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## HOMOAMY PREFERENCES FOR COGNITIVE SEX-TYPICALITY IN WOMEN

*ABSTRACT: Homogamy has been suggested as crucial for human mate preferences and mate choice. People are attracted to and choose romantic partners that are similar to them in socio-demographic, physical, and psychological traits. However, only a few studies have shown homogamy in preferences for evolved sex-typical traits. Here, we have investigated male and female preferences for the level of cognitive masculinity-femininity (MF). We tested whether self-reported MF positively correlates with preferences for MF. One hundred men and one hundred women from Brazil filled in questionnaires on their own level of cognitive MF and preferred level of cognitive MF in their ideal partner. Half of the respondents were asked to indicate their preferences for long-term, and the other half for short-term relationships. We found a positive correlation between self-ascribed and preferred level of cognitive MF in women ( $P = 0.002$ ), but no significant correlation in men ( $P = 0.309$ ). There was no significant effect of the temporal context of the relationship, but there was a positive correlation between self-ascribed and preferred level of cognitive MF only in women answering about long-term partner. By subtracting the preferred from the self-ascribed level of cognitive MF, we created a self-similarity index. We found that women desire potential mates more self-similar and more masculine than men ( $P < 0.001$ ) and that in men there is greater variation in the self-similarity index than in women. Our results thus add to previous evidence on the role of homogamy in human mating, by showing preferences for self-similarity also in cognitive MF for women, especially for long-term partner preferences. Future studies should cross-culturally test whether the higher self-similar preference found in women is universal.*

*KEY WORDS: Homogamy – Sex differences – Masculinity-femininity – Cognitive abilities – Evolutionary psychology*

### INTRODUCTION

Non-random or assortative mating is one of the most universal aspects of human and other species mate

choice, although a few studies have shown that for some traits rather random mating might happen (e.g., in actual choices for height in Hadza people, Sear, Marlowe 2009). Positive assortative mating, called homogamy,

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might be caused, among other mechanisms, by self-similarity attraction. It is one of the most documented biases underlying human mating and reproduction. Many studies have found that people prefer and choose romantic partners with characteristics that are similar to themselves (e.g., Kalmijn 1998, Watson *et al.* 2004, Zietsch *et al.* 2011). In particular, it has been found that individuals are actually dating or are attracted to others who are similar in socio-demographics, including age, income, and level of education, among others (e.g., Buston, Emlen 2003, Chen *et al.* 2009, Watson *et al.* 2004), physical traits, such as facial traits (e.g., Bovey *et al.* 2012, Burriss *et al.* 2011), height (Pawlowski 2003, Re, Perrett 2012), and attractiveness (Buston, Emlen 2003, Feingold 1988); and psychological traits, such as personality (e.g., Dijkstra, Barelds 2008, Klohnen, Luo 2003, McCrae *et al.* 2008), values and attitudes (e.g., Luo, Klohnen 2005, Newcomb 1956), attachment style (Luo, Klohnen 2005), sensation seeking and cognitive style (Glicksohn, Golan 2001), and intelligence (Dijkstra *et al.* 2012).

Until now, the literature gives the most empirical support to homogamy rather than to complementarity as the main pattern of human mate choice (Buston, Emlen 2003, Klohnen, Luo 2003; for a review, see, Štěřbová, Valentová 2012). From the evolutionary point of view, self-similarity is suggested to be adaptive in terms of kin selection, among other options. Preferring a higher degree of mutual similarity in a partner would increase representation of their common genes in future generations, even if they are not genetically related, since similarity generally means that partners share more common genes (for review, see Štěřbová, Valentová 2012).

Another well documented bias underlying human mating and reproduction lies in the attraction to sex-typical traits. Studies have shown that men and women prefer developed sexually dimorphic physical traits in their potential partners, such as body shape (Brown *et al.* 2008, Little *et al.* 2011), height (Re, Perrett 2012), voice pitch (Little *et al.* 2011, Re *et al.* 2012), facial features (Little *et al.* 2008, Little *et al.* 2011), or smell (Little *et al.* 2011). It has been shown that development of some sexually dimorphic traits is at least partly affected by the action of sex hormones; e.g., high testosterone levels in men correlate with low voice pitch (Dabbs, Mallinger 1999) and facial appearance (Penton-Voak, Chen 2004), while in women, higher oestrogen levels correlate with higher voice pitch (Abitbol *et al.* 1999) and facial appearance (Law-Smith *et al.* 2006). It has thus been assumed that morphological and behavioural sex-typical traits cue to some underlying quality of the organism

