separately testing an attitudinal and a behavioral component, the items he aggregated to form the behavioral component are still quite heterogeneous. No overall sex differences can be expected for honest reports on the number of sex partners in the last 12 months (item 1) and the number of one-night stands (item 3). Thus, if they are not solely a consequence of sex-specific reporting biases (Alexander & Fisher 2003), the sex differences in Schmitt's behavioral component should stem exclusively from sex differences in the expected number of future sex partners (item 2) and the frequency of sexual fantasies with an uncommitted partner (item 4), aspects that are both arguably closer to his attitudinal component.

Problem 2: The homogeneity of the samples. In such encompassing projects as the ISDP, limitations of data quality are practically inevitable, a fact that Schmitt is well aware of. Still it cannot be overemphasized that his conclusions of universal sex differences in sociosexuality have only been proven for young college-linked populations. These samples show more or less severe range restrictions not only in age and sociodemographic variables but especially in life phase: An extended educational period goes hand in hand with prolonged dependence on parental support, delay of marriage and reproduction, and extensive identity exploration and self-selection into social niches (Arnett 2000). Such a state of change and confusion is very likely unsupportive for women to develop a subjective feeling of independence from paternal investment in any culture or environment, which, accord-

ing to Gangestad and Simpson's (2000) strategic pluralism model, is the prime determinant of women's conditional switch towards a more unrestricted sociosexual orientation. The different models Buss and Schmitt (1993) and Gangestad and Simpson (2000) derived from Trivers' (1972) parental investment theory would thus make the same predictions for sex differences in populations of college students. The critical studies of sociosexuality in the context of highly committed long-term relationships and especially marriages are grossly absent from the literature (Simpson et al. 2004).

Our data. To provide some clarification for these issues, Penke and Denissen (2005) studied a German community sample (over 1,000 sexually experienced heterosexuals aged 18 to 50). As expected, they found that sex differences were absent in self-reports of past behaviors but more pronounced in future expectations and especially unrestricted sexual fantasies. The latter aspect also showed a clear connection to the attitudinal, but not the behavioral component, the former being indifferent in between. In line with the conditional sexual strategies emphasized by the strategic pluralism model, but contrary to the sex-specific mixed sexual strategies proposed by Buss & Schmitt (1993), a lack of sex differences in the total sociosexuality score for married (but not for dating) participants emerged, which was the result of a greater number of reported unrestricted behaviors by married (vs. dating) women. Just as suggested by recent evidence on female strategy shifts conditional to their natural ovulatory cycle (Thornhill & Gangestad 2003), this effect was especially pronounced when controlling for hormonal contraceptive usage.

Conclusion. Schmitt has made a great contribution in proving conditional shifts in sexual strategies across cultural contexts and environmental conditions. Unfortunately, he drops this ecological sensitivity to argue for universal sex differences in sociosexuality based on national averages, without making an attempt to account for the large residual intranational variance in both sexes (even though he explored interactions with relationship status and sexual orientation in the ISDP article on the less controversial sex differences in the desire for sexual variety, Schmitt et al. 2003). Because different evolutionary models with concurring predictions exist, such claims can be misleading, even when restricted to college populations. Although demonstrating that mean (or median) sex differences in the human mating psychology was surely helpful for the initial establishment of modern evolutionary psychology, its current state demands a more differentiated perspective and more carefully designed empirical studies to give consideration to the full scope of possibilities the evolutionary metatheory has to offer.

Sex Differences: Empiricism, hypothesis testing, and other virtues

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Abstract: "Sociosexuality from Argentina to Zimbabwe: A 48-nation study of sex, culture, and strategies of human mating" delivers on its title. By combining empiricism and careful hypothesis testing, it not only contributes to our current knowledge but also points the way to further advances.

David Schmitt is to be congratulated. There is undoubtedly a great need for a "cross-culturally validated measure of human mating strategies," and it is quite likely that the Sociosexual Orientation Inventory (SOI) fills the bill. In addition to filling this near-vacuum, Schmitt has succeeded in putting together what appears to be the most comprehensive worldwide study of its sort, ever. And in the politically reactionary, antiscience environment fostered by the George W. Bush Administration – in which research into human sexual behavior has been woefully inhibited – such efforts should be especially applauded.

Male–female differences in preferences for multiple partners and in thresholds for sexual activity (a more "unrestricted" sexuality, in this study's terms) generally have emerged as among the most robust aspects of evolutionary theory applied to human behavior, and Schmitt's research – which also represents a notable and perhaps unique degree of international, cross-disciplinary collaboration – may well provide the final nail in the coffin of the doctrine of male–female sexual indistinguishability. If not, then this will be testimony to the persistence of ideology over empirical science, not unlike that of theologians clinging to a geocentric universe in the decades after Copernicus and Galileo.

Schmitt's research is particularly notable not only in further documenting the increasingly well established patterns of male–female differences but also in testing specific, closely formulated hypotheses, finding impressive support for two ("sex ratio theory" and "strategic pluralism theory") along with disconfirmation of a third ("developmental-attachment theory").

In a research environment increasingly polarized into two seemingly irreconcilable camps, namely, evolutionary psychology on the one hand and the traditional social science model on the other, Schmitt's work is also important in helping to construct a much-needed bridge. (Or, looked at alternatively, it comprises a needed blow against simplistic *either/or* theories, whether they mistakenly focus only on biology or on culture.) Thus, despite his clear predilection for the importance of evolutionary considerations, Schmitt points unambiguously toward a substantial role for environmental factors, notably operational sex ratio and resource plenitude. As with earlier and unproductive debates about whether human aggression is instinctive, researchers need to refocus their thinking from the question of whether male–female differences in sociosexuality are instinctive to more productive avenues. Given that sociosexual inclinations, like inclinations toward aggression and violence, are almost certainly the adaptive consequence of natural selection, one question, at least, is this: Under what circumstances are women and men likely to embrace more sexually restrictive (or unrestrictive) behavior patterns? Not only is this matter theoretically important, but in a world beset with sexually transmitted diseases, sexually linked violence (especially toward women), and unwanted pregnancy, as well as the profound socioeconomic consequences of each of these, a deeper understanding of human sociosexuality is not only desirable but desperately necessary.

On a narrower note, *contra* Schmitt, I have not argued that with regard to sexual inclinations, "both men and women are naturally unrestricted (Barash & Lipton 2001), with sex roles in certain cultures causing large sex differences by suppressing women's innate tendency toward sexual promiscuity." Rather, I maintain that female inclinations toward extra-pair copulations have in the recent past been underestimated by too-facile generalizations on the part of sociobiologists – myself included (e.g., Barash & Lipton 2002). To clarify: There is little doubt that various cultures suppress female (and male) sexual inclinations to varying degrees, but as Schmitt's work demonstrates – and my own has supported – there is no reason to think that men and women are "naturally unrestricted" (or restricted) to the same degree. Certainly, some cultures repress female sexuality more than do others; the same can be said, doubtless, for men, although anecdotally at least, the amount of such repression appears less in the latter case. The reasons for this, incidentally, are not intuitively obvious, because given the salience of male–male competition, we might expect that cultural traditions, however patriarchal, might be structured – by powerful men – to limit the sexual opportunities of other men who are potential competitors. Alternatively, perhaps males tend to recognize the potentially destabilizing social effect of going too far in directly restricting the reproductive opportunities of other men, and they have typically opted instead to achieve greater control of female sexuality.

In any event, much of the research and speculation in evolutionary psychology revolves around sexual and reproductive strategies, in large part because much of human evolutionary psychology does in fact revolve around sexual and reproductive strategies (Gandolfi et al. 2002). On occasion, however, I have wondered whether the thrust of such efforts reflect the genuine, evolved predispositions of *Homo sapiens*, as opposed to the living conditions currently experienced by the great majority of practicing, publishing scientists. Granted that the projection of genes into the future is what natural selection is all about, and that reproduction (defined more inclusively to embrace assistance toward kin) is the means of achieving this end, it is also true that survival is typically a prerequisite for sexual selection, parenting, and so forth. Given the strong likelihood that during most of our evolutionary prehistory mortality factors were omnipresent, it seems equally likely that human nature has long been concerned with basic survival (resource accrual, predator avoidance, temperature regulation, suitable response to and avoidance of pathogens, etc.), at least as much as with reproduction *per se*. Although there may well be room for sex differences in survival selection, these promise to be less dramatic than sex differences in sexual selection, but no less important.

Because evolutionary psychologists and sociobiologists lead privileged lives (for the most part in affluent Western societies, in which food, shelter, and adequate medical are available, as well as a reasonable probability that researchers will not themselves be seriously menaced by predators), they are able to take survival pretty much for granted and focus their research energy on "sexier" topics, notably sex and reproduction. This in turn has led me to question whether evolutionary psychologists should focus more on those presumed mental modules – possibly including sex differences – that contribute to survival and perhaps less on sex and reproduction itself.

In this regard, once more Schmitt's research is, if not conclusive, at least reassuring. His massive cross-cultural sample, which includes data from many developing countries, suggests that – as most of us have long intuited – sex is important, and so are sex differences, and not only for those in the affluent West. An important extension of the present study would therefore involve surveys of less privileged people in developing countries, among whom sheer survival cannot be taken for granted.

As evolutionary thinking matures, analysis of human mating patterns has been making headway in numerous disciplines within which it had previously been lacking. Thanks to the work of Schmitt and others, it seems likely that we are on the brink of a true multidisciplinary understanding of human sexuality, and not a moment too soon.

Sociosexual strategies in tribes and nations

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Abstract: Extending the findings of this work: Tribal peoples need study. Monogamy as marital institution and monogamy as sociosexual orientation must be separated. Sociosexuality must be considered as an aspect of somatic as well as reproductive effort; third-party interventions in sociosexuality need attention; and multiple sociosexual orientations, with frequency-dependent fitness payoffs equal at equilibrium, need to be modeled.

The interesting and important work reported in the target article is a necessary step toward an evolutionary understanding of human mating. That my comments are directed largely at its limitations and their implications for further research should not be taken as deprecation of this essential research but as an attempt to locate its results in their wider anthropological context.

Limitations of the sample. As Schmitt is clearly aware, a sample of people from modern states (the great majority of which enforce monogamy as their only legal form of marriage) does not represent the full range of human mating systems. As Schmitt notes, it is an anthropological commonplace that in most tribal societies polygyny is considered the preferred form of marriage, even if it is usually achieved only by a favored minority of successful men. As he further notes, a sample of college-age people, who are mainly at the beginning of their sexual careers and largely unmarried, does not necessarily represent the opinions and behaviors of even the same people a few years down the road. Less obvious is the problem that any survey of this sort is necessarily restricted to people who are literate and comfortable with the idea of grading behaviors and opinions on a numerical scale: The instrument inherently eliminates the tribal people, who represent 95% of human history, the time in which in which our modern sociosexuality evolved. The need for an alternate instrument that can be administered to nonliterate peoples who may not be able to count beyond 2 or 3 is clear. The problem of developing such an instrument, and calibrating it to surveys such as the current one, is immense.

Limitations of the descriptive apparatus. Schmitt appears generally to use the word *monogamy* to mean a sexually exclusive arrangement between a single man and a single woman. Sometimes, he uses monogamy to mean a marriage between a single man and a single woman. It is important to note that the two uses are distinct, and one cannot take the presence of the latter as evidence of the former. It is fairly common in tribal societies (no one knows how common, because the subject is underinvestigated and underreported, for obvious reasons of ethnographer discretion) that a married man's brothers have legitimate sexual access to his wife. In many societies, men classified as brothers include parallel cousins (e.g., father's brothers' sons and mother's sisters' sons), as well as children of the same mother and father. It also happens that a man may have legitimate sexual access to his wife's sisters, whether or not they are married to other men. The lending of a wife to a visitor, even one who is not close kin to the husband, is also common in some tribal societies. In a number of tribes, married women accept socially sanctioned, long-term lovers. Finally, there are a number of societies with ceremonies or other regular occasions for sexual license. All of these practices are compatible with monogamy as a system of marriage. The distribution of monogamy as a marital institution tells us little about whether sexual attentions are restricted or unrestricted. The terminological confusion of mating system with marital institution is a recurring problem in discussions of the evolution of human mating. Eventually, there may have to be some sort of nomenclatural convention.

Limitations of the theories. The theories evaluated here are significant attempts to deal with the evolution and current manifestations of human mating strategies. However, they simplify the natural history of these strategies in at least three important ways. First, all of them except that of Eagly and Wood (1999) see human sexual behavior simply as reproductive effort, the imperative of finding mates and producing offspring who will themselves reach reproductive status. However, since the advent, very early in human history, of the sexual division of labor and food sharing, sexual behavior has also been, particularly for females, an aspect of somatic effort, of the basic need to get enough food and other resources to stay alive. Put simply, in virtually all tribal societies, making a sexual connection (usually marriage) with a man or men is an indispensable part of the way a woman makes a living, irrespective of her reproductive interests. In the substantial number of societies in which a man cannot survive without the foods or services a woman supplies, the same is true for males. Although a mate is not a fundamental survival necessity for any of the college students surveyed by Schmitt's collaborators, one cannot ignore the occupational and other economic advantages that can be obtained by a successful mating strategy in the modern nation state.

Second, in focusing on the individual's own sexual attitudes and

behaviors, the theories give short shrift to a peculiar human trait – third-party policing of other people's sexual behavior. From incest taboos to prescribed and arranged marriages to the rape or exile or execution of people who violate sexual rules, human beings have a uniquely complicated social environment in which to behave sexually. A complete theory of human sexual behavior needs to explore and account for this extraordinary species-typical elaboration of the social context. What, for example, is the role of parental pressure in sociosexuality, as parental interests respond to such externals as sex ratio, resource levels, and infant mortality? Even if parents attend to exactly the same cues as their offspring, *their* reproductive interests (as manifested largely in the number and survival of the grandchildren produced by all their children) will rarely correspond exactly to those of an individual child. There are major parent–offspring conflicts to be explored here, not only by administering the same instruments to both parents and children but also by asking parents to answer on behalf of their children.

Finally, the possibility of strategic pluralism in sociosexuality, as suggested by Gangestad and Simpson (2000), needs to be addressed in the context of plural alternatives within a single society. There is no a priori reason that one sociosexual orientation should be the single best adapted strategy for a given sociocultural context. On the contrary, particularly in large, complex societies, one might expect several successful alternative sociosexual strategies, probably with frequency dependent fitness payoffs.

Who's zooming who?

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Abstract: Men and women report having significantly different numbers of sexual partners, which is impossible in a large sample. Schmitt's target article is no exception. This focuses discussion on the nature of the samples, their heterogeneity, and the locale they are drawn from. Further, we query how humans determine, for example, sex ratio, in the context of large numbers.

Schmitt and his many colleagues have provided us with an article that is rich both in terms of data and in the application of those data to test a number of theories. This is a monumental endeavour that will provide a source of debate for years to come. However, as with all monumental studies, there are weaknesses that need examination. I focus on the sampling and how it links into the claims made with respect to responses on the Sociosexual Orientation Inventory (SOI).

A number of authors, most notably Dorothy Einon, have pointed out that there are often major discrepancies between the number of sexual partners claimed by men and women (Einon 1994; Walsh 1993). The problem is, given the nature of sexual activity, these claims, although they may not be identical, should be relatively close. Despite this obvious fact, almost every study reports that men claim to have had more sexual partners than women. The present study is no exception. Men in every country claim that they have had or will have more sexual partners than do women. Of course, one would not expect these small samples to match up perfectly, but given that the sum must approach equality as the sample size increases, one would expect women in some countries to report that they have had or will have more partners than men.

Einon makes the point that this difference might be the result of the relative difference in prostitution. There are more female prostitutes serving males than vice versa. However, her studies show quite clearly that this is not the case, and that the most likely explanation is that men are exaggerating and women are being coy. The truth lies somewhere in the middle.

This is important because it suggests that we need to look carefully at the samples that were employed to generate the data in the Schmitt article. To be fair, Schmitt notes some of these weaknesses. However, these weaknesses could have a profound effect on the outcomes that he observed and the conclusions he drew.

If Einon is correct, then clearly men and women will not differ dramatically in terms of their mean number of sexual partners. There will be some variation, given the differences in sex ratio, as illustrated in Figure 1 of the target article, but these are small in comparison with the claims made. Unfortunately, the samples employed are unlikely to pick up outliers such as women who are working as prostitutes. Clearly, if women who are working as prostitutes make up the differences that are reported here and in other studies, and if such women are included in such studies, then we would expect to see considerable differences in the variability of reported sexual activity. Men are likely to be much more homogenous and women more heterogeneous in terms of number of sexual partners. What would be of interest is how these differences in variability are expressed as preferences. Do women who work as prostitutes have similar preferences to women who do not work as prostitutes, thereby preserving the differences in the SOI reported here?

We can take the issue of sampling one step further. The above focuses on differences between men and women. However, we should not assume that samples taken from different countries are necessarily homogenous, as is implied in the Schmitt article. Australia is a multicultural society that contains numerous religious and ethnic groupings, all of whom are likely to differ on the SOI. Therefore, it is important to know exactly where the sample was taken to determine the extent to which it is likely to be representative of the nation as a whole. Even large cities such as Sydney and Adelaide differ dramatically in their religious and ethnic makeup. What is true of Sydney would not necessarily be true of Adelaide and vice versa.

The locale of the sample raises the question of how people are able to gauge some of the posited causal factors that influence the SOI. For example, Schmitt notes that certain areas of the United States are likely to have significant imbalances in the number of men versus women because of likelihood that the former are incarcerated. It is easy to understand how such a local imbalance could affect behaviour. However, it is difficult to see how the marginal differences in sex ratio reflected in Figure 1 could affect behaviour. Schmitt and others assume that all men and all women will form a long-lasting partnership. Thus, like musical chairs, the absence of a partner will become obvious. This has never been the case, and it is certainly not the case at present, which leaves open the questions of how people know that there are differences in the number of men and women available as partners, and whether they alter their behaviour accordingly.

In summary, Schmitt has provided us with much food for thought. He provides us with answers to some questions and poses many more. Nevertheless, in examining the data produced, we must be mindful of the weaknesses inherent in the sampling. The jury must remain out until more evidence is provided.

Sex differences in the design features of socially contingent mating adaptations

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Abstract: Schmitt's study provides strong support for sexual strategies theory (Buss & Schmitt 1993) – that men and women *both* have evolved a complex menu of mating strategies, selectively deployed depending on personal, social, and ecological contexts. It also simultaneously refutes social structural theories founded on the core premise that women and men are sexually monomorphic in their psychology of human mating. Further progress depends on identifying evolved psychological design features

sensitive to the costs and benefits of pursuing each strategy from the menu, which vary across mating milieus. These design features, like many well-documented mating adaptations, are likely to be highly sex-differentiated.

According to the sexual strategies theory, both men and women possess an evolved menu of mating strategies, selectively activated by particular features of the personal, social, and ecological context (Buss & Schmitt 1993). Although both sexes possess short- and long-term strategies at a broad level of description, their mating psychologies contain many sex-linked design features that accompany each strategy. These include sex differences in mate preferences when pursuing each mating strategy, corresponding sex differences in tactics for attracting mates, and sex differences in the conditions that lead to the termination of mating relationships (Buss 2003). In the context of short-term mating, they include a greater desire for sexual variety by men than by women, indicated by well-documented design features such as the number of partners desired, the length of time elapsed before seeking sexual intercourse, the sexual overperception bias, a decrease in standards for consenting to sex with strangers, affective valence shifts promoting a hasty postcopulatory departure, and many others (Buss 2003; Haselton & Buss 2000). The sexual strategies theory also proposes that women will obtain reproductive benefits from pursuing short-term mating, such as immediate resources, better genes, and trading up, that differ from those obtained by men such as a direct increase in offspring number (e.g., Gangestad & Thornhill 1997b; Greiling & Buss 2000). As a consequence, the contexts in which women versus men actively pursue short-term mating are predicted to differ. In short, the sexual strategies theory proposes that men and women differ fundamentally in many design features of their evolved psychology of mating.

In sharp contrast, a core premise of social role and socialization theories of human mating such as the structural powerlessness hypothesis (Buss & Barnes 1986) and its later elaborations in social structural theories (Eagly & Wood 1999) is that men and women are fundamentally identical in their mating psychology, possessing no evolved sex-linked psychological design features. Rather, according to these theories, observed sex differences in mate preferences, desires, and strategies owe their existence to sex-linked socialization practices, the societal assignment of men and women to different roles, and societal factors that grant power to the sexes differentially. If the role assignments were reversed, for example, then these theories necessarily predict sexual reversals – that men more than women would value economic resources in a mate, that women more than men would place a premium on physical attractiveness and youth in mate selection, and that women would experience a greater desire for sexual variety than men. Furthermore, given the fundamental premise of social structural theories that male and female minds and brains are identical in the mating domain, containing no sex-linked psychological adaptations, the sexes should respond to the same personal, social, and ecological factors in the same ways.

