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Abstract

Whereas sexually dimorphic evolutionary models argue for clear sex differences in responses to jealousy-evoking scenarios, social cognitive models emphasize the importance of other factors. This paper explores variables associated with responses to a commonly-used jealousy-evoking scenario in a population-representative sample. Data from 8,386 Australian men and women aged 16-69 were weighted to match the population. The results provided some support for evolutionary models among heterosexual respondents, but findings contrary to evolutionary models were found among non-heterosexual respondents. Support for social cognitive models was provided by the identification of six variables that had significant independent multivariate associations with jealousy: sex, age, education, lifetime number of partners, relationship status, and attitudes toward infidelity. The results suggest that although men and women may tend to respond differently to sexual or emotional infidelity scenarios, the anticipated experience of jealousy in each context is strongly influenced by biographical and cultural factors.

Jealousy is a potent emotion associated with the actual or threatened loss of a valued relationship to a rival, and is a cause of relationship difficulties and failure (Amato & Previti, 2003; Buss, 2000; Lampard, 2014; Salovey, 1991). It reflects most people's expectation of sexual and emotional monogamy from their partners (Badcock et al., 2014; de Visser et al., 2014; Richters, Heywood et al., 2014). Jealousy can be triggered by sexual acts (e.g., one's partner having sex with another person may evoke sexual jealousy) or emotional acts (e.g., one's partner having an emotional relationship with another person may evoke emotional jealousy). However, there is disagreement about whether women and men have similar responses to their partner's sexual or emotional behavior with others. The aim of this paper is to explore some of the debated issues in a population-representative sample.

Sexually Dimorphic Evolutionary Models and Social Cognitive Models

Sexually dimorphic evolutionary models (SDEMs) posit that jealousy is an adaptive phenomenon that evolved because women and men want to maximize the provision of resources for their offspring (Buss, 2000; Buss, Larsen, Westen, & Semmelroth, 1992; Dijkstra & Buunk, 2002). SDEMs argue that women become more jealous in response to emotional infidelity than sexual infidelity because a male partner's emotional infidelity means that he diverts resources toward another woman's offspring. In contrast, these models propose that men become more jealous in response to sexual infidelity than emotional infidelity because a partner's sexual infidelity may result in him providing resources to a rival male's offspring.

Studies based on SDEMs commonly use forced-choice measures: respondents indicate whether they would consider a partner's sexual or emotional infidelity to be worse (e.g., Buss et al., 1992); whereas other studies have used scalar measures. Meta-analyses of both types of studies reveal support for the evolutionary model, with moderate effect sizes (Harris, 2003a; Sagarin et al., 2012). However, not all studies find sexual dimorphism in response to jealousy-evoking situations (e.g., Carpenter, 2012; Sagarin, Becker, Guadagno, Newcastle, & Millevoi, 2003). It is therefore important to examine alternatives to SDEMs.

Social cognitive models propose that, rather than being a hard-wired sexually-dimorphic response, jealousy is influenced by social and cultural factors. Such models help to explain observed (sub-)cultural differences in men's and women's responses to jealousy-evoking scenarios (de Visser & McDonald, 2007; DeSteno, Bartlett, Braverman, & Salovey, 2002; Green & Sabini, 2006; Harris, 2003a; Sabini & Green, 2004). For example, a meta-analysis revealed that the effect size for cultural differences between men living in different countries

was of a similar magnitude to the effect size of sex differences between men and women (Harris, 2003a). Meta-analyses also reveal that sex differences are smaller and less likely to be significant: (a) in population-representative samples than in opportunistic samples; (b) among samples of non-student adults than among student samples; and (c) among older samples (Carpenter, 2012; Harris, 2003a; Sagarin et al., 2012). The latter finding accords with Buss et al.'s (1992) claim that for men, responses to sexual infidelity will weaken with age because women's reproductive value falls with age. It may also be affected by older people having experience of actual jealousy-evoking situations. Responses to hypothetical scenarios are also affected by experience of actual partner infidelity (Burchell & Ward, 2011; Sagarin et al., 2003), relationship experience and quality (Hosking, 2014; Varga, Gee, & Munro, 2011; Ward & Voracek, 2004), and whether the rival is a stranger or a friend of one's partner (Hosking, 2014). Such variation cannot be explained by evolutionary models, and it highlights a need for further exploration of how personal, social, and cultural factors affect responses to jealousy-evoking scenarios.