such as fertility, healthiness, developmental stability, or resistance against parasites (Gangestad, Scheyd 2005, Grammer *et al.* 2003; for a contrary view, see, Skamel 2003). Indeed, some sex-typical traits, such as low voice-pitch in men, have been shown to correlate positively with number of their offspring (Apicella *et al.* 2007), and larger breast and narrow waist in women is related to their higher fertility (Jasińska *et al.* 2004).

Moreover, in heterosexual individuals, attraction for homogamy and for sex-typical traits are not mutually exclusive. In fact, homogamy for sex-typical traits, i.e., a feminine individual would prefer a feminine individual of the opposite sex, has been reported by several studies. Although in general, both sexes prefer sex-dimorphic traits typical for individuals of the opposite sex, this preference is relative, modulated by their own level of the given sex-dimorphic traits. Regarding physical traits, preferences for height have been found to be positively correlated to own height of the individual (Pawlowski 2003, Re, Perrett 2012), and a preference for masculine low pitch voice is also positively predicted by women's own voice pitch (Vukovic *et al.* 2010). Further, it has been shown that preferences for facial masculinity are strongest in women with relatively high salivary testosterone levels (Welling *et al.* 2007), although there was no assortative mating for other rated facial masculinity (Burriss *et al.* 2011). Concerning psychological gender roles, women presenting a masculine gender role prefer more masculine male faces (Johnston *et al.* 2001). Baron-Cohen (2007) is further proposing a theoretical model for positive assortative mating between strong systemizers, which means people with a masculine cognitive profile. Nevertheless, as far as we know, no other study has focused on possible homogamy in a global set of sex-specific cognitive functions, which is also suggested to be affected by sex-hormone levels (Baron-Cohen 2003, Halpern 2000, Moir, Jessel 1991, Pinker 2002), and might thus be considered as a mental ornament, cue to quality of the organism, or both (Grammer *et al.* 2003, Miller, Todd 1998, Miller 2000a, 2000b, Miller, Murphy 2007). In the same way that individuals have preferences for sex-typical physical traits, they might also have preferences for cognitive sex-typical functions. Moreover, if there is such preference, it might be influenced by individual's own level of cognitive sex-typicality operating under a homogamy pattern.

### **The Current Study**

The main aim of this study was to explore whether self-reported level of cognitive masculinity-femininity,

in both men and women, affects their preferences for cognitive masculinity-femininity in their potential partners. Based on the literature outlined above, we propose that preferences for cognitive masculinity-femininity in an ideal partner would be positively influenced by the self-ascribed level of cognitive masculinity-femininity. More specifically, we expect that a higher level of self-reported cognitive masculinity-femininity would positively correlate with the preferred level of cognitive masculinity-femininity in an ideal partner.

Most questionnaires measuring behavioural sex-typicality assess either one or very few psychological dimensions (Baron-Cohen 2007) or focus more on social gender roles rather than on cognition (Johnston *et al.* 2001). It has been shown that expected gender stereotypes can influence the performance of the respondents (Spencer *et al.* 1999). Since it is easier for participants to figure out male and female gender role than cognitive sex-typical traits, we used a questionnaire that approaches various sex typical traits in cognition (Moir, Jessel 1991, Pease, Pease 1998).

Finally, we also expect that preferences for sex-typical cognitive traits might be linked to the temporality of the mating context (i.e., short-term or long-term relationships). It has been shown that women prefer more masculine male faces and voices when they seek short-term partners rather than long-term partners (Little *et al.* 2002, Puts 2005). It has been suggested that higher testosterone levels in men negatively affect their willingness to invest in relationships and offspring (Burnham *et al.* 2003, Feinberg 2008, Gray 2003, Gray *et al.* 2002, 2004). Therefore, based on findings for physical traits, here we suggest that women would prefer higher cognitive masculinity in their potential short-term, rather than long-term partners, while in men, we do not expect any differences according to the temporal mating context.