The impressive study conducted by Schmitt and his colleagues adds to a growing body of empirical evidence that provides strong support for the sexual strategies theory and a resounding refutation of social structural theories and their variants. The universality of sex differences on the Sociosexual Orientation Inventory (SOI) across the 48 nations studied confirms a core prediction of the sexual strategies theory and its predecessors, anchored in Trivers' theory of parental investment and sexual selection. It supports the broad notion that men have an evolved mating psychology that differs dramatically from that of women, and the specific hypothesis about a profound sex difference in desire for sexual variety. The data simultaneously refute the notion that men and women are psychologically monomorphic in mating desire, falsifying current social structural theories (Eagly & Wood 1999) and their earlier conceptual forebears (Buss & Barnes 1986).

These findings, in conjunction with dozens of others (Buss 2003), lead to the unusual position of disavowing a hypothesis I previously articulated and also disagreeing with Schmitt's implication that social structural theories are needed for a comprehensive conceptualization of human mating strategies. The structural powerlessness hypothesis (Buss & Barnes 1986) and subsequent social structural variants are fundamentally indefensible, because their core premise of male and female identity of underlying psychology was always theoretically problematic and is now known to be empirically false. The notion that sexual selection would fashion male and female bodies for different mating strategies while leaving male and female brains and minds identical contravenes everything that we now know about adaptation and natural selection. And although the modest cultural variation in the magnitude of sex differences in the SOI is theoretically important, I suggest that it is not adequately explained by nebulous theoretical constructs such as structural powerlessness, gender empowerment, patriarchy, or social structural roles (see Buss [1996a; 1996b] for more detailed conceptual critiques of these concepts).

Rather, I propose that the theoretical integration that Schmitt appropriately calls for will be found in part by identifying the specific evolved mating mechanisms that are responsive to the particular *costs* and *benefits* of pursuing short- and long-term mating strategies, which are almost certainly highly sex-differentiated in design (Greiling & Buss 2000). I propose, for example, that women have evolved mating mechanisms that are highly sensitive to the *reputational costs* of pursuing short-term mating in their local mating environment. In large Western urban cultures with high geographical mobility (surely a correlate of measures of "gender empowerment"), short-term mating can be pursued in relative anonymity, decreasing the reputational damage that women often accrue from pursuing a promiscuous mating strategy. In cultures more characterized by small-group living and little geographical mobility, anonymous sex is more difficult and the reputational damage that women acquire from short-term mating can severely handicap their long-term mate value. By identifying *when* women secure specific benefits from short-term mating, such as needed resources, better genes, or better mates while simultaneously avoiding the costs of short-term mating such as reputational damage and a decline in perceived long-term mate value, we will attain a deeper understanding of the cultural and subcultural variation in the selective pursuit of this strategy from the human menu.

In summary, Schmitt makes a large contribution by identifying the universality of sex differences in one important aspect of the psychology of human mating strategies, as well as by identifying cultural variation in expression from the menu of human mating strategies that is correlated with well-defined and theoretically cogent concepts such as sex ratio. His work simultaneously refutes the core premise of social structural theories, which are anchored in the premise of sexual monomorphism of evolved psychological design. The field of evolutionary psychology has identified a large menu of human mating strategies, including short-term, long-term, and mixed mating strategies, the pursuit of which is highly sensitive to context, as initially postulated by sexual strategies theory. Future theoretical and empirical work in the important domain of human mating will reside not with vague constructs such as gender empowerment or dubious notions about socially assigned roles to passive recipients. Scientific advances will come from identifying the specialized psychological design that determines which mating strategies from the universal menu will be deployed by each sex in particular contexts.

What is the significance of cross-national variability in sociosexuality?

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Abstract: Schmitt finds that national sex ratios predict levels of sociosexuality, but how we should interpret this result is unclear for both methodological and conceptual reasons. We criticize aspects of Schmitt's theorizing and his analytic strategy, and suggest that some additional analyses of the data in hand might be illuminating.

Schmitt's most striking finding is the negative cross-national correlation between sex ratios and sociosexuality (Figure 1 of the target article). This is interpreted as support for "sex ratio theory," a set of insights that Schmitt attributes to Pedersen (1991) but that owe much to Emlen & Oring (1977), who first argued that operational sex ratio (OSR) largely determines mating systems. According to Schmitt, when males are scarce, females are sexually selected to succumb to male demands for promiscuous sex (and SOI increases), and when females are scarce, males are sexually selected to succumb to female demands for long-term monogamy (and SOI decreases). However, although the direction of these predictions is reasonable, the logic by which Schmitt justifies them is faulty.

Sexual selection favours traits that improve mating success for the individuals bearing them. This is not equivalent to pandering to the desires of the other sex; if it were, there would be no such thing as sexual conflict. In a female-biased population, women might indeed lower their threshold values of required commitment to avoid being abandoned for rivals offering better returns on male mating effort, but given that there is less male investment to go around, women may also resort to polyandrous mating to extract resources from multiple sources. Both these strategic shifts would increase average SOI scores, but the latter would run counter to the best interests of women's "first-choice" mates rather than pandering to them. Similarly, in a male-biased population, males may reduce SOI levels and forego the pursuit of multiple mates, but the reallocation of male effort need not take the form of compliance with female investment demands; instead, elevated mate guarding may actually impose costs on scarce women (a possibility that Schmitt does entertain, albeit briefly). Averaging male and female SOI scores to produce a single national score was a curious way to address the relevance of OSR. Why not assess how sex ratio is related to each sex's SOI level, particularly since Schmitt predicts that female scores should be more susceptible to variation?

Furthermore, sexual selection is not relevant as an immediate causal process, as Schmitt implies. For SOI to be correlated with sex ratio, it is enough that past sexual selection favoured those who employed mating strategies that respond conditionally as described above. Indeed, even this is unnecessary. If historical sexual selection created an unconditional sex difference in multiple partner preference (males high, females low), even that could produce a correlation between sex ratio and SOI, because there would be fewer unique sexual partnerships when females outnumber males than vice versa. Consider an extreme example where females only ever want one partner and males want many. In a population with 40 men and 60 women, there will be 60 unique sexual pairings, but in a population of 60 men and 40 women, there will only be 40 unique sexual pairings, and 20 males will go without sex. The average SOI score will be higher in the former population than the latter, though both mating systems are driven by the hypothesized female monogamy and strategies are unconditional. But in any event, the process of sexual selection is not a proximate force.

How sex ratios were computed for Figure 1 requires clarification. The *x*-axis is labelled "National Sex Ratio," but the caption says "operational sex ratio." These are not synonyms; OSR refers properly to the numbers of males or females simultaneously seeking mates, but Schmitt claims it is usually calculated as males or females in the 15–49 age range. Whether the sex ratios he used were age restricted in this way is inexplicit, but even if so, 15 to 49 may still be too broad, considering that most participants were university students occupying the lower end of this age range.

Schmitt addresses criticisms of the SOI's dual nature by dividing it into behavioural and attitudinal components and demonstrating that both exhibit sex differences. However, calling items 1 to 4 "behavioural" is problematic because only items 1 and 3 are self-reports of actual behaviour. Item 2 concerns expectations, which may or may not be fulfilled, while item 4 is about fantasy and self-monitoring cognitive activity and arguably belongs with "attitudinal" items 5, 6, and 7.

Schmitt claims to have affirmed the SOI's validity, but the ostensible validation concerns only consistency of self-report. Truthfulness is another matter. Whether lying varies cross-nationally cannot easily be determined, but Schmitt's data permit a partial test. Heterosexual contacts are constrained to be equal for males and females in toto, so if there are sex differences in responses to SOI items 1 and 3 in some samples, this may bespeak lying, although there could be other explanations such as variability in undergraduate use of prostitutes.

Ideas about "cultural influences on sociosexuality" need refinement. It will rankle some readers that Schmitt uses "culture" to refer both to his national samples and to decidedly noncultural variables such as pathogen loads, but this is a relatively minor problem of word choice. More important is the absence of clear theoretical rationales for the target article's hypotheses about between-group variability. One example is Schmitt's claim that a female-biased sex ratio "may lead men to engage in greater intrasexual competition" (sect. 7.2). Surely, it is easier to argue precisely the opposite: Female scarcity exacerbates male competition. Similarly, the hypotheses about impacts of environmental stress on sociosexuality (sect. 3.2) lack clear derivations. A formal theory from which one could derive genuine predictions must distinguish resource scarcity from unpredictability, as well as distinguishing both from mortality, rather than conflating these distinct challenges in a vague construct of environmental "stress."

On sociosexual cognitive architecture

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Abstract: Schmitt has equivocated about the underlying psychology of sociosexuality, but from the data presented in the target article, it would appear that he has drawn out the underlying cognitive architecture. In this commentary, I describe this architecture and discuss two emerging hypotheses about heterosexual and homosexual male sociosexuality.

Schmitt's investigation of sociosexuality across 48 nations firmly embeds itself within an evolutionary perspective of human sexual behaviour and cognition. However, there appears to be some equivocation in Schmitt's use of evolutionary theory between the perspectives offered by human behavioural ecology and evolutionary psychology. The former position tends to analyse behavioural responses to contingent ecological demands and seeks evidence of optimality in the face of adaptive challenges. Such a position can lead either to no commitment about the underlying cognitive architecture that delivers optimal behaviours or to the view that aspects of cognition are somewhat global in their processing capabilities. Evolutionary psychology, however, explicitly argues for a cognitive architecture composed of domain specific modules, each selected to solve specific adaptive problems. Such modules deliver conditional algorithms that take particular inputs,

p, and deliver appropriate outputs, q, such that $p \rightarrow q$. While the two approaches can coexist at the level of describing the task demands that confront a particular agent, they can clash over psychological commitments.

Schmitt's equivocation becomes apparent toward the end of the target article:

> The current perspective, in which sociosexuality is seen as resulting from a collection of psychological adaptations, is quite limited in scope. Still, this evolutionary framework may have some use as a heuristic for the future theorising on the psychology of human sexual strategies (sect. 8, para. 6).

Prior to this, Schmitt discussed the notion of adaptive responsiveness to local ecologies and raised issues of socialization and experience with regard to Eagly and Wood's (1999) social structural theory. What is more, Schmitt's data partially support the predictions made by the social structural theory, demonstrating a reduction of magnitude in sex differences as a consequence of sociopolitical and relational freedom. It is possible to view such flexibility as contradictory to the view that human psychology consists of a suite of adapted cognitive mechanisms. Surely, responses would be rigid in the face of ecological change.

I see no reason to adopt an ecological perspective on the underlying psychology of sociosexuality, partly because of theoretical commitments. Not only can there be no selection for a general psychological mechanism, for there are no general psychological problems, but also modularity renders the numerous problems facing an agent computationally tractable (Tooby & Cosmides 1992). More important, in this case Schmitt's own evidence of sociosexuality shaping up differently under various local ecologies in fact lends itself to evolutionary psychology. This is because Schmitt has presented clear data that strongly suggest distinct patterning within the human sociosexual response, not infinite flexibility. Indeed, it would appear that Schmitt has isolated the conditional architecture of an aspect of sociosexual cognition, and that it looks something like this:

If (p: male-biased sex ratio), ***then*** (q: adopt monogamy, i.e., long-term single partner investment)
If (p: female-biased sex ratio), ***then*** (q: adopt (male) promiscuity and (female) tolerance of promiscuity)
If (p: high-stress local environment), ***then*** (q: adopt monogamy)
If (p: low-stress local environment), ***then*** (q: adopt unrestricted sociosexuality)

These conditional rules are, of course, to be taken as descriptions of the kinds of computation that are necessary for a sociosexual cognitive architecture to implement; they represent a functional decomposition. It can be further hypothesized that these conditional rules set the parameters for sociosexual behaviour. Such rules will have been selected for over long historical time, in response to adaptive demands, and the combined effect of these four rules accounts for the cultural variance and consistency described by Schmitt.

If the four rules I have outlined capture human sociosexual cognition, then we can begin to extend Schmitt's analysis in the hope of further refining our knowledge. One obvious question to ask is how sociosexual cognition interacts with other related cognitions such as mate preference or targeting systems. Would mate preferences be different if there were a male-biased sex ratio compared with preferences under female-biased sex ratios? For example, you might expect to see male monogamy leading to much choosier males, but under Schmitt's analysis, rather than seeing this as an expression of an individual difference, it might actually be the best choice under the circumstances. If the same males are put in a different situation, where the sex ratio is female biased, you might see a change in behaviour. It would be interesting to map this potential dynamic.

Another route to understanding sociosexuality is through studying homosexual behaviours. One might speculate that homosexual males share a basic sociosexual cognitive architecture with heterosexual males; all that differs is the targeting or preference cognitions. However, homosexual exposure to sex ratios is somewhat hard to define, and it is not immediately clear how to understand the operation of sociosexual cognition in homosexual males. On the one hand, it could be that functionally speaking, although homosexual males are operating in an all male "mating" environment, it is equivalent to existing in a situation with a female-biased sex ratio. In heterosexual males, this leads to promiscuity, according to Schmitt, and in many groups of homosexual males, we see promiscuity. On the other hand, it is not always clear in some cultures which men are homosexual, and this might actually lead to a situation that is functionally equivalent to male-biased sex ratios. In this case "monogamy" would emerge. Homosexual promiscuity can also be explained in terms of the absence of a possible pregnancy – where no offspring can result, sexual psychology is freed from investment calculations. This might be a sufficient explanation; however, long-term partner investment also occurs within homosexual populations, and this is not so readily explained. Schmitt's analysis may help us to explain this.

Universal sex differences across patriarchal cultures ≠ evolved psychological dispositions

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Abstract: Schmitt's findings provide little evidence that sex differences in sociosexuality are explained by evolved dispositions. These sex differences are better explained by an evolutionary account that treats the psychological attributes of women and men as emergent, given the biological attributes of the sexes, especially female reproductive capacity, and the economic and social structural aspects of societies.

Schmitt's research is an ambitious attempt to evaluate evolutionary and cultural theories of mating within a multination study. The research raises basic questions about the evidence required to demonstrate "fundamental differences in the evolved reproductive strategies of men and women" (sect. 2.1). We argue that Schmitt's cross-national evidence for a more promiscuous mating pattern among men than women is better explained by biosocial mechanisms that take into account the social structural context of sexual behavior than by evolved sex-typed psychological dispositions. As we show, the superiority of our alternative account becomes apparent when researchers consider the full spectrum of cross-cultural evidence and carefully scrutinize Schmitt's data.

Although Schmitt acknowledges that evidence of men's greater promiscuity across societies "does not mean that sex differences must be the result of evolved reproductive strategies" (sect. 6.7), he then ignores this insight. He concludes that the cross-cultural consistency of his data provides evidence for sex-typed evolved reproductive strategies that emerge across all contexts (sect. 7.5). We agree that sex differences that emerge across societies despite diversity in societal attributes suggest fundamental biological and psychological attributes of humans. However, the evolutionary origins of these sex differences are not revealed by their wide distribution.

If the greater promiscuity of men than women across cultures does not require explanation in terms of evolved psychological dispositions, what other mechanisms explain this effect? In our theory, psychological sex differences, including differences in sexual promiscuity, derive from the distribution of men and women into social roles within a society (Eagly & Wood 1999; Wood & Eagly

2002). The distal causes of these roles include the fundamental sex differences represented by each sex's physical attributes and related behaviors, especially women's childbearing and nursing of infants and men's greater size, speed, and upper-body strength. These differences interact with the contextual factors represented by the social, economic, technological, and ecological forces present in a society. The roles held by men and women within a society are defined by this interaction between physical sex differences and prevailing societal conditions because certain activities are more efficiently accomplished by one sex (see Wood & Eagly 2002).

The roles of men and women yield sex-differentiated behavior through the social construction of gender and the formation of gender roles. These roles consist of socially shared expectations and preferences that individuals have psychological characteristics that equip them for the tasks typically performed by their sex. Gender roles, along with the specific roles occupied by men and women (e.g., provider, homemaker), then guide social behavior through proximal processes that include sex-typed socialization, biological (hormonal) changes, self-regulation, and behavioral confirmation of others' expectancies (Eagly et al. 2000).

Our theory is social structural in its emphasis on the importance of social roles (hence its common name, "social role theory"). Yet, understanding the ultimate origins of the roles of men and women requires our biosocial extension of this theory, which takes into account the relations between the sexes' physical attributes and the prevailing social and ecological conditions (Wood & Eagly 2002).

We expect consistent sex differences to emerge across societies in the activities most closely enabled or constrained by sex-typed physical attributes and reproductive activities. In support of this idea, Murdock and Provost's (1973) analysis of productive activities in nonindustrial societies revealed a division of labor across societies in which women ordinarily had responsibility for tasks that could be performed close to home and despite interruptions, presumably because such tasks were compatible with women's childbearing and nursing of infants. Men more often had responsibility for tasks requiring speed of locomotion and bursts of strength, presumably because such tasks were facilitated by men's size and upper-body strength.

Societal control over women's sexuality, like other limits on women's power and status, emerged from the interaction between physical sex differences and societal conditions (Eagly et al. 2004). As socioeconomic systems became more complex, the division of labor between the sexes subordinated women because their reproductive activities limited their ability to contribute to tasks that yielded status and resources. Patriarchy thus emerged with socioeconomic developments, including warfare, intensive agriculture, and multifaceted economies, that yielded activities requiring extensive training and skill development, high-energy expenditure, and extended absences from home (Wood & Eagly 2002). Because women's reproductive functions limited their contribution to such activities, they failed to gain the economic and social capital inherent in these activities, especially control over goods that can be traded in the marketplace. Thus, when gender hierarchies form, men tend to be advantaged relative to women.

Consistent with our claim that control of women's sexuality and other aspects of patriarchy emerged with socioeconomic complexity, anthropologists' assessments of nonindustrial societies reveal variability in patriarchy across ethnographic samples of world societies. Examining sexual control, Whyte (1978) reported that, in 75 nonindustrial societies selected to be geographically representative of world societies, only 43% had an extramarital double standard favoring greater promiscuity by men. Similarly, Broude and Greene (1976) independently reported the absence of the sexual double standard favoring male promiscuity in approximately one-third of the 116 nonindustrial societies in their review. With respect to patriarchy in general, investigations of pastoral groups and simple nomadic foragers have revealed that these societies are not necessarily characterized by gender hierarchies (e.g., Knauft 1991; Salzman 1999). In such societies, approximately one-third apparently have egalitarian relations between the sexes (Hayden et al. 1986; Sanday 1981).

In contrast to the variability in sexual control and other aspects of patriarchy in anthropological data, restriction of female sexuality is universal in the nation states of Schmitt's International Sexuality Description Project (ISDP) sample. Despite counterforces that lessen patriarchy in postindustrial societies, United Nations indicators reveal gender inequality in all of the societies in his sample. Only by confining his sample to patriarchal societies and thereby excluding societies that are more gender-equal could Schmitt produce sex differences in sociosexuality that were consistent in direction. Although Schmitt noted the limitations in his sample (sect. 7.1), he did not acknowledge that his conclusions might differ with a broader sample of societies. A more diverse sample would likely have demonstrated that sex differences in sociosexuality are not nearly as uniform across human societies as they are in his sample (Wood & Eagly 2002).

Of course, evidence of cross-cultural variability in sexual control of women does not ipso facto invalidate the idea of evolved psychological dispositions orienting men toward promiscuous sexual strategies and women toward more restricted sexual practices. Instead, it is the specific form of this variability across cultures that challenges the idea that men's greater promiscuity reflects evolved psychological dispositions. That is, the double standard appears to have emerged with the development of socioeconomic structures within which sexual control of women acquired special utility, specifically with societal practices that imbued child bearing with economic implications for men. Whyte's (1978) analysis of 93 nonindustrial societies thus revealed an association between sexual control over women and aggregated indexes of societal complexity that included intensive agriculture, ownership of private property, technological developments, and community stratification. Although Whyte failed to identify the critical aspect of societal complexity, Gaulin and Schlegel's (1980) analysis of 196 nonindustrial societies suggested an economic explanation for this relation. Specifically, paternity certainty acquired economic impact when property was inherited through male lines, and consequently control over women's sexuality enabled men to ensure such certainty and consequent economic advantage. Thus, across cultures, sexual control became important with socioeconomic developments such as inheritance through male lines.

Schmitt acknowledges a few of these ideas but wrongly conflates our theory with Buss and Barnes's (1986) structural powerlessness theory. Although we, like Buss and Barnes, take into account the relative status of men and women in contemporary societies (Eagly & Wood 1999), it is the portion of our theory that considers the origins of sex differences that underlies our critique of Schmitt's reasoning (Wood & Eagly 2002). Our origin theory of sex differences, which diverges sharply from theories in evolutionary psychology, analyzes the socioeconomic conditions under which divided labor yields patriarchy and greater male than female promiscuity.

The relation between sexual control of women and societies' socioeconomic complexity challenges evolutionary psychology theorizing about evolved sex-typed reproductive strategies. It is critical that the sex difference in sexual restrictiveness was least prevalent in societies with simpler economies that are presumably more similar to the ones in which humans evolved as a species. In these simpler societies, any evolved psychological dispositions would plausibly have affected behavior similarly to the ways that they functioned in humans' ancestral past. Evolutionary psychologists thus reason that technology and other developments of more complex societies can derail the obvious effects of evolved dispositions on behavior (Pérusse 1993). Therefore, simpler societies should provide the strongest evidence for evolved dispositions favoring greater male promiscuity. Instead, simpler societies provide the weakest evidence and patriarchal societies the strongest evidence. Apparently, Schmitt observed sex differences under modern social conditions and inappropriately used these observations to conclude that human nature features evolved sex-

typed psychological dispositions that correspond to these observed differences. As Erlich and Feldman (2003) argued, "[the researcher] is simply confusing the preferences of women he knows in his society with evolutionary fitness" (p. 89).