Jealousy in non-heterosexual contexts

Evolutionary theories are only applicable insofar as sexual and emotional behavior is driven by mechanisms that have been selected for as a result of reproductive success. A key limitation of evolutionary models is that they cannot explain non-procreative sexual behavior, including same-sex activity: "homosexuals are the acid test for hypotheses about sex differences in sexuality" (Symons, 1979, p. 292). Harris' (2003a) meta-analysis suggested that evolutionary models do not explain lesbian women's and gay men's responses to sexual and emotional infidelity. Although jealousy responses to hypothetical scenarios are affected by the respondent's sexuality, studies of jealousy in non-heterosexual people have been limited by a reliance on convenience samples (De Souza, Verderaine, Taira, & Otta, 2006; Dijkstra, Barelds, & Groothof, 2013; Leeker & Carlozzi, 2012). Furthermore, the responses of bisexual women and men are under-researched.

Study aims and hypotheses

The focus on sex *differences* that characterizes studies of jealousy obscures similarities. This includes the observation that in many studies, a *minority* of men indicate that sexual infidelity would be more distressing than emotional infidelity (Harris, 2003a). Furthermore, studies are more likely to approach the issues from an SDEM perspective than from a social cognitive perspective.

The first aim of the analyses presented here was to determine whether the sex differences in jealousy proposed by SDEMs were present in a large population-representative sample of heterosexual people aged 16-69 (i.e., over the age of consent), because studies in this domain have tended to use non-representative samples. Following the typical SDEM findings, it was hypothesized that women would be more upset by emotional infidelity than sexual infidelity, and that men would be more upset by sexual infidelity than sexual infidelity.

The second aim was to determine the level of support for social cognitive models in a large population-representative sample of heterosexual adults by examining how responses to jealousy-evoking scenarios are affected by individual and cognitive variables such as demographics, sexual history, and attitudes toward infidelity. These variables were selected because social cognitive model suggest that demographic, experiential, and attitudinal variables may affect responses to jealousy-evoking scenarios, and because these specific variables were available in the existing data set. It was hypothesized that variables other than sex would be significantly related to heterosexual adults' responses to the hypothetical scenario. Specifically, it was hypothesized that respondents would be more upset by emotional infidelity than sexual infidelity if they were older, had higher levels of education, had more experience of sexual relationships, and were in a relationship.

The third aim was to determine whether the sex differences in jealousy proposed by SDEMs are evident among non-heterosexual people. Based on past findings (e.g., Harris, 2003a), it was hypothesized that sex differences predicted by DSMEs would not be found among non-heterosexual respondents.

Methods

Participants

The Second Australian Study of Health & Relationships (ASHR2) recruited a population-representative sample of 20,093 Australian residents aged 16–69 years from all States and mainland Territories. The analyses reported here focus on 8,386 respondents who completed those elements of the questionnaire relevant to the study aims.

Design

ASHR2 was a cross-sectional survey of a population-representative sample: it is described in detail elsewhere (Richters, Badcock et al., 2014). We obtained ethical approval from the researchers' host universities. We collected data between October 2012 and November 2013 using computer-assisted telephone interviews. We selected respondents using dual-frame modified random digit dialing (RDD), combining directory-assisted RDD

of home phones with RDD of mobile telephones. The overall participation rate among eligible people was 66.2%.

We delivered the survey in two modules. All respondents completed the standard module, which covered demographics, sexual identity, and sexual history. The long module collected detailed data on sexual attitudes, relationships and behaviors from: all respondents who had had no partners or multiple partners in the previous year; all respondents who reported any same-sex experience; and a randomly selected 20% of the respondents who reported only one sexual partner in the last year and no same-sex experience ever. Among the 8,577 who completed the long module, 8,386 completed all items relevant to the analyses reported here. We report responses to items included in the long module - including the hypothetical jealousy-evoking scenario - after weighting to reflect the whole sample of 20,093 (for details see Richters, Badcock et al., 2014).

Measures

The key outcome variable was responses to the statement: ‘What would upset or distress you more: imagining your partner forming a deep emotional attachment to another person, or having sexual intercourse with another person?’ (Buss et al., 1999). Responses are reported in the tables below as “emotional infidelity,” “sexual infidelity,” or “don’t know.” Upset and distress are the two emotions for which there is clearest evidence to support the evolutionary theory of jealousy (Sagarin et al., 2012).

We recorded age in years and also re-coded age into six groups (16-19, 20-29, 30-39, 40-49, 50-59, 60-69 years) to allow examination of non-linear variation in responses to the scenario across age groups. This also allowed us to look at differences between pre-, peri-, and post-menopausal women. We coded sexual identity (in answer to the question ‘Do you think of yourself as ...’) as heterosexual, homosexual (gay or lesbian), or bisexual. Too few respondents ($n = 36$) stated that they were ‘queer’, ‘other’ or ‘undecided’ to allow examination of these groups, so we excluded them from the analyses. We coded respondents’ reports of their highest completed level of education as: not (yet) completed secondary school; completed secondary school; and completed post-secondary education. Using a strategy employed previously (de Visser, Smith, Richters, & Rissel, 2007), we allocated respondents to one of three religiosity groups: those with no religion, religious people who attended services less than monthly or only on special occasions, and religious people who attended services at least monthly.

