

Sexual arousal by dominance and submission in relation to increased reproductive success in the general population

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Abstract

OBJECTIVE: Sexual arousal by dominance and submissiveness was long considered a mental disorder. The origin of this sexual preference has not been clearly explained. This study scrutinizes the hypothesis that sexual arousal by hierarchical disparity is a manifestation of mating strategy by comparing number of offspring and self-reported attractiveness of the study participants.

METHODS: Our data were obtained from the general population via e-mail questionnaire (n=673, age 25–34 years and 35–44 years).

RESULTS: Sexually dominant men aged 35–44 years had more biological male children. Both the sexually dominant men aged 35–44 years and sexually submissive women aged 35–44 years perceived themselves as being more attractive.

THE MAIN FINDINGS: Here we show that sexual arousal by dominance and submissiveness confers an increased capacity to pass on genes in the general population.

CONCLUSION: We suggest that sexual arousal by dominance is likely to be the means by which the mating strategy is accomplished. Sexual arousal by dominance and submissiveness is a manifestation of mating strategy because such a behaviour results in an increased reproductive success and thus may lead to the preferential selection of individuals who prefer sexual arousal by hierarchical disparity. This fact explains why the high number of people is excited by sexual fantasies and activities connected to hierarchical disparity. This finding might open up novel insights into some reproductive medicine issues, as well as into such field as partnership therapy and partner violence.

INTRODUCTION

Women are attracted to male features that show an increased social dominance, such as high social status (Mealey, 1985; Fieder *et al.* 2005; Mazur *et al.* 1994), dominant looking face (Mazur & Booth, 1998; Mueller & Mazur, 1997), physical dominance (Wolff & Puts, 2010), masculine voice (Feinberg *et al.* 2006), and dominant male odor (Havlicek *et al.* 2005). Some of these preferences appear prominently in fertile phase of menstrual cycle (Feinberg *et al.* 2006; Havlicek *et al.* 2005). In contrast, men prefer female submission, for instance, lower social status (Greitemeyer, 2007), submissive postures and gesticulation (Burke & Sulikowski, 2010; Moore, 2002; Moore, 2010; Henley, 1977). These preferences can be explained using approaches of evolutionary biology (see (Stephen *et al.* 2014)). These, male and female, preferences represent a mating strategy in which the dominant individual carries high quality genes and/or provides access to scarce resources (Mealey, 1985; Fieder *et al.* 2005; Perusse, 1993; Puts *et al.* 2012), whereas the submitting individual provides an opportunity for reproduction with the guarantee of paternity (no cheating on one's partner) (Mennill *et al.* 2004). Such behavioural strategy is "inherited behaviour pattern that affect"... "an individual's contribution of genes to the next generation" (Alcock, 2013).

In *Homo sapiens* an interesting phenomenon occurs: sexual arousal caused by dominance and submission. Many countries consider such arousal a mental disorder (World Health Organization, 2010). However, literature containing a low level of this behaviour (Fifty Shades of Grey by E. L James) is the best-selling. Powls and Davies (2012) summed up older studies from various countries, reporting that more than 50% of respondents were aroused by fantasies or activities related to sexual hierarchical disparity (Powls & Davies, 2012). Sexual practices related to arousal by dominance and submission commonly involve an exaggeration of dominant or submissive features during foreplay or flirting. 8–10% of homes owned some equipment (sex toys) for such practices and 11% of people had a personal experience of dominance/bondage in the US (Janus & Janus, 1993). 1.8% of people practiced so-called BDSM (bondage, dominance and submission, sadism, and masochism) sex during last year in Australia (Richters *et al.* 2003) and according to Wright (2008), at least 50.5% of BDSM practitioners labelled their sexual activities as dominance/submission in sex.

Sexual arousal by dominance and submission could be the aforementioned mating strategy (Jozifkova & Konvicka, 2009; Jozifkova *et al.* 2012). Therefore, bearers of this strategy should have some evolutionary advantage such as enhanced reproductive success conferred by higher number of male relatives and by increased physical attractiveness (Jozifkova & Konvicka, 2009). Attractiveness increases reproductive success via sexual selection (Jokela, 2009; Schooling *et al.* 2011).