Schmitt's analysis of cultural conditions that affect mating strategies also gives priority to evolved psychological dispositions over more plausible accounts (sect. 7.5). To explain the cross-cultural variability, he invokes the concept of contingent evolved dispositions, whereby people contingently shift their mating strategies in adaptive ways depending on the demanding nature of the local environment. Specifically, following Gangestad and Simpson's (2000) arguments, Schmitt argues that environmental stress shifts mating strategies toward larger sociosexuality sex differences because it is primarily women who become more sexually restricted when there is a greater need for biparental care.

Schmitt's data provide limited support for this hypothesis about sex differences in response to environmental demands. His statement that "sex differences in sociosexuality were related as predicted to several indicators of environmental demand" is not supported by even one significant correlation between an indicator of environmental demand and the size of the sex difference (Table 10 of target article). Only when men's and women's sociosexuality scores were separately correlated with indicators of demanding environments did two of these five indicators show that the association between sociosexuality and demand was stronger in men than women (Table 10 of target article). Moreover, when Schmitt placed prevalence of low birth weight, an environmental variable consistent with strategic pluralism theory, in head-to-head competition with women's parliamentary representation, an environmental variable consistent with social structural theory, only parliamentary representation was significant (sect. 6.7.2). Because parliamentary representation is a particularly indirect indicator of women's status, we recalculated the regression model and replaced this predictor with the Gender Empowerment Measure, a more adequate indicator of women's status (Eagly & Wood 1999). Then the findings even more strongly favored our social structural theory over strategic pluralism theory. Our theory thus correctly predicts that sex differences in sociosexuality become smaller with increasing gender equality (Eagly & Wood 1999). However, given the universality of patriarchy within Schmitt's sample, our theory does *not* predict that these differences might be absent within any of these societies, even though Schmitt maintains that our theory has this implication (sect. 4.2).

In interpreting sex differences in sociosexuality, Schmitt gives considerable credence to Baumeister's (2000) claim that women's sexuality is more responsive than men's to environmental and cultural influences (sect. 4.1 and 6.7.2). At best, however, this claim received only mixed support. Although Tables 9 and 10 of the target article reveal that sociosexuality more closely tracked some of the indicators of societal equality and environmental demands among women than men, the data in Table 6 of the target article reveal that sociosexuality is more variable in men than women. Men's mean sociosexuality scores ranged from 28.42 to 65.58 across the nations, a difference of 37.16, whereas women's scores ranged from 11.80 to 41.68, a difference of 29.88. Even more striking is the greater variability of men's than women's scores within every nation except for Latvia. These data are problematic for Baumeister's (2000) assertions that female sexuality is more responsive to external influences than male sexuality (see also Archer & Mehdikhani 2003).

Schmitt also argues that mating strategies contingently shift in adaptive patterns depending on sex ratios. In his view, greater promiscuity in nations with lower sex ratios (i.e., more marriageable women than men) supports Pedersen's (1991) sexual selection explanation by which cultures with more women than men possess mating systems driven by men's evolved desires for promiscuous sex. However, these effects are equally compatible with Guttentag and Secord's (1983) sex ratio theory, which assumes social psychological mediating processes. Specifically, in Guttentag and Secord's economic model of mating, sex ratios affect the values of the social exchanges between men and women in relationships. The minority sex has greater exchange power within relationship dyads because they have more relationship alternatives, higher expectations for outcomes, and less willingness to commit than the majority sex. However, these effects of sex ratios occur within the broader context of men's greater structural power in patriarchal societies. Thus, when women are scarce, men's lesser dyadic power is offset by societal mechanisms that control women's alternatives through social norms that favor monogamy, limit women's interactions with men, and shape female roles in domestic directions. When men are scarce, no such protective mechanisms arise to offset women's relatively low dyadic power. Men then reap the benefits of their greater exchange power by participating in multiple relationships. In Guttentag and Secord's theory, it is because sexual norms benefit those in power that in patriarchal cultures a surplus of men produces greater restriction of sociosexuality than a surplus of women.

Given that patriarchy and sexual control of women are not necessarily organizing features of foraging societies, it is likely that sex ratios would have very different effects from those Schmitt reports if his sample had encompassed more egalitarian foraging groups. However, before scientists accept any one mediating processes as accounting for the relation between sex ratios and mating patterns, critical tests are required of the relative merits of the socioeconomic mechanisms proposed by Guttentag and Second (1983) and the evolved psychological dispositions proposed by Pedersen (1991).

In general, in thinking about how to conduct evolutionarily informed psychological research, we are impressed by Frans de Waal's (2002) statement that "one cannot single out a trait for an adaptive story, as is often done in evolutionary psychology. Rather, one needs to (a) consider the entire set of traits and (b) trace the organism's phylogeny, that is, the ancestral forms that produced it" (p. 188). In this spirit, instead of locating the evolutionary origins of promiscuity sex differences in evolved psychological dispositions, our biosocial model considers the broader patterns of behavior that emerge from the interaction between the bodily specialization of each sex and the attributes of societies' economy, social structure, and ecology. Although we have not considered sociosexuality from a phylogenetic perspective, cross-cultural comparisons provide insight into the development of social behaviors across simpler societies and those that are more economically, socially, and technologically complex. As we have shown, these comparisons provide an effective strategy for evaluating theories of the origins of human behavior.

The second to fourth digit ratio, sociosexuality, and offspring sex ratio

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Abstract: Previous research has suggested that offspring sex ratio may be influenced by the actions of prenatal sex steroids, principally androgens. The relative length of the second (index finger) to the fourth digit (ring finger) has been reported to be a proxy to prenatal testosterone levels. This trait is sexually dimorphic, such that males display a significantly lower 2D:4D ratio (indicating higher testosterone exposure), and this dimorphism appears robust across different populations. We suggest that digit ratio (2D:4D) may form a useful marker to help explain variation in sex ratio and sociosexuality.

According to parental investment theory (Trivers 1972) there are differences between men and women with respect to the amount of time and energy invested in their offspring. Consequently, it is supposed that the lesser-investing sex is usually more unrestricted in sociosexual orientation than the more-investing sex. Men should therefore demonstrate more unrestricted sociosexual orientation than women across human cultures. Schmitt suggests that the robustness of such a sex difference forms strong support for parental investment theory. He further notes that to date there is no study that has carefully examined environmental influences on sociosexuality, though the impact might be high, especially in light of theories concerning sex ratio.

Sex ratio is defined by the relative balance of marriage-age men to marriage-age women in a mating pool. It is considered high when men significantly outnumber women and is considered low when there are relatively more women than men in the mating market. According to Daly and Wilson (1988), in most cultures women typically slightly outnumber men because of a higher male mortality rate. Pedersen (1991) consequently argued that when sex ratios are low and there are more women than man, males become an especially scarce resource that women must compete for. Accordingly, Schmitt hypothesizes that cultures with lower sex ratios should possess higher levels of sociosexuality when men tend to desire promiscuous sex. In contrast, in cultures with higher sex ratios, lower levels of sociosexuality should be observed. The International Sexuality Description Project (ISDP) project found, as predicted, that sex ratios were significantly negatively correlated with national sociosexuality, and this finding is consistent with the view that cultures with more women than men possess mating systems driven by men's evolved desires for unrestricted promiscuous sex. However, in some cultures with more men than women, sociosexuality was found to be low, and the mating system is therefore supposed to be driven by women's desires for monogamous mating. But what might be the driving force of these remarkably stable effects across nations, and what might explain the variance between cultures?

Although the results reported by Schmitt are basically consistent with the sex ratio theory, it seems that the ISDP so far provides only limited explanations. For example, Schmitt argues that an alternative explanation could be that a low sex ratio in a culture may lead men to engage in greater intrasexual competition and mating efforts.

We suggest that (1) the variation in sex ratio across nations may be at least partly explained by prenatal androgen levels causing intrauterine stress and (2) the study of a potential hormonal basis would provide a more detailed picture about the variation of male–male competition across different cultures. James (1996; 1997; 2000) has presented evidence that high testosterone, in both male and female parents, at conception is associated with an increased sex ratio. Elevated levels of testosterone might be a result of intrauterine stress. However, the study of prenatal androgen action with respect to sex ratio theory across nations in a large-scale project such as the ISDP appears to be a difficult undertaking. There is now considerable evidence that the relative length of the second (the index finger) to fourth finger (the ring finger) (2D:4D) is a pointer to prenatal testosterone levels and may thus serve as a window to the prenatal hormonal environment (for a review, see Manning 2002). We propose that the study of 2D:4D ratio may provide a proxy to early androgen action and its implications for sex ratio theory.

There is evidence that this 2D:4D ratio is sexually dimorphic and is largely determined prenatally (Manning 2002). Males tend to show lower values of 2D:4D than do females; that is, males have on average longer fourth digits relative to their second than do females (Phelps 1952; Manning et al. 1998). Relative finger lengths are determined before birth (Garn et al. 1975), and the sex difference in 2D:4D seems to be present in children as young as 2 years (Manning et al. 1998). This sex difference in 2D:4D appears to be robust across a number of ethnic groups and races (Manning 2002; Manning et al. 2000; Peters et al. 2002). The sexual dimorphism in 2D:4D has been known for many years (e.g. Baker 1888), although it has only recently been suggested that sex differences in 2D:4D arise from in utero concentrations of sex steroids, with 2D:4D negatively related to prenatal testosterone and positively associated with prenatal estrogen (Manning et al. 1998). There is accumulating evidence for these relationships with sex hormones and sex-dependent behavior. For example, some sexually dimorphic traits favouring males are associated with low 2D:4D ratios such as left-handedness, autism, good visuospatial ability, and fast running speed. Other dimorphic traits favouring females are associated with high 2D:4D ratios – good verbal fluency and breast cancer (for review, see Manning 2002). Further, mothers with high waist-to-hip ratio (WHR), which is associated with high testosterone and low estrogen, tend to have children with low 2D:4D ratios (Manning et al. 1999). Children with congenital adrenal hyperplasia (CAH), a condition associated with high prenatal androgens, have lower 2D:4D ratios than do controls (Okten et al. 2002); and mothers with low 2D:4D tend to have children with low 2D:4D ratio, and their children possess high concentrations of testosterone in their amniotic fluid (Manning 2002).

Manning et al. (2002) hypothesized that if the suggestion by James (1996, 1997, 2000) were true, 2D:4D ratios of adults might be negatively related to the sex ratio of their children. This was tested in samples from English, Spanish, and Jamaican populations, and a negative relationship between sex ratio and 2D:4D ratio independent of sex and ethnicity of the parent was found. Manning et al. (2002) suggested that low 2D:4D individuals are more likely to have male offspring than those with a high 2D:4D ratio. These findings are consistent with James' (1996, 1997, 2000) suggestion that sex ratio varies according to exposure to environmental stress. We suggest that the study of associations among 2D:4D ratios across nations may provide further insight into sex ratio theory and its consequences for sociosexual orientation because of its nature as proxy to prenatal and adult levels of sex steroids. We argue that the variance in sex ratio is caused by exposure to early androgen levels and also suggest that sex-dependent behaviors and aspects of sociosexuality may correlate with 2D:4D ratio. Given that the sexual dimorphism in 2D:4D ratios appears to be a relatively robust trait across various human populations, 2D:4D is likely to be a valuable trait to study the hormonal basis of sociosexuality regardless of particular social influences.

Ethnography, cultural context, and assessments of reproductive success matter when discussing human mating strategies

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Abstract: The target article effectively assesses multiple hypotheses for human sexuality, demonstrating support for a complex, integrated perspective. However, care must be taken when extrapolating human universal patterns from specific cultural subsets without appropriate ethnographic contexts. Although it makes a strong contribution to the investigation of human sexuality, the basal reliance on a reductionist perspective constrains the full efficacy of this research.

In the target article, Schmitt tackles an extremely complex subject with an eye toward identifying mating strategies by using the Sociosexual Orientation Inventory (SOI) in a broad cross-cultural survey. Schmitt's conclusion that sociosexual differences "are predictable from several theoretical perspectives, none of which is conspicuously superior to the others" (sect. 7.5) is an important statement that clearly lays out an appeal for a broad, complexities-based approach to the topic. The application of this data set to hypotheses for human mating patterns and sexuality results in one of the strongest assessments of these hypotheses to date. The data

presented in the target article argue not for a specific focus on single perspectives in attempting to model and understand human sociosexuality but rather seem to suggest that a holistic meta-approach, inclusive of ethnographic, psychological, sociological, and biological perspectives, although difficult, will produce the most comprehensive and effective results.

Although I wholeheartedly agree with many of Schmitt's conclusions, aspects of the analyses remain rooted in a reductionist perspective that can inhibit further elaboration of trends and patterns in human sexuality. It is on this point that I will focus my commentary, not in derision of the overall contribution of the target article but as a consistent reminder of the importance of including anthropological contexts and complex evolutionary perspectives.

Like many studies of sexuality, this one is focused primarily on one subculture (college students) and thus should also include other correlates of these specific populations, such as type of education, media exposure, integration with other generations in the same society, general and specific health issues/status, and economic status, for example. Schmitt uses United Nations reports and psychological surveys of sex roles and sexism as cultural variables. However, using these statistical data sets does not actually provide ethnographic measures as much as it provides broad demographic and nation-level sociological ones (such as gross domestic product [GDP], mean age at marriage, or percentage of women in parliament). Using the International Sexuality Description Project (ISDP) SOI data set as partial support for some very broad adaptive hypotheses regarding human mating strategies can miss the power of the data set and paint an incomplete picture. The data presented here are not truly a study of evolutionary strategies (because measures of reproductive success are not included) but rather one of SOI responses. In this sense the title of the target article could have been "the sociosexuality of college students: a 48-nation study of the SOI measure of sexuality" and remain a substantial contribution to the study of sexuality.

Schmitt refers to Wood and Eagly (2002) frequently but does not fully include an important aspect of that source's methodology: the inclusion of anthropological databases (ethnographic sets) to contextualize the differences and similarities in human sexualities. Providing an ethnographic context facilitates attempts to uncover patterns of behavior that may reflect adaptive mating strategies in humans. Without ethnographic inclusions, the data set rests outside the complex interconnective biocultural web of humanity and thus may present a functionally incomplete picture of actual behavioral patterns.

Schmitt states that "culture has an important influence on sociosexuality, but biological sex is the larger and stronger predictor of human mating strategies across the nations of the ISDP" (sect. 6.6). Here, answers to the SOI questions made by primarily urban, educated individuals are taken first as accurate indicators of their sociosexuality and then translated into representations of mating strategies. This leap is arguably justified by the fact that many of the responses are statistically similar across samples used. However, it is not clear to me that, for example, the measure of "nation" defined as half the partial η^2-effect size of "sex" adequately addresses actual cultural and biological complexities. Neither the target article nor the other SOI reports clearly link the sociosexuality indicators as measured by the SOI to actual reproductive success or even actual mating patterns or behavior by individuals. Therefore, the leap from SOI answers to adaptive patterns of human behavior remains tenuous at best. The use of proxy measures for reproductive success (even if they are internally valid in the sample) remains highly speculative as evidenced from the primatological and animal behavior literatures. Proxy measures on generally young individuals (as in this study) may result in missing substantial components of their lifetime strategies. Experience affects behavior, and a focus on mainly reproductively young individuals can produce incomplete or artificial results.

The target article would have benefited from inclusion of the discourse arguing for less dramatic differences in male and females attitudes towards partner number and mating patterns (Miller et al. 2002; Pederson et al. 2002). Also, in an overview of mating strategies theory, one should be careful about heavy reliance on simplistic interpretations of the Trivers' model for obligatory parental investment and subsequent differences in sociosexual strategies, given the substantial complexities in the actual impacts of sexual selection, choice, and mating strategies reviewed in recent literature in evolutionary and ecological studies (Borgerhoff-Moulder 2004; Kokko & Jennions 2003; Tang-Martinez 2000).

Finally, the use of unrealistic figures of potential male reproductive success is counterproductive because there is no evidence that in humans or other primates such a dramatic lifetime reproductive skew occurs with any regularity in any population studied. Using such assumptions as a jumping off point, even if hypothetical, lays an unrealistic baseline that can then be used to create a variety of scenarios, all of which are faulty given the erroneous basal assumption. True potential reproductive success in a human society is dependant on much more than whether that society practices polygyny or monogamy as its primary marriage system. Marriage systems should not be seen simply as proxies for mating systems, nor should they necessarily be seen as reflective of adaptive strategies. This again stresses the need for a cultural context in which to place interview data on sexuality in humans.

Despite my criticisms, it is important to note the Schmitt is very aware of the limitations of the data set and explicitly points them out in section 7.1, entitled "Sociosexuality and psychometrics." He explicitly states that the current findings are "tentative until more sophisticated sampling techniques can be employed" (sect. 7.1), but this does not dissuade him from making some broad claims about adaptations and strategies throughout the target article.

In all, this is an extremely important contribution to the study of human sexuality, and Schmitt and his colleagues are to be congratulated on the ISDP and its far-reaching implications. The diverse sets of data produced from the project, especially those discussed in the target article, will provide substantial fodder for multiple theoretical and practical innovations in sexuality theory, as Schmitt clearly outlines in his discussion and conclusion.

Sperm competition theory offers additional insight into cultural variation in sexual behavior

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Abstract: Schmitt recognized that research is needed to identify other factors associated with sex ratio and with sociosexuality that may explain cross-cultural variation in sexual behavior. One such factor may be the risk of sperm competition. Sperm competition theory may lead us to a more complete explanation of cultural variation in sexual behavior.

Schmitt found that sex ratio, as predicted by Pedersen (1991), is correlated negatively with sociosexuality. That is, in those nations where women outnumber men (low sex ratio), individuals tend to be more sexually promiscuous. It is not yet known whether the sex ratio in a population causes a shift in sociosexuality, and Schmitt acknowledged appropriately that future research will identify other factors associated with sex ratio and with sociosexuality that may help to provide a more complete theory of cross-cultural variation in sexual behavior.

One such factor likely related to sex ratio and to sociosexuality that warrants future investigation is sperm competition, defined as the competition between the sperm of two or more males for fertilization of a female's eggs (Parker 1970). In humans, sperm competition is a consequence of female sexual infidelity and fe-

male sexual promiscuity (Smith 1984). Anatomical, physiological, psychological, and behavioral data suggest that sperm competition was an important selection pressure throughout human evolution (Baker & Bellis 1993; Gallup et al. 2003; Goetz et al. 2005; Shackelford et al. 2002; Smith 1984).

At first, one might posit that a high sex ratio would generate more sperm competition because there is a surplus of males in the population and therefore, more males' sperm competing for fewer females' eggs. However, sperm competition is independent of the general area of intrasexual competition. Instead, it is a low sex ratio (more women than men) that is likely to generate more intense sperm competition. As predicted by sex ratio theory and documented by Schmitt, a low sex ratio is associated with greater sexual promiscuity because men are the scarce, valued resource and can actualize their preference for promiscuous sex. Sexual promiscuity or unrestricted sociosexuality increases the likelihood that sperm from two different men will occupy simultaneously a woman's reproductive tract and thus generates an increased risk of sperm competition (Smith 1984). Risk of sperm competition therefore is hypothesized to be a consequence of variations in sex ratio and in sociosexuality. That is, variations in sex ratio and sociosexuality are expected to influence the risk of sperm competition, which will consequently produce variations in particular sexual behaviors.

One sexual behavior that may be facultatively contingent on the risk of sperm competition is copulatory frequency. High in-pair copulatory frequency has been proposed as a corrective measure in the context of sperm competition, because the relative abundance of sperm from the primary male would outnumber rival sperm, as a result of differential insemination frequency (Parker 1984). An increase in the frequency of in-pair copulations in response to cues of increased risk of sperm competition has been documented in several species of birds, insects, and mammals (e.g., Dickinson & Leonard 1996; Evans et al. 2003; Møller & Birkhead 1989). We therefore predict that in societies with a low sex ratio (more women than men) and unrestricted sociosexuality, men will initiate more copulations with their in-pair partner. Accordingly, there is substantial variation in the copulatory rates of peoples in different societies. Ford and Beach (1951), for example, reviewed anthropological records and identified tribes in which couples copulated an average of once per week, tribes in which couples copulated an average of three to four times per week, and tribes in which couples copulated more than seven times per week.

Existing data related to the interrelationships among sex ratio, sexual behavior, and the risk of sperm competition are not abundant, but some data can be reexamined to assess informally if copulation frequency (a sperm competition parameter) is related to local sex ratio. Ford and Beach (1951), for example, documented that the Keraki tribe of Papua New Guinea report copulating once per week on average. If sex ratio, sociosexuality, and sperm competition risk are related, as we predict, we expect the Keraki to have had a high sex ratio. A high sex ratio is associated with lower sociosexuality and (theoretically) with lesser risk of sperm competition. We examined data taken from the same time period and, indeed, found some evidence that New Guinea had a correspondingly high sex ratio (Keesing 1952). Data from the Keraki are consistent with the hypothesis that a high sex ratio and restricted sociosexuality are likely to generate lesser sperm competition in a population.

