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SEX DIFFERENCES IN THE INCIDENCE OF SEXUAL FANTASIES FOCUSED ON EVOLUTIONARY RELEVANT OBJECTS

ABSTRACT: Sexual fantasies (SF) are an integral part of human sexuality. In contrast with sexual behavioural displays, which rely to great extend on social factors, they are ideal for studying cognitive adaptations related to sexual differences in mate preferences and motivations. This article examines sex differences in the incidence of sexual fantasies highlighting evolutionary relevant objects across the sample of university students currently involved in long-term relationship (142 women and 121 men). In addition, the intentions to perform sexual activities with these objects were observed. Objects in the checklist of SF (10) were chosen based on evolutionary-psychological literature (e.g., stranger, same sex partner, multiple partner, and inexperienced partner) and were reflected assuming reproductive strategies of both sexes. Supporting evolutionary assumptions, men fantasised more about partners who provide the possibility of increasing fitness with low investment (e.g., multiple partners of opposite sex, $\chi^2 = 19.90$, $P < 0.001$*), and displaying characteristics indicating fertility and youth (much younger partners* $\chi^2 = 18.60$, $P < 0.001$*). Women, in contrast, were more likely to fantasise and perform sexual activities with another woman (*$\chi^2 = 17.04$, $P < 0.001$*), which is in accordance with recent studies highlighting the plasticity of female sexuality. The evolutionary advantageousness of such sexual activities, however, is debatable. Notably, we found similar patterns in SF incidence and intentions to perform activities with chosen objects, making this study one of the first to prove such phenomena. Based on the results, we suggest that SF highlighting objects represent desired sexual activities that may not be performed because of the existence of social pressure, cultural rules and/or unavailability of (consensual) sexual partner.*

KEY WORDS: Sexual fantasy – Evolutionary psychology – Mating strategy – Objects – Sex differences

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INTRODUCTION

Previous research has shown that sexual fantasies (SF) are present in a majority (more than 95%) of the human population (e.g., Davidson 1985, Leitenberg, Henning 1995), thus being an integral part of human sexuality. Furthermore, in contrast with sexual behavioural displays, SF are rather independent of social pressure, cultural rules, availability of (consensual) sexual partner and individual mate-value. For these reasons, SF are suggested to mirror individual sexual preferences more adequately, being the ideal material to study adaptive sexual strategies in both sexes (Baumeister *et al*. 2001, Ellis, Symons 1990).

In his complex definition, Wilson (1978: 9) described sexual fantasies (SF) as "an elaborate story, or a fleeting thought of some romantic or sexual activity. It can involve bizarre imagery, or it can be quite realistic. It can involve memories of past events, or it can be a completely imaginary experience. It can occur spontaneously or be intentionally imagined, or it can be provoked by other thoughts, feelings, or sensory cues. SF can take place outside of sexual activity, or they can occur during autosexual activities or sexual activities with a partner". This definition is employed throughout the paper.

There is a body of empirical evidence concerning sex differences in frequency, incidence, and content of SF. Please note that in this article "incidence" is understood as the proportion of participants having a SF in the whole sample, and "frequency" refers to the number of occurrences of a repeating event per time unit in one person (consistent with Leitenberg, Henning 1995). Previous findings indicate that a) SF in men appear more frequently in a given time period than in women (Person *et al*. 1989), and b) men have more SF of different content in their individual repertoire than women (Wilson, Lang 1981, for a review, see, Leitenberg, Henning 1995).

From the proximate biological perspective, a relationship between the amount of free testosterone and sexual desire has been suggested (Udry *et al*. 1985), which is directly associated with higher frequency of SF; this claim was confirmed by Udry *et al.* (1986). The testosterone level of men is typically about 20 times higher than that of women. Consequently, androgens are supposed to be mediators of selective attention to erotic stimuli (Jones, Barlow 1990) and of appetite for sexual pleasure (particularly for masturbation; see, Zamboni, Crawford 2003). However, the influence of sex hormones and sexual fantasies does not need to be directly causal, but rather feedback-looped. For instance, a noticed erotic stimulus triggers SF and SF trigger masturbation which elicits further sexual imagery that, in turn, increases physiological sexual arousal and androgen levels (Leitenberg, Henning 1995).

