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INFIDELITY: WHEN, WHERE, WHY.

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Pair-bonding is a hallmark of humanity. Data from the Demographic Yearbooks of the United Nations on 97 societies canvassed in the 1990s indicate that approximately 93.1% of women and 91.8% of men married by age forty-

nine (Fisher, 1992). Worldwide marriage rates have declined somewhat since then; but today 85% to 90% of men and women in the United States are projected to marry (Cherlin, 2009). Cross-culturally, most who marry wed one person at a time: monogamy. Polygyny is permitted in 84% of human societies; but in the vast majority of these cultures, only 5% to 10% of men actually have several wives simultaneously (Frayser, 1985; Murdock &White, 1969; van den Berghe, 1979). Monogamy, wedding one mate at a time, is the norm for *Homo sapiens*.

Monogamy is only part of the human reproductive strategy, however. Infidelity is also widespread (Buunk & Dijkstra, 2006; Fisher, 1992). Studies of American couples indicate that 20%-40% of heterosexual married men and 20%-25% of heterosexual married women will have an extramarital affair during their lifetime (e.g., Greeley, 1994; Laumann et al., 1994; Tafoya & Spitzberg, 2007); when polled, approximately 2%-4% of American men and women had had extramarital sex in the past year (e.g., Forste & Tanfer, 1996; Whisman). Currently American dating couples report a 70% incidence of infidelity (Allen & Baucom, 2006); and in a recent survey of single American men and women, 60% of men and 53% of women admitted to "mate poaching," trying to woo an

individual away from a committed relationship to begin a relationship with them instead (Schmitt & Buss, 2001). Mate poaching is also common in 30 other cultures studied (Schmitt & Buss, 2001).

Infidelity was also widespread in former decades, and in historical and tribal societies. Reports in the 1920s indicated that 28% of American men and 24% of women were adulterous at some point after wedding (Lawrence, 1989). In the late 1940s and early 1950s, approximately 33% of men and 26% of women in an American sample were adulterous (Kinsey et al., 1948; Kinsey et al., 1953). Data in the 1970s indicated that some 41% of men and 25% of women reported infidelity (Hunt, 1974), and data collected in the 1980s suggest that 72% of men and 54% of women were unfaithful at some point during marriage. Infidelity was also common among the classical Greeks and Romans, among the pre-industrial Europeans, among the historical Japanese, Chinese and Hindus and among the traditional Inuit of the arctic, Kuikuru of the jungles of Brazil, Kofyar of Nigeria, Turu of Tanzania and many other tribal societies (Fisher, 1992).

The Oxford English Dictionary defines adultery as sexual intercourse by a married person with someone other than one's spouse. But current researchers have broadened this definition to include sexual infidelity (sexual exchange with

no romantic involvement), romantic infidelity (romantic exchanges with no sexual involvement) and sexual and romantic involvement (Glass & Wright, 1992). When considering these varieties of adultery, statistics vary. In a meta-analysis of 12 studies of infidelity among American married couples, Thompson (1983) reported that 31% of men and 16% of women had had a *sexual* affair that entailed no emotional involvement; 13% of men and 21% of women had been romantically but not sexually involved with someone other than their spouse; and 20% of men and women had engaged in an affair that included both a sexual and emotional connection.

This chapter will provide an overview of infidelity research conducted in the last 30 years with an emphasis on current trends in the field, including psychological, sociological, biological, and anthropological perspectives. Issues ranging from gender and individual difference variables to characteristics of the primary relationship and biological factors will be investigated. Further, the theoretical perspectives applied to the study of infidelity (i.e., investment, self-expansion, and evolutionary theories) will also be explored. Finally, the chapter will conclude with a consideration of future directions for infidelity research,

including methodological advances and the benefit of exploring the functional ambivalence of infidelity.

Attitudes toward Infidelity

In a random sample of 3,432 American individuals, Laumann and colleagues (1994) reported that 77% of participants believed that extramarital sex is always wrong. Lieberman (1988) concluded, however, that American women are more disapproving of sexual infidelity in premarital committed relationships than are men. Disapproval of infidelity also differs among ethnic groups in the United States. Whereas 30% of Asian American men and women feel that violence toward a sexually unfaithful wife is justified (Yoshioka, DiNoia, & Ullah, 2001), 48% of Arab American women and 23% of Arab American men approve of a man slapping a sexually unfaithful wife (Kulwicki & Miller, 1999); 18% of Arab American women even approve of a man killing a sexually unfaithful wife. American men and women overall disapprove of emotional infidelity the least, followed by sexual infidelity; and disapproval is highest when the infidelity involves both sexual and emotional components (Glass & Wright, 1985).