Another society in Papua New Guinea for which there are records of the sex ratio and of sexual behavior is the Chimbu of Mintima (Brown 1978). Although the sex ratio was not formally recorded, Brown (1978) repeatedly mentions the noticeable surplus of women, attributable to the death of men in warfare. The Chimbu, therefore, had a low sex ratio. Although polygyny was practiced among one-third to one-half of the population, female sexual infidelity was frequent. Brown (1978) describes several conflicts arising from adulterous wives and jealous husbands. Brown also writes, "A pregnant bride or unmarried girl is thought to be promiscuous; it is believed that the baby has been fathered by 'all the men,' and her husband may deny responsibility" (p. 176). Data from the Chimbu are consistent with the prediction interrelationships among a low sex ratio, unrestricted sociosexuality, and greater sperm competition risk.

We cannot rule out the possibility that copulatory frequency is an artifact of sociosexuality, for example, independent of sperm competition risk. Multiple sperm competition parameters (e.g., cuckoldry rates, testis size) are needed to determine if sex ratio, sociosexuality, and sperm competition are interrelated.

Schmitt recognized that future research is needed to discover other factors associated with sex ratio and with sociosexuality. Sperm competition theory, in conjunction with sex ratio theory (Pedersen 1991) and strategic pluralism theory (Gangestad & Simpson 2000), may help to provide a more complete theory of cross-cultural variation in sexual behavior.

Medical advances reduce risk of behaviours related to high sociosexuality

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Abstract: Although statistically significant correlations have been found among political, economic, and social indices, on the one hand, and measures of sociosexuality, on the other, it is likely that these correlations are second-order effects. Underpinning the reproductive freedom associated with higher sociosexuality are factors more closely related to biology, namely, easy access to safe, effective contraception and reproductive medical care.

Schmitt summarised his findings by reporting inter alia that "sex differences in sociosexuality were significantly larger when reproductive environments were demanding but were reduced to more moderate levels in cultures with more political and economic gender equality" (abstract). This conclusion was based on his investigation of both social structural theory and strategic pluralism.

Schmitt opted for "political and economic gender equality" as his criterion for looking at social structural theory and used as measures "percentage of women in parliament, percentage of women in ministerial positions, percentage of women-headed households, and divorce rates across cultures" (sect. 6.7.1). While investigating strategic pluralism, he looked at the prevalence of low birth weights, women's mean age at marriage, and GDP (gross domestic product per capita). He noted that the "same sex-differentiated pattern of correlations was evident for infant mortality rate, teen pregnancy rate, mean age at marriage, and the Human Development Index" (sect. 6.7.2).

It is perfectly plausible that there would be statistically significant correlations between all these measures and sociosexuality scores. And Schmitt adds to the usefulness of these theories by documenting support for them. However, these are mostly second-order effects, the primary factors being more closely related to biology. For example, if women were not freed from unplanned and often frequent child bearing they would be unlikely to be members of parliament, let alone hold ministerial positions. They would be much less likely to contribute to GDP, nor would they be deferring marriage and pregnancy at least until their early thirties, and sometimes indefinitely.

Thus Schmitt underestimates the arguably overwhelming effect of modern contraception; availability of safe, early abortion; advances in reproductive healthcare; and medical protection against sexually transmitted diseases (STDs). This means he may be underestimating the extent to which high sociosexuality or promiscuity in premodern or third-world cultures was or still is a high-risk, life-threatening strategy, especially, but not solely, for women.

In contemporary settings where antibiotics and contraceptives are not reliably available (and before their introduction in modern cultures), women capable of weighing future consequences are less likely to participate in promiscuous sexual activity, thus avoiding both pregnancy and STDs. Because such forward-looking women are also likely to be the best educated, it would not be surprising if Schmitt et al.'s (2003b) college samples reflected the attitudes of well-informed, forward-looking women in all the cultures they measured rather than those who are less well-informed. In doing so, they may be both underestimating sociosexuality for third-world cultures and overestimating it for developed countries.

Before the advent of modern medicine, most reproductively successful cultures had strong social constraints against promiscuity in women. Such constraints could be viewed as evolutionarily strategic, having as their outcome a protective, even life-saving effect on women of reproductive age.

Campbell (1999) described how, from an evolutionary perspective, women have more (than men) to lose and less to gain from taking risks involving physical harm, because in the environment of evolutionary adaptation "infant survival depended more on maternal than on paternal care and defence." Or, as Browne (1999) expressed it, "Because death has greater negative fitness consequences for females, women are more concerned with staying alive than are men." Infant dependence is a fact of biology. Thus, "if a mother wants her children to survive, then she must be equally concerned with her own survival" (Campbell 1999).

Before the advent of medical science, the death rate for young women was the same as or higher than for young men. Young women who conceived too early during their lifespans could and did die of the complications of pregnancy and spontaneous abortion. Women high in sociosexuality could and did contract untreatable STDs, which resulted in death for both themselves and their babies. Women low in sociosexuality, or those surrounded by tight social and cultural constraints on sexual behaviour at least had the benefit of being slightly older at first pregnancy and better supported when the baby arrived, thus increasing life expectancy for both mother and child.

In a section entitled, "Do we need Darwin?" Campbell (1999, p. 242) wrote that "some commentators seek to replace an evolutionary analysis with a menu of alternative social theories." Campbell was arguing the case for an evolutionary basis for sex differences in aggression, but the same argument applies to being unwilling to take risks that involve bodily harm in other settings, especially those involved in high sociosexuality, because these have clear links with reproductive outcomes.

Schmitt's article illustrates this contention. Although it is not clear whether Schmitt himself prefers an evolutionary interpretation of his data, he goes to some length in his article to substantiate the cultural, political, and social ramifications rather than the underlying biological basis. That is, instead of searching social indices, he could have searched for international data on the availability of effective contraception, safe abortion, good ante- and postnatal care, as well as easy access to STD clinics.

Of course, there is nothing wrong with documenting both. And given the tensions between disciplines, it may pay to minimise so-called reductionist explanations in some settings, in favour of the more expansive ones. But in my opinion there is no need for either to be ignored or de-valued. Each exists, the one underpinning the other. Both levels of explanation enrich our understanding of human behaviour.

The trees are not the forest, and monogamy is certainly not a kind of wood

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Abstract: The target article, which is part of a larger study, the International Sexuality Description Project (ISDP), seeks to explore cross-culturally aspects of human mating behavior on a global scale. However the non-representation of large cultures restricts the depth of this study. The inferences drawn from such a sample must therefore remain limited despite the impressive sample sizes. In a larger context it raises thoughts on how partial disclosures may misrepresent the design of the larger study.

The target article is a part of the larger International Sexuality Description Project (ISDP). In the target article the objective the ISDP sets for itself is testing the cross-cultural validation of the Sociosexual Orientation Inventory (SOI; Simpson & Gangestad 1991). It does succeed in certain ways. The span of cultures the SOI is tested on, the translations of the SOI, and the sample size are impressive. It is by these same standards that the methodology appears to have limitations. A definition of *culture* speaks of its coming into being wherever people engage in joint activity over a period of time (Cole 1996). Such a definition goes beyond geopolitical boundaries and is a pragmatic definition of culture. This essentially means that there are macro and micro issues involved in cultures, and that mating as a cultural phenomenon has both macro and micro perspectives. In addition, phenomena are believed to be universal and possibly modulated by biological processes. The sequel of these phenomena in the form of thoughts, acts, and behaviors is largely influenced by the sociocultural milieu in which these phenomena occur. This is particularly so in sexuality related behaviors. Mating behavior is one aspect of sexuality and by itself is a highly dynamic factor. The inference drawn is that mating as a behavior has both macro dimensions and individualized factors in various degrees at different points of time. Thus there are mating behaviors in different ethnic and national groupings, which at the same time have universally common factors, as well as unique differentiating factors.

Schmitt does not attempt to delineate his definition of culture, and presumably it is national identity that Schmitt has in mind when he speaks of "modern cultures." The concept of a nation is only one construct, and that, too, is a relatively recent attribute of cultures. It is not even equitably distributed given that there are cultural identities that cross political boundaries, and multiple cultures exist within a nation. Thus it sounds unreal when Schmitt concludes with a certainty that the SOI scores in the tested cultures indicate the mating patterns in that culture. He goes on to state that the SOI predicts national levels of sociosexuality, which remains only a presumption because the gauge of culture has only been nationality.

Mating is a sexual activity seen across the biosphere in a variety of forms, and in human cultures, this takes on a greater variety of forms. In the ISDP, although 48 nations are studied, many cultures do not find representation; 6 of the 10 most populous countries, including the two most populous countries in the world – China and India, with a combined population of more than 2 billion, are not part of the study. The countries not included are multiethnic nations with diverse sexual behaviors, which are unfortunately inadequately documented. Schmitt seems to have lost an opportunity to examine mating strategies and parental investment in these cultures. This is all the more exasperating because corporate entities have conducted preliminary explorations of sexual behaviors in China, India, and Southeast Asian cultures from Malaysia, Thailand, and others (Durex Sexuality Study 2003). However, samples from Arab, African, and South American cultures remain largely underrepresented in the target article. Elsewhere (Schmitt 2002a), Schmitt speaks of recruiting samples in India in the context of infidelity and promiscuity, and this was part

of the ISDP. However, for the current study the SOI was not administrated in India for reasons not specified in the target article, and recruitment difficulties were reported in China, despite having collaborators in both countries.

Therefore, although the scale of the ISDP is indeed very large, it cannot be truly called global. It is interesting that the Durex Sexuality Study, which has been conducted for the past four years (Durex Sexuality Study 2003) has recruited samples from these same countries, and the questions asked are sexually explicit! However this is an online questionnaire offering anonymity and hence participation in such a "sexual" study may be seen as less threatening. However, the fact remains that the SOI is untested in more than half of the world's population, and yet it is used in the target article to make assumptions on national sociosexual behaviors. Important cultural processes have been studied, though not by the ISDP, such as mate selection in Morocco; shared paternity among marital tribes of Amazonian South America; couple relationships in Iranian migrants in Sweden; and premarital relations in the Fante ethnic group of Ghana, Sub-Saharan Africa, and other areas of Africa (Ahmadi 2003; Ankomah 1996; Gage & Meekers 1994; McDonald 1999; Walter 1997). None of these, however, is on the scale of the ISDP. It would have been interesting to note if the ISDP's findings, as compared with these smaller studies, would have led to new insights into cultures, which were hitherto not studied.

The validations seem to confirm reasonably well-documented sexual practices in parts of the Western world. However, while discussing this reaffirmation of these, it is worth remembering that this is part of the mainstream thinking in Western civilization, which equates geopolitical national identities with cultures. This is the step where the testing of the SOI stumbles again. It may have been worthwhile to define each sample in terms of ethnic and historical backgrounds. This could have made the testing not vulnerable to an *imposed etic* strategy (Berry 1989; Church & Lonner 1998; Hambleton 2001) and amenable to the multitrait-multimethod approach (Campbell & Fiske 1959). This is possibly because the ISDP itself was conducted by a collaborative network of dedicated individuals with minimal funding and no organizational support. There also are other logistics, which seem to have influenced Schmitt to present various perspectives of the same study in multiple publications (five), thus possibly blurring the initial philosophy, which was to have studied sexuality in a truly cross-cultural manner.

However, all of these do not diminish the vast scope the ISDP opens up. It shows that in the different nations examined mating strategies were clearly and indisputably linked to other factors related to sexuality and parental investment. The questions of correlations among personality, mating approaches, and the influence cultural factors have on both of these need to be studied in cultural groups within and beyond national boundaries. It is the possibilities of these vistas being examined by in a truly cross-cultural manner by scientists without the interfering influence of funding agencies that make the target article exciting to read.

Sociosexuality and sex ratio: Sex differences and local markets

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Abstract: Operational sex ratio (OSR) is the correct sex ratio measure for predicting sociosexuality, but it is unclear whether this is the measure used. It would be valuable to know how OSR and sociosexuality correlate separately for males and females. The relationship between sociosexuality and OSR should also be examined with OSR measured at the local level of the mating market, where sex ratio must be having its psychological effects.

Schmitt's study valuably extends our understanding of evolutionary and cultural influences on human mating strategies. My commentary is concerned largely with the analysis of sex ratio influences.

The correct sex ratio measure for predicting sociosexuality is the operational sex ratio (OSR), the ratio of males to females in the breeding population, as Schmitt states (sect. 3.1). However, it is not clear whether Schmitt uses the OSR as his measure. Sometimes the term "national sex ratio" is used, and at other times, "operational sex ratio," for the same data, but the age range is not stated. This needs to be clarified; if the OSR is not the measure used, then the validity of the conclusions about the relationship between OSR and sociosexuality is in doubt.

It would be valuable to know how the OSR and sociosexuality (as measured by the Sociosexual Orientation Inventory, or SOI) correlate separately for males and females to determine how each sex adjusts its sociosexuality to the prevailing market forces in the competition for mates as the sex ratio changes. Although male and female SOI scores were significantly correlated across nations (sect. 6.4), the sexes may differ in the relationships they exhibit between OSR and SOI. The influence of environmental harshness on mating strategies was manifested primarily through changes in women's sociosexuality (section 7.4). Might the same be true for OSR effects, with male promiscuity remaining relatively stable and women's sexuality responding more flexibly to the numbers of competing females and potential mates? Evolutionary theory has had rather little to say about the relative flexibility of male and female mating strategies. Models of the problem would need to go beyond cost-benefit analysis to include game-theoretic considerations because a shift in sociosexuality by some members of one sex would influence the payoffs both to other members of the same sex and to members of the opposite sex.

The relationship between sociosexuality and OSR should also be examined with OSR measured at the more local level of the mating market, because psychologically this is where sex ratio must be having its effects. In the related case of the Fisherian response of birth sex ratio to OSR (Werren & Charnov 1978), a significant response was found at the level of individual Finnish parishes (Lummaa et al. 1998) but not at the larger scale of nations (James 2000). The reference group for status is a further example of the importance of a local scale of analysis, at which individuals can identify and respond to the relevant environmental variables (Frank 1985).

Replication at the local level of the OSR/SOI correlation found here at the national level would greatly strengthen the conclusion that the cross-national correlation represents a causal relationship rather than reflecting a correlation of both measures with a third unknown variable. One possibly important variable that does not seem to have been controlled for is the age of the participants, which may have varied between the national samples and may influence SOI.

A final comment, unrelated to sex ratio: The suggestion that a low sex ratio "may lead men to engage in greater intrasexual competition" (sect. 7.2) seems unlikely because market forces in this situation favour males and thus make intrasexual competition *less* necessary as a method for procuring a mate.

Adding the missing link back into mate choice research

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Abstract: Evolutionary psychologists should go beyond research on individual differences in attitudes and focus more on detailed models of psychological mechanisms. We argue for complementing attitude research with agent-based computational modeling of mate choice. Agent-based models require detailed specification of individual choice mechanisms that can be evaluated in terms of both their psychological plausibility and the population-level outcomes they produce.

A fundamental step in studying the connections between evolution and behavior is that of postulating the psychological mechanism responsible for a given adaptive behavior – evolutionary psychology's "missing link" (Cosmides & Tooby 1987). Orientations and attitudes are not mechanisms, and are not necessarily predictive of behavior (e.g., Ajzen & Fishbein 1977). Attitude researchers usually deal with this prediction problem by constructing new scales and measuring more variables. Schmitt is no exception in hoping for future studies to include "additional measures and variables" (sect. 7.5). However, our understanding of the cognitive mechanisms underlying mate choice is unlikely to improve with the unprincipled proliferation of variables to scrutinize. The *attitudes-without-process approach* may be one reason why Schmitt ends with the somewhat disappointing observation that differences on the Sociosexual Orientation Inventory (SOI) are predictable from several perspectives, leaving researchers little the wiser about which is most appropriate. Instead, we advocate a *process-with-attitude approach*, aiming to uncover how people process information, possibly in conjunction with their sexual attitudes, on the way to mate choice (Miller 1997). Specifying how mate choice mechanisms may work can also indicate just what measures and variables are needed to explain behavior, and because less can be more in environmentally situated decision making (Todd & Gigerenzer 2000), we may even find that attitudes do not prove strictly necessary in our models.

A useful form of modeling for studying mate choice and other social phenomena is agent-based computational modeling. Such models force one to specify how individuals meet, learn over time, and make decisions about potential partners. The behavior of such models can then be tested at the individual level, seeing if the predictions of the information-processing mechanisms match observed subject behavior. Importantly, these models can also be tested at the population level, for example, analyzing how the simulated individuals pair up (i.e., get married), when they get paired, and how well-matched the pairs are, and then comparing this to relevant demographic data (Billari & Prskawetz 2003).

Agent-based models of mate choice create a set of simulated individuals of both sexes that go about finding a partner in a well-defined mating environment. In Todd and Billari's (2003) model, agents live out a life composed of different steps: grow to marriageable age while learning something about the mating environment; look for a mate; find an acceptable potential partner and make a courtship offer; if accepted, pair up; if not, get a bit older, possibly learn something from the experience, and try again. Simulated individuals were endowed with a psychologically plausible decision mechanism, in which an aspiration level for desired mate quality is set through early experience, and any later-encountered potential mate above that level is courted. This simple type of heuristic embodies the principles of bounded rationality (cf. Todd & Gigerenzer 2000) at the individual level and fares well at the population level in explaining demographic patterns of human mutual mate search such as the distribution of ages at which people first get married.

Simão and Todd (2003) applied a similar model to test how population sex ratio can affect age at first marriage. According to their model, populations with skewed sex ratios should show lower mean age at first marriage, at least for the less common sex, because they are able to form and meet their aspiration level sooner given the abundance of potential mates. The same hypothesis follows for high sex ratios from the target article. Populations with a high operational sex ratio, those with more men than women, should be oriented towards women's preferences as the limiting factor, and thus should show lower SOI scores. Low SOI goes along with a tendency towards monogamy and, accordingly, to lower mean age at first marriage for women. Schmitt's data are compatible with this hypothesis: There is a positive relation between SOI and mean age at marriage for women (see Table 5 in the target article; note, though, the puzzling lack of relation between sex ratio and women's mean age at marriage in Table 4, which must be further looked into). However, although both approaches make the same prediction, Simão and Todd's model makes no assumptions about individual attitudes towards sex; instead, the results emerge from the dynamics of the search process in the simulated population.

The two approaches make distinct predictions for cases of a low sex ratio. Simão and Todd's model predicts that when females outnumber males, men should get married earlier because of their increased opportunities to find a suitable mate. The opposite follows from Schmitt's perspective in which men are predicted to be less motivated in pursuing monogamous relationships. The two predictions cannot be decided between at this point because the target article does not report data for men's mean age at marriage.

Process models also produce other testable predictions about issues on which less precise theories remain silent. For example, Simão and Todd's model predicts that the degree of assortative matching on quality between mates should decrease as a population deviates from the fully balanced sex ratio. This occurs because the quality variation among mated individuals of the more common sex gets smaller – only the high-quality individuals will be selected as partners – which in turn implies reduced correlation in quality between the sexes.

Making such predictions is of course risky for any model. They can be readily tested, and they may turn out to be wrong. One possible outcome of this enterprise would be a refutation of at least part of Simão and Todd's model. It may well be the case, for example, that some sort of attitudinal or motivational aspect – like SOI – must be included in the model for it to account for the relation (or lack thereof) between sex ratio and age at marriage for men. This is just the sort of interplay that should go on between mate choice process models and the valuable body of cross-cultural data produced by the research of Schmitt and others. By building models of psychological mechanisms and confronting them with the facts, we can reforge evolutionary psychology's missing link and hammer out ever more detailed and accurate models in the process.

Promiscuity in an evolved pair-bonding system: Mating within and outside the Pleistocene box

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Abstract: Across mammals, when fathers matter, as they did for hunter-gatherers, sex-similar pair-bonding mechanisms evolve. Attachment fertility theory can explain Schmitt's and other findings as resulting from a system of mechanisms affording pair-bonding in which promiscuous seeking is part. Departures from hunter-gatherer environments (e.g., early menarche, delayed marriage) can alter dating trajectories, thereby impacting mating outside of pair-bonds.

Many of Schmitt's findings are consistent with Attachment fertility theory (AFT; Miller & Fishkin 1997). First, every evolutionary theory, including ours, argues for a diversity of mating outcomes (e.g., short- to long-term) beyond monogamy alone. Second, Miller and Fishkin (1997) argue that with the post-Pleistocene advent of agriculture, father presence was less consistently important for offspring survival, producing more diversity in mating outcomes. When fathers mattered, pair-bonding was more likely: Pair-bonding is less likely in environments that depart from those experienced by hunter-gatherers (Miller & Fishkin 1997). If we assume that low scores on the Sociosexuality Orientation Inventory (SOI) are adequately measuring pair-bonding propensities1 and Schmitt's sociocultural variables include those like hunter-gatherer environments (e.g., vulnerability of offspring; daughters who are married by about 18 years of age) versus those unlike hunter gatherer environments (e.g., high average life expectancy; high accumulated nonshared economic resources), then a similar pattern of correlations would be predicted by AFT (Miller & Fishkin 1997; Miller et al., in preparation).