This study scrutinizes the hypothesis that sexual arousal by hierarchical disparity is a manifestation of a mating strategy by comparing number of offspring, self-reported attractiveness, and social status of the study participants. Men who were sexually excited by their partner's submission and women who were sexually excited by submission to their partner were compared to men and women without these preferences.

If the sexual arousal by dominance and submission is not connected with the mating strategy, the sexual preference of hierarchical disparity should occur independently on indicators of expected reproductive success (number of offspring, attractiveness, and socioeconomic status measured via social status, finance, and education).

If the sexual arousal by dominance and submission is not adaptive then the men who were sexually excited by their partner's submission and women who were sexually excited by submission to their partner should not have more offspring compared to men and women without these preferences independently on the other characteristic of respondents.

METHODS

Data collection and respondents

Our data were obtained from the general population via e-mail questionnaire in the Czech Republic, European Union. Emails with questionnaires were sent by the email account provider as a part of our advertising campaign. Data were collected anonymously. Blinded methods were used when all behavioral data were recorded and/or analyzed. There was no observer bias. Data were collected within a few months in 2013. Out of 903 respondents who started to fill out the questionnaire, 803 people completed it. Only respondents ticked the age category of 35–44 years (220 men and 172 women) who were not sexually aroused by the same gender and/or who did not live with the same gender partner were included into analysis. The Data of those who ticked the age category of 25–34 years (156 men and 125 women) were analysed separately because these respondents were less likely to reach the final number of offspring due to their shorter life span (see Supplementary Tables S1–S4).

The respondents of both age categories answered that their socioeconomic status was better than other people of similar age; 328 (48.7%) of these respondents had a university level of education. 292 (43.4%) respondents considered their financial situation average, and 223 (33.1%) moderately above average. 306 (45.5%) respondents rather agreed that they had a good social status, 250 (37.1%) answered "neither yes nor no".

Ethical approval

The research was performed in accordance with the relevant guidelines and regulations. The ethics of the research were approved by the Institutional Board of J.

E. Purkyne University in Usti nad Labem. Data were collected anonymously. All respondents were informed about the purpose of this study and about voluntary and conscious participation via e-mail and via the survey instruction web page before entering the questionnaire. They confirmed their participation by clicking 'enter the questionnaire'. This form of informed consent was obtained from all participants. The datasets generated during and/or analysed during the current study are not publicly available due to ethical issues but are available from the corresponding author on reasonable request.

Questionnaire

Respondents answered according to their situation and experiences relating to their former, current or future partner, number of children, number of siblings and parents' siblings, relationships between partners and between parents, attractiveness, sexual preference, and socioeconomic status. Respondents either chose a specific detail (or a range) offered by the choice of answers or they provided specific details relating to an answer. Most questions related to attitudes and opinions and were categorized on a five level scale. The questions are stated in Table 1.

Statistics

In the questionnaire, people who were sexually excited when their partner was submissive (answers: "definitely yes," "rather yes") but were not excited by a dominant partner (answers: "definitely not," "rather not," and "neither yes nor no") were marked as "Dom." Other respondents were excited by their submission to their partner (answers: "definitely yes," "rather yes") but were not excited by their partner's submission (answers: "definitely not," "rather not," and "neither yes nor no"). They were marked as "Sub." The group without any sexual preference of this kind was described as "No." Within this group, individuals either ranked themselves "neither yes nor no," or were not excited by these types of preferences (answers: "rather not" and "definitely not"). People who were excited by both their own submission and their partner's submission were included in the group "Both." Respondents who replied to one or both answers "I don't know" were excluded from the analysis.

We compared the number of offspring, attractiveness, and socioeconomic status (measured via social status, finance, and education) of "Dom" males with the number of offspring, attractiveness, and socioeconomic status of "No" males. Similarly, these variables in "Sub" females were compared to the values in "No" females.

Data were analyzed using IBM SPSS Statistic 20. Data normality was assessed by Shapiro-Wilk's test and Kolmogorov-Smirnov test with Lilliefors Significance Correction. Therefore we used non-parametric tests to analyze the data. We used Mann-Whitney U test (2-tailed) and asymptotic significance and Pearson's chi-squared test for subgroup comparison and data description.

RESULTS

Number of offspring

Out of the respondents aged 35–44 years, sexually dominant men had more biological male children (Figure 1, Table 2). They had more sons but they did not differ in number of daughters (Figure 1, Table 2, the biological children with previous partners and with a current partner were summed; see Table 3 for women).