From the evolutionary perspective, differences in SF between men and women might have evolved as adaptations to sex-specific constrains in reproductive strategies. According to evolutionary-oriented authors, females cannot increase their reproductive success by increasing the number of sexual partners, while the opposite is true for men (see, e.g., Buss 2002, Buss, Schmitt 1993). Therefore, men who are easily aroused by using their own mental imagery were suggested to be favoured by intrasexual selection, because their better preparedness for the opportunity of occasional copulations increased their reproductive fitness by producing more offspring (Ellis, Symons 1990). Conversely, since women invest more energy and time into successful reproduction, and cannot increase their reproductive success by increasing the number of sexual partners, the presence of sexual imagery evoking immediate preparedness for an occasional copulation with any available partner does not seem to be adaptive. It has been thus suggested that SF in women are more likely to serve different purposes, such as increasing actual sexual arousal. This is supported by studies showing that any sex difference in reported frequencies of SF when no sexual activity is occurring disappear during the context of sexual activities (for a review, see, Leitenberg, Henning 1995).

Here we argue that along with sex differences in frequency and incidence of SF, it is also worthy to study the specific contents of SF in men and women, which might reflect the general sex differences in mating strategies. As Wilson (1987) previously suggested these characteristics could mirror universal patterns, suiting mating strategies for each sex, and can be of adaptive relevance. As outlined above, men can significantly increase their reproductive success by increasing the number of sexual partners and, in line with this, it has been repeatedly shown that in general male SF can be described as focused on sexual novelty and variety (Baumeister *et al.* 2001). In comparison to women, men fantasise about higher number of partners (within a particular fantasy). Moreover, they fantasise about more different sexual objects per person in total within the whole individual repertoire of fantasies (Ellis, Symons 1990, Kinsey *et al*. 1953, for a review, see, Klapilová, Weiss 2009). Furthermore, men have more SF highlighting strangers and multiple partners (Wilson 1997), and Hsu *et al*. (1994) found that men significantly outnumbered women in SF involving a mysterious stranger (40.7 vs. 20.7%) or being involved in an orgy (29.6 vs. 12.3%). Finally, compared

to women, male SF are triggered more often by the presence of an attractive opposite-sex person in their surroundings, or any kind of external erotic stimuli (Gerianne, Sherwin 1991, Schmidt 1975).

It is worth pointing out that, since human offspring need extensive and long-lasting parental care, their survival rate is increased by the amount of parental investment. Consequently, women can increase their reproductive fitness through finding a long-term partner willing to invest in their children and/or to provide paternal care (Trivers 1972). Therefore, an ideal scenario for women is to find someone (e.g., a famous person or an older partner of high social status) who can support her and their offspring by offering sufficient resources (Gangestad, Simpson 1990). In fact, previous studies have confirmed that women have more SF highlighting famous partners than men (e.g., Wilson 1997).

In line with this, an important role of a primary partner in female SF was repeatedly pointed out in previous literature: 20% of women fantasise exclusively about sexual activities with their own partner (Hicks, Leitenberg 2001) and, furthermore, a factor of romantic activities with their own partner was found in studies using PCA analysis of SF content in women – usually described as an "intimate" or "sensual" factor (e.g., Meuwissen, Over 1991, Smith, Over 1991, Wilson 1978). Such activities (oral sex, romantic walk with own partner), when practiced, might increase cohesion of such relationship even though it is clear that only penile-vaginal intercourse (PVI) would lead to reproduction.

Furthermore, several previous studies found that women significantly outscored men in same-sex thoughts (e.g., 21.7% in women vs. 9.4% in men, respectively, Hsu *et al.* 1994). The interpretation of this difference relies mainly on greater sexual plasticity in women, e.g., that women have shown to be more affected by social influences such as public opinion and cultural acceptability (see, Baumeister 2000). From the evolutionary point of view, we hypothesise that for women is risky to have casual sexual contact with a man, because of the lack of guaranty of future investment, but there is no such threat in the case of engaging in sexual activities with another woman which increases chance for occurrence of sexual activities involving women in comparison to casual sex with men (Davies 2004).