We collapsed respondents' reports of the total number of people with whom they had had a sexual experience were collapsed into four groups: no sexual partners; one partner, 2-5 partners, 6-10 partners, and 11+ partners. Respondents also indicated whether they were currently in a regular relationship by answering "yes" or "no" to the question "Do you currently have a regular [male/female] sexual partner or partners? Someone you have an ongoing sexual relationship with?"

Respondents used a five-point scale (Strongly agree/Agree/Neither/Disagree/Strongly disagree) to indicate the extent of their agreement with the statement: "Having an affair when in a committed relationship is always wrong" (de Visser et al., 2014; Rissel et al., 2003). For ease of interpretation, we collapsed responses into three categories: "agree," "neither," and "disagree."

Analysis

We weighted data to adjust for the probability of a person being selected for a home phone or mobile phone interview, the probability of completing the long module, and the number of eligible adults in the household. We then weighted data to match the Australian population in terms of age, sex, area of residence, and telephone ownership (i.e., mobile and/or home phone). The weighted data therefore describe the Australian population aged 16–69 years (Richters, Badcock et al., 2014). We analyzed weighted data using survey estimation commands in Stata Version 13.1.

We conducted analyses separately for different sexual identity groups. Within each group, we conducted χ^2 -tests to explore sex differences in responses to the hypothetical scenario. We conducted further χ^2 -tests to explore how responses to the hypothetical scenario were related to demographics, sexual history, and attitudes. Next, we conducted multinomial logistic regression in which all of the significant variables identified in the bivariate analyses were included to determine which had significant independent multivariate associations with jealousy responses. These analyses allowed a test of SDEMs alongside social cognitive models. The numbers of non-heterosexual respondents were too small ($n = 36$) to allow reliable analyses of responses to the hypothetical scenario.

Results

Sex differences in jealousy

Table 1 displays a significant sex difference in heterosexual participants' responses to the question 'What would upset or distress you more: imagining your partner forming a deep emotional attachment to another person, or having sexual intercourse with another person?'

Whereas a majority (55%) of men selected their partner's sexual involvement with someone else, women were most likely (50%) to select their partner's emotional involvement with someone else as being more distressing. The proportion of men choosing sexual activity as most distressing/upsetting was significantly greater than chance ($z = 6.11, p < .001$); the proportion of women choosing emotional activity was not ($z = 0.38, p = .701$).

Table 1

Individual and cognitive variables associated with jealousy

Table 2 displays bivariate associations with responses to the hypothetical scenario among heterosexual women. There was a significant non-linear association between age group and responses ($\chi^2_{(10)} = 53.18, p = .003$): only among women aged 20-49 did a majority select emotional infidelity as the more distressing/upsetting, and among women aged 60-69, more considered sexual infidelity worse than emotional infidelity. There was a significant association with mean age ($F_{(2, 4066)} = 9.47, p < .001$): women who found emotional infidelity more distressing were significantly younger than women who found sexual infidelity more distressing, and both groups were significantly younger than women who replied "don't know" (respective mean ages = 38.9 years, 40.9 years, 43.6 years). The proportion identifying emotional infidelity as more distressing/upsetting increased with increasing education ($\chi^2_{(4)} = 40.83, p < .001$): among women who had not completed secondary school, a majority reported that sexual infidelity would be worse. Jealousy responses were significantly associated with religiosity ($\chi^2_{(4)} = 45.76, p < .001$): the proportion choosing emotional infidelity as more distressing/upsetting was greatest among those with no religion, and among women who attended religious services at least monthly, a majority reported that sexual infidelity would be worse. The proportion choosing emotional infidelity as most distressing/upsetting increased with increasing numbers of partners over the lifetime ($\chi^2_{(8)} = 118.42, p < .001$): women reporting one or zero sexual partners were more likely to choose sexual infidelity as worse, and among women who had never had a partnered sexual experience a majority reported that sexual infidelity would be worse. Women were significantly more likely to identify emotional infidelity as more distressing if they were in a relationship at the time of completing the survey, and women who were not in a relationship were most likely to choose sexual infidelity as more distressing ($\chi^2_{(2)} = 25.46, p < .001$). Responses to the scenario were also significantly related to attitudes toward having an affair ($\chi^2_{(4)} = 40.34, p = .001$): a minority of women who agreed with the statement "Having an affair when in a committed relationship is always wrong" identified emotional infidelity as more

distressing, whereas the majority of women who disagreed or were unsure choose this option. There was a significant association with mean attitude scores ($F_{(2, 4072)} = 7.96, p < .001$): women who found emotional infidelity more distressing had significantly higher scores (indicating disagreement with the statement) than women who found sexual infidelity more distressing, but comparable scores to women who replied “don’t know” (respective mean scores = 2.35, 2.23, 2.30).