People who have been sexually unfaithful are more approving of infidelity (Solstad & Mucic, 1999). In fact, 90% of American husbands and wives who had engaged in some form of infidelity (sexual, emotional, or sexual and emotional infidelity) felt there were conditions under which this behavior was justified (Glass & Wright, 1992). In a sample of American dating adolescents, disapproval of infidelity was very high, yet one third reported engaging in infidelity (Feldman & Cauffman, 1999). Widmer and colleagues (1998) conducted a study of attitudes regarding infidelity in 24 countries and also found widespread disapproval of extramarital sexual relationships, but participants in some countries, particularly Russia, Bulgaria, and the Czech Republic, were more tolerant of infidelity than were those in other countries. Japanese women were also more inclined to engage in sexual infidelity, but not approve of it (Maykovich, 1976), while American women were more inclined to approve of it without engaging in it.

Psychological and Relationship Factors Associated With Infidelity

A prominent psychological factor associated with infidelity is the degree of satisfaction in one's primary, committed relationship. Known as the "deficit model" of infidelity, Thompson (1983) found that extramarital sex was

negatively associated with several aspects of relationship satisfaction, including the degree to which the relationship was generally satisfying, whether personal needs were being fulfilled, the degree of love felt for the primary partner, the frequency and quality of sex with the primary partner, and the length of the marriage. Together, these characteristics accounted for some 25% of the variance in the incidence of extramarital sex. Boredom and a lack of emotional support in a marriage can also put partners at risk for infidelity (Allen et al., 2005), as does poor communication, including fewer positive and more negative interactions (Allen et al., 2008). Recent work (Tafoya & Spitzberg, 2007) has also begun to investigate the communicative functions of infidelity, including the intentions to maintain, repair, or terminate the primary relationship.

Buss and Shackelford (1997) found that individuals who are unhappy in their marriages expect to engage in infidelity in the future, and they expect their spouses to do the same. Relationship dissatisfaction also correlates with the number of extra-dyadic partners (Wiggins & Lederer, 1984) and the degree of emotional and sexual involvement with one's extra-marital partner (e.g., Allen & Baucom, 2001; Glass & Wright, 1985). Marital dissatisfaction, however, unfolds in different ways for men and women (Allen et al., 2008). Unfaithful husbands

indicate less satisfaction with their primary relationship before getting married; whereas unfaithful wives do not report lower levels of premarital relationship satisfaction.

The degree of investment in a primary partnership and perceived quality of alternatives also play a role in infidelity. Rusbult's investment model (Drigotas & Barta, 2001; Rusbult, 1980; Rusbult, Drigotas, & Verette, 1994) predicts that in addition to satisfaction with the relationship, other factors influence commitment to the relationship, including self-perceived ability to do without the relationship, and the benefits that might be lost if the relationship ends, including possessions, friends and connections. Among college students, the degree of investment in the relationship negatively predicted the degree of physical and emotional infidelity (Drigotas, Safstrom, & Gentilia, 1999).

Researchers have also studied infidelity from the perspective of the attachment model (Bogaert & Sadava, 2002). According to this perspective, children develop a specific style of attachment based on the way they are treated by caregivers (Bowlby, 1973). If a caregiver is not responsive to a child's distress, the child may develop negative models of the self and others, known as fearful avoidant attachment. Other children develop a style of attachment in

which they have a positive concept of the self but a negative concept of others, known as the dismissive avoidant attachment style. Still others develop a preoccupied attachment style, in which they have a negative concept of the self and a positive concept of others. Those who receive the appropriate attention and care in childhood often develop a secure attachment style with a positive concept of both themselves and others.