## MATERIAL AND METHODS

### Participants

In total, the sample consisted of 100 men (mean age = 20.89, SD = 3.33) and 100 women (mean age = 22.67, SD = 5.22), recruited from undergraduate students of Psychology, Sports, Biological Sciences and Engineering at universities in three different cities of São Paulo State (Jaboticabal, São José do Rio Preto, and Bauru) in Brazil. Initially we found a sex difference in age, with women being significantly older than men ( $t = 2.834$ ,  $df = 163$ ,

$P = 0.005$ ). Since only few (in particularly women) participants were older than 30 years, we have excluded them from further analyses. Thus, 95 men and 87 women younger than 30 years old entered the final analyses, and they did not significantly differ in age ( $t = 1.645$ ,  $df = 180$ ,  $P = 0.102$ ).

### Questionnaires

We distributed a set of questionnaires including information on sex and age, a questionnaire on self-ascribed cognitive masculinity-femininity, and another one on preferred masculinity-femininity in an ideal partner (see below).

#### *Questionnaire on self-ascribed cognitive masculinity-femininity*

The level of a respondent's cognitive masculinity-femininity was assessed by a standardized questionnaire "The Test of Brain Structure" (Moir, Jessel 1991), which was used in Brazilian Portuguese translation (Pease, Pease 2000). The questionnaire contains 30 items, and estimates the level of a respondent's cognitive masculinity-femininity. The items propose scenarios in which men and women, on average, make different decisions because they use different cognitive functions, such as spatial orientation, non-verbal and verbal communication, multitasking, problem solving strategies, reaction to danger, type of reasoning most used (rational or intuitive), approaches to romantic relationship, and sociability (Moir, Jessel 1991, Pease, Pease 1998). For instance, an item regarding the type of reasoning most used (rational or intuitive) is: "When you want to foresee how a situation will end up, you: (a) Use intuition; (b) Take a decision based on concrete information and on intuition; (c) Analyse facts, data and statistics." An item regarding spatial orientation is: "When consulting a map or plan of the city, you: (a) Have difficulty and ask for help often; (b) Turn the map around to face the direction you will take; (c) Do not feel any difficulty." Three options are available for each statement; (a) is the more feminine, (b) intermediate and (c) more masculine. Thus, each participant reports a more feminine, intermediate, or more masculine answer in all contexts.

To calculate the overall score, the total number of answers 'a' was multiplied by 10, the total number of answers 'b' was multiplied by five and the total number of answers 'c' was multiplied by minus five. Summing up these values creates the overall score for each individual. The maximal possible score is 300 and minimal 150. A higher score indicates a more feminine

individual, and a lower score a more masculine individual (Pease, Pease 1998).

### ***Questionnaire on preferred cognitive level of masculinity-femininity in an ideal partner***

The questionnaire on preferred level of masculinity-femininity in an ideal partner was created by authors MV and SC. It was based on the questionnaire "The Test of Brain Structure" (Pease, Pease 1998). Most items in this questionnaire were similar to those in the self-ascribed questionnaire; nevertheless, the respondents do not report their own level of cognitive masculinity-femininity, but the preferred level of cognitive masculinity-femininity in an ideal partner. Since in 11 cases it was not possible to adapt the same item from the original self-ascribed questionnaire for partner preferences context we created alternative items from the same domain of cognitive function, all of them concerning cognitive capacities that, on average, differ between men and women (Baron-Cohen 2003, Hoshino 1993, Pease, Pease 1998, Pinker 2002).

Thus, the questionnaire for preferred cognitive masculinity-femininity consisted of 30 items following the form of Pease and Pease's (1998), and consisted of items differing between men and women in the following areas: non-verbal and verbal communication, problem solving strategies, reaction to danger, values, spatial orientation, multitasking, laughter and humour, approaches to relationship, sociability, and type of reasoning most used (rational or intuitive). Thus, most of the areas are the same ones which were employed in the original questionnaire of Pease and Pease (1998).

Each item and the possible answers were constructed in a gender neutral way by presenting both gender declinations together (he/she, him/her), so that the same version could be responded to by men and women regardless of their sexual orientation. For instance, an item about preference for type of reasoning most used (rational or intuitive) is: "You prefer a possible partner that in order to foresee how a situation will end up: (a) Uses intuition; (b) Takes a decision based on concrete information and on intuition; (c) Analyses facts, data and probabilities." And an item about the preferred level of spatial ability in a potential partner is: "When you ask where the bar is located, in which you will meet next time, do you prefer a potential partner who: (a) Says that he/she can't explain and asks for someone's help; (b) Try to explain generically the way; (c) Explains street by street, block by block, easily."