Table 2

Table 3 displays bivariate associations with heterosexual men’s responses to the hypothetical scenario. Although a majority of men in all age groups indicated that sexual infidelity would be more distressing/upsetting than emotional infidelity, there was a significant non-linear association between age group and the likelihood of choosing sexual infidelity as worse, with men aged 30-39 the least likely to choose this ($\chi^2_{(10)} = 66.24, p < .001$). There was a significant association with mean age ($F_{(2, 3713)} = 9.73, p < .001$): men who found emotional infidelity more distressing were significantly younger than men who found sexual infidelity more distressing, and both groups were significantly younger than men who replied “don’t know” (respective mean ages = 39.7 years, 41.5 years, 44.7 years). There was a significant inverse association between education and likelihood of choosing sexual infidelity as more distressing/upsetting ($\chi^2_{(4)} = 60.63, p < .001$): among men who had completed university, a minority reported that sexual infidelity would be worse. The proportion identifying sexual infidelity as more distressing/upsetting was lowest among men with no religion and greatest among men who attended religious services at least monthly ($\chi^2_{(4)} = 38.14, p < .001$). There was a significant inverse association between number of partners over the lifetime and likelihood of reporting sexual infidelity as more distressing/upsetting ($\chi^2_{(8)} = 52.16, p < .001$): among men who reported over 10 sexual partners, a minority chose sexual infidelity as worse. Although all men indicated that sexual infidelity would be more distressing/upsetting than emotional infidelity, they were significantly less likely to if they were in a relationship at the time of completing the survey ($\chi^2_{(2)} = 14.72, p < .001$). Responses to the scenario were also significantly related to attitudes toward having an affair ($\chi^2_{(4)} = 48.13, p < .001$): men who agreed with the statement “Having an affair when in a committed relationship is always wrong” were significantly more likely to consider sexual infidelity most distressing, with a minority of other men choosing this option. There was a significant association with mean attitude scores ($F_{(2, 3719)} = 13.25, p < .001$): men who found emotional infidelity more distressing had significantly

higher scores (indicating disagreement with the statement) than men who found sexual infidelity more distressing, but comparable scores to men who replied “don’t know” (respective mean scores = 2.34, 2.20, 2.36).

Table 3

Multinomial logistic regression was conducted to determine which variables made a unique contribution to explanation of variance in the likelihood of heterosexual respondents choosing emotional infidelity as more distressing/upsetting than sexual infidelity ($F_{(34, 7725)} = 14.81, p < .001$). Sexual infidelity was used as the reference category because it was the largest sub-group. The data in Table 4 show that respondents were significantly more likely to identify emotional infidelity as more distressing/upsetting than sexual infidelity if they were female, were aged 40 or over, had completed university education, reported more than 10 sexual partners in their lifetime, were in a relationship at the time of completing the interview, and if they did not agree with the statement “Having an affair when in a committed relationship is always wrong.”

Table 4

Sexual identity and jealousy

Among respondents who identified as non-heterosexual, there were no significant sex differences in responses to the hypothetical scenario: the majority of men and women reported that they would be more distressed/upset by their partner forming an emotional attachment to another person than by their partner having sex with another person (Table 1). When this sub-sample was disaggregated, the majority of gay men lesbian women reported that they would be more distressed/upset by emotional infidelity, and there was no significant sex difference. Likewise, the majority of bisexual men and women reported that they would be more distressed/upset by emotional infidelity, but men were significantly more likely than women to select emotional involvement with someone else as worse.

There were also significant sexual identity differences in responses to the statement “Having an affair when in a committed relationship is always wrong” ($\chi^2_{(2)} = 42.72, p < .001$). Respondents who identified as heterosexual were significantly more likely to agree (83.1%) than were those who identified as homosexual (69.5%) or bisexual (67.9%).

Discussion

The findings reported here contribute to ongoing debates about how well “evolutionary” and social cognitive models explain responses to jealousy-evoking scenarios. This study of a population-representative sample expanded existing understanding based on studies of

convenience samples by (1) exploring support for DSEMs in a population-representative sample of heterosexual people, (2) identifying associations that support the arguments of social cognitive models in a population-representative sample of heterosexual people, and (3) exploring support for DSEMs among people who are not heterosexual. Each of the three issues is discussed below.

Sex differences in jealousy

The study revealed support for DSEMs among heterosexual respondents (Buss, 2000; Buss et al., 1992; Dijkstra & Buunk, 2002; Harris, 2003a; Sagarin et al., 2012). As hypothesized, women were upset more by emotional infidelity than sexual infidelity, and men were more upset by sexual infidelity than emotional infidelity.