Attractiveness

Both the sexually dominant men and sexually submissive women of the age 35–44 years perceived themselves as being more attractive (Figure 2, Tables 4–5).

Socioeconomic status

Sexually dominant men and sexually submissive women did not display lower socioeconomic status which was measured by evaluating their financial situation, social status, and education (Tables 4–5). Sexu-

Tab. 1. Questions.

No. and Abbr.	Question
Q1 Education	I have completed: <ul style="list-style-type: none"> – Elementary education – Secondary education – Education equal to Bachelor's degree level – Education higher or equal to Master's degree level
Q2 Finances	When compared to other people of my age and gender, my finances are: <ul style="list-style-type: none"> – Significantly below average – Below average – Average – Above average – Significantly above average
Q3 Status	I have high social status: <ul style="list-style-type: none"> – Definitely not – Rather not – Neither yes nor no – Rather yes – Definitely yes
Q4 Attractiveness	I'm physically attractive: Options as in Q3
Q5 Equality	I'm sexually excited by an equal partner: <ul style="list-style-type: none"> – Definitely yes – Rather yes – Neither yes nor no – Rather no – Definitely no – I don't know
Q6 Sexual Submission	I'm sexually excited by my submission to the partner: Options as in Q5
Q7 Sexual Dominance	I'm sexually excited by my partner's submission: Options as in Q5

All analyzed categories and subcategories and versions of questions we involved in our questionnaire (although, the order of the questions does not exactly correspond with the order in the questionnaire, questions from Q5 to Q7 are in the same order).

Tab. 2. Number of offspring in men aged 35-44 years.

U	p-value	Group No n=98						Group Dom n=69				
		Median	Min	Max	Q ₁	Q ₃	Median	Min	Max	Q ₁	Q ₃	
Children	2625.0	0.010*	1	0	3	0.75	2	2	0	4	1	2
Sons	2651.0	0.009*	0	0	2	0	1	1	0	3	0	1
Daughters	3202.0	0.531	1	0	3	0	1	1	0	2	0	1

* $p < 0.05$; Dominant men (Dom) compared with men without these sexual preferences (No), tested by Mann-Whitney U test. Analyzed variables: number of children, number of sons, and number of daughters. Men aged 35-44 who were excited by submissive women had a higher number of children, specifically more sons. Median, minimum (Min), maximum (Max), first quartile (Q₁), and third quartile (Q₃) for every group are depicted.

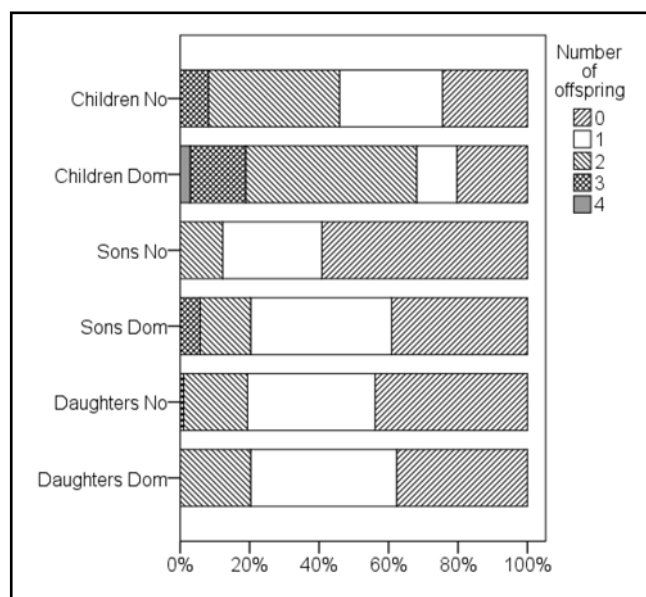


Fig. 1. Dominant males (Group Dom) had more children (Variable Child), specifically more sons (Variable Sons), than males without the sexual preference for hierarchy (Group No) in males aged 35-44 years; (they did not differ in number of daughters (Variable Daughter); number of offspring is displayed as the frequency (%) of respondents choosing the answers