THE CURRENT STUDY

Although several previous studies focused on the identification of SF content dimensions (mainly based on performing PCA analysis) (e.g., Alfonso *et al*. 1992, Byers *et al*. 1998, Crepault *et al.* 1976, Crepault, Couture 1980, Meuwissen, Over 1991, Pérez-González *et al*. 2011, Person *et al*. 1989, Reverter *et al*. 2004, Shanor 1978, Wilson 1978), the identification of sex differences in objects accented in SF is difficult, mainly because the authors merge activities and objects into one item of the presented checklist (e.g., being masturbated to orgasm by a partner (Wilson 1978); for a detailed critique see, Methods section). Thus, the empirical evidence for sex differences related to the characteristics of objects in SF is still scarce and incomplete. For the purpose of the current study, we developed a new checklist of SF appropriate for testing sex differences in the incidence of SF focused on objects that meet characteristics regarding the reproductive advantages to one or both sexes. All objects appearing in checklists from previous studies (e.g., multiple partners, stranger) were included along with some new ones (e.g., inexperienced partner) that have not been particularly studied yet, but for which we also expect adaptive differences between sexes. Furthermore, this study is one of the first strictly dividing SF contents into SF highlighting objects and SF highlighting activities (read more in the Materials and methods section). Based on the above reviewed predictions we aimed to test the following hypotheses:

H1: Sex differences will be found in the incidence of SF containing evolutionary relevant objects bringing benefits to the reproductive strategy of each sex (e.g., sex with multiple partners, younger and inexperienced partners will be higher among men, and women will prefer SF with famous, older partners).

H2: Similarly, we expect sex differences in the intention to perform sexual activities with objects with characteristics considered to bring benefits to the reproductive strategy of each sex (e.g., intention to have sex with multiple partners, younger and inexperienced partners will be higher among men, while women will tend to have sex with famous, older partners).

MATERIALS AND METHODS

Procedure

Participants were contacted by researchers (JB, LJ) either in the foyer of the Faculty of Humanities (Charles University, Prague, Czech Republic), or in the student dormitories in Prague. They were asked if they were willing to take part in a study about human sexuality, which includes to complete set of anonymous questionnaires which might contain intimate questions.

Along with the questionnaires, participants who agreed to participate in the study were given a blank empty envelope to guarantee their anonymity. Participants were asked to complete the questionnaires privately; either in their room (in dormitories) or in a prepared empty seminar-room (at the Faculty). All respondents received 50 CZK (2 €) for their participation. A written informed consent form was signed by each respondent.

Participants

The completed questionnaires were obtained from 263 respondents in total (142 women, 121 men). The mean female age was 24.8 years (range = 19–35 years, SD = 5.0 years), and the mean male age was 26 years (range = 18–35 years, SD = 6.8 years). At the time of their participation, all respondents were undergraduate or graduate students (77% of participants were students of humanities; other study programs were present in less than 5% each, e.g., medicine, economics) and had a long-term heterosexual partner. Having a long-term relationship was one of the recruitment criteria; it was specifically defined as "a relationship lasting longer than six months that you find perspective in the future". The choice of the student sample purposely follows the design of some previous studies (e.g., Ellis, Symons 1990, Buunk, Hupka 1987) allowing the comparison of results. Men who identified themselves as bisexuals or homosexuals (scoring higher than three on the Kinsey scale of sexual self-identification) were excluded from the final analysis (N = 8) because homosexual men were found to have different content of SF objects than heterosexual men (Price *et al*. 1985). This procedure was not applied for women due to the less rigid female sexuality (Diamond 2008). It was found that women's self-reported sexual orientation fluctuates during life more often than in men. In fact, the self-identified sexual orientation of women in our sample was distributed more equally all over the (7-point) Kinsey scale (i.e., in contrast to women, men were more likely to use only first two points and were not using the middle (bisexual) part; mean = 1.63, SD = 0.93 for women and mean = 1.33, SD = 0.62 for men). Mean relationship length was 7.5 months for men (SD = 5.4 months) and 12.5 months (SD = 36.6 months) for women.