Individual and cognitive variables associated with jealousy

The second hypothesis was also supported, because variables other than sex were significantly related to heterosexual adults' responses to the hypothetical scenario. Six variables had significant independent multivariate associations with jealousy responses: sex, age, education, lifetime number of sexual partners, relationship status, and attitudes toward infidelity. Other studies have also found that relationship experience explains variance not accounted for by sex (Varga et al., 2011; Voracek, 2001; Ward & Voracek, 2004). Greater relationship experience results in men *and* women being more distressed by emotional infidelity than sexual infidelity, suggesting that any predispositions men may have to respond more strongly to sexual infidelity are outweighed by actual personal experience of relationships.

Within the sub-samples of heterosexual men and women, some findings not predicted by DSEMs emerged (Buss, 2000; Buss et al., 1992; Dijkstra & Buunk, 2002). Heterosexual women were more likely to report that sexual infidelity would be *more* distressing than emotional infidelity if: they were aged 60-69; less educated; more religious; and had fewer sexual partners over their lifetime. Although the responses of heterosexual men tended to reflect DSEMs, contrary to Buss et al.'s (1992) theory and Sagarin et al.'s (2012) findings, older men were *not* less likely than younger men to be distressed by sexual infidelity. This is interesting given that men in relationships with post-menopausal women should not have concerns about the reproductive consequences of any extra-dyadic sexual activity. The lack of age differences predicted by SDEMs among men may reflect the fact that men's reproductive capacity is not affected by age (at least not within the age range of the sample), whereas women's reproductive capacity ceases at the menopause. Furthermore, older men

are not restricted to older women in their choice of partners - i.e., even if women of their age may be post-menopause, men in their 50s or 60s could partner with a pre-menopausal woman. Further insights into age effects on jealousy responses may be provided the application of socioemotional theory may be useful in explorations of emotional responses at different phases of men's and women's (reproductive) lives (Carstensen, 2006; Carstensen, Isaacowitz & Charles, 1999). This theory suggests that people's attentions to emotions in general, and to positive and negative emotions in particular, changes when people have a sense of time as limited: this could be the end of life, or the end of the reproductive phase of life for women approaching or experiencing menopause.

Although it was possible to demonstrate significant associations between social cognitive variables and jealousy responses, the data do not explain why these associations emerged. One can, however, speculate as to possible reasons for the observed associations. In the analyses reported here, greater education was associated with a greater likelihood of reporting that emotional infidelity would be worse than sexual infidelity. Furthermore, men and women who agreed with the statement that having an affair is always wrong were significantly more likely to report that sexual infidelity would be worse than emotional infidelity. In other analyses of the ASHR2 data, it was found that more liberal attitudes toward sexuality were associated with greater education, higher status occupations, and higher household incomes (de Visser et al., 2014). Perhaps those in more socially privileged or less socially vulnerable positions may feel less threatened by extra-dyadic sexual activity as long as there is not a threat to the emotional and financial stability of their relationship. Further research would be required to explore this conjecture.

In line with past research, it was found that emotional infidelity was considered worse than sexual infidelity among older respondents and respondents who reported a greater number of sexual partners over their lifetimes (Carpenter, 2012; Harris, 2003a; Hosking, 2014; Sagarin et al., 2003, 2012; Varga, Gee, & Munro, 2011; Ward & Voracek, 2004). This may be because people with more experience of their own (and others') relationships may give more value to the emotional aspects of relationships than the physical aspects. Similarly, the finding that people in a relationship at the time of participating in the study were significantly more likely to report that emotional infidelity would be worse than sexual infidelity may arise because the value of the emotional aspects of relationships - and the threat to these valued aspects - is most apparent to those currently in relationships.

The effect sizes for sex differences predicted by SDEMs and for other social cognitive variables were all relatively modest (Cohen, 1988). This indicates that the sex differences predicted by SDEMs are not particularly strong. The multivariate analyses revealed that numerous social cognitive variables explained variance in jealousy responses not explained by sex differences.

Sexual identity and jealousy

As hypothesized, the sex differences in responses to jealousy-evoking scenarios predicted by SDMEs were not found among non-heterosexual respondents. In contrast to the predictions of these models, gay and bisexual men were *more* likely than lesbian and bisexual women to report that emotional infidelity would be more distressing/upsetting than sexual infidelity, and gay men were the group in which there was the *greatest* proportion of respondents reporting that emotional infidelity would be worse. These results add to earlier findings that DSEMs do not explain the jealousy responses of homosexual adults (De Souza et al., 2006; Harris, 2003a). Whereas in an earlier Brazilian convenience sample, homosexual participants' responses fell between those of heterosexual men and women (De Souza et al., 2006), in the population-representative Australian sample examined here, gay men were the most likely to select emotional infidelity as most distressing, with bisexual men also more likely to select this option than heterosexual women.