Evolutionary theories of mating differ in the *underlying, evolved mechanisms that produce these patterns of behavioral diversity* and in whether and how these mechanisms interact with Pleistocene-like (e.g., hunter-gatherer) and post-Pleistocene conditions. Strategic pluralism theory (SPT) and developmental attachment (DA) theories argue for evolved mechanisms sensitive to early childhood (Belsky et al. 1991) or local conditions (Gangestad & Simpson 2000; see target article) producing a more restricted or unrestricted mating pattern.[2] But, their model of how this type of mechanism might plausibly operate is underspecified.[3]

Attachment fertility theory argues that biparental care *always mattered throughout the Pleistocene* – our environment of evolutionary adaptiveness (EEA). Up to 50% of today's hunter-gather offspring perish before adulthood: With responsive paternal caregiving perhaps 80% survive (Geary 2000). Across all mammals where biparental care historically mattered for offspring survival, males and females evolve more homologous (sex-similar) chemical and biological caregiving, pair-bonding, and mate selection mechanisms (Ziegler 2000), with the evidence to date supporting this claim in humans (Miller et al., in preparation; Wynne-Edwards 2001).

Consistent with Hazan and Zeifman 1999, AFT argues for universal, sex-similar, evolved mechanisms leading up to and affording pair-bonding. These could also quite naturally (see Figure 1) produce short-term and other types of dating as by-products (Miller et al., in preparation; Miller & Wilcox , in preparation). That is, humans and other primate species, from those more promiscuous to pair-bonders, engage in the seeking of sexual relationships with possible mates, that is influenced by hormones (Dixson 1998; Fisher 2000)[4]: This "preattachment phase" (Hazan & Zeifman 1999) is associated with flirtatious or "proceptive behavior" (Eibl-Eibesfeldt 1989). For species that are not exclusively promiscuous, this leads to a specific partner preference phase that is heavily mediated by oxytocin release in humans (see Hazan & Zeifman 1999; Miller et al.,in preparation) and prairie voles (Insel 1997). A third phase follows with a series of attachment stages that Hazan and Zeifman have identified in humans. From preattachment to established bond, there are parallels in child-parent attachment (Hazan & Zeifman 1999), and in monogamous voles (Carter 1998, 2003; Insel 1997). The underlying evolved mechanisms can, at least plausibly, be tied to species-wide neuromodulator mechanisms that afford individual variability in parameter settings[5] (Miller et al., in preparation; Insel 1997).

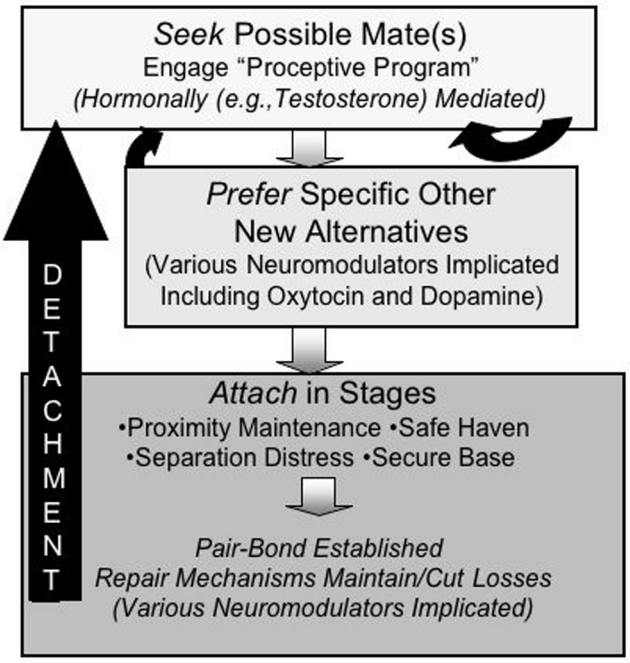

Figure 1 (Miller et al.). Universal (sex-similar) systems of mechanisms afford enduring pair-bonding (shaded boxes and arrows) while producing dating outcomes (from short-term to nonenduring pair-bonds) as by-products (solid black arrow). The number of these depends, in part, on time until an emotionally close pair-bond and whether that bond is maintained. Other mechanisms afford relationship repair (e.g., protest, despair) and even permanent detachment when there is sufficient sustained negative or insufficient positive affect. Then, the process can begin anew. Variability in mechanism parameter settings (e.g., relative levels of neuromodulators) as a result of experiential, maturational, and biological factors produce emergent within and between-subject diversity in mating outcomes over time.

We would argue that humans typically desire to eventually pair-bond. Across Schmitt et al.'s (2003b) 10 world regions (with Oceania being the sole exception), the median number of partners in 30 years desired for both men and women is actually one (Miller & Wilcox, in preparation), consistent with our earlier U.S. samples (Miller & Fishkin 1997; Pedersen et al. 2002). More than 98.9% of men and women in our college samples (the predominant group sampled, albeit globally, in the target article) want to "settle down" in a long-term relationship by five years into the future: In the interim, they want to date (Pedersen et al. 2002). Laumann et al. (1994), across representative cohorts, similarly found dating preceding (and following) long-term commitment.

Attachment fertility theory (Miller et al., in preparation) points to numerous post-Pleistocene changes enhancing variability in mating outcomes. For example, within hunter-gatherer societies

(with very different diet and exercise patterns), father absence delays menarche, does not advance it (as in nonhunter gatherer samples): This suggests that interactions between diet and paternal presence produce a much earlier sexual maturation trajectory today (Waynforth 2002). This reinforces the need to include hunter-gatherer data in cross-cultural studies and the need to cover a broader developmental trajectory (e.g., younger to older samples developmentally).

A developmental trajectory with later pair-bonding across cultures is apt to increase the number of sexual partners before pair-bonding. Using Schmitt et al.'s (2003b) cross-cultural samples, the average point at which men and women desired no new partners (between adjacent time frames into the future) was significantly correlated with SOI values: $r = .46$ ($p = .001$) for women; $r = .37$, ($p < .01$) for men. Furthermore, men reach this point later than women in these samples (Miller & Wilcox , in preparation). Men tend to marry later than women across cultures (United Nations Statistics Division 2001).

What nonevolved differences in our environments today could contribute to sex differences in mating beyond those mentioned above? Chemicals routinely provided in delivery could sex-differentially impact neuromodulator regulation and that in turn does impact caregiving and pair-bonding mechanisms, as has been found in pair-bonding voles (Carter 1998; 2003). Furthermore, circumcision (Taddio et al. 1997), prenatal chemical and substance exposure (Moe & Slinning 2001; Wakschlag & Hans 2002) and birth trauma (Eogan et al. 2003) all differentially impact sex differences in offspring emotional regulation, reactivity, and/or neuromodulator regulation (see also, Herskovits et al. 1999).

Evolutionary theories of mating need to contain and will be evaluated by the adequacy and plausibility of their underlying embodied mechanisms (e.g., ties to neuromodulators, specific genetic mechanisms). Therefore, AFT not only can explain the data in the target article, but it offers greater promise for better specifying the links between these underlying mechanisms, parameter differentials, and emergent mating behaviors (Miller et al., in preparation).

NOTES

1. Low SOI scores may include not only those who follow a more monogamous mating strategy (sect. 7.5) but those who are not interested in having any sexual partners (up to 5% of the males in some of our samples). Furthermore, the SOI contains items using very different metrics, and a standardized composite is not formed: Instead, a weighing formula is used without a clear conceptual basis. In addition, many of the items are open-ended variables (e.g., number of partners desired in the next five years) that are heavily skewed (Pedersen et al. 2002), making them unsuitable for parametric analyses. The median test employed by Schmitt is known to be problematic for testing median differences (Miller & Wilcox, in preparation). The Mann-Whitney U test tells us that there are distributional differences between men and women, but not whether those differences are at the median or deep into the tails: Newer methods allow us to assess this (Miller & Wilcox , in preparation). In short, conceptually and psychometrically these measures could be improved.

2. Harlow's research (discussed by Bowlby [1969/1982]) provides a model of how diversity in mating outcomes can result from departures from the adapted-for environment (e.g., absent or impaired maternal caregiving). Clearly Harlow's monkeys (and apes) that were removed from their mothers by humans and given cloth alternatives did not *evolve* a sensitivity to environmental cues that produced the differential mating and sexual outcomes experienced by these primates.

3. Ultimately, relative support for alternative evolutionary theories will rest on providing models of the underlying biochemically based evolved mechanisms (and their control parameters) – and how these operate and are effected. We are learning enough about the biochemical underpinnings and genetic processes here to specify in more detail (than is provided) some plausible mechanisms. For example, regulatory genes seem to have evolved to directly impact mating strategies in voles (e.g., more monogamous versus more promiscuous) by ensuring (or not) that there are sufficient oxytocin receptor sites in the dopamine reward pathways (Insel 1997). This genetic mechanism would enable (or not) the specific partner preference phase and later attachment stages (mentioned in Figure 1) that are necessary in affording pair-bond formation. But, these effects occur between species and occur in embryonic brain development (Insel 1997; Young et al. 1998) – requirements that do not fit with either DA or SPT.

4. Solely promiscuous species may not have mechanisms for partner preference formation, whereas pair-bonding species are likely to have evolved chemical and biological mechanisms to support most, if not all, of these mechanisms. Some species, especially among primates, may evolve partner preference mechanisms and perhaps some, but not enough other mechanisms, to support enduring pair-bonds. It's an intriguing possibility that species may differ along a continuum of mechanisms that together afford pair-bonding.

5. Bowlby (1968/1982) said that, "although regarded as distinct behavioral systems, attachment behavior and sexual behavior are believed to have unusually close linkages" (p. 230). The sexual circuitry system, which is heavily impacted by positive and negative emotions, dovetails well with these systems (Miller et al., in preparation). Sustained negative emotions and/or insufficient positive emotions may serve as cues that the relationship is unlikely to last and offspring production should be avoided because, in the absence of biparental care, such offspring would be far less likely to survive.

Less restricted mating, low contact with kin, and the role of culture

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Abstract: On the basis of a reinterpretation of the International Sexuality Description Project (ISDP) data, we suggest that findings are consistent with the view that human reproductive behaviour is largely under social control. Behaviours associated with a high Sociosexual Orientation Index (SOI) may be part of a progressive change in reproductive behaviour initiated by the dispersal of kin that occurs as societies modernize.

As Schmitt acknowledges, his perspective of sociosexuality as the result of a collection of psychological adaptations is limited in scope and does not account for the observed influence of cultural factors such as religion and political ideology on reproductive behaviour. A long tradition in social and cultural psychology argues that individual attitudes do not arise in a social vacuum, but through social interaction and exchange (Mead 1934/1967; Tajfel 1972; Turner 1991). This explains why, for example, individuals within social networks that hold common religious or political beliefs also share beliefs about appropriate mating behaviour.

In a similar vein, Boyd and Richerson (1985) argue that, in humans, reproductive behaviour is constrained by genetic influences, but strategies are remodelled to fit different environmental conditions, not by evolved mental modules, but by the cultural evolution of norms and institutions. The tendency to find mating pleasurable may be part of human biology, but ideas about with whom to mate and when it is appropriate to mate are informed by observing others and taking note of the information and evaluations they communicate.

Modern humans do not achieve levels of reproductive success consistent with the availability of resources. Models that maintain that reproductive choices emerge from an individual's striving to maximise fitness do not explain this as well those that assume that human reproduction is, to some extent, under social control. The process of modernization involves a suite of cultural changes, which includes profound changes in reproductive behaviour. These changes, which have become known as the "Demographic Transition" (Notestein 1953), break the link between access to resources and reproductive success, a link that has been amply observed in traditional societies (e.g. Borgerhoff Mulder 1988a; Chagnon 1988; Cronk 1989; Hill & Hurtado 1996; Irons 1979; Vining 1986; Wang et al. 1995; and reviews by Cronk 1991 and Low 2000).

Knodel's (1986) analysis of the demographic records of German villages during and just prior to the time the population went

through the Demographic Transition reveals the nature of the change. From 1825 to 1900, the average age at which a woman gave birth to her last child dropped from over 40 to below 38. Prior to 1825, a woman continued to bear children until the menopause, so couples who had not lost children as a result of disease or accident had greater reproductive success. But as the century progressed, women who had not lost children were more likely to stop childbearing early, allowing less fortunate couples to catch up. Such an apparent abandonment of reproductive competition sits uneasily with the assumption that human reproductive attitudes and behaviour are evoked by psychological adaptations designed to promote reproductive decisions that maximise fitness in response to ecological conditions.

Studies of historical and contemporary fertility declines are consistent with the idea that reproduction is under social control. The adoption of family size limitation is associated with a widening of social networks that allows increasing interaction between people of different communities (Bongaarts & Watkins 1996; Kohler 2001; Watkins 1991). One result of such a change is a decrease in contact between kin and a rise in contact between nonkin. Because nonkin have no genetic interest in encouraging one another to behave in ways likely to lead to reproductive success, the reduction in influence from kin could result in a drift away from cultural norms that provide social rewards for family creation.

Two lines of empirical evidence support this suggestion (Newson 2003, Newson et al. 2005). Role-play studies have shown that when the purported recipient of reproductive advice is a daughter, women are more likely to advise behaviour likely to lead to reproductive success than when it is a friend. And people who have more contact with kin have more children at a younger age.

Without the influence of kin to keep behaviour directed toward competing for reproductive success, activity within the social network is likely to become increasingly inconsistent with the efficient conversion of resources into offspring. A superficial look at changes in the reproductive behaviour of European populations suggests that this is the case. The increased prosperity that follows modernisation allows virtually everyone to reproduce, and after the Second World War, Europeans (in Europe and former European colonies) took advantage of this. Most people married and had families, and even though family sizes were limited, many people became parents at a relatively young age, creating the birth-rate rise known as the "baby boom." Then cultural values changed so that the status associated with motherhood declined. It became increasingly common for individuals to postpone marriage and childbearing or to forgo it completely. Same sex partnerships also became increasingly common and accepted even though creating a family is more difficult in such a relationship.

In a modern population, unrestricted mating is not likely to enhance fitness but it can reduce fitness, particularly in women, because of the associated risk of infertility due to sexually transmitted infections. Could unrestricted mating be part of a progressive abandonment of behaviours consistent with reproductive success? If so, SOI scores, particularly those of women, should be higher in cultures that were the first to experience a decline in contact with kin and the family size. The ISDP data reported in the target article support this hypothesis. European cultures were the first to modernize, and participants of European ancestry had significantly higher SOI scores than any other ethnic category.

The data can, therefore, be interpreted in a way that is very different from those offered by Schmitt – one that suggests that important aspects of reproductive behaviour are under social rather than individual control and that humans strive for reproductive success through cultural mechanisms.

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Universal human traits: The holy grail of evolutionary psychology

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Abstract: Although the search for universal human traits is necessarily the principle focus of researchers in evolutionary psychology, the habitual reliance on undergraduate students introduces profound doubts concerning resulting data. Furthermore, the absence of relevant data from foraging societies undermines claims of cross-cultural universality in this paper and in many others.

Evolutionary psychology revolves around the quest for universal human traits. If a cognitive or behavioral trait can be shown to exist cross-culturally, researchers are often quick to claim it is universal and may therefore provide a glimpse into human nature. Prominent examples would include Buss (2000), with his research on sexual jealousy; Fisher (1992), with her work on long-term pair bonding; and Ridley (1996), with his theories of altruism. In the target article, Schmitt sets off along the same path, hoping to elucidate universal human sociosexual characteristics with data from 48 countries.

But Schmitt has chosen a difficult and dangerous path. For all its apparent breadth, this type of research often suffers from a lack of methodological depth. Schmitt and his colleagues succumb to the same temptation that plagues so much sexuality research: reliance on a subject population more convenient than representative. The vast majority of the respondents in this study were university students. (Note: Schmitt writes that they are "college-aged," and in many of the countries surveyed, "college" refers to preuniversity or high school, but we assume he is referring to university students). We understand that undergraduate students are easy for many researchers to locate and motivate (e.g., by offering partial course-credit for returning a questionnaire), but this does not in any way make them valid representatives of human sexuality. Far from it. Even in liberal western cultures, college-aged people are normally in the very early stages of their sociosexual development with little, if any, experience to draw on when considering questions about one-night stands, long-term mate poaching or the ideal number of lifetime sexual partners, for example. In more restrictive cultures, this inexperience can only be more pronounced and thus impart even more bias to the research. In sexuality research, convenience and accuracy are often opposing forces.

As Schmitt points out, "because the . . . samples were primarily college students, any generalizations beyond college-aged populations would be inappropriate" (sect.7.1). He continues, "Importantly, the sociosexual lives of college-aged individuals may be quite different from older and more experienced men and women." Quite so. Notwithstanding this caveat, Schmitt is clearly in search of universals, as he states here:

> One of the objectives of the present study was to evaluate whether sex differences in sociosexuality are robust across the broad range of human cultures represented in [the ISDP]. Finding universal sex differences in sociosexuality would support parental investment theory (Trivers 1972), as well as other evolutionary perspectives on human mating (Alexander & Noonan 1979; Buss & Schmitt 1993; Gangestad & Simpson 2000; Hinde 1984; Symons 1979; Wilson 1987).

Whatever one may find in such a narrow sample pool, it is unlikely to be *universal*.

Beyond the limitations related to the subjects' age, many of their responses are likely to have been deeply distorted by cultural pressures. In many Islamic countries, for example, a prostitute is popularly defined as "an unmarried woman with knowledge of sex." What sort of self-reporting bias can be expected from presumably unmarried, female college-aged respondents being asked about their sexual experiences and fantasies in countries with such

deeply sex-negative and antifemale cultural indoctrination? It is highly doubtful that a study like this one is reaching beyond culture to any biological substrata where universal human traits may lie.

Another problem with using college students in this sort of multicultural study is that of class distinctions. In underdeveloped countries, only students in the highest class are likely to be fortunate enough to attend university. Indeed, a wealthy Ethiopian student may have much more in common with a British student than with a less well-off young adult from the Ethiopian countryside. Our field research in Africa suggests that sexual beliefs and behavior differ greatly among social classes and subcultures there and presumably in other parts of the world, as well (Jethá & Falcato 1991a; 1991b). Distorting effects of class and local subcultures are not addressed by Schmitt in the target article.

Another structural problem common to much research of this sort is related to theory underlying evolutionary psychology. One of the cornerstones of the discipline is the assumption that the vast majority of human psychological evolution took place in the so-called environment of evolutionary adaptedness (EEA) – normally defined as comprising that period bracketed by the first appearance of *Homo sapiens* and the origins of agriculture. According to this understanding, those of us living in nonforaging societies are somewhat ill-adapted to many aspects of our present environment and consequently suffer sometimes severe psychological and physiological consequences (Konner 1982). So it stands to reason that the search for *human universals* must include at least a few representative foragers, whose thought and behavior are not warped by the distorting effects of modern life. But there are no foragers among the 14,059 participants in this study. Existing research on the sociosexuality of foragers strongly confirms the existence of important similarities among unrelated foraging societies as well as dramatic differences from postagricultural sexual norms. (Beckerman & Valentine 2002) Swedes and upper-class Congolese may see themselves as very different from each other, but they may share important similarities from a forager's perspective.

Granted, it is no easy matter to distribute questionnaires in the Upper Amazon, but the difficulty or impossibility of including foragers in this type of research does not mitigate its vital importance. To his credit, Schmitt admits that "it would have been ideal to include additional samples from hunter-gatherer and tribal horticultural societies." Indeed, Schmitt is very candid in discussing the shortcomings of the research, but despite these caveats, the results are repeatedly referred to as illuminating "cultural universals." Although we sympathize with the difficulties faced by those seeking to uncover elusive human universals, future research will suffer greatly if we accept mistaken claims of success.

Worldwide, economic development and gender equality correlate with liberal sexual attitudes and behavior: What does this tell us about evolutionary psychology?

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Abstract: Shortcomings in the target article preclude adequate tests of developmental/attachment and strategic pluralism theories. Methodological problems include comparing college student attitudes with societal level indicators that may not reflect life conditions of college students. We show, through two principal components analyses, that multiple tests of the theories reduce to only two findings that cannot be interpreted as solid support for evolutionary hypotheses.

We commend Schmitt for extending sociosexuality research to a broad multicultural sample and attempting to contrast several evolutionary theories of human mating. We share his interest in understanding human mating from an evolutionary perspective (Schachner & Shaver 2002; Scheib 2001) and welcome further tests of evolutionary hypotheses. Unfortunately, certain features of Schmitt's study limit the conclusions that can be drawn. Most importantly, the study did not provide an adequate test of Chisholm, Belsky, and colleagues' developmental/attachment theory (e.g., Belsky et al. 1991; Chisholm 1996) or Gangestad and Simpson's (2000) strategic pluralism theory, because of problems with the sampling procedures and the use of population-level measures of each country's reproductive environment and degree of gender equality. We explain these problems briefly below.