Researchers now believe that attachment style remains active throughout the life course and serves as a foundation for attachment with a spouse (Fraley & Shaver, 2000; Hazan & Diamond, 2000; Hazan & Shaver, 1987). Research indicates that secure attachment is positively associated with more stable relationships and less infidelity (Miller & Fishkin, 1997), whereas insecure attachment is positively associated with more extra-dyadic relationships (Bogaert & Sadava, 2002). Men with a dismissive attachment style and women with a preoccupied attachment style had the largest number of extra-dyadic partners (Allen & Baucom 2004); and individuals expressive of anxious attachment, particularly women, were also more likely to engage in sexual infidelity (Bogaert & Sadava, 2002).

Aron and Aron's (1986) self-expansion model posits another factor that plays a prominent role in the incidence of infidelity. According to this model, people are motivated to enter relationships in order to enhance the self and increase self-efficacy. By including others in the self (IOS), individuals experience their partner's resources, perspectives and identities as their own. This self-expansion starts as new partners begin to engage in intensive self-disclosure, talking on the phone for hours, spending extensive time together and thinking obsessively about one another. This results in rapid self-expansion, associated with feelings of pleasure and excitement (Aron, Aron & Norman, 2001). Then as the partnership continues, shared participation in novel and challenging activities continues to enhance relationship quality and satisfaction, as well as counteract boredom (Aron et al., 2000; Graham, 2008; Tsapelas, Aron, & Orbuch, 2009).

If the process of self-expansion declines or stops, however, as partners become accustomed to one another, mates can become less satisfied with the relationship (Bradbury, Fincham, & Beach, 2000). Lewandowski and Ackerman (2006) found that among dating college students, the potential for self-expansion and one's degree of inclusion of the other in the self accounted for a large

portion of the variance in susceptibility to infidelity. On the other hand, although there were no direct data on effects on infidelity, the model also suggests that if the primary relationship is too self-expanding and thus overwhelming, or if there is too much closeness with the primary partner (see Mashek & Sherman, 2004), an individual may find this aversive and choose an extra-dyadic relationship that provides less self-expansion and less inclusion of the other.

Researchers have also explored the relationship between infidelity and the "Big Five" personality traits—openness to new experience, conscientiousness, extroversion, agreeableness, and neuroticism – and related traits. Individuals who engage in infidelity are more open to new experiences and extroverted than their partners (Orzeck & Lung, 2005; Wiederman & Hurd, 1999; Yeniceri & Kokdemir, 2006), and more susceptible to boredom (Hendrick & Hendrick, 1987). Sexual infidelity is also associated with low agreeableness (Costa & McCrae, 1992; Graziano & Eisenberg, 1997), with low conscientiousness, and with higher neuroticism, or lacking positive psychological adjustment (Whisman et al., 2007).

These correlations are found worldwide. In a study of 10 world regions, including North America, South America, Western Europe, Eastern Europe,

Southern Europe, the Middle East, Africa, Oceania, South Asia and East Asia, individuals with a low degree of agreeableness or conscientiousness are also more likely to be unfaithful (Schmitt, 2004). In fact, individuals whose spouses have a low degree of agreeableness or conscientiousness are also more likely to engage in infidelity (Shackelford, Besser, & Goetz, 2008). And in relationships where both partners have a similar degree of agreeableness, conscientiousness, neuroticism, and openness to new experiences, individuals are more likely to be faithful (Drigotas et al., 1999; Orzeck & Lung 2005). Based on the available data, low conscientiousness and low agreeableness seem to be most strongly related to infidelity (compared to the other "Big Five" traits) and these associations seem to be found in a diverse array of cultures.

With regard to psychological disorders, individuals with relatively higher levels of psychopathy (Neubeck & Schletzer, 1969), and men (Hurlbert et al., 1994) and women (Buss & Shackelford, 1997) high in narcissism reported greater involvement in various forms of infidelity. In men, excessive alcohol consumption was related to a greater prevalence of extramarital involvement, and individuals with higher rates of depression were more likely to engage in extramarital sex (Beach, Jouriles, & O'Leary, 1985). The probability of sexual

infidelity was also greater for women who had been sexually abused as children (Whisman & Snyder, 2007), perhaps because childhood sexual abuse is often related to sexual dissatisfaction and sexual difficulties in adult relationships (Finkelhor, Lewis, & Smith, 1989; Rumstein-McKean & Hunsley, 2001). Finally, Platt and colleagues (2008) found that adult children who knew about their father's infidelity were also more likely to engage in philandering.