The overall score was calculated similarly to the self-reported questionnaire (see above). Thus, the higher the

overall score, the more feminine and the lower, the more masculine was the psychological profile of a desired partner.

The questionnaire for preferred characteristics was finalized after a pilot study, during which five men and five women read it in detail and responded to it. Importantly, they reported not guessing in the end that the tested variable was the level of masculinity-femininity. The quantitative appraisal showed that the scores for men were higher than for women, which means that their preferences were in the expected direction: men preferred more feminine partners and women preferred more masculine ones.

Regarding the questionnaire on preferences of cognitive masculinity-femininity in a mate, participants were divided into four groups, each containing 50 individuals. Randomly chosen half of the men and half of the women were instructed to answer the questions as if they were choosing an ideal partner for a long-term committed relationship (i.e., serious relationship, marriage, long-term romantic involvement), while the other half were asked to answer this questionnaire as if they were seeking a partner for a short-term relationship (i.e., casual sex, sexual involvement, hook-up, one night stand romance).

The final material consisted of the items regarding participant's sex, age, and both questionnaires, the self-ascribed cognitive masculinity-femininity profile and the preferred cognitive masculinity-femininity profile in a mate. The order of presentation of each questionnaire was randomized, so that half of each sex sample first answered the self-ascribed questionnaire and the other half answered first the preferred profile in a mate questionnaire. In this way we have controlled for any possible order effect.

### **Procedure**

The final set of questionnaires was administered to undergraduate students in classrooms after prior consent of the professor, students, and of the educational institutions. All questionnaires were completed individually and anonymously, after each participant had received a general explanation of the research and had signed a consent form. In the information about the purpose of the research, we stated that the research is aimed at ideal partner preferences, and we did not include any information about sex-typicality, or masculinity-femininity in order to avoid possible bias in the answers.

The whole procedure took around 20 minutes and participants dropped the completed questionnaires in a ballot box at the end. The Research Ethics Committee

of the Faculty of Science – UNESP, Bauru – São Paulo State, Brazil, approved this study during the 11<sup>th</sup> meeting on 19<sup>th</sup> August, 2004.

### Statistical analysis

The raw data were entered into the Statistical Package for Social Sciences (SPSS), version 20.0, to run group comparisons and correlation tests. Further, outliers, extreme values exceeding two standard deviations, were identified using descriptive statistics and box-plots (i.e., values from variables of age, self-reported, and preferred characteristics) and were excluded from further analyses (around 10 men and 15 women, depending on the analysis used). Finally, we tested the distributions for normality: the Shapiro-Wilks test did not show any violations from normality (all  $P$ -values  $> 0.09$ ). Thus, we have used parametric tests for further analyses.

In order to test for possible differences between men and women and between short-term and long-term context in preferred level of masculinity-femininity, we have performed a GLM ( $2 \times 2$  ANOVA) with the score of preferences for partner masculinity-femininity as a dependent variable, and sex and context as factors.

Afterwards, in order to test for a homogamy or a complementarity pattern of preferences we have run Person's correlations between self-ascribed and preferred level of femininity. Positive correlations would indicate homogamy and negative ones, complementarity. In order to test for group differences (sex or relationship context) we have compared the correlation coefficients using Fisher  $r$ -to- $z$  transformation.

To explore this relationship in more detail, we subtracted the overall score of preferred cognitive masculinity-femininity from the self-ascribed one, thus creating a relative measure of similarity: the self-similarity index. Using the self-similarity index, individuals scoring near to zero show a higher level of self-similarity than those scoring further from zero in both directions, negative and positive. Positive scores indicate preferences for relative masculinity and negative scores indicate preferences for relative femininity.

In order to test for possible differences between men and women and between short-term and long-term context in self-similarity index, we performed a GLM ( $2 \times 2$  ANOVA) with the self-similarity index as a dependent variable, and sex and context as factors. We tested for sex differences in the variances of the self-ascribed scores, preferred scores and self-similarity indexes using the  $F$ -test.