Studies of non-representative samples have noted that lesbian women and gay men express less intense jealousy than heterosexual individuals in response to hypothetical scenarios (Dijkstra et al., 2013). Within the sample studied here, homosexual and bisexual respondents had more permissive attitudes toward various aspects of sexuality (de Visser et al., 2014), and were less likely to agree that "Having an affair when in a committed relationship is always wrong." Social cognitive models argue that jealousy is influenced by social and cultural factors and that it only arises if personally-valued entities are threatened (DeSteno et al., 2002; Green & Sabini, 2006; Harris, 2003a; Sabini & Green, 2004). They are therefore better able than DSEMs to explain how people in non-procreative or non-monogamous relationships avoid jealousy by giving different meanings to sexual and emotional exclusivity (de Visser & McDonald, 2007; Ritchie & Barker, 2006; Rodrigues, Lopes, & Pereira, 2016; Rodrigues, Lopes, & Smith, 2017; Rodrigues, Lopes, Pereira, de Visser, & Cabaceira, 2019). Gay men and lesbian women need not worry about the procreative repercussions of extra-dyadic sex, and this is likely to affect their responses to potentially jealousy-evoking scenarios. Furthermore, gay men, lesbian women, and bisexual

individuals tend to have more permissive attitudes toward sexual behavior than heterosexual men and women (de Visser et al., 2014), are more likely than heterosexual people to report experience of consensually non-monogamous relationships (Hauptert, Gesselman, Moors, Fisher, & Garcia, 2017), and may be more open to extra-dyadic sex (e.g., Hosking, 2013, 2014; Richters, Heywood, et al., 2014). These factors may mean that physical activity with others is less threatening to the relationship than emotional connections with others. Similarly, in the context of swinging couples, it has been noted that agreements and expectation about what can be shared with other couples (i.e., sexual intimacy) and what cannot (i.e., emotional intimacy) shape jealousy responses (de Visser & McDonald, 2007). Some studies suggest that younger people may be more permissive of “hook-ups” that may include physical intimacy of various forms without any promise of, or desire for, a traditional emotional or romantic relationship (Garcia, Reiber, Massey, & Merriwether, 2012). However, not all studies have found such associations. For example, Treger and Sprecher (2011) found that greater sexual permissiveness was associated with greater distress in response to hypothetical sexual infidelity than emotional infidelity. It should be noted, however, that because their sample was restricted to college students, their findings may not be applicable to the general population and/or people with more experience of relationships (Varga et al., 2011; Voracek, 2001; Ward & Voracek, 2004). There is a need for further exploration of these issues in specific sub-groups as well as in the broader population.

Methodological issues

The use of a large population-representative sample was a key strength of this study, because most studies of jealousy are based on non-representative samples. In addition, the analyses were designed to allow a test of the size of sex differences predicted by SDEMs relative to social cognitive variables. Furthermore, the sample used to explore jealousy in homosexual and bisexual respondents was also population-representative. However, the support for the social cognitive models suggests that there is a need for further exploration of these issues in population-representative samples in other countries and cultures. The inclusion of all respondents regardless of current relationship status allowed some important insights. However, space restrictions precluded detailed analyses of people in regular relationships to explore how jealousy responses were related to relationship characteristics (e.g., Hosking, 2014; Richters, Heywood, et al., 2014).

Within the wide-ranging ASHR2 interview, little attention could be given to jealousy, and although the key measure of jealousy responses had been validated in past research, the measure was limited in range and depth. Furthermore, it is important to note that there are many ways to conceptualise jealousy. For example, Pfeiffer and Wong (1989) distinguished between different dimensions of jealousy - emotional, cognitive, and behavioural responses - whereas Buunk (1991, 1997) and Buunk and Dijkstra (2001, 2006) distinguished between different types of jealousy - reactive, anxious, and possessive. Simply cross-tabulating these two dimensions produces nine different type-component combinations. Moreover, the different components of jealousy may be multifaceted: for example, emotions may include anger, anxiety, disgust, distress, hurt, and upset (Sagarin et al., 2012)

It must also be noted that there is not always a significant correlation between responses to actual infidelity and imagined responses to hypothetical infidelity (e.g., Berman & Frazier, 2005; Harris, 2002; Sagarin et al., 2003). Harris' (2002; 2003b) studies of actual experiences of infidelity revealed that both women and men focused more on emotional aspects of infidelity than sexual aspects. A recent meta-analysis of actual experiences of infidelity revealed "fairly fragile" support for the sex differences predicted by the evolutionary model (Sagarin et al., 2012, p. 610). Further research with population-representative samples is needed to better understand people's responses to actual infidelity.