First, whereas the sampling procedure "allowed . . .a large number of cultures to be studied," information about the cultures came from a special subset of the population – college students. As Schmitt notes, this "seriously limited the representativeness of national SOI profiles . . .[making] generalizations beyond college-aged populations . . .inappropriate" (sect. 7.1). Although Schmitt was able to compare average SOI scores from college students across countries, he could not perform legitimate tests based on variables at the societal level. For example, he tried to test developmental/attachment theory by examining the sociosexual attitudes and behavior of college students from countries with reproductively difficult versus less challenging environments. But it is in countries with reproductively difficult environments where one would expect college students to be least representative of the entire population. In cases where a large proportion of college students are members of the economic elite, they are a misleading sample on which to test ideas that apply mostly to the poorest, most stressed segment of society. Schmitt acknowledges this (sect. 6.7.1) yet still proceeds, following a logic that is akin to asking Stanford students about their sociosexual attitudes and then using their answers to test a theory likely to apply best to people living in the poor sections of Oakland. Not surprisingly, Schmitt finds no support for developmental/attachment theory using his method. Sampling from a wider range of countries (e.g., Jordan, India, Indonesia) with "more stress-related variability," as suggested by Schmitt, does not solve the methodological problem.

Second, to identify countries with reproductively difficult environments and measure their levels of gender equality and economic development, Schmitt used population-level indicators such as infant mortality, low birth weight, and child malnutrition (measures of reproductive difficulty), the gender development index, percentage of women in parliament, divorce rate, and women's sex-role ideology (measures of gender equality), and gross domestic product and human development index (measures of economic development). These measures apply to the population as a whole and may not be representative of college students in a particular country. Thus, the meaning of Schmitt's correlations between sociosexual attitudes and behavior, on the one hand, and population-level measures on the other, depend on the similarity of the college students sampled to the general population on which societal indicators are based. If the college students in a particular society are more liberal than their fellow citizens, as is likely in the US, for example, the findings will be distorted in one direction, but if the students in a society are less liberal than their fellow citizens, as might occur where students attend religiously conservative schools, the correlation will be distorted in the other direction. Thus, the finding that students in more reproductively challenging countries tend to be more restricted in their sociosexuality may indicate a real association or a misleading artifact. We cannot tell without knowing more about how the college samples in various countries differ from other people in those countries.

Schmitt also used population-level measures to conduct multiple tests of developmental/attachment theory versus strategic pluralism theory. Table 5 outlines the predicted associations, based on each of the theories, between sociosexuality and nine of the

population-level indicators. Schmitt finds that eight of the nine relationships are in the direction predicted by strategic pluralism theory, resulting in what looks like strong support for that theory and little support for developmental/ attachment theory. Tables 8–10 appear to provide further support for strategic pluralism theory. In fact, however, what appear to be multiple tests of these theories can be reduced to just two, because all of the population-level measures can be reduced to two principal components. In a principal components analysis of the correlation matrix in Table 4, we found that economically prosperous societies also have higher human development indexes, greater life expectancies, lower birth rates, lower teen pregnancy rates, lower infant mortality rates, lower fertility rates, higher average birth weights, and so on. (Not all variables could be included in our analysis because the matrix is not positive definite, but if we had been able to use the raw data, the other variables would most likely have loaded on the primary factor, too.) Only one principal component had an eigenvalue greater than 1.0; it accounted for 79% of the variance. All seven of the variables in the positive definite matrix loaded above .70 on this factor, with most loading above .90. Thus, all of the findings related to the correlation matrix reduce to one: College students in economically better off societies report more liberal sexual attitudes and behavior than students from poorer, less developed societies.

Similarly, the measures of gender equality in Table 8 form a single factor (accounting for 68% of the variance) that correlates with both our poverty/wealth factor and liberal sociosexuality. Hence, what looks like 13 associations between gender equality and sociosexuality can be reduced to one: College students, especially women, in countries with greater gender equality report more liberal sexual attitudes and behavior. As before, there is no way to draw conclusions about evolutionary psychology from this finding. In other words, Schmitt inadvertently created a situation in which evolutionary theories predict nothing more than one would expect without reliance on neo-Darwinian theory.

Fitting data to theory: The contribution of a comparative perspective

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Abstract: In this commentary, I consider Schmitt's cross-cultural investigation of sociosexuality from a comparative perspective. I argue that such a perspective lends support to an evolutionary explanation of a number of Schmitt's findings, including universal sex differences in sociosexuality and the sensitivity of mating behavior to contextual variables such as sex ratio.

Schmitt's cross-cultural survey of sociosexuality is a genuinely outstanding achievement. The data he presents are powerful and convincingly demonstrate sex differences and national differences in the extent to which people engage in monogamous versus promiscuous mating. However, the pattern of results and the explanation of those results are two separate issues. In this commentary, I address the latter issue. The question I explore is this: How confident should we be in attributing Schmitt's findings to evolutionary selection? To answer this question, I place these findings within the framework of a comparative perspective. My conclusion is that, in many cases, adopting this perspective does indeed support an evolutionary interpretation of Schmitt's findings.

The clearest example relates to what is probably Schmitt's least controversial finding: that in every nation surveyed in the International Sexuality Description Project (ISDP), men are more oriented toward promiscuous mating than women. How does a comparative perspective inform the interpretation of this result? The most striking thing about Schmitt's finding from a comparative perspective is its consistency with a major trend found in the animal kingdom, namely, that the sex that invests less in offspring tends to exhibit more interest in indiscriminate mating with multiple partners than does the higher investing sex (Trivers 1972). When speaking of nonhuman species, theorists inevitably explain this sex difference in evolutionary terms. For example, no one would wish to explain the greater pursuit of sexual partners by male than female turkeys or frogs as a product of arbitrary cultural whims or patriarchal norms. Given that we accept an evolutionary explanation for this sex difference in other species, it would seem tenuous to argue that the same phenomenon in humans is wholly a product of a completely different cause: learning or culture. Certainly, it is possible. However, we should have a strong reason to make this exception. Without such a reason, the default interpretation of the data should be that we are continuous with the rest of nature and thus that the sex difference in sociosexuality has an evolutionary origin.[1] Conversely, a higher standard of evidence should be demanded of theories that claim that this difference is explicable entirely in sociocultural terms. The general point here is that, to the extent that an aspect of human behavior is consistent with patterns found in the rest of the natural world, the onus of proof should fall more to advocates of nonevolutionary explanations of that behavior than to advocates of evolutionary explanations.

Next consider the finding that differences in national levels of sociosexuality are related to differences in variables such as sex ratio and environmental demand. Schmitt interprets this result in terms of the operation of a flexible evolved mating psychology, sensitive to evolutionarily significant ecological conditions. At first glance, the type of argument used above might not seem to support this position. It might be argued, for example, that most species have relatively inflexible mating systems: Chimpanzees are polygynandrous, gorillas polygynous, and gibbons monogamous (socially if not always sexually; Reichard 1995). However, the type of flexibility posited by Schmitt and other evolutionary psychologists is not without precedent among nonhuman animals. Variable mating systems are particularly common among birds (Castro et al. 1996; Dobson et al. 2000; Sorenson 1992). Furthermore, in many cases, they are responsive to variables such as those investigated in the target article.[2] One of the best examples of a species with a variable mating system is the dunnock, a small brown bird whose repertoire includes monogamy, polygyny, polyandry, and polygynandry (Davies 1985; 1989; Hatchwell & Davies 1990). The mating system found in a given dunnock population is determined by various factors, including sex ratio and resource availability. The existence of variable mating systems in dunnocks and other birds increases the plausibility of the claim that variability in human sociosexuality across different environments can be attributed, at least in part, to evolutionary selection.

Admittedly, this argument is weaker than that for evolved sex differences in sociosexuality. After all, variable mating strategies are less common in the animal kingdom, and the best examples are found in birds rather than more closely related species. Furthermore, there may be important differences in the mechanisms underlying variable mating in birds versus humans. As Schmitt's data show, in the human case, shifts in the prevailing mating system appear to involve changes in individual mating psychology, including attitudes and fantasies. In contrast, Davies (1985, 1989) has argued that, although dunnock mating systems change, individual mating preferences do not. Instead, the mating strategy pursued by males differs from that pursued by females, and any shifts in mating system represent different outcomes of male-female conflict in different contexts. For example, when the sex ratio is female-biased, males are better placed to enact their optimal mating strategy (polygyny); whereas when the sex ratio is male-biased, females are better placed to enact theirs (polyandry).[3] Considerations such as these weaken the argument presented in the preceding paragraph. Nonetheless, at the very least, the comparative evidence suggests that functional explanations of cross-cultural differences in sociosexuality cannot simply be dismissed as the overenthusiastic application of adaptationist reasoning. They

are consistent with trends observed in other animals, and therefore an evolutionary interpretation of the data deserves our most serious attention.

My final comment relates to the value of a comparative perspective in generating hypotheses about human psychology (see, e.g., Shackelford & LeBlank 2001). Although variable mating systems are not unknown among nonhumans, many species possess relatively inflexible mating systems. The particular system adopted by a species is predictable from variables related to that species' ecology. For example, monogamy and biparental care are more common in species for which reproduction is more demanding. In light of this trend, consider Schmitt's finding that, among humans, reproductively demanding environments are related to higher levels of monogamy and biparental care. This result raises the possibility that humans have evolved several behavioral strategies in this domain, each of which would normally typify a single species. If this is a general trend in human evolution, comparative research may help us generate hypotheses about facultative psychological adaptations in humans. Put simply, the environmental variables that predict between-species differences in behavior in nonhumans may be used to predict within-species differences in human behavior.

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NOTES

1. As Schmitt demonstrates, however, sociocultural variables also influence the size of the difference.

2. Of course, this does not apply to variables such as the proportion of women in parliament.

3. See Alexander (1979) for discussion of the possibility that invariant mating preferences in humans could give rise to either monogamy or polygyny depending on the distribution of resources in a society.

Sex, sex differences, and the new polygyny

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Abstract: The Sociosexual Orientation Inventory (SOI) was not designed to illuminate the sexually dimorphic mental mechanisms posited by evolutionary theories. Its results are therefore open to competing interpretations. Measures designed to tap the thought processes surrounding sexual experience generate findings that are more compatible with evolutionary than with social structural theory.

Schmitt's research makes an important contribution. My remarks are therefore intended to be heuristic rather than critical. In the target article, Schmitt states that both strategic pluralism theory and social structural theory (SST) are needed to explain the full spectrum of sex differences (sect. 6.7.2). A longitudinal, cross-cultural study of changes in social roles and sociosexuality could help to determine which theory is more compelling. Clearly, such a study would be worthwhile, but Schmitt's findings are consistent with both theories not because the theories are equally compelling but because the Sociosexual Orientation Inventory (SOI) does not effectively tap pivotal sex differences in sexual psychology (Townsend 1995; Townsend & Wasserman 1998).

Most of the mental mechanisms that moderate sexual behavior are monomorphic; one strategy to illuminate dimorphism in mental mechanisms is to design measures that maximize sex differences in traits that are theoretically postulated as dimorphic (Symons & Ellis 1989). The following are some of the sex differences predicted by evolutionary theories: Men place more emphasis than women on physical attractiveness in choosing partners for sex or marriage and are more readily aroused by visual stimuli, that is, the sight of a potential sex partner; consequently, evaluation of acceptability for coitus can be virtually instantaneous for males but tends to take longer for females. Women place more emphasis than men do on partners' ability to invest (prowess, dominance, resources) and on signs of partners' willingness to invest (affection, commitment, and emotional involvement; Buss & Schmitt l993; Townsend 1998).

Social structural theory posits that bifurcated sex roles and manifest patriarchy produce, through socialization, sex differences in sociosexuality; as patriarchy declines and women become more empowered, sex differences in sexuality also decline (sect. 6.7.1). Logically, as women become more empowered and unrestricted sexually, sex differences in partner-selection criteria should also decline. This does not happen. Upwardly mobile women raise their socioeconomic standards for partners rather than lower them (see Townsend l998, for a review). Furthermore, survey and ethnographic data and experimental manipulations indicate that even when women voluntarily engage in short-term, low-investment sexual relationships, women's interest in partners' ability and willingness to invest remains unabated, or in some cases, actually increases with increasing sexual permissiveness. Men's interest in these traits, however, declines with increasing numbers of partners; for short-term partners, a visual scan of physical attributes suffices (Townsend 1998; Townsend & Wasserman 1998). Thus, women's criteria for short- and long-term partners are similar, whereas men's criteria show greater differences (Buss & Schmitt 1992). Apparently, although the sexes' overt behavior may appear to be identical, dimorphic mental mechanisms cause the motives, assessment of partners, and evaluations of sexual experience to differ.

Social structural theory suggests that sex differences in sexuality should covary with gender-role ideology. Actually, factors such as gender-role attitudes and parental and peer socialization have not proven to be reliable predictors of sexual behavior (Townsend l998, p. 241). In Townsend (l993), neither women's SOI scores nor their insistence that future husbands' socioeconomic status be equal or superior to their own covaried with scores on the Attitudes Toward Women Scale (AWS). In contrast, men with high SOI scores had lower AWS scores and greater economic resources. Men with higher AWS scores reported less emphasis on future wives' physical attractiveness and less willingness to support wives financially, but high scorers were just as eager as low scorers to copulate with physically attractive target persons, so their lower number of sex partners and marital preferences arguably reflect market realities: having fewer economic resources, they are less able to attract and marry highly physically attractive women and financially more likely to need their wives to work (Townsend l998). This conclusion is consistent with Schmitt (sect. 4.1): Higher-status men are more attractive to women and therefore more able to indulge their desire for low-investment copulation with multiple, physically attractive partners; more "robust" men can, and so they do (Gangestad & Simpson 2000).

Contrary to SST, increasing women's financial independence and sexual freedom does not cause the sexual behavior of men and women to converge. In fact, it produces higher rates of functional polygyny. As women become financially independent and more sexually permissive, their attraction to dominant men and men's taste for partner variety allow high-status men to have sex with unprecedented numbers of partners (Townsend 1998). To test this proposition empirically, researchers need only compare total numbers of partners for the men in current studies to figures from previous decades. If the variation in numbers of partners for contemporary men exceeds variation in previous periods and exceeds the variation in women's number of partners (which it always does), then the rate of functional polygyny has increased (van den Berghe 1979). The enormous numbers of sex partners attributed to male celebrities are neither apocryphal nor a fluke; they reflect the interaction of women's increasing economic independence and consequent sexual freedom, their attraction to dominant men, and men's desire for partner variety. Innate sex differences in sexual psychology offer a better explanation of this development than

does SST. Doyenne of feminist sociology Jessie Bernard predicted that the more freedom men and women enjoy, "the more fundamental and ineradicable differences will show up" (1972, p. 256). I believe that the evidence reviewed here confirms her prediction.

Shortcomings of the Sociosexual Orientation Inventory: Can psychometrics inform evolutionary psychology?

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Abstract: Simpson and Gangestad's (1991) *Sociosexual Orientation Inventory* (SOI) is pivotal in Schmitt's cross-national study on sociosexuality. Here I elaborate on psychometric shortcomings of the SOI that are crucial in this research context.

The Sociosexual Orientation Inventory (SOI; Simpson & Gangestad 1991) is at the center of Schmitt's target article. In a fascinating attempt, a massive set of cross-cultural SOI data is used to test various competing evolutionary and nonevolutionary hypotheses, the outcome of this endeavor, however, being a mixed one: "[W]e are left with the relatively unsatisfying conclusion that sociosexual sex differences are predictable from several theoretical perspectives, none of which is conspicuously superior to the others" (sect. 7.5).

Here I suggest that the mixed outcome obtained is not unexpected, because the SOI instrument is a problematic measure in various ways. I contributed a portion (106 males, 102 females) of the Austrian data set analyzed in the target article. In the following paragraphs, I illustrate my principal argument, concerning the psychometric shortcomings of the SOI, by reanalysis of this community sample (sample A) and analysis of a second, comparable sample of Austrian adults (sample B: 87 males, 92 females; unpublished data).

From a psychometric standpoint, the SOI is atypical and an odd thing. It comprises not "numerous" (target article, first paragraph) but only seven items. Several investigators therefore felt a need to use larger item pools for measuring sociosexuality (Bailey et al. 2000; Putz et al. 2004). Although sociosexuality is a behavioral trait, the SOI comprises different domains (behavioral recall and anticipation, desire and fantasy, attitudinal facets) and also different response formats and measurement scale types (count variable, ordered categorization, Likert-type rating scale), from which, nevertheless, a single composite score is created.

Items 1 and 3 on the SOI capture past sexual behavior (last-year number of sexual partners, total number of one-night stands); item 2 aims at future sexual behavior (five-year number of anticipated sexual partners); item 4 concerns covert sexual behavior (fantasies about someone else than current partner); and items 5 to 7 assess attitudes towards casual sex. It is known that variance restriction on item 3 responses decreases SOI reliabilities (Brennan & Shaver 1995), and that item 4 is skipped more often than any other SOI item (Clark 2004; also evident in sample A: 9.6% missing values). Sometimes (Brennan & Shaver 1995; Clark 2004) these items therefore have been excluded from the calculation of SOI scores. Notice also that item 3 responses can only accumulate with participant age, but this obvious age effect is not adjusted for in SOI scoring methods.

SOI items 1 through 3 are count variables (positive integers), and as such, responses should be ratio-scaled. However, psychologically, they certainly do not constitute a ratio scale. Naturally, having had sex with zero versus one versus two partners during the past year makes a difference, behaviorally and psychologically; but having had sex with "many," say, 20 versus 30 versus 50 partners, hardly so. Moreover, preferences for rounded digits occur regularly (e.g., 50 partners, but never precisely 47 or 51), which is suggestive for recall inaccuracies. Thus responses on these items should be regarded as only ordinal-scaled. Responses on item 4 (sexual fantasy frequency) are ordinal-scaled, too, because between-category intervals are unequally spaced. Items 5 to 7 are 9-point Likert scales, with equally spaced between-category intervals, and thus could be conceived as interval-scaled. This assumption is testable with methods of modern item-response theory. Analyzing the consonance of items 5 to 7 to a Linear Rating Scale Model (LRSM; Andrich 1978; Fischer & Ponocny-Seliger 1998), I found the interval-scale properties were violated, that is, respondents in both samples A and B did not use the response format as if between-category intervals were equally spaced. It is revealing that some researchers have treated sociosexuality as a merely ordinal-scaled trait (Bailey et al. 2000).

The SOI authors have repeatedly stated that their weighted scoring approach "should" be used (Simpson 1998; Simpson & Gangestad 1991). Data analysis in the target article followed this recommendation. I emphasize that the weighted scoring method is unconvincing (neither theory-driven nor psychometrically tested). Other SOI scoring methods have been proposed and used in the literature (e.g., averaging *z*-score-transformed SOI items), but, of course, the same objection applies to these, too. For sample A, the SOI sex difference (Cohen's *d*) is either 0.737 (weighted scoring method) or about 15% smaller (0.639; *z-score* method), for sample B, either 0.533 or 0.683 (about 28% larger), respectively (no outlier trimming applied here, because samples were not college samples). These divergent results illustrate the arbitrariness of SOI scoring methods.

Response distributions on SOI items 1 to 3 are, necessarily, heavily skewed. Unfortunately, this extends to SOI items 4 to 7 as well. Testing the normality of the seven SOI items (untransformed and *z*-transformed, samples A and B, males and females), I found 56 out of 56 distributions significantly deviant from normal distribution (all $ps < .036$, with most $ps < .001$). Distributional skewness heavily impacts on parametric sample statistics (*M*, *SD*, and *r*). As a consequence, skewness likewise affects calculations of sex differences (Cohen's *d* metric), internal consistency (Cronbach's α), or dimensionality (factor analysis). There are no generally accepted trimming procedures for skewness, and the type of trimming itself influences results of parametric data analyses (Pedersen et al. 2002). Sex differences in SOI score variability belong to the most robust SOI findings (target article, note 3), and there is also evidence (Gangestad & Simpson 1990, p. 78, footnote 5) for bimodality in SOI distributions. These facts greatly complicate the calculation of SOI sex differences, because it is not clear which *SD* (male, female, or pooled estimate) should be used in this case, and because *M* is a poor location estimator for bimodal distributions. Because response styles on SOI items may well differ across groups (sex, age, and culture), uniform handling of SOI items does not ensure validity of group comparisons (a premise of the target article). And even within cultures, SOI sample statistics depend on study sampling characteristics.

The SOI is unique in another respect: Some items' meaning varies with participant relationship status. Consider item 1 (last-year number of sexual partners): For respondents attached more than one year, responses of "one" indicate intact sexuality and monogamy; responses of "zero" indicate cessation of sexuality (whether initiated by respondent or partner, and why, is not identifiably from other SOI item responses); and responses of "more than one" indicate sexual infidelity (given monogamy; the meaning of the same response being less clear in polygamous cultures). For respondents attached less than one year, the situation is even less clear: do responses of "two" imply sex with current partner plus one infidelity instance during this relationship (monogamy assumed), or sex with current partner plus one instance of sex during last year before this relationship commenced? And, if so: Was it a one-night stand or sex with previous partner? Now consider respondents unattached during the last year; the meaning of "zero," "one," and "more than one" responses again changes. Ev-

identely, identical responses on SOI items can mean very different things, depending on respondents' age, relationship (and marital) status, or culture (monogamous vs. polygamous).

The final note here is a disquieting finding: Female (but not male) SOI scores (z-scoring method) were substantially negatively related ($r = -.41$, $p < .001$, two-tailed) to a social desirability measure (Stöber 2001) in my sample B. Could it be that female SOI scores in general are depressed, as a consequence of social desirability standards?