Sociological and Demographic Factors Associated With Infidelity

The imbalance of power in the primary relationship has been associated with infidelity. Edwards and Booth (1976) found that wives who reported that they "get their way" more often during disagreements were also more likely to have extramarital sexual involvements. Men and women who considered themselves more socially desirable than their spouses also had more extramarital partners and engaged in sexual infidelity sooner after wedding (Walster et al.,1978).

In past decades gender has shown a relationship with infidelity. A large body of research with American samples indicated that men have a stronger desire to engage in sexual infidelity (Prins et al., 1993), are more likely to engage in sexual infidelity (Allen & Baucom, 2004; Atkins, Baucom, & Jacobson, 2001), have more extra-dyadic sexual partners (Blumstein & Schwartz, 1983;

Wiggins & Lederer, 1984), have more episodes of infidelity, including short or long term affairs and one-night stands (Brand, Markey, Mills, & Hodges, 2007), have more physical contact with an extra-dyadic partner (including intercourse) (Wiederman & Hurd, 1999), cite more sexual motivations for infidelity (e.g., Barta & Kiene, 2005), and are less likely to fall in love with an extra-dyadic partner (Glass & Wright, 1985). Husbands are also more suspicious of a wife's potential sexual infidelity, as well as more likely to discover a wife's affair (Brand et al., 2007).

Women, on the other hand, tend to have a greater emotional connection with the extra-dyadic partner (Spanier & Margolis, 1983), report more intimacy and self-esteem motivations for infidelity, are more likely to feel this behavior is unlike them, and are more concerned about the negative judgments of others when they are unfaithful (Brand et al., 2007). Moreover, among women, the strength and frequency of affairs are related to the degree of dissatisfaction with the primary relationship, whereas among men the desire to engage in infidelity is less dependent on the state of the primary partnership (Prins et al., 1993). Although women are more distressed about their own infidelity (Van den Eijnden, Buunk, & Bosveld, 2000), Allen and Baucom (2006) report that

American women are less concerned about hurting their spouse. Perhaps the lower level of marital satisfaction experienced by women leads them to feel more justified about their infidelity.

Although gender differences in infidelity have been found in almost all past research, male and female rates of infidelity are becoming increasingly similar, particularly in younger cohorts in developed countries (Atkins et al., 2001; Choi et al., 1994; Laumann et al.1994; Feldman & Cauffman, 1999; Oliver & Hyde, 1993; Wiederman, 1997) Wiederman (1997) found no gender differences in extramarital sex among men and women under age 40. Seal and colleagues (1994) found that although men are more likely to report a desire to seek extra-dyadic partners, actual extra-dyadic sexual encounters show no gender difference. Decreasing gender differences in infidelity may be due to social changes, including rising female economic and reproductive independence (Fisher, 1999), or to the use of more sensitive measurements of infidelity based on broader definitions of philandering. Some aspects of infidelity, however, continue to vary by gender. Women still seem to be more likely to engage in infidelity when they are not satisfied with their primary relationship, while men tend to have higher rates of intercourse with an extra-dyadic partner.

Homosexuals show slightly different patterns of infidelity. One study found that gay men were seven times as likely to have sexual encounters outside their primary relationship, compared to heterosexual men (Buss, 2000). In a sample of Americans, homosexual men were not as concerned as heterosexual men about the sexual infidelity of their partners; moreover gay men tended to regard only certain kinds of sexual behaviors as cheating (Blumstein & Schwartz, 1983). College-age gays and lesbians in both Japan and the United States also have more extra-dyadic partners than do heterosexuals (Tsapelas, Fisher, & Aron, 2009).

Individuals who attend religious services frequently were less likely to engage in sexual infidelity (Amato & Rogers, 1997; Choi et al., 1994); whereas those who were less religious were more likely to engage in philandering (Whisman et al., 2007). There is no evidence, however, that religious denomination plays a role in tendency toward infidelity (Edwards & Booth, 1976; Forste & Tanfer, 1996). The relationship between religious activity and infidelity, however, is often moderated by other variables. Among African Americans and Hispanic Americans, more religious activity was associated with less sexual infidelity, but this association did not hold among Caucasian

Americans (Choi et al., 1994). Atkins and colleagues (2001) found that religious participation lowered the risk of extramarital sex for individuals in “very happy” marriages, but not for those in “pretty happy” or “not too happy” marriages.