Questionnaires

We used a questionnaire developed by JB, KK, and JV specifically for this study. The questionnaire consists of four parts: socio-demographic information, details on ideal sexual activity, frequency of real sexual activity, and checklist of SF. The detailed definition of SF described above (according to Wilson 1978) was at the beginning of each questionnaire to avoid confusion between participants in understanding the term. In contrast with previous research, the checklist of SF contents was divided into two separate checklists: one containing 10 objects with specific attributes (e.g., a stranger, multiple opposite-sex partners) and the second one listing 47 sexual activities (e.g., anal sex, sex in front of an audience) which is not presented in this article. By this separation we tried to avoid the shortcomings of previous studies where both objects and sexual activities were merged into a single item (e.g., you seduce a man who was a virgin, Meuweisen, Over 1991). (Methodological note: this might have led respondents in previous studies preferring one of the two (object/activity) to check the SF as present or rate it high in frequency or excitability, even when the other one of the two (object or activity) was not favoured. Or, alternatively, respondents might have rated them low even if they found one of them arousing, because the other one was not). Given the purpose of this study, only data from SF focused on objects were used. Checklist of SF consisted of 10 evolutionary relevant objects. Objects were chosen based on previous literature: multiple partners, stranger, famous person and same-sex partner were previously analysed by Wilson (1997); own partner is to be one of the most common SF as mentioned in, for example, Shanor (1978) and Hunt (1974); the remaining objects were added to the list because there was a relevant evolutionary based assumption that the object will have some advantage or benefit in terms of sex-specific reproductive strategies (e.g., younger partner for man, older partner for women) (Buss, Schmitt 1993). See list of presented SF objects with explanation of suggested mating strategy relevance in *Table 1*. Each SF was rated for a) incidence (Q: Is this SF present in you repertoire? A: present/not present), b) intention to perform sexual activity with presented object (Q: Have you or would you like to perform the presented SF? A: 1, have not performed it and do not want to do so; 2, have not performed such activity yet, but I want to perform it; 3, I have performed such activity). The Cronbach alpha indicating the internal consistency of 20 items focused on object highlighting SF (10 asked about incidence $\alpha = 0.557$; 10 about will to perform activity $\alpha = 0.758$) was $\alpha = 0.782$.

Data were analysed using SPSS 16.0. Chi-square was used to test sex differences in incidence of SF. Mann-Whitney nonparametric *U* tests were used to test sex differences in the intention to perform SF.

TABLE 1. List of presented SF highlighting 10 evolutionary relevant objects followed by evolutionary assumptions we suggest based on previous literature.

Objects presented in checklist	Brings more benefits to	Evolutionary reasoning
Sex with own partner	Women	Committed partner invests in offspring, is emotionally close, trustworthy
Sex with some other known person (excluding own partner)	Men/Women	For men represents the way to increase fitness outside the relationship with low (or no) investment; for women the possibility to test a new partner for formation of new relationship
Sex with a stranger of opposite sex	Men	Low investment in eventual offspring, sexual variety
Sex with a famous person	Women	Well situated partner able to invest in offspring
Sex with multiple opposite sex partners	Men	Low investment, possible increase of fitness, sexual variety
Sexual activities with someone of the same sex	Women	No risk of eventual offspring with low quality male partner, forming female-female coalitions
Casual sex with partners of both sexes together	Men	Low investment, while possible increase of fitness partners, sexual variety
Sex with someone inexperienced	Men	Reduces paternity uncertainty
Sex with much a older partner	Women	Well situated partner able to invest in offspring
Sex with a much younger partner.	Men	Reduces paternity uncertainty youth is an indicator of high fertility

RESULTS

Sex differences in the incidence of SF with evolutionary relevant objects

In men, a higher incidence of SF with younger partner ($P < 0.001$), inexperienced partner ($P < 0.001$), multiple partners ($P < 0.001$), and other known person of opposite sex ($P = 0.038$) were found. In women higher incidence of SF with someone of the same sex ($\chi^2 = 17.04$, $P < 0.001$) was found (see *Table 2, Figure 1*). Without excluding homosexual men the result is $\chi^2 = 16.24$, $P < 0.001$, i.e., meaning the result is not

TABLE 2. Sex differences in incidence of SF with evolutionary relevant objects.