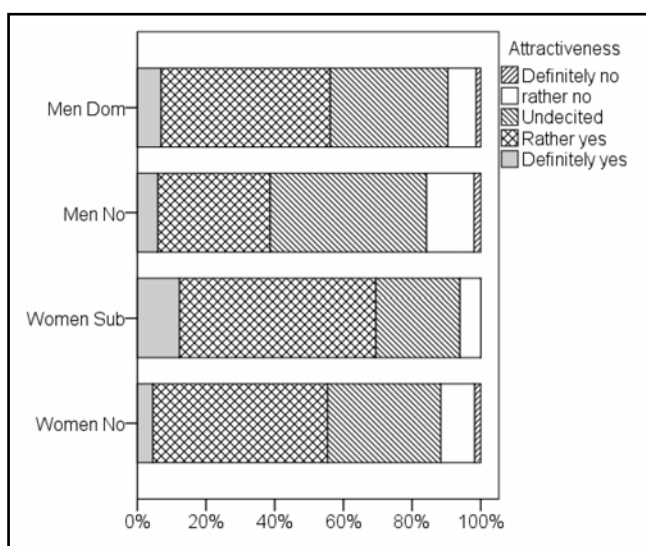


Fig. 2. Comparison of self-reported attractiveness in dominant men (Dom), submissive women (Sub), men and women without these sexual preferences (No) in men and women aged 35-44 years; attractiveness is displayed as the frequency (%) of respondents choosing the answers

ally dominant males were more likely to reach a higher level of education than men without a preference for hierarchy. Sexually submissive women reached a higher level of education than women without a preference for hierarchy.

DISCUSSION

Behavioural features of dominance and submissiveness testify to the quality of an individual and could be strong mating signals for others. Recognition and response to these signals by direct sexual arousal can increase reproductive success and thus lead to the preferential selection of individuals who prefer sexual arousal by hierarchical disparity.

Our data reveal enhanced reproductive success that was indicated by higher number of offspring in sexually dominant men and by increased physical attractiveness in sexually dominant men and sexually submissive women. Therefore, sexual arousal by dominance and submission may represent a behavioral strategy (“inborn mechanism that increases the reproductive success under given conditions” (Alcock, 2013)). Former studies gave evidence of a connection between social dominance (Mealey, 1985; Fieder *et al.* 2005) or in-pair dominance (Jozifkova *et al.* 2014) and the number of offspring in humans. Here, we reveal a connection between sexual arousal by dominance and increased reproductive success.

Men who were sexually aroused by submissive women had more sons but the same number of daughters compared to men without this preference. The proportion of male relatives might be seen as a sign of the increased reproductive success, because males are able to produce considerably more offspring than females (Trivers & Willard, 1973).

In women, there was no relationship between the number of offspring and the preference for hierarchical disparity. It must be noted that the women sexually aroused by their submission to the partner were more educated. In general, educated women do have a lower number of children in Czech Republic (Czech Statistical Office, 2013).

Similar markers of increased reproductive success were found in students. Sexual arousal by the submissive partner correlated positively with the proportion

Tab. 3. Number of offspring in women aged 35-44 years.

	U	p-value	Group No n=110					Group Sub n=48				
			Median	Min	Max	Q ₁	Q ₃	Median	Min	Max	Q ₁	Q ₃
Children	2616.5	0.925	2	0	5	1	2	2	0	4	0	2
Sons	2600.5	0.871	1	0	3	0	1	1	0	2	0	1
Daughters	2611.0	0.905	1	0	5	0	1	1	0	2	0	1

Submissive women (Sub) compared with women without these sexual preferences (No), tested by Mann-Whitney U test. Analyzed variables: number of all children, number of sons, and number of daughters.

Tab. 4. Attractiveness, education, financial situation, and socioeconomic status in men aged 35-44 years.

	U	p-value	Group No n=101					Group Dom n=73				
			Median	Min	Max	Q ₁	Q ₃	Median	Min	Max	Q ₁	Q ₃
Attractive	3027.0	0.031*	3	1	5	3	4	4	1	5	3	4
Education	3158.5	0.083	3	1	5	3	5	4	2	5	3	5
Finance	3259.0	0.165	3	1	5	3	4	4	1	5	3	4
Status	3261.5	0.158	4	2	5	3	4	4	2	5	3	4

* $p < 0.05$; Dominant men (Dom) compared with men without these sexual preferences (No), tested by Mann-Whitney U test. In the men aged 35-44 years, dominant men perceived themselves as more attractive than men without a preference for hierarchy.