Race and culture play a role in infidelity. Some work indicates that African Americans and Hispanic Americans were more likely than Whites to engage in infidelity (Amato & Rogers, 1997; Treas & Giesen, 2000). The higher rates for African Americans, however, may be due to the shortage of single men in the African American community, creating increased opportunities for married black men to engage in infidelity with single black women (Wiederman, 1997).Extramarital sex also appears to be more prevalent in some African societies than in Asian countries. For instance, in Guinea Bissau, 38% of men and 19% of women were found to have had extra-dyadic sex in the past year, compared with only 8% of men and 1% of women in Hong Kong (Carael et al., 1995). In contrast, in a large sample of Japanese and American college-age participants, Tsapelas and colleagues (2009) did not find a culture difference in extra-dyadic relationships.

Educational level plays a role in the frequency of infidelity. In many studies, infidelity has been associated with either lower levels of education

(Treas & Giesen, 2000) or higher levels of education (Whisman & Snyder, 2007), suggesting that these statistics are dependent on contingent variables. For example, in a large U.S. national study of dating, cohabiting, and married women, Forste and Tanfer (1996) found that women who were more educated than their husbands were more likely to engage in sexual infidelity; but if the husband was more educated than the wife, she was less likely to philander. Level of education relative to that of the partner appears to be more important than absolute level of education.

Income level and the distribution of income between partners is also related to infidelity. Atkins and colleagues (2001) found a positive relationship between income and extramarital sexual involvement among individuals with an annual income above $30,000. These researchers suggest that higher income leads to infidelity through its influence on factors such as opportunity, education, and feelings of entitlement. Further, lower income individuals may be financially dependent on their partners and thus regard infidelity as too risky to pursue.

Individuals who work outside the home while their partners remain in the home also express higher rates of extramarital sexual involvement (Atkins et al., 2001), perhaps because the work environment provides the opportunity and time

to get to know coworkers (Treas & Giesen, 2000). In clinical samples, 46% to 62% of individuals reported that they met their extramarital sexual partner at work (Glass, 2003; Wiggins & Lederer, 1984). The likelihood of extramarital involvement is also related to the degree to which an individual's job involves touching clients, discussing personal concerns with colleagues or clients, or working alone with co-workers (Treas & Giesen, 2000). Liu (2000) found a positive relationship between opportunity and sexual infidelity among men. It is unclear, however, whether men actually create more opportunities for infidelity, respond to more opportunities for infidelity, or have fewer qualms about engaging in infidelity (Atkins, Yi, & Baucom, 2005).

Duration of the primary relationship also plays a role in infidelity. Among dating, cohabiting and married couples, the longer the primary relationship continues, the more likely that sexual infidelity will occur (e.g., Forste & Tanfer, 1996; Hansen, 1987). Among married women, the likelihood of extramarital involvement peaks in the seventh year of marriage, then declines; but among married men, the likelihood of extramarital involvement decreases over time until the eighteenth year of matrimony, after which the likelihood of extramarital involvement increases (Liu, 2000). Similarly, in a sample of couples in therapy

for infidelity, sexual infidelity first occurred after an average of seven years of marriage (Wiggins & Lederer, 1984). Lawson and Samson (1988) reported, however, that the length of marriage prior to initial sexual infidelity is decreasing with younger cohorts. Certain developmental stages in a marriage, including pregnancy and the months following the birth of a child, are also high risk times for infidelity among males (Allen & Baucom, 2001; Brown, 1991; Whisman et al., 2007).

Last, age may make a difference in one's inclination toward infidelity, however the data are contradictory. Recent, large, representative surveys indicate that the prevalence of sexual infidelity generally increases with age in America (Atkins et al., 2001; Wiederman, 1997); however, there are also seems to be an interaction between age and gender. In a sample of married American participants, women ages 40-45 and men ages 55-65 were more likely to report infidelity at some point in their lifetime. Individuals outside of these age ranges were less likely to have been unfaithful, and men and women younger than 40 did not differ significantly in their reported rates of infidelity. These data may not necessarily reflect age differences but rather cohort differences.