Object	χ^2	*P*-value	Total % in men	Total % in women
Partner	0.34	0.600	78	85
Other known person	5.04	0.038*	77	72
Stranger	0.94	0.333	61	59
Famous person	0.15	1.000	34	36
Multiple partners of opposite sex	19.90	< 0.001***	67	42
Same sex partner	17.04	< 0.001***	11	38
Orgy with both sexes	1.30	0.523	21	26
Inexperienced partner	33.94	< 0.001***	55	21
Much older partner	0.51	0.512	27	25
Much younger partner	18.60	< 0.001***	34	11

Note: Tested by χ^2 test.
Significant results are marked: *, $P < 0.05$; **, $P < 0.01$; ***, $P < 0.001$.

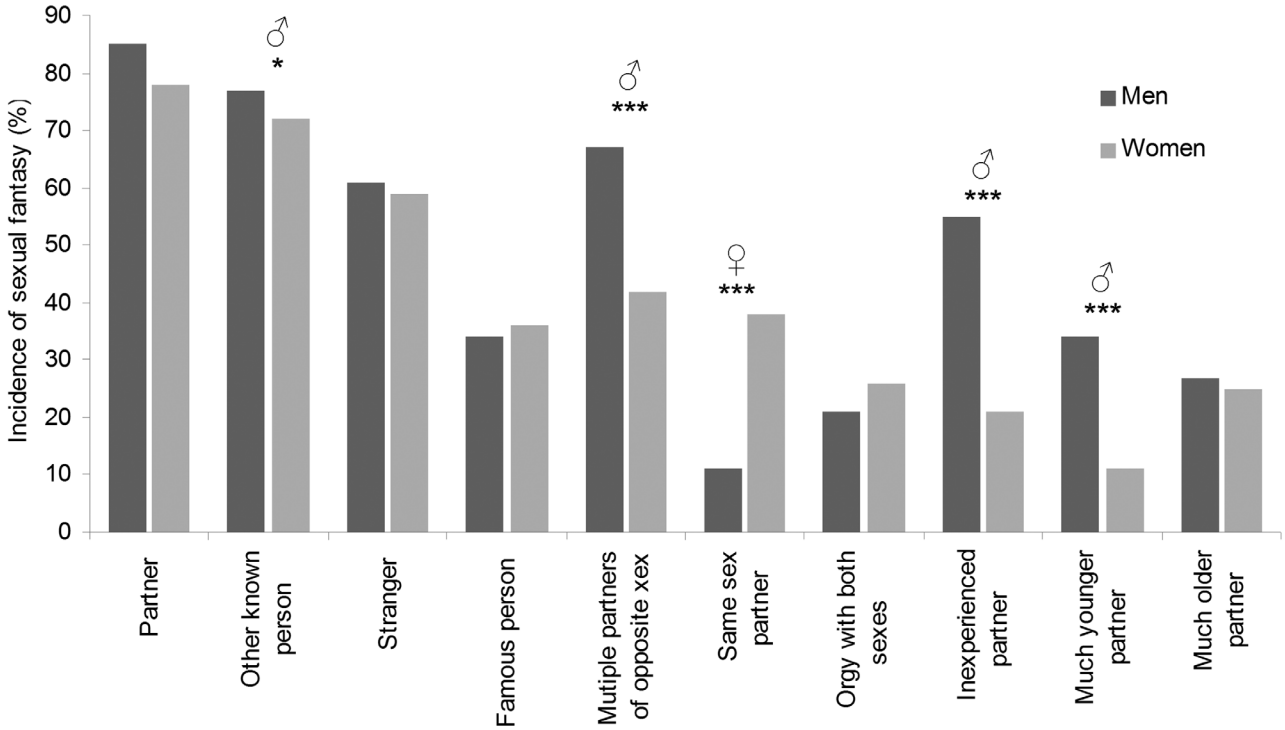

FIGURE 1. Sex differences in the relative incidence of SF accenting evolutionary relevant objects. Note: significant results are marked (*, $P < 0.05$; **, $P < 0.01$; ***, $P < 0.001$). Only positive answers are shown.

biased by excluding part of the data. No other significant sex differences were found.