All analyses with the self-similarity index were repeated using a standardized index created from the

$z$ -scores of the total scores of both questionnaires on self-ascribed and preferred cognitive masculinity-femininity. The results were similar to those reported here, and are thus not presented. Moreover we did the same analysis using the overall score of each questionnaire containing only the items which equally match items and of answers in both self-ascribed and preferred cognitive level of masculinity-femininity. These analyses also revealed similar results to those reported here, so they are not presented below.

## RESULTS

Overall, men ( $N = 91$ , average score = 150.11,  $SD = 37.64$ ) scored significantly lower in self-ascribed level of cognitive masculinity-femininity than women ( $N = 86$ , average score = 179.53,  $SD = 38.53$ ), ( $t = 5.139$ ,  $df = 175$ ,  $P < 0.001$ ). Thus, since the higher the score, the more feminine, and the lower the score, the more masculine, the questionnaire we used captured expected differences between men and women in psychological traits. The  $F$  test showed no sex difference in the variance of self-ascribed scores level of masculinity-femininity ( $F = 1.09$ ,  $P = 0.683$ ). In *Figure 1*, the distribution of the self-ascribed level of cognitive masculinity-femininity is presented for each sex, and *Table 1* shows the sex difference for that questionnaire.

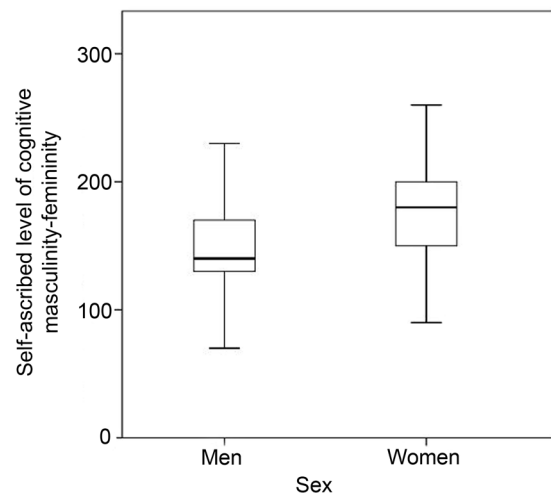


FIGURE 1. Distribution of the level of the self-ascribed masculinity-femininity in men and women. The boxes indicate interquartile range, the line inside the box indicates the median and the bars show the 95% confidence interval.

TABLE 1. Mean values and standard deviations (SD) in self-ascribed and preferred cognitive masculinity-femininity (MF), and self-similarity in men and women.

	Men			Women			P-value (equality of means)	P-value (equality of variances)
	N	Mean	SD	N	Mean	SD		
Self-ascribed MF <sup>a</sup>	91	150.11	37.64	86	179.53	38.53	0.001	0.683
Preferred cognitive MF <sup>a</sup>	94	186.49	42.57	87	172.99	34.91	0.018	0.066
Self-similarity index <sup>b</sup>	94	-37.13	52.91	87	7.70	41.61	0.001	0.026

<sup>a</sup> The higher the score the more feminine.

<sup>b</sup> Self-similarity index was computed by subtracting the preferred level of masculinity-femininity from the self-ascribed level of masculinity-femininity, the close to zero is the score the more self-similar.

The whole GLM model of two-way ANOVA was significant ( $F = 3.26$ ,  $df = 3,177$ ,  $P = 0.023$ , partial Eta square = 0.052). We found a significant effect of sex on preferred level of masculinity-femininity ( $F = 5.73$ ,  $df = 1,181$ ,  $P = 0.018$ , partial Eta square = 0.031), but there was no effect of context ( $F = 3.21$ ,  $df = 1,181$ ,  $P = 0.075$ , partial Eta square = 0.018), neither an interaction of sex and context ( $F = 1.25$ ,  $df = 1,181$ ,  $P = 0.265$ , partial Eta square = 0.007). Men ( $N = 94$ , average score = 186.53, SD = 42.57) scored significantly higher on preferred masculinity-femininity than women ( $N = 87$ , average score = 172.70, SD = 34.91). Thus men preferred more feminine partners than women. The  $F$  test showed a non-significant sex difference in the variance of preferred level

of masculinity-femininity scores ( $F = 1.48$ ,  $P = 0.066$ ). In Figure 2, the distribution of the preferred level of cognitive masculinity-femininity is presented for each sex, and Table 1 shows also the sex difference for that questionnaire. In Figure 3, the distribution of the preferred level of cognitive masculinity-femininity is presented for each sex and relationship context.