Biological Factors Associated with Infidelity

The above data point to myriad psychological, sociological, and economic variables that play a role in the frequency and expression of infidelity. But one thing is clear: infidelity is a worldwide phenomenon that occurs with remarkable regularity, despite near universal disapproval of this behavior. Moreover, regardless of the many correlations between relationship dissatisfaction and adultery, Glass and Wright (1985) reported that among individuals engaging in infidelity, 56% of men and 34% of women rate their marriage as "happy" or "very happy."

Why do men and women around the world engage in infidelity, despite the risks to their partnerships, children, social standing, financial well being, and health? New data from genetics offers clues to some underlying biological mechanisms that may contribute to the worldwide frequency and persistence of infidelity.

The most explanatory research has been collected on small monogamous mammals, prairie voles (*Microtus ochrogaster*). These individuals form pairbonds soon after puberty and maintain social monogamy throughout the life course, raising several litters as a team. Their pairbonding behaviors include mutual territory defense and nest building, mutual feeding and grooming,

maintenance of close proximity with one another, separation anxiety, shared parental chores and affiliative behaviors. Researchers have established that when prairie voles engage in sex, copulation triggers the activity of oxytocin (OT) in the nucleus accumbens among females and arginine vasopressin (AV) in the ventral pallidum among males, which then facilitates dopamine release in these reward regions and motivates females and males to prefer a particular mating partner, initiate pairbonding and express attachment behaviors (Lim, Murphy & Young 2004; Williams, Insel, Harbaugh, & Carter; Young et al., 2001).

Other brain regions are involved in pairbonding and attachment behaviors as well (Lim et al., 2004; Smeltzer et al., 2006; Ross et al., 2009; Young et al., 1996), as are the brain's opioid system (Moles et al., 2004) and other neural systems (Kendrick, 2000). Nevertheless, research has clearly linked activity in the ventral pallidum associated with a specific distribution pattern of vasopressin (V1a) receptors with pairbonding and attachment behaviors in monogamous male prairie voles (Lim et al. 2004; Lim & Young 2004), and oxytocin (OT) activity in the nucleus accumbens with attachment behaviors in female prairie voles (Carter, 1992; Lim et al, 2004; Lim & Young 2004; Winslow, Shapiro, Carter, & Insel et al., 1993; Young, Wang, & Insel, 1998).

These data have been corroborated in other species. Promiscuous white-footed mice and promiscuous rhesus monkeys do not form pairbonds or express attachment behaviors for a mate, and these species do not express the same distribution of V1a receptors in the ventral pallidum (Bester-Meredith et al., 1999; Wang et al., 1997; Young, 1999; Young et al., 1997). When Lim and colleagues (2004) transgenically inserted the genetic variant associated with pair-bonding in male prairie voles into the ventral pallidum of male meadow voles, an asocial promiscuous species, vasopressin receptors were up-regulated; these males also began to fixate on a particular female and mate exclusively with her, even when other females were available (Lim et al., 2004). When this gene was inserted into nonmonogamous male mice, these creatures also began to exhibit attachment behaviors (Young et al., 1999). Most applicable to this chapter, polymorphisms in this gene in the vasopressin system contributed to the *variability* in the strength of monogamous pairbonding among male prairie voles (Hammock & Young 2002), including the degree to which they expressed sexual fidelity (Ophir, Wolff, & Phelps, 2008).

Activity in the ventral pallidum has been linked with longer term relationships in humans (Acevedo et al., 2008; Aron et al., 2005); and although

the AVPR1A gene among *Homo sapiens* is not homologous to the one found in prairie voles, humans do have three polymorphic alleles in this genetic region. And recently Walum and colleagues (2008) investigated whether the various alleles in this genetic region affect pair-bonding behavior in humans as they do in prairie voles. In this seminal study, 552 couples were examined, biologically, psychologically, and socially. All couples were either married or co-habiting for at least five years.

The results were compelling. Men carrying the 334 allele in this region of the vasopressin system scored significantly lower on a questionnaire known as the Partner Bonding Scale, indicating less feelings of attachment to their spouse. Moreover, their scores were dose dependent: those carrying two of these alleles showed the lowest scores, followed by those carrying only one allele. Men carrying the 334 allele also experienced more marital crises (including threat of divorce) during the past year, and once again, these results were dose-dependent: men with two copies of this allele were approximately twice as likely to have had a marital crisis than those who had inherited either one or no copies of this allele. Men with one or two copies of this allele were also significantly more likely to be involved in a relationship without being married. Last, the spouses of men

with one or two copies of this allele scored significantly lower on questionnaires measuring marital satisfaction. This study did not measure infidelity directly, but it did measure several factors likely to contribute to infidelity.