Sex differences in intention to perform sexual activities with evolutionary relevant objects present in SF

Similar sex differences were found in the experience with or intention to perform sexual activities with evolutionary relevant objects. Men intended and tended to have more sex than women with younger partners ($P = 0.017$), inexperienced partners ($P = 0.010$), strangers ($P = 0.035$), multiple partners ($P = 0.006$), and other known person of the opposite sex (except their primary partner) ($P = 0.046$), while women intended and tended to perform more sex than men with same-sex partners ($P = 0.025$), a famous person ($P = 0.054$), and an older partner ($P = 0.010$) (see *Table 3*).

TABLE 3. Sex differences in the experience or intention to perform sexual activities with evolutionary relevant objects.

Object	*U*	*P*-value	*z*-value
Partner	947	0.857	−0.180
Other known person	751	0.046	−1.775
Stranger	676	0.0035*	−2.114
Famous person	676	0.054	−1.929
Multiple partners of opposite sex	586	0.006*	−2.751
Same sex partner	606	0.025*	−2.237
Orgy with both sexes	715	0.518	−0.646
Inexperienced partner	706	0.001*	−1.223
Much older partner	537	0.01*	−3.379
Much younger partner	768	0.017*	−0.204

Note: Tested by Mann-Whitney nonparametric *U* test.
z, *z*-score (standard score) value.
Significant results are marked: *, $P < 0.05$; **, $P < 0.01$; ***, $P < 0.001$.

DISCUSSION

The aim of this study was to test sex differences in the incidence and intention to perform sexual activities with evolutionary relevant objects. In accordance with our hypotheses we found significant differences in the incidence of SF containing other known person, multiple partners, an inexperienced partner and a younger partner,

all higher in men, and a higher incidence of SF highlighting sexual activities with a same-sex partner in women. In the case of some SF (older partner, famous person, stranger) the expected sex differences were not found. Similar sex differences were confirmed for the experience with or intention to perform sexual activities with such objects and, moreover, the expected higher intention to have sex with a stranger in men and with famous and an older partner in women was confirmed.

Considering the results we can state that hypothesis 1 (i.e., that "Significant sex differences will be found in incidence of SF containing evolutionary relevant objects bringing benefits to reproductive strategy of each sex") was partially confirmed.

On the one hand, according to the evolutionary-based expectations, objects fitting to the image of an ideal partner were significantly more present in male SF repertoires. Thus, young partners, supposed to display indicators of fertility, youth and higher reproductive potential such as neotenous face, bilateral symmetry, body-mass-index approximately 0.7 (Thornhill, Grammer 1997), as well as inexperienced partners, representing lower risk of uncertain paternity (Beaulieu 2007) and reduced risk of sexually transmitted diseases were overrepresented in men (Beaulieu 2007), even if younger partner was suprisingly present in only about one third of men (34%). As in the case of several following results, this can be explained at the same time by sociocultural factors (Angier 1999, Buss, Schmitt 1993), as differences in socialization processes in sexes, and by the internalization of cultural rules that are in agreement with an evolutionary approach (Oliver, Hyde 1993, Singer 1985); for example, the preference of a virgin female partner is a cultural rule widespread across many societies (Singer 1985). Additionally, the proximate psychological mechanisms can complete the view of this phenomenon, for example, inexperienced men could prefer less sexually-skilled women to avoid the possibility of comparison of their sexual skills with those of other men (Kirkendall 1961). The higher incidence of SF with multiple opposite-sex partners found in men supports our evolutionary-based predictions regarding the evolutionary advantageousness of quantitative reproductive strategy in men, helping them to increase their fitness through spreading their genes as much as possible (Ellis, Symons 1990). Likewise it is in accordance with social deterministic theories pointing out the role of higher social acceptance of male infidelity (Gagnon, Simon 1973) or having multiple mates simultaneously, e.g., he majority of human societies are polygynous (Murdock 1967) in the development of SF contents. We also suggest that on proximate level this result might be driven by lower socio-sexual restrictiveness (i.e., higher tendency to enjoy uncommitted sexual behaviours with numerous partners), which was repeatedly confirmed in men compared to women (Buss, Schmitt 1993; see also Buss 2002). In the case of multiple partner imagination (and behaviour), there is research showing that finding multiple men in women's fantasies, which is evolutionarily explained by sperm competition, is more likely (Nummi, Pellikka 2012). Although the incidence is lower than in men, the surprisingly high incidence of SF with multiple partners of the opposite sex found in our female sample (42%) could possibly be explained by the bias in our sample in direction to women with low socio-sexual restrictiveness, but unfortunately a measure of this variable was not included in our design. Similarly, the high incidence of SF with a stranger (representing uncommitted sexual affairs with an unknown person) found in women (59%) could be explained by bias in this variable. This could also lead to the non-significant difference in the case of incidence of SF with a stranger, where the expected sex difference was confirmed only by the experience or intention to perform sexual activities with such object. Besides the low commitment that this object impersonates, it also subsumes an important aspect of novelty, which tends to produce higher sexual arousal in men than in women (Baumeister *et al.* 2001), who have been found to react more to known and emotionally closed stimuli (Oliver, Hyde 1993).