**Correlations between self-ascribed and preferred level of masculinity-femininity**

In men, we did not find a significant relationship between self-ascribed and preferred level of masculinity-

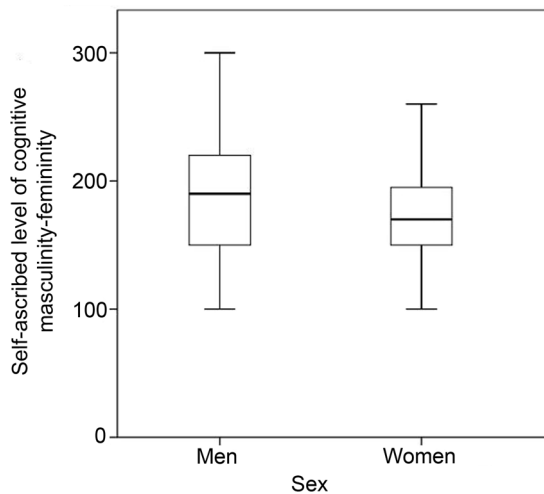


FIGURE 2. Distribution of the level of masculinity-femininity preferred for a potential partner in men and women. The boxes indicate interquartile range, the line inside the box indicates the median and the bars show the 95% confidence interval.

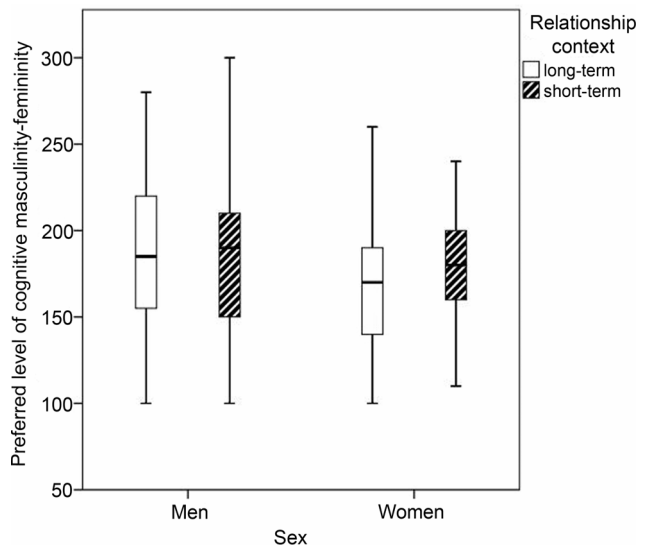


FIGURE 3. Preferred level of cognitive masculinity-femininity in men and women for short-term and long-term relationship. The boxes indicate interquartile range, the line inside the box indicates the median and the bars show the 95% confidence interval.

femininity ( $r = 0.109, N = 90, P = 0.309$ ). There was also no correlation between self-ascribed and preferred level of masculinity-femininity for men reporting preferences for long-term partners ( $r = 0.115, N = 47, P = 0.441$ ), nor for short-term partners ( $r = 0.093, N = 43, P = 0.554$ ). The coefficients of correlation did not differ between long- and short-term groups for men ( $z = 0.1, P = 0.920$ ).

In women, self-ascribed and preferred level of masculinity-femininity were significantly and positively correlated ( $r = 0.337, N = 86, P = 0.002$ ). There was only a correlation between self-ascribed and preferred level of masculinity-femininity for women reporting preferences for long-term partners ( $r = 0.435, N = 41, P = 0.004$ ), but not for short-term partners ( $r = 0.217, N = 45, P = 0.153$ ). The coefficients of correlation did not differ between long and short-term groups for women ( $z = 1.1, P = 0.271$ ). In *Figure 4*, the scatter plot of the correlations between both questionnaires is presented for each sex.

**Self-similarity index**

As shown in *Figure 5*, the distribution of the self-similarity index is presented for each sex. And *Table 1* also shows the sex difference for the self-similarity index.