It is also notable that 9% of men and 8% of women chose "don't know" and may therefore have felt equally distressed/upset by both sexual and emotional infidelity or felt that the context was important. Even among those who indicated that one form of infidelity was more distressing/upsetting than other, it was not clear how much worse it was perceived to be. Furthermore, asking people to distinguish between emotional and sexual infidelity may be somewhat artificial, because sexual and emotional infidelities often occur together (Cramer, Manning-Ryan, Johnson, & Barbo, 2002; DeSteno & Salovey, 1996; Harris & Christenfeld, 1996; Ward & Voracek, 2004). It is also possible that different manifestations of jealousy may be elicited by sexual or emotional infidelity (Sabini & Green, 2004). For example, Green and Sabini (2006) found that men and women felt angrier about sexual infidelity than emotional infidelity, but more hurt and upset by emotional infidelity. It has also been noted that sex differences are less obvious when continuous measures of responses to infidelity are used instead of forced-choice items (DeSteno et al., 2002; Dijkstra et al., 2013; Harris, 2003a). These are several reasons why it may be more informative to use

continuous measures of a range of emotional responses to jealousy-evoking scenarios (e.g., Dijkstra et al., 2013).

The ASHR2 interview only covered some of the variables that may influence jealousy responses. For example, it did not assess attachment style (Burchell & Ward, 2011; Buunk, 1997; Levy & Kelly, 2010). As noted above, although it was possible to demonstrate *that* individual characteristics were important, the nature of the data meant that it was only possible to speculate as to *why* the observed differences emerged. There is a need for further quantitative and/or qualitative research to explore why the important social cognitive variables identified in our analyses are related to different jealousy responses.

Conclusion

The results presented here provide support for both SDEMs and social cognitive models. Often these models are presented as conflicting, but it may be better to see them as complementary. As in many other nature-nurture debates, it may be most productive to think of predisposing factors and experiential factors - e.g., genes *and* diet affect cancer risk. It appears that men and women may have a tendency to respond to jealousy-evoking scenarios in certain ways, but that the expression of this predisposition can be overridden by cultural and/or biographical influences.

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Table 1

Responses to the question ‘What would upset or distress you more: imagining your partner forming a deep emotional attachment to another person, or having sexual intercourse with another person?’

Sex / Sexual identity	Emotional infidelity	Sexual infidelity	Don't know	Difference and effect size
Heterosexual				$\chi^2_{(2)} = 170.44, p < .001$
men (n = 3738)	35.9%	55.0%	9.1%	V = 0.10
women (n = 4103)	50.3%	41.5%	8.2%	
All non-heterosexual *				$\chi^2_{(2)} = 5.65, p = .129$
men (n = 267)	65.1%	26.4%	8.5%	V = 0.07
women (n = 278)	59.8%	34.8%	5.4%	
Gay / lesbian				$\chi^2_{(2)} = 2.52, p = .311$
men (n = 159)	70.0%	25.3%	4.8%	V = 0.07
women (n = 110)	60.5%	33.4%	6.1%	
Bisexual				$\chi^2_{(2)} = 9.55, p = .031$
men (n = 96)	60.7%	24.5%	14.8%	V = 0.14
women (n = 153)	59.1%	36.3%	4.6%	

* Gay/lesbian, bisexual, other

Table 2

Individual and cognitive variables associated with responses to hypothetical jealousy-evoking scenario among heterosexual women (n = 4103)

Covariate	Emotional infidelity	Sexual infidelity	Don't know	Difference and effect size
Age				$\chi^2_{(10)} = 53.18, p = .003$ $V = 0.04$
16-19	47.7%	43.6%	8.7%	
20-29	57.2%	37.5%	5.3%	
30-39	51.7%	40.5%	7.8%	
40-49	51.9%	41.1%	7.0%	
50-59	45.5%	44.0%	10.4%	
60-69	42.2%	45.6%	12.2%	
Education				$\chi^2_{(4)} = 40.83, p < .001$ $V = 0.05$
Less than secondary	41.1%	50.5%	8.4%	
Secondary	48.5%	42.0%	9.5%	
University	53.9%	38.5%	7.6%	
Religiosity				$\chi^2_{(4)} = 45.76, p < .001$ $V = 0.05$
No religion	54.3%	38.7%	7.1%	
Attend < monthly	49.8%	42.1%	8.2%	
Attend \geq monthly	39.0%	50.1%	10.9%	
Number of sexual partners in lifetime				$\chi^2_{(8)} = 118.42, p < .001$ $V = 0.06$
0	37.8%	53.8%	8.4%	
1	41.0%	48.2%	10.8%	
2-5	49.2%	41.2%	9.6%	
6-10	51.6%	42.8%	5.6%	
11+	64.4%	30.1%	5.5%	
In a relationship?				$\chi^2_{(2)} = 25.46, p < .001$ $V = 0.06$
No	43.7%	46.3%	10.1%	
Yes	52.5%	39.9%	7.6%	
Affairs are always wrong				$\chi^2_{(4)} = 40.34, p < .001$ $V = 0.05$
Agree	48.2%	43.7%	8.1%	
Neither	62.7%	27.8%	9.4%	
Disagree	58.1%	34.0%	7.9%	