In contrast, the expected sex differences in the incidence of SF with objects hypothesised to be adaptive for women were not confirmed. First of all, this result can be caused by the fact that the average man has more types of SF with objects in his repertoire (mean = 6.07, SD = 2.66) than the average woman (mean = 4.93, SD = 2.17) indicating statistically significant difference ($P = 0.002$). Thus, the total percentage of men having each type of SF tends to be higher. This general finding provides strong support for the idea that more men seek for variety in objects. Surprisingly, the incidence of SF with older partners and with famous partners were unexpectedly low for women (for older partner = 25%, for famous person = 36%) in contrast with the incidence of other type of objects, indicating these object are not preferred by women for fantasizing (and neither for men, for whom the incidences were comparable). We suggest that this result is caused by the social environment of our sample; students are surrounded by a large number of attractive people of similar age, resulting in a high

incidence of SF highlighting other known persons and strangers (present in over 50% in both sexes, making them the SF with the second highest incidence). In contrast, SF with own partner was highly prevalent in women as predicted by previous research (Hicks, Leitenberg 2001, Hunt 1974, Malamuth 1981, Shanor 1978), but was also the most prevalent fantasy in men (70%) and therefore the sex difference was not significant. Compared to previous studies describing the incidence of SF with own partner or intimate activities (Davidson 1985, Meuwissen, Over 1991, Wilson 1978, Wilson, Lang 1981, for a review, see, Leitenberg, Henning 1995), the percentage in our male sample was higher. We suppose that it is due to sampling, because all our participants were currently in long-term relationships (lasting at least 6 months), which they proclaim to find perspective in the future, so that we can expect that they fantasise about their own partners at least sometimes. The sex difference could potentially have been found if we had focused the study on the frequency of having SF with their own partner, where we might expect women to highly outscore men, because of the previously described key role (almost exclusive) of the long-term partner in female sexual imaginary during the first 2 years of relationship (e.g., Pelletier, Harrold 1988); however, this was not the aim of our study.

Special attention should be drawn to the result concerning the "homosexual (or same-sex)" SF. Our results show that they were prevalent in a non-negligible percentage (10%) of our heterosexual male sample (all subjects scoring higher than three on Kinsey scale of sexual orientation were excluded), which is in agreement with the results of Wilson, Lang (1981), who proclaimed that men have SF with other men even if they perceive them as unpleasant. Nevertheless, the high incidence of this type of SF in women (38% vs. 11% in men) could be explained by the less rigid sexuality of human females (Diamond 2008). This is supported by Baumeister (2000), that analysed sex differences in sexual plasticity – women have shown to be more affected by environmental influences such as public opinion or cultural acceptability and were found to have greater sexual plasticity. According to previous studies (e.g., Suschinsky *et al*. 2009), men react by physical arousal (penile erection) only to preferred stimuli, whereas women experience physical arousal in response to any sex-related stimuli (even to video showing chimpanzee copulation, e.g., Chivers *et al.* 2007). The presentation of male sexual stimuli to heterosexual men was frequently followed by erection decrease and unpleasant feelings that were not found in women watching same-sex stimuli (for a review, see, Chivers 2005). Moreover "friendly touching" and even sexual plays, which help to build coalitions and close relationships, are more often seen among females of some close species (e.g., *Pan paniscus*, Parish 1996). Furthermore, evolutionary reasoning would argue that for women there is a high risk in having casual sex with men, because of the threat of conception with less valued men and the lack of guaranty of future investment, while there is no such risk in the case of engaging in sexual activities with another woman. For this reason, sex between two females might be socially accepted more commonly than male-male sexual behaviour (Davies 2004). Therefore, we expect that even the incidence of such kind of fantasy in women is not adaptively inhibited, which is the case of incidence of fantasies with partners that are evolutionary disadvantageous. Herein, it can be argued, that this result could be a by-product of selecting strictly heterosexual men (e.g., scoring lower than three on the Kinsey scale, see sample description). However, the confirmatory analysis shows this is not the case. When the incidence of same-sex SF in the whole sample (when all male participants were included) was tested the difference remained significant ($\chi^2 = 16.24$, $P < 0.001$).