The overall GLM two-way ANOVA model was significant ( $F = 14.22, df = 3, 181, P < 0.001$ , partial Eta square = 0.194). We found a significant effect of sex ( $F = 40.01, df = 1, 181, P < 0.001$ , partial Eta square = 0.184), but no effect of context ( $F = 0.004, df = 1, 181, P = 0.951$ , partial Eta square = 0.002) nor sex by context

interaction ( $F = 2.78, df = 1, 181, P = 0.097$ , partial Eta square = 0.015). Thus, men ( $N = 94$ , average score =  $-37.00, SD = 52.91$ ) scored significantly lower than women ( $N = 87$ , average score =  $7.91, SD = 41.61$ ). The  $F$  test showed a significant sex difference in the variance of the self-similarity index ( $F = 1.61, P = 0.026$ ); men's self-similarity index distribution has higher variation than women's distribution.

**DISCUSSION**

In this exploratory study, we have investigated male and female ideal preferences for a set of cognitive traits that, on average, differ between men and women. Furthermore, we have tested whether self-reported masculinity-femininity modulates preferences for masculinity-femininity in an ideal partner. In agreement with previous evidence on homogamy in mate preferences, we have found positive correlations between the self-ascribed and preferred level of cognitive masculinity-femininity in women, especially in the long-term relationship context. This indicates that women higher in masculinity prefer rather masculine partners and those higher in femininity prefer rather feminine partners. Negative correlations, which would indicate a complementary pattern of mate preference, have not been found.

Our results are in line with studies showing homogamy preferences for sex-typical physical traits

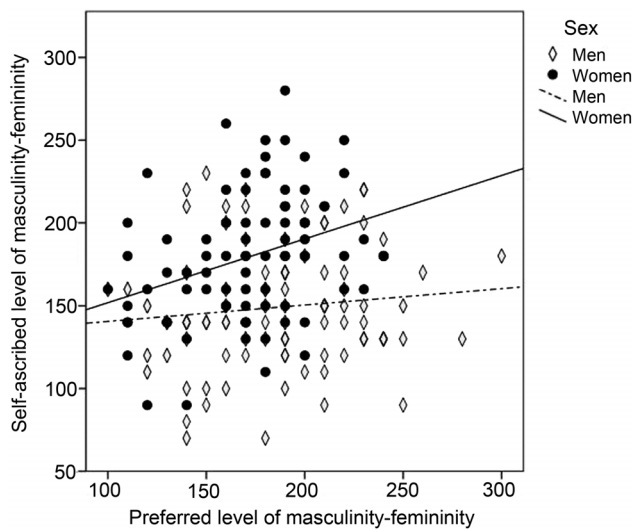


FIGURE 4. Correlations between self-ascribed and preferred level of cognitive masculinity-femininity.

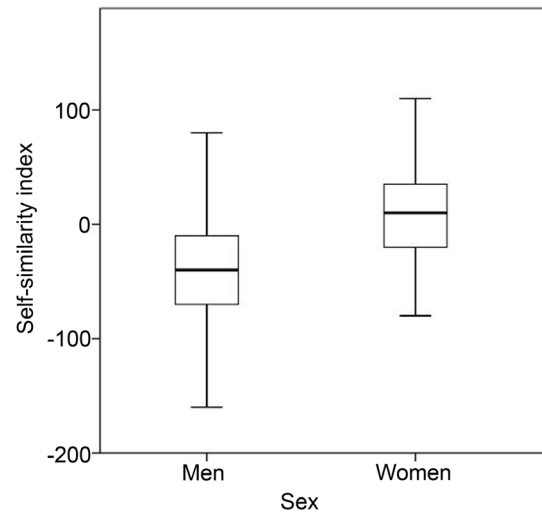


FIGURE 5. Comparison of self-similarity index between men and women. The boxes indicate interquartile range, the line inside the box indicates the median and the bars show the 95% confidence interval.

(Pawlowski 2003, Re, Perrett 2012, Vukovic *et al.* 2010, Welling *et al.* 2007) and psychological traits (Baron-Cohen 2007, Johnston *et al.* 2001). In general, our results are also consistent with studies indicating the pattern of homogamy in many other traits, such as socio-demographic, physical and psychological traits (Burriss *et al.* 2011, Buston, Emlen 2003, Chen *et al.* 2009, Dijkstra, Barelds 2008, Dijkstra *et al.* 2012, Feingold 1988, Glicksohn, Golan 2001, Kalmijn 1998, Keller *et al.* 1996, Kenrick, Keefe 1992, Klohnen, Luo 2003, Luo, Klohnen 2005, McCrae *et al.* 2008, Newcomb 1956, Pawlowski 2003, Watson *et al.* 2004, Zietsch *et al.* 2011).