Table 3

Individual and cognitive variables associated with responses to hypothetical jealousy-evoking scenario among heterosexual men (n = 3738)

Covariate	Emotional infidelity	Sexual infidelity	Don't know	Difference and effect size
Age				$\chi^2_{(10)} = 66.24, p < .001$ $V = 0.04$
16-19	31.4%	63.1%	5.5%	
20-29	42.1%	51.6%	6.3%	
30-39	39.5%	50.6%	9.9%	
40-49	36.8%	56.4%	6.8%	
50-59	33.8%	55.3%	10.9%	
60-69	27.4%	58.6%	14.0%	
Education				$\chi^2_{(4)} = 60.63, p < .001$ $V = 0.06$
Less than secondary	27.2%	61.1%	11.7%	
Secondary	32.0%	59.6%	8.5%	
University	42.0%	49.4%	8.7%	
Religiosity				$\chi^2_{(4)} = 38.14, p < .001$ $V = 0.05$
No religion	39.6%	52.3%	8.1%	
Attend < monthly	34.3%	54.6%	11.1%	
Attend \geq monthly	27.7%	63.9%	8.4%	
Number of sexual partners in lifetime				$\chi^2_{(8)} = 52.16, p < .001$ $V = 0.04$
0	30.2%	60.1%	9.7%	
1	26.1%	63.4%	10.5%	
2-5	34.5%	58.4%	7.1%	
6-10	34.2%	56.1%	9.7%	
11+	41.3%	49.2%	9.5%	
In a relationship?				$\chi^2_{(2)} = 14.72, p = .002$ $V = 0.04$
No	30.8%	60.4%	8.7%	
Yes	37.5%	53.3%	9.2%	
Affairs are always wrong				$\chi^2_{(4)} = 48.13, p < .001$ $V = 0.06$
Agree	34.1%	57.5%	8.4%	
Neither	48.2%	39.9%	11.9%	
Disagree	45.0%	43.0%	12.0%	

Table 4

Multinomial regression of individual and cognitive variables associated with responses to hypothetical jealousy-evoking scenario (n = 7759)

Covariate	Emotional infidelity	Sexual infidelity	Don't know
	OR (95%CI)*		OR (95%CI)*
Sex			
Female	1	-	1
Male	0.68 (0.55, 0.84)**	-	0.17 (-0.05, 0.40)
Age			
16-19	1	-	1
20-29	0.02 (-0.30, 0.35)	-	-0.04 (-0.63, 0.55)
30-39	-0.26 (-0.59, 0.08)	-	0.40 (-0.18, 0.99)
40-49	-0.36 (-0.68, -0.04)**	-	0.08 (-0.48, 0.64)
50-59	-0.42 (-0.74, -0.11)**	-	0.46 (-0.08, 1.01)
60-69	-0.51 (-0.82, -0.20)**	-	0.61 (0.07, 1.15)**
Education			
Less than secondary	1	-	1
Secondary	0.12 (-0.09, 0.32)	-	0.04 (-0.27, 0.36)
University	0.50 (0.30, 0.70)**	-	0.05 (-0.24, 0.36)
Religiosity			
No religion	1	-	1
Attend < monthly	-0.10 (-0.25, 0.05)	-	0.10 (-0.15, 0.36)
Attend ≥ monthly	-0.43 (-0.64, 0.22)**	-	0.02 (-0.32, 0.36)
Number of sexual partners in lifetime			
0	1	-	1
1	-0.12 (-0.44, 0.20)	-	-0.04 (-0.55, 0.48)
2-5	0.17 (-0.12, 0.47)	-	-0.08 (-0.57, 0.41)
6-10	0.13 (-0.18, 0.44)	-	-0.19 (-0.73, 0.35)
11+	0.53 (0.24, 0.83)**	-	0.03 (-0.46, 0.52)
In a relationship?			
No	1	-	1
Yes	0.32 (0.17, 0.47)**	-	0.00 (-0.23, 0.23)
Affairs are always wrong			
Agree	1	-	1
Neither	0.69 (0.41, 0.97)**	-	0.58 (0.13, 1.05)**
Disagree	0.49 (0.29, 0.69)**	-	0.32 (0.00, 0.63)**

* - Odds Ratio (OR) with 95% Confidence Interval (95%CI)

** - significantly different from "sexual infidelity" at $p < .01$

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