We want to highlight the fact that the same sex differences were found for incidence and for the experience with or intention to perform SF with objects, in addition to other differences confirming our predictions (sex with a stranger in men and sex with an older and famous partner in women). The same argument, therefore, can be applied to discuss the validity of the second hypothesis (H2). However, evidence for the link between SF, defined solely as an imaginative process, and its behavioural displays or tendencies to performance of sexual activity with such objects, is ambiguous. On the one hand, sexual fantasizing with inclusion of preferred (deviant) objects is used in the diagnosis of paraphilia (Davidson 1985, Weiss 2002); for example, a higher incidence of SF containing pre-pubertal children among child molesters was found (Laws, Marshall 1991), but on the other hand one of the common SF contents among normal population (in men as well as in women), a "rape fantasy", was shown to have no association with the "will to act" in reality (Hunt 1974). As we have noted in the introduction, for SF containing evolutionary relevant objects, we assume a universal adaptive pattern and we expect high concordance between imagination and experience or intentions to perform sexual activity with such objects. We suggest they represent the desired sexual activities that are not performed because of the existence of social pressure, cultural rules or availability of

(consensual) sexual partners (Baumeister *et al.* 2001, Ellis, Symons 1990). Our results indirectly support this assumption.

Finally, we are aware of the several limitations of the study. First, the use of our recruitment criteria can limit the generalisation of the findings. The use of a student sample, even when selected on purpose because of the comparability of results with previous studies that it provides, represents a relatively low proportion of the Czech population (nearly 30% of people aged 20–29 attend university in the Czech Republic (ČSÚ, 2013) differing from other adults. On the other hand, most of the students find their mate during the time of their university studies, making their current sexual fantasy repertoire closely linked to the topic of mating strategies; in fact, the university is one of the common spaces to find a partner (Kalijimin 1998). Choosing a student sample could have also affected our results because university students may perceive their possibilities to find a new partner differently from the rest of the population. Moreover, data might be biased by selecting volunteers, as they can be expected to have a more positive attitude towards sexual topics, increasing their willingness to answer sex-related questions. Moreover, the SF of single or of sexually inexperienced adults can have a different distribution (e.g., the fantasy accenting own partner is irrelevant in such context). In our analysis, we followed the statistical methods used in previous studies focused particularly on sex differences in SF (e.g., Wilson 1987), making the findings easily comparable. However, in future research we suggest to analyse sex differences using the relative incidence of SF highlighting particular objects focusing on female/male repertoires rather than absolute incidence of these objects in a male and female sample. This could help in controlling the results for the higher mean number of SF per person in men and reduce possible bias in the results.

CONCLUSION

As predicted, we found higher frequency and tendency to perform SF with preferred partners according to evolutionary psychological expectations. For men it means significantly higher preference for multiple partners, younger partners, and inexperienced partners. Such partners are considered to be ideal for spreading genes and also decrease paternity uncertainty. The only SF found to have a higher incidence among females was a same-sex partner. It is in agreement with the findings of previous researcher that have suggested that, compared to male sexuality, female sexuality is less rigid. It can also be explained as lower preference for such SF and activity realization among man whose sexuality is more rigid and innate.

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