Another biological system contributes to infidelity. In the now classic "sweaty t-shirt" experiment, women sniffed the t-shirts of several anonymous men and selected the t-shirts of those they felt were the sexiest. Interestingly, they selected the t-shirts of men with *different* gene in a specific part of the immune system, the major histocompatibility complex (MHC) (Wedekind et al., 1995). In a subsequent investigation, women married to men with similar genes in this part of the immune system were also more adulterous; and the more of these genes a woman shared with her spouse the more extra-dyadic partners she engaged (Garver-Apgar et al., 2006), perhaps because similarity between partners in this part of the immune system can lead to complications in pregnancy and fertility (Garver-Apgar et al., 2006).

Brain architecture may also contribute to infidelity. Fisher has proposed that *Homo sapiens* has evolved three primary brain systems that guide mating and reproduction: (a) The sex drive evolved to motivate individuals to seek copulation with a *range* of partners; (b) romantic love evolved to motivate

individuals to focus their mating energy on *specific* partners, thereby conserving courtship time and metabolic energy; (c) partner attachment evolved to motivate mating individuals to remain together at least long enough to rear a single child through infancy (Fisher, 1998). These three basic neural systems interact with one another and many other brain systems in myriad flexible, combinatorial patterns to provide the range of motivations, emotions and behaviors necessary to orchestrate our complex human reproductive strategy (Fisher, 2006; Fisher, Aron, & Brown, 2006; Fisher & Thomson 2007).

This flexible combinatorial system, however, makes it biologically possible to express deep feelings of attachment for one partner, while one feels intense romantic love for another individual, while one feels the sex drive for even more extra-dyadic partners (Fisher, 2004).

Evolutionary Forces Contributing to Infidelity

For decades scientists have believed that attachment behaviors are part of an innate mammalian attachment system that evolved to promote the survival of the young (Ainsworth et al., 1978; Bowlby, 1969; 1973;). Partner attachment, or pair-bonding, is common in avian species; 90% of more than 8,000 avian species practice pair-bonding to rear their young. Pair-bonding is rare among mammals,

however; only 3% of mammals form pair-bonds to rear their young. Yet infidelity is also prevalent in over 100 species of monogamous birds and all mammalian species examined (Mock & Fujioka 1990; Westneatet, Sherman, & Morton, 1990; Wittenberger & Tilson, 1980). Indeed, infidelity is so widespread and persistent in monogamous avian and mammalian species that scientists now refer to monogamous species as practicing "social monogamy," in which partners display the array of social and reproductive behaviors associated with monogamy, while not necessarily displaying sexual fidelity to this partner as well. Among humans, Fisher (1992) refers to this phenomenon as a dual reproductive strategy: we regularly appear to express a combination of life long (or serial) social monogamy and, in many cases, clandestine adultery.

Because philandering (in association with social monogamy) is so prevalent worldwide, because it is associated with a wide range of psychological and sociological factors, and because it is correlated with several biological underpinnings, it is parsimonious to propose that infidelity must have contributed to reproductive success during our long human prehistory. So several scientists have offered hypotheses about the selective value of infidelity.

Evolutionary theorists have suggested that because women have greater parental investment in their offspring, including gestation and nursing, and men have more time and resources to devote to mating, women are obliged to compete for men and men have more opportunities to engage extra-dyadic partners (Buss, 1993). Although the reproductive benefits of sexual variety and infidelity in particular seem to be greater for men, evolutionary theory points to several reasons why infidelity may be adaptive for women as well. Buss (2000) has suggested that women may have a "back-up" mate to serve various functions (e.g., offer protection, resources) when the regular mate is not around. Similarly, women may use affairs as a means of "trading up" and finding a more desirable partner.