In spite of the many virtues of Schmitt's impressive target article, I fear that the SOI, as a result of considerable conceptual and psychometric problems, cannot be expected to meaningfully measure a single (behavioral) trait. Its usefulness for investigating sex differences and cross-cultural differences and for relating these to external variables seems limited. For the future, we must do better about measuring sociosexuality.

Author's Response

Measuring sociosexuality across people and nations: Revisiting the strengths and weaknesses of cross-cultural sex research

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Abstract: My response to the commentaries highlights three main points. First, the Sociosexual Orientation Inventory (SOI) has demonstrated adequate reliability and validity across dozens of studies, and it deserves its reputation as a useful measure of basic human mating strategies. Second, the sampling limitations of the International Sexuality Description Project (ISDP) do not negate the conclusion that sex differences in sociosexuality are likely universal across cultures. Third, the ISDP results support several theories of human sexuality, although some are based on faulty assumptions that render them less viable than others.

R1. Introduction

My response to the commentaries will address three primary issues: (1) psychometric concerns with the Sociosexual Orientation Inventory (SOI), (2) sampling limitations of the International Sexuality Description Project (ISDP), and (3) appropriateness of interpreting ISDP results as supporting or refuting various theories of human mating.

I first want to express my gratitude to all commentators for recognizing the inherent difficulties in completing a cross-cultural study as ambitious as the ISDP. Problems with collaborator recruitment, survey translation/back-translation, subject selection, uniform survey administration, and consistency in data entry and coding become increasingly difficult as new cultures and languages are added to an international collaboration. The ISDP eventually included dozens of cultures and languages, as well as more than 100 individual researchers, pushing our organizational and collaborative skills to their limits. I thank everyone for acknowledging the time and effort of all ISDP members.

R2. Psychometrics of the SOI

Several commentators expressed serious concerns with the psychometric properties of the SOI (**Asendorpf & Penke, Bond, Clark & Daly**, and **Voracek**). Although the SOI has limitations, it would be unfortunate for readers to conclude that responses to the SOI provide little meaning or empirical value. The reliability and validity of the SOI has been documented in dozens of studies (see Simpson 1998; Simpson et al. 2004), and SOI profiles repeatedly prove useful in testing evolutionary and other theories of human mating (e.g., Gangestad & Simpson 2000). Still, there are legitimate issues regarding the psychometrics of the SOI.

R2.1. Response biases on behavioral items

One psychometric concern is that the first item of the SOI (i.e., number of sex partners in the past year) and SOI item 3 (i.e., number of one-night stands) should theoretically produce no sex differences among closed heterosexual populations. As a result, the sociosexual sex differences found in the ISDP may be underestimates of true sexual differentiation in human mating strategies. In his commentary, **Townsend** persuasively argues this point and insists the SOI misses many key sex differences in human mating psychology (see also **Buss** and **Mata, Wilke, & Todd** [**Mata et al**.]), including the highly consequential dimorphisms involving mate preferences for physical attractiveness and resources.

Another potential problem with SOI items 1 and 3 is that these particular scales may reflect systematic biases in the way men and women respond to behavioral sex questions. If true, this would raise doubts as to whether men and women actually differ in sociosexual tendencies. Of course, concerns over self-reports of sexual behavior are a classic psychometric problem in sex research (Andersen & Broffit 1998; Catania et al. 1986; Green & Weiner 1980). Sex differences on behavioral questions such as "number of past sex partners" are thought to result from several factors, including men's greater use of prostitutes (with prostitutes not being included in most research studies), unequal sex ratios among college student samples, and the way men and women define "sex" and what it means to be a "sex partner" (for a review, see Wiederman 1997b).

Perhaps the most credible exposition of why the sexes differ in "number of past sex partners" is that men and women cognitively reflect on their past sexual experiences in fundamentally different ways (Wiederman 1997b). In essence, men tend to estimate and give an approximate, ballpark figure concerning their lifetime number of sexual partners, whereas women are apt to mentally tally their past sexual partners and consider each experience in detail (Wiederman 1997b). In the SOI, this may have occurred with items 1 and 3, and some SOI differentiation across sex may have resulted from this cognitive reasoning bias. Even so, the tendency to think about sexual experiences in this way may, itself, represent interesting information that reflects fundamental sex differences in mating psychology.

More important, as noted in the original article, sex differences were also apparent when looking only at the *attitudinal* items of the SOI. There is no logical necessity for closed populations of men and women to score identically on positive endorsements of unrestricted sociosexual attitudes such as "sex without love is OK" (i.e., item 5 of the

SOI) or "I can imagine myself being comfortable and enjoying 'casual' sex with different partners" (i.e., item 6 of the SOI). Indeed, from evolutionary perspectives such as parental investment theory (Trivers 1972), one would expect – as found in the ISDP – that the sexes differ universally in this respect.

R2.2. Mating strategies and marital systems

A few commentators (**Beckerman** and **Fuentes**) took issue with using the SOI as a measure of human mating strategies per se and with the use of *monogamy* as a term for both marital systems and mating behavior. The SOI was originally designed to measure individual differences in the need for commitment before consenting to sex (Simpson 1998; Simpson & Gangestad 1991). Most investigators have treated SOI responses as a more general indicator of the tendency to have a few heavily invested sexual relationships (i.e., monogamy or restricted sociosexuality) versus having many low-investment sexual relationships (i.e., promiscuity or unrestricted sociosexuality). Given the SOI's diverse item content and the fruitfulness of past SOI research studies, I consider this extended treatment a reasonable one.

The issue of marital versus mating terminology is a concern, particularly when applied to cultures rather than individuals. Some cultures have officially monogamous marriage systems, but many individuals practice more promiscuous or short-term-oriented sexuality when it comes to actual behavior (e.g., exhibit high rates of premarital sex, extramarital sex, divorce and remarriage, and mate poaching). As I noted in the target article, for this reason the terminology of *short-term* versus *long-term* mating is often preferable to other conceptions of mating tendencies. This is partly because individuals can be both long-term maters (i.e., married) and short-term maters (i.e., have affairs) simultaneously, with the different psychologies of these two mating strategies operating within the same person over time, depending on which strategy is being pursued at the moment (Gangestad & Simpson 2000; Schmitt, in press).

The SOI, unfortunately, merely provides a broad brushstroke of whether a person is generally restricted (i.e., more oriented toward long-term mating) or unrestricted (i.e., more oriented toward short-term mating), and does not fully account for shifts in long-term versus short-term mating throughout developmental time, across the ovulatory cycle, and during different stages of romantic relationships. The SOI also fails to capture mating variability as a result of recent changes in a person's mate value or the qualities of their current romantic partner. In my view, focusing on the activity of "short-term mating adaptations" and "long-term mating adaptations" operating within the same person over time and across relationship contexts will prove most useful in future investigations of human mating strategies.

R2.3. Construct validity and impression management

Some commentators expressed the opinion that human mating strategies may not be measurable with self-report methods (**Clark & Daly** and **Voracek**). Questions about whether sexuality can be assessed via self-report fundamentally involve issues of reliability and validity, and so should be addressed empirically (Andersen & Broffit 1998; Wiederman 2002). What we know empirically is that responses to the SOI possess adequate internal reliability, temporal reliability, convergent validity, discriminant validity, and predictive validity (Simpson & Gangestad 1991; Simpson 1998). SOI responses are almost always related, as theorized, to individual differences in mating motives, mate preferences, relationship initiation, relationship interaction, and early family environments (Simpson et al. 2004). Across numerous studies, SOI response have been correlated with observer reports, peer ratings, and external criteria such as facial symmetry and finger length ratios (Gangestad & Simpson 2000; Simpson 1998; Simpson et al. 2004). Clearly, individual differences along the dimension of sociosexuality can be assessed with self-report methods, particularly with the SOI.

Still, even if SOI scores represent valid and meaningful information, some commentators insist this information is corrupted by men and women actively managing the impressions they give when completing self-reports (**Clark & Daly, Ryan & Jethá**, and **Voracek**). Typically, the assumption is that men tend to report much higher sociosexuality, and women, much lower, than is actually the case. As evidence of this, critics often cite a recent experiment in which women appeared to lie in sexual self-reports (Alexander & Fisher 2003). Participants in that study were asked to complete sexuality measures under three different conditions: A bogus pipeline condition in which they thought lying could be detected, an anonymous condition, and a nonanonymous condition. When anonymity was not guaranteed, women reported fewer past sexual partners. Importantly, women's self-reports about most sexual behaviors, and virtually all sexual attitudes, *did not differ* across the anonymous versus bogus pipelines conditions. For example, sex differences in the Sexual Opinion Survey (a measure of erotophilia) were the same across the anonymous (d = 0.37) versus bogus pipeline (d = 0.36) conditions. In other words, the study documented that responses to most sexuality measures are unaffected by impression management under conditions of anonymity. In the ISDP, all surveys were administered anonymously, so we could speculate that responses in the ISDP are just as valid as if participants were administered the SOI while connected to a lie detector.

In addition to the Alexander and Fisher (2003) study, many researchers have found that lifetime numbers of partners, sexual fidelity, and sociosexual variables are largely unrelated to impression management under truly anonymous conditions (e.g., Clark & Tiffit 1966; Ostovich & Sabini 2004; Schmitt & Buss 2000; Tourangeau et al. 1997). Indeed, in all samples ever collected by the author, sex differences in the SOI have never been drastically affected, let alone disappeared, after controlling for impression management biases.

In a recently collected sample of 901 men and 1,973 women from the ISDP-2, a follow-up study to the ISDP in which the Balanced Inventory of Desirable Responding (BIDR; Paulhus & Reid 1991) was included, after controlling for impression management using the BIDR, men's SOI scores were reduced from 50.2 to 49.0, a very slight reduction. Women's SOI scores increased only from 30.5 to 31.0, again very slight. The magnitude of sex difference in terms of the d statistic, after controlling for impression management, went from 0.75 to 0.69, a negligible change. Impression management clearly does not account for observed sex differences in self-reported sociosexuality. The

empirical reality is that the SOI is neither invalid nor do sex differences in sociosexuality result from spurious reporting biases. As noted in the **Barash** commentary, clinging to the view that men and women do not differ in sociosexuality, at this point in time, most likely stems from ideology rather than science.

R3. Sampling concerns with the ISDP

Most commentators noted limitations with the ISDP sampling procedures (e.g., **Asendorpf & Penke, Beckerman, Grant, Kiran, Ryan & Jethá**, and **Schachner, Scheib, Gillath, & Shaver** [**Schachner et al**.]). Sampling concerns are quite common in psychological research (especially the use of convenience samples), and within the field of sexology the problem of volunteer bias among convenience samples is especially vexing (Dunne 2002). The samples of the ISDP were composed mainly of volunteer college students, leaving open the very real possibility that those who did not volunteer for the ISDP were less erotophilic, less extraverted, and less sexually experienced than those who did volunteer (Wiederman 1999).

In addition, the degree to which college students are representative of national samples varied across the nations of the ISDP – a significant confound addressed in the target article. Ultimately, representative sampling of entire national populations will be needed to fully verify the results of the ISDP. This may be difficult in less developed nations as most representative sampling done today uses telephone polling methods, and people in less developed nations tend to lack access to private telephones. Although the sampling limitations mentioned by the commentators are a concern, they were in many ways unavoidable given the logistics of the ISDP collaboration (i.e., collaborators had to pay for their own translation, copying, and data entry costs, making true national sampling practically impossible). Perhaps future researchers will have the resources to conduct census-like assessments of national sociosexual tendencies.

R3.1. Age and relationship status

Two legitimate concerns over sampling involved age and relationship status. Because most ISDP participants were college students, they also tended to be both young and single. This raises the prospect that sociosexual sex differences may fade away among older or married individuals (**Asendorpf & Penke, Fuentes**, and **Ryan & Jethá**). For example, unrestricted sociosexuality may be adaptive and normative among young and single men, and those who fail to experiment with multiple sexual relations while they are young and unattached may be somehow maladaptive (perhaps having low mate value). In contrast, unrestricted sociosexuality could take on a different meaning and function once outside of college and engaged in more serious romantic pursuits. Among older and married men, perhaps, unrestricted sociosexuality may be less frequent and sex differences might disappear.

To investigate this possibility, I divided the ISDP sample into five age groups, including those who were 18 to 20 (2,410 men, 4,178 women), 21 to 25 (2,253 men, 2,851 women), 26 to 35 (735 men, 743 women), 36 to 45 (184 men, 231 women), or older than 45 (92 men, 127 women). To investigate the effects of relationship status, I divided

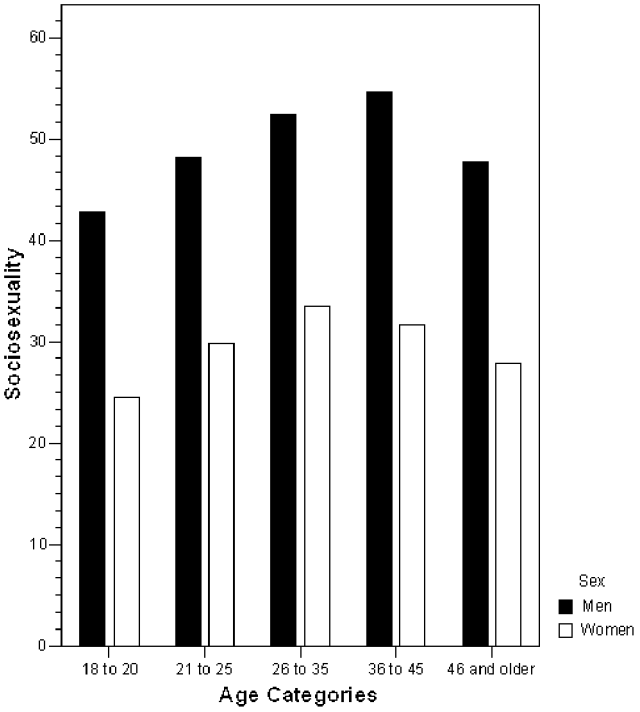

Figure R1. Age and sex differences in sociosexuality.

the ISDP sample into those who have never had sex (174 men, 327 women), were currently single (1,661 men, 1,691 women), were dating one person (1,622 men, 2,892 women), were living with someone (270 men, 369 women), or were currently married (389 men, 467 women).

As shown in Figure R1, both men and women tended to score higher on sociosexuality as they aged, $F(4, 13{,}794) = 65.75$, $p < .001$ (at least until reaching age 46). Importantly, there was no interaction between sex and age. Regardless of age, men scored significantly higher than women on sociosexuality, $F(1, 13{,}794) = 502.90$, $p < .001$. Sex differences were significant within each age group, and in magnitude of effect showed strong consistency, 18 to 20 ($d = 0.79$), 21 to 25 ($d = 0.68$), 26 to 35 ($d = 0.62$), 36 to 45 ($d = 0.70$), 46 and older ($d = 0.70$). According to the large ISDP database, the notion that sex differences are limited to younger samples is unfounded (see Schmitt et al. 2002).

As shown in Figure R2, relationship status had a significant effect on sociosexuality, $F(4, 9{,}852) = 99.49$, $p < .001$. Importantly, there was no interaction between sex and relationship status. Regardless of relationship status, men scored significantly higher than women on sociosexuality, $F(1, 9{,}852) = 573.78$, $p < .001$. Sex differences were significant for each relationship status group, and once again showed a consistent pattern in terms of magnitude of effect: never had sex ($d = 0.72$), currently single ($d = 0.67$), dating one person ($d = 0.76$), living with someone ($d = 0.59$), and currently married ($d = 0.74$). According to the large ISDP database, the notion that sex differences are limited to single individuals, and somehow disappear once married, is demonstrably false.

R3.2. Tribal samples and missing populations

Several commentators (**Beckerman, Eagly & Wood, Grant, Kiran, Ryan & Jethá**, and **Schachner et al**.)

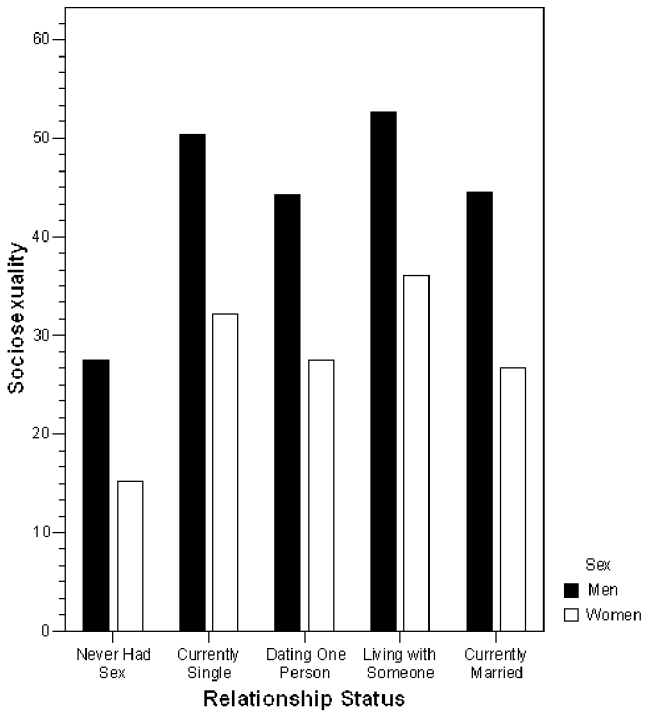

Figure R2. Relationship status and sex differences in sociosexuality.

noted that many human populations, including tribal populations, were missing from the ISDP. This was regrettable but unavoidable in many cases due to the limited nature of ISDP methodology (i.e., international collaborators had to pay for their own costs). Even so, previous investigations of preindustrial populations (see Broude & Greene 1976; Frayser 1985; Murdock 1967; Pasternak et al. 1997) may yield some insight into how the SOI would have been completed by such individuals. In general, these insights suggest that sociosexual sex differences and cultural variations among preindustrial populations would be consistent with those documented in the ISDP.

For example, more than 80% of preindustrial cultures allow or have allowed polygynous marriages (Frayser 1985; Murdock 1967). The pervasiveness of polygyny (particularly men's pronounced *desires* for multiple wives, given that balanced sex ratios typically limit the number of men who can achieve their true mating desires), and the relative absence of polyandry (including the absence of women's desires for multiple husbands) corresponds favorably to the sociosexual sex differences found in the ISDP. In the Standard Cross-Cultural Sample, extramarital sex and premarital sex are thought to be more common among men than women, and men are typically thought to be more forward in sexual overtures (Broude & Greene 1976). Others have documented findings similar to those of the ISDP regarding the effects of culture (e.g., unbalanced sex ratios) on sociosexual mating behavior (see Barber 2002; Low 2000).

Still, until direct assessments of modern-day preindustrial populations are made possible, the findings of the ISDP should be considered limited by sampling concerns. Direct assessment will be difficult, however, given that anonymous surveys are probably best for assessing sociosexuality, and many members of preindustrial populations lack the literacy skills needed to complete the SOI. It will likely take a concerted and heretofore unprecedented effort among well-trained psychologists and anthropologists to systematically interview samples from around the globe to fully address the problem of missing populations in the ISDP.

R4. Interpretation of theories and theoretical support

Many commentators took issue with the interpretation of ISDP results as supporting or refuting specific theories of human sexuality. I will focus on the three major theories of human sexuality that generated the most comments.

R4.1. Sex ratio theory

Lazarus, Eagly & Wood, and **Clark & Daly** took issue with the interpretation of ISDP data as supporting Pedersen's (1991) sex ratio theory. **Lazarus** questioned the use of general sex ratios as applying to reproductive populations, particularly national populations (**Mata et al**.). Indeed, local breeding population ages were not used, as this information was not obtainable by the author. Future researchers who do have access to that information will be able to conduct those analyses, as will others interested in relating sociosexuality to other cultural variables. In this way, the target article should serve as an empirical resource to future investigators.

Eagly & Wood argued that the theories of Guttentag and Secord (1983) explain the links between sex ratio and sociosexuality better than Pedersen's (1991) theory. For example, in cultures where men are scarce (i.e., low sex ratios), Guttentag and Secord (1983) argue that men have higher dyadic exchange power, women have low dyadic power, and men are thereby able to engage in unrestricted multiple mating, or as **Eagly & Wood** state, in low sex ratio cultures "men then reap the benefits of their greater exchange power by participating in multiple relationships." But why would men want to engage in multiple mating in the first place, and why would this be an inherent benefit that men "are able to impose" when given the chance? From this perspective, one has to assume that men fundamentally desire multiple mating, an assumption that is an explicit center piece of Pedersen's sex ratio theory (1991), sexual strategies theory (Buss & Schmitt 1993), strategic pluralism theory (Gangestad & Simpson 2000), and nearly all evolutionary theories of mating except social structural theory (**Eagly & Wood**) and attachment fertility theory (**Miller, Pedersen, & Putcha-Bhagavatula** [**Miller et al**.]). In some sense, to favor Guttentag and Secord's (1983) explanation of sex ratio effects one has to view theories that do not assume men's greater desire for sexual variety (e.g., **Eagly & Wood** and **Miller et al**.) with disfavor.