From the evolutionary perspective a stable couple forms a better adaptive social environment for giving birth and raising highly dependent offspring that require investments of both parents. Indeed, previous studies have shown that couples with a higher degree of homogamy are more satisfied (Luo, Klohnen 2005), last longer, and have more children than complementary couples (Bereczkei, Csanaky 1996). Cognitive self-similarity might thus be one of the traits helping to form and maintain a stable relationship (for review see Štěrbová, Valentová 2012).

Nevertheless, we have shown that the degree of preferences for homogamy is higher in women than in men. This was supported by two findings. First, in general we found a significant positive correlation between the self-ascribed and preferred level of cognitive masculinity-femininity in women, but not in men. Second, after computing the self-similarity index we found that the self-similarity score for women was closer to zero and higher than the score for men, indicating that women desire potential mates more self-similar and higher on masculinity than men. Since compared to men, women invest more into reproduction and have a shorter reproductive window than men (Gangestad, Simpson 2000, Trivers 1972), women's higher preference for homogamy in partners might be adaptive in terms of increasing chances for longer paternal investments into reproduction, and thus increasing chances for successful reproduction. This could be also the effect of sex differences in mate selection criteria. More specifically, women on average put more emphasis on psychological characteristics than men do, while men put more emphasis on physical traits than women do (Gangestad, Simpson 2000).

As far as we know, this is the first study showing sex differences in preferences for self-similarity in an ideal partner. Along with correlational analyses, which are commonly used in homogamy studies, we were able to

explore possible sex differences in more detail by computing the self-similarity index. This index measures distances between the self-ascribed and preferred trait. Glicksohn and Golan (2001) state that similarity can be defined as a proximity (distance) measure between profiles or as the degree of correlation of key traits. We argue that correlations between self-ascribed and preferred traits, a positive value of which might indicate homogamy in the population, do not necessarily need to imply self-similarity per se in individual basis. Two variables might co-vary without being proximate or equal. Thus, in addition to the correlation approach, here we have used another measure of self-similarity created by subtracting standardized variables which enabled fine group comparisons. By presenting both options, we aim to expand and integrate different measures of self-similarity and homogamy.

Finally, we have tested whether temporality of the mating context (short-term versus long-term) influences such preferences. Contrary to previous studies focusing on masculinity of physical traits (Feinberg 2008, Haselton, Miller 2006, Johnston *et al.* 2001, Puts 2006), preferences for cognitive masculinity-femininity did not differ between short and long term mating contexts, neither in men nor in women. Some previous studies have shown that women prefer more masculine facial and vocal traits in men when seeking a short-term partner compared to long-term relationship (Feinberg 2008, Johnston *et al.* 2001, Puts 2006). Haselton and Miller (2006) found short term preferences for creative intelligence in fertile phase women. Thus, although we found positive correlations only in women thinking of long-term partners, ideal preferences for cognitive masculinity-femininity at least initially do not seem to be influenced by temporal mating context as much as morphological traits and other psychological traits.

## CONCLUSION

We have shown that, in women, preferences for cognitive masculinity-femininity in an ideal partner are modulated by their own level of masculinity-femininity on this trait. Thus, homogamy underlies preferences for cognitive masculinity-femininity in a potential partner in women but not in men, especially for those preferring partners for long-term relationship. Furthermore, we have shown that women display higher self-similarity preferences than men.

The authors are aware of several limitations of this study such as the need for more standardized measurement



tools especially for partner preferences, or a specific sample based on young students from the State of São Paulo in Brazil. However, we have tried to overcome these limitations by sampling participants from different undergraduate courses, not only first year students, and from different cities of the State of São Paulo.

We suggest that preferences for tighter self-similarity in women might be adaptive in terms of finding a compatible long-term partner who would provide her and their offspring with resources. Prospective studies should test the adaptive functions of our findings cross-culturally using combined methods and assessing both preferences and actual mate choices. Further studies should thus focus on testing the sex-differences found in this study not only on a different sample, but also when investigating homogamy of other dimensions such as psychological, physical, or socio-demographic traits.

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