Fisher (1992) has proposed that during prehistory, philandering males disproportionately reproduced, selecting for the biological underpinnings of the roving eye in contemporary men. Unfaithful females, reaped economic resources from their extra-dyadic partnerships, as well as additional individual(s) to help with parenting duties if their primary partner died or deserted them. If they bore a child with this extra-marital partnership they also increased the genetic variety in their forthcoming young. Buss' (2000) "sexy sons" theory similarly suggests

that by mating with attractive men, women increase their chances of bearing attractive sons who in turn, will attract an above average number of women. In this way, these women gain a genetic edge on the competition and enhance their ultimate reproductive success. In short, infidelity had unconscious biological payoffs for both males and females throughout prehistory, thus perpetuating the biological underpinnings and a taste for infidelity in both sexes today.

Future Directions for Infidelity Research

The study of infidelity has many methodological problems. Foremost, researchers need to be precise in how they define infidelity. And when comparing findings, they need to more consistently take into account the different meanings of philandering. Some researchers, for example, regard inappropriate flirting, sexual fantasies, and/or sexual or romantic exchanges on the Internet as infidelity. This lack of a clear definition of adultery can skew the data (Whitty, 2007). Indeed, older studies report that men engaged in infidelity more frequently than women did; however recent investigations employing a broader measure of infidelity do not report these differences (Brand et al., 2007).

Data collection also needs refinement. Whisman and Snyder (2007) found, for example, that the annual rates of infidelity were much higher when researchers interviewed participants via a computer questionnaire than when they employed face-to-face interviews. Samples are not representative of the general population, either. Most focus on white, middle-class heterosexual populations. Equally important, surveys and questionnaires do not address the problems of memory bias and ego maintenance. Participants often recall incidences of past infidelity inaccurately or distort the facts to suit their personal psychological and social needs. Collecting data from the spouse *and* the extra-dyadic partner would add considerable validity to these measures, as well as broaden the understanding of infidelity. Longitudinal studies in which researchers follow couples across their relationship or track daily diaries would also provide more detailed and accurate information on the causal relationships between many of the variables associated with infidelity. It would also be more effective to collect psychological and sociological data on infidelity in tandem with associated biological and genetic data. Finally, recent research has also begun to examine a potential starting point or marker for infidelity: attention to alternative partners when one is already in a relationship (e.g., Maner, Gailliot, & Miller, 2009;

Miller, 2008; Miller, 1997) and the factors that may influence this (e.g., commitment, love, and investments in the primary relationship). Future work in this area can help elucidate this important variable and inform infidelity research in new and exciting ways.

It is well know that infidelity can result in family strife, divorce, violence, depression and low self-esteem. Yet future research could also test some of the current hypotheses regarding the adaptive psychological and biological motivations underlying infidelity. The self-expansion model, for example, suggests that infidelity may result from insufficient self-expansion from one's primary relationship and/or the desire to experience more varied forms of self-expansion, such as gaining access to a broader range of resources, skills, experiences or perspectives. In this way, infidelity may function to expand the self in ways that are not possible within the primary relationship.

Infidelity may also serve various positive communicative functions in the primary relationship. For instance, individuals may engage in infidelity in order to gain attention from the primary partner, or to indicate dissatisfaction with the primary relationship, or as a means of dissolving an unsatisfactory primary relationship (Tafoya & Spitzberg, 2007). Indeed, some research suggests some

positive outcomes of infidelity, including the desire to improve one's marital relationship (Hansen, 1987), the greater willingness to discuss and work out problems in the relationship (Roscoe, 1988), and the tendency to place higher value on family and positive communication within the primary relationship (Olson et al., 2002).

Biological and anthropological perspectives suggest still other positive functional aspects of infidelity. Throughout evolutionary history, both men and women may have benefited from a dual reproductive strategy of social monogamy and sexual infidelity in order to enhance their reproductive success (Fisher 1992). Women may still engage extra-dyadic partners as a preliminary step toward "trading up" to a better mate, or to maintain a "back-up mate" for when their primary partner is absent (Buss, 2000), or as an unconscious strategy to bear a child with a man with superior genes or resources (Fisher, 1992); while contemporary men may still (unconsciously) engage in infidelity to acquire more offspring, or healthier offspring, or more varied offspring in their lineage (Fisher, 1992).

Only with an integrative, comprehensive approach can scientists hope to assimilate the myriad complex variables associated with this prevalent and persistent human phenomenon: infidelity.

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