Other commentators, however, not only accepted Pedersen's (1991) views but have used his theory to integrate sperm competition theory in explaining sociosexual variation (**Goetz & Shackelford**). Though some commentators contested the logic of low sex ratios (more women than men) leading to more short-term mating at a cultural level (**Clark & Daly, Mata et al**.), others clearly extended the theory, even applying it to sexual frequency among tribal peoples (**Goetz & Shackelford**). Finally, **Stewart-Williams** notes many other species react as humans do when faced with unbalanced sex ratios, including the dun-

nock, which has a flexible or "mixed" mating repertoire astonishingly similar to humans.

R4.2. Social structural theory

According to commentary by **Eagly & Wood**, the universal sex differences documented across the ISPD are in no way evidence of evolved psychological differences between the sexes (see also **Schachner et al**.). As noted in the original article, the universal ISDP results, by themselves, do not rise to the status of irrefutable evidence. Most of the world's cultures were not sampled in the ISDP, no foraging cultures were sampled in the ISDP, and even if men and women were different in all cultures across the entire globe there could be some other factor – such as men's external genitalia – that functions as a third variable cause of universal sociosexual sex differences.

Nevertheless, the ISDP empirical findings are highly *consistent* with the idea that men and women evolved somewhat different mating psychologies, particularly when it comes to short-term mating (Buss & Schmitt 1993). As Lippa (2002) notes, "If a sex difference occurs consistently, despite all the variations in learning and socialization practices that occur across cultures, then a biological 'signal' – an innate predisposition – is probably showing through all the cultural 'noise'" (p. 116). When the ISDP evidence is placed along side other empirical evidence of evolved sociosexual sex differences – including cross-species, developmental, and hormonal studies (see Lippa 2002; Schmitt & Pilcher 2004; Schmitt et al. 2003) – the most parsimonious explanation is that evolved psychological dispositions contribute to sex differences in human mating.

As **Stewart-Williams** notes, although it is possible that cultural forces alone account for sociosexual sex differences, the default interpretation must now be the evolutionary explanation. Conversely, a higher standard of evidence should be demanded of claims that sex differences are entirely cultural. To the extent that human behavior is consistent with the rest of the natural world, the burden of proof falls more on nonevolutionary approaches. Indeed, the evidence on this point is so compelling to Barash that he argues those who refuse to acknowledge sociosexual sex differences result from evolved dispositions are the ideological equivalents of church officials refusing to acknowledge the Earth moves around the sun.

Of course, proximate factors such as sex-role socialization and patriarchy likely contribute to the *intensity* of manifest sex differences in sociosexuality. I would argue, however, that social structural and other theories that primarily rely on proximate origin explanations are rooted in fundamentally flawed assumptions. Social structural theory assumes that natural selection is responsible for physical differences between the sexes (e.g., women's nursing abilities and men's physical strength), but there are very few, if any, evolved psychological differences. Sociosexual sex differences may exist, they argue, because sex differences in physical adaptations often lead to the development of disparate social roles that, in turn, proximately give rise to psychological sex differences.

The problem with this view is that selection pressures surely acted on the psychological adaptations of men and women, just as they have for males and females of all other animal species (Buss 1995). As **Stewart-Williams** notes, there is a strong trend across the animal kingdom for the sex that invests less in offspring to have more interest in multiple mating (Trivers 1972). No one would attribute disparate social roles or patriarchal forces as causing this sex difference in dolphins or gorillas. Moreover, in humans there is additional evidence of culturally pervasive and brain-based sex differences in the psychology of perception, spatial ability, verbal ability, reasoning, emotion processing, negative affect, risk taking, nurturance, empathy, systematization, and physical aggression (Archer & Lloyd 2002; Baron-Cohen 2003; Campbell 2002; Geary 1998; Kimura 1999; Lippa 2002; Mealey 2000; Rhoads 2004). To assume, as social structural theory does, that over millions of years of human evolution selection processes had significant effects on men's and women's bodies but miraculously played no role in shaping their brains is scientifically untenable.

Social structural theory further assumes that our hunter-gatherer past was effectively influenced by gender egalitarian cultures in which sex-role socialization was often minimized. Historically, as cultures became more modern and economically complex, women presumably lost their natural ability to contribute to tasks that yielded status and resources, while patriarchy (including intensive sex-role socialization needed for warfare) frequently emerged from the artificial complexity of the modern nation-state.

The critical problem with this view of human evolution is that hunter-gatherer cultures are *not* predominantly gender egalitarian. As acknowledged by **Eagly & Wood**, only about one-third of modern-day foraging cultures have any semblance of gender egalitarian social structures or attitudes. Even then, it is most typical for the sexes to be "equal" in the sense that they have power over different domains, with women taking charge in those domains in which they specialize (e.g., child rearing), and men taking charge over their areas of expertise (Endicott 1999). As Pasternak and his colleagues (1997) observe, "By almost any measure, most human societies have male dominance of some sort" (p. 87), while prominent feminist and primatologist Hrdy notes, "Hunter-gatherers are often held up as being egalitarian, but according to my reading of hunter-gathering monographs – and I read quite a few of them – they are more egalitarian than most, but, even so, males are dominant. I don't find even among hunter-gatherers a very convincing case where females are dominant or even completely equal" (Roes 1998, p. 14). Finally, in the context of modern foraging cultures, Lee and Daly (1999) comment "nowhere can it be said that women and men live in a state of perfect equality" (p. 5).

Indeed, true gender egalitarianism is basically unseen among ethnographies of preindustrial cultures. Based on analyses of the Standard Cross-Cultural Sample, there are no preindustrial cultures where men perform most of the domestic work or have institutional deference to their wives (Whyte 1980). In 80% of preindustrial cultures wife beating is present (Broude & Greene 1983), in 77% of cultures men are noticeably more sexually forward or aggressive (Broude & Greene 1976), and in 67% of cultures it is explicitly thought that men should dominate their wives (Whyte 1980). Our foraging past may have been more egalitarian than some modern nations, but it was not dominated by gender egalitarianism and minimal sex-role socialization (see also Low 1989).

Finally, **Eagly & Wood** assume that in the supposedly gender-egalitarian past in which we evolved men and

women were sociosexually equal, or at least were very close to equal. Analyses of modern foraging cultures suggest this is extremely unlikely. Ethnological analyses of the world's preindustrial cultures have shown that more than 80% allow or have allowed polygynous marriages (Frayser 1985; Murdock 1967). Moreover, most men within those cultures desire both high status and the multiple wives that status affords (Borgerhoff Mulder 1988b; Turke & Betzig 1985), and reproductive success for men living in foraging societies is significantly enhanced by securing multiple wives (Betzig 1986; Casimir & Aparna 1995), providing evidence that historical selection pressures would have rewarded those men who desired numerous mating partners (see also Schmitt et al. 2003). **Eagly & Wood** are correct in that our natural mating psychology is designed for a simpler hunting and gathering lifestyle, but this design is not one of gender egalitarianism and sociosexual equivalence. Men are designed to be more interested in multiple mating than women (Symons 1979), a difference that is prevalent across the ISDP and is unlikely to disappear among modern nations of the near future.

The ISDP findings do confirm that as modern nations come closer to gender equality, women tend to gain greater control over their sexual lives and engage in more unrestricted short-term mating. As noted by **Eagly & Wood**, this is also true among foraging cultures. For example, matrilineal inheritance and matrilocal residence rules are often associated with fewer sexual restrictions on women (see Barry et al. 1980; Frayser 1985; Whyte 1978).

Putting the ISDP findings along side what we know of foraging cultures, it appears there may have been a curvilinear historical development to women's sociosexuality. In those foraging cultures where women had more power, they may have come closer (though probably never matched) men's desires for unrestricted short-term mating. As pastoralism and agriculture emerged, women's short-term sexuality was stifled by greater patriarchy and perhaps economic disempowerment (though most studies show no link between women's contribution to primary subsistence and women's status; Sanday 1973; Whyte 1978). As modern nation-states begin to move back to more gender equity, women are regaining some control over their sexuality and are emerging as more unrestricted short-term maters.

Again, it is unlikely that women have the exact same short-term mating psychology that men do (Gangestad & Simpson 2000; Schmitt et al. 2003). Men tend to be relatively indiscriminate when choosing short-term mates, whereas women's preferences for traits such as physical attractiveness significantly increase when short-term mating (Kenrick et al. 1990). The proportion of women pursuing their sex-specific short-term mating psychology, however, exhibits variation across cultures and time, variation that has consequences and is measurable.

As modernization progresses around the world, for example, one can expect that women's short-term mating adaptations will become more active and will play a greater role in cultural developments. For example, as a nation progresses toward gender equity and increased resource levels, women residing in that nation will likely become more unrestricted sociosexually (see Gangestad & Simpson 2000). As a result of the heightened activation of women's short-term mating adaptations, the importance of men's physical attractiveness will increase in that culture. In the United States and other more progressive cultures, I would speculate, this development is currently underway.

R4.3. Attachment fertility theory

In the commentary by **Miller et al**., the writers claim that "every evolutionary theory, including ours [Miller's], argues for a diversity of mating outcomes (e.g., short- to long-term) beyond monogamy alone." In terms evolutionary design arguments, this statement is factually incorrect. Numerous evolutionary theories have argued that humans are solely designed for monogamy or long-term mating (for reviews, see Barash& Lipton 2001; Barkow 1989). Indeed, Miller and her colleagues have repeatedly claimed that men and women are identically and solely designed for long-term pair-bonding (Miller & Fishkin 1997; Miller et al. 2002; Pedersen et al. 2002). In modern cultures that are different from our ancestral past, Miller believes, our naturally monogamous system sometimes "fails" and does not produce pair-bonding, particularly among men (Miller & Fishkin 1997). In these instances, "a propensity to spend more of one's time seeking short-term relationships rather than long-term ones may have been a 'fallout' of a failure to interface with human's adapted for social environment (e.g., responsive paternal and maternal caregivers)" (Miller & Fishkin 1997, p. 228). Even in the modified form presented in the commentary, Miller's theory primarily views short-term mating as a residual failure of our normative long-term system, not as an independent, adaptive mating strategy of its own.

As such, attachment fertility theory cannot account for the mounting body of evidence that short-term mating displays all the hallmarks of adaptive design. For example, short-term mating tendencies have been functionally linked to operational sex ratios (Barber 2002; Lancaster 1989), self-perceived mate value (Landolt et al. 1995), partner-related attributes (Simpson & Gangestad 1992), mate value discrepancies (Buss 1994), the presence of stepfathers (Ellis et al. 1999), and a host of other ecological factors (e.g., Belsky et al. 1991; Low 2000).

Furthermore, similar to the flaws of social structural theory, **Miller et al**. argue that men and women share identical mating psychologies. Rather than men and women being designed for unrestricted sociosexuality, however, Miller and Fishkin (1997) argue that men and women are similarly designed for life-long monogamy, "our current biological design – rooted in our Pleistocene gatherer-hunter roots – strongly favors relatively enduring relationships and few sex differences in mating strategies" (p. 197). Every empirical indication, in contrast, is that men and women, when short-term mating, are very different in design and behavior (Schmitt et al. 2003), including substantial evidence that women's short-term mating psychology is adaptively responsive to ovulatory cycles (Gangestad 2001).

For example, women who are interested in short-term mating tend to prefer men who are high in dominance and masculinity (Buss & Schmitt 1993), as indicated by testosterone-related attributes such has prominent brows, large chins, and other features of facial masculinity (Mueller & Mazur 1998; Penton-Voak & Chen 2004). Short-term-oriented women seem to prefer these attributes because facial markers of testosterone are honest indicators of immunocompetence quality in men (Gangestad & Thornhill 2003).

During the late follicular phase, women's preferences for men with masculine faces conspicuously increase (Johnston et al. 2001; Penton-Voak et al. 2003), precisely as though women are adaptively shifting their mating psychology to follow a more short-term-oriented strategy designed to obtain genetic quality.

A similar ovulatory shift can be seen in women's preference for symmetrical faces. Women who generally pursue a short-term mating strategy express stronger preferences than other women do for male faces that are symmetrical, perhaps because facial symmetry is indicative of low mutation load (Gangestad & Thornhill 1997). During the late follicular phase, women's preference for symmetrical faces increases even further (Gangestad & Cousins 2001), again as though they have functionally shifted their psychology to that of a short-term mating strategist in pursuit of high-quality genes. Attachment fertility theory cannot account for the wide array of evidence regarding women's adaptive ovulatory shifts between long- and short-term mating. Any evolutionary theory that fails to acknowledge both men and women possess short-term mating adaptations as well as long-term mating adaptations should probably be discarded.

R5. Other important issues

R5.1. Potential third variable causes of sociosexual variation

Several commentators highlighted potential third variable causes and underlying substrates of sociosexual variation (e.g., **Fink, Manning, & Neave** [**Fink et al**.], **Grant, Newson & Postmes**, and **Schachner et al**.), many of which deserve serious attention from future researchers. **Grant** noted that safe access to contraception may directly cause both unrestricted sociosexuality and greater sociopolitical freedom for women, rather than greater sociopolitical freedom causing unrestricted sociosexuality (as predicted by social structural theory). **Newson & Postmes** suggest that modern rates of kin dispersal cause increased sociosexuality, because once we move away from kin their normal controls over sociosexuality are removed.

Many potential third variable causes of the ISDP results may be plausible, but it is difficult to rule any one explanation in or out given our current findings. Perhaps by studying changes over time, we will be able to rule out some causes and rule in others. For example, in the follow-up study to the ISDP, the ISDP-2, we may be able to show that some cultures experienced dramatic decreases in reproduction, whereas others experienced greater mobility away from kin. By mapping these changes against changes in sociosexuality across the ISDP and the ISDP-2, we will begin to be able to gauge the causal effects of these unknown third variables with more precision.

R5.2. Modeling sociosexuality

Several commentators mentioned the need to develop better models of sociosexual variability. **Beckerman** suggested that multiple sociosexual orientations might be successful within any given society. In the target article, I highlighted cultural and sex differences, but it should be expected that people in different situations will find long-term versus short-term mating more adaptive (see Gangestad & Simpson 2000). For example, in most regions of the world, men with high self-esteem tend to favor short-term oriented mating strategies (Schmitt, in press), whereas women nearing ovulation tend to possess a more short-term oriented mating psychology (Gangestad 2001).

Mata et al. suggest that future models of sociosexual focus on the actual psychological adaptations underlying sociosexual variation rather than on attitudinal and behavioral measures (see also **Dickens**). What do people pay attention to, and how do the process information in ways that influence mate choices? What are the benefits and costs associated with strategic mating decisions in particular sociocultural and familial contexts? Similar to arguments by **Townsend** and **Buss**, they view the SOI as simply too vague to capture the most critical sexual dimorphisms in human mating adaptations.

R5.3. Sexual orientation and sociosexuality

Dickens wonders whether sexual orientation would have an impact on the ISDP results. Variability in sexual orientation has been the source of much theoretical debate within evolutionary psychology, particularly in terms of the mating psychology of heterosexuals versus homosexuals. In general, researchers have found that gay men tend to have the same basic mate preferences as heterosexual men, including desires for young and physically attractive partners (Bailey et al. 1994), and lesbians tend to prefer partners that are older and intelligent much as heterosexual women do (Kenrick et al. 1995). In terms of sociosexuality, one might predict that homosexual men will report levels higher than women, as heterosexual men do. However, I think it is crucial to distinguish between sociosexual attitudes and behaviors. I would predict that gay men are similar to heterosexual men in their sociosexual attitudes (relatively

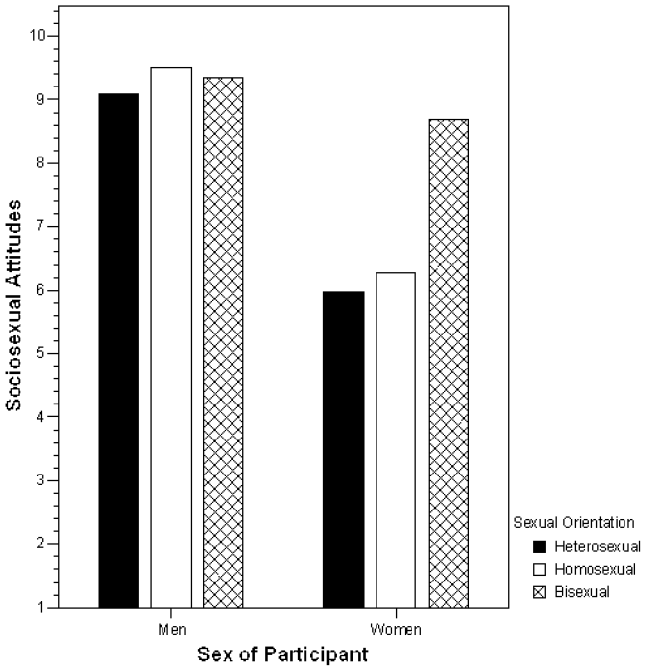

Figure R3. Sexual orientation and sex related to sociosexual attitudes.

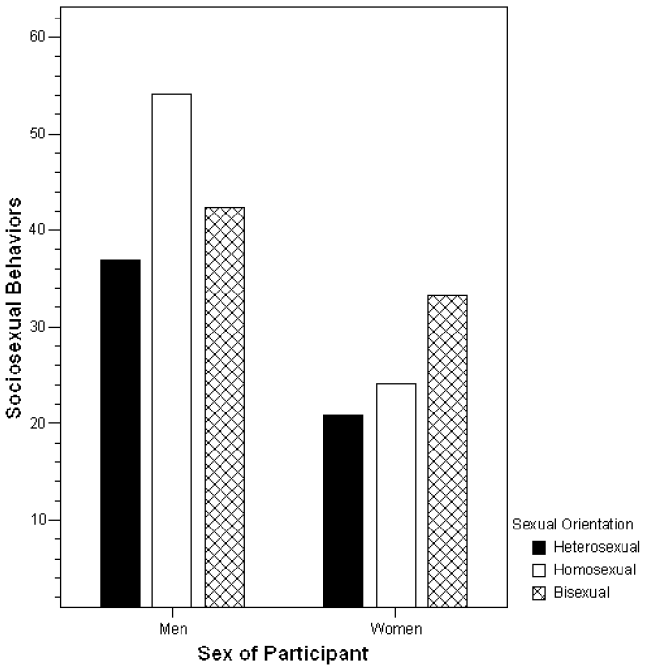

Figure R4. Sexual orientation and sex related to sociosexual behaviors.

unrestricted), but because gay men have a pool of potential mates that includes other unrestricted men, gay men will score higher in sociosexual behavior than heterosexual men do.

In the ISDP, we measured sexual orientation with a simple categorical item in which participants circled heterosexual, homosexual, or bisexual. For those that responded to this item, we found 5,083 heterosexual men, 7,240 heterosexual women, 131 homosexual men, 143 homosexual women, 96 bisexual men, and 206 bisexual women. As predicted (Figure R3), gay men, bisexual men, and heterosexual men had very similar sociosexual attitudes (comprised of items one through four of the SOI). However, sociosexual behavior was significantly different across sexual orientation (Figure R4), $F(2, 12{,}893) = 49.78$, $p < 0.001$. In general, gay men and bisexual women stood out as particularly unrestricted in sociosexuality. For gay men, this may be a consequence of their pool of potential mates (i.e., other men) being just as unrestricted in sociosexual attitudes as they are. It is unclear why bisexual women are unrestricted, though other studies also find bisexual women to be different from heterosexual women or lesbians (Rothblum & Factor 2001).

R6. Summary and conclusion

The commentaries on the target article focused on three main issues. First, several commentators were concerned with the psychometric properties of the SOI. As noted earlier, the SOI has limitations, but has proven reliable and valid across dozens of studies, and it did so again in the ISDP. Contrary to what some commentators believe, empirical evidence demonstrates that the SOI is neither invalid nor is significantly corrupted by self-reporting biases when administered anonymously. Because the SOI was proven to be psychometrically sound across the nations of the ISDP, future researchers can be assured that reliable and valid assessments of sociosexuality are possible across cultures.

Second, many concerns were raised regarding the sampling limitations of the ISDP. As noted earlier, concerns over age and relationship limitations were unfounded. The age and relationship status of participants had very little effect on sociosexual sex differences. It is true that many modern nations were missing from the ISDP, and no tribal peoples were investigated. However, given the convergence of the current findings with other surveys, experimental tests, ethnologies, cross-species comparisons, and hormonal evidence (see Schmitt & Pilcher 2004), the onus is on nonevolutionary investigators to show that these results fail to permeate most human cultural forms.

Third, some commentators had concerns over the appropriateness of interpreting ISDP results as supporting or refuting various theories of human mating. The results of the ISDP supported sex ratio theory, but it is true that possible third variables may cause the apparent link between a surplus of women and increased levels of short-term mating. Social structural theory was supported, but as noted earlier, many of the key assumptions of this theory are fundamentally flawed. Finally, attachment fertility theory was completely refuted by the current findings, in that men are clearly designed for short-term mating in a different way than women are, and neither men nor women are solely designed for lifelong monogamy (see also Barash & Lipton 2001; Schmitt, in press).

The ISDP was an ambitious project, and I would like once again to thank all of my ISDP collaborators for their extraordinary efforts in completing this task. Importantly, the ISDP is the start of an ongoing research program that should be able to chart temporal shifts in sociocultural variables and connect these shifts to changes in sexual attitudes and behaviors over time. Only by studying these factors in the full context of time will we be able to more persuasively demonstrate that some theories of human sexuality are superior to others.

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