Tab. 5. Attractiveness, education, financial situation, and socioeconomic status in women aged 35-44 years.

	U	p-value	Group No n=112					Group Sub n=49				
			Median	Min	Max	Q ₁	Q ₃	Median	Min	Max	Q ₁	Q ₃
Attractive	2232.5	0.038*	4	1	5	3	4	4	2	5	3	4
Education	2242.0	0.044*	3	2	5	3	5	4	2	5	3	5
Finance	2342.5	0.112	3	1	5	2	4	3	1	5	3	4
Status	2646.5	0.337	3	1	5	3	4	3	1	5	3	4

* $p < 0.05$; Submissive women (Sub) compared with women without these sexual preferences (No), respectively, tested by Mann-Whitney U test. In the women aged 35-44 years, submissive females not only considered themselves more attractive, but had also reached a higher level of education than women without a preference for hierarchy.

of male relatives in both men and women (Jozifkova & Konvicka, 2009). It was also observed that sexual arousal by a submissive woman correlated positively with the self-reported attractiveness in men while arousal by a dominant man correlated positively with self-reported attractiveness in women (Jozifkova & Konvicka, 2009).

We did not find any disadvantage in respondents who had a sexual preference for hierarchical disparity (Figure 1–2, Table 2–5, and Supplementary Tables S1–S4). With respect to social status and financial situation, men who preferred submissive females and women who preferred their own submission did not differ from men and women without these preferences, respectively.

Similarly, previous studies on members of the BDSM practitioners' community did not reveal any psychosocial malfunction of these members (Cross & Matheson, 2006; Richters *et al.* 2008; Sandnabba *et al.* 2002; Connolly *et al.* 2006; Wismeijer & van Assen, 2013).

(Former theories of sexual abuse or psychopathy as the cause of sexual arousal by dominance have been invalidated (Cross & Matheson, 2006; Sandnabba *et al.* 2002; Richters *et al.* 2008; Connolly *et al.* 2006; Wismeijer & van Assen, 2013).)

Our respondents subjectively perceived their socioeconomic status as better than other people of similar age; 48.7% of these respondents had a university level of education. With regard to the above-mentioned findings, a higher level of education and a better socioeconomic status could be connected to access to e-mail, the ability to classify their preferences, and a willingness to participate in the survey.

The response rate was low (1.8%). On the other hand, out of respondents who started filling the questionnaire 89% completed the entire questionnaire. We reached our respondents via e-mail with the help of a commercial advertisement company. However, it might have discouraged people who disliked advertisements in their e-mail box. Also they could have been suspi-

cious of some commercial message hidden in the text. Although this method showed a low response rate, we were able to reach a broad population in Czech Republic.

CONCLUSION

Sexual arousal by dominance is likely to be the means of a mating strategy. Accomplishment of this strategy results in an increased reproductive success and thus may lead to the preferential selection of individuals who feel sexually aroused by hierarchical disparity. This finding explains why a high number of people are excited by sexual fantasies and activities connected to hierarchical disparity.

The findings of this study seem to underline the importance of successful reproductive strategy who involves the arousal by dominance and submission even in a European, egalitarian culture. Such inborn preferences cannot be erased, easily suppressed, or switched off. On the basis of these results, it is possible to conclude that some people may lose their chance to maintain long-term relationships and may bring up fewer children when they suppress their natural preferences by pairing with an inappropriate partner. It is necessary to explain these sexual preferences to the broad population and provide people with sufficient information to enable them, in a safe way, a choice of partner which would be related to their preferences. This finding might open up novel insights into sexology, partnership therapy and domestic violence issues.

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SUPPLEMENTARY TABLES

Tab. S1. Attractiveness, education, financial situation, and socioeconomic status in men aged 25–34 years

	U	p-value	Group No n=83					Group Dom n=35				
			Median	Min	Max	Q ₁	Q ₃	Median	Min	Max	Q ₁	Q ₃
Attractive	1216.0	0.135	3	1	5	3	4	4	2	5	3	4
Education	1426.5	0.868	3	2	5	3	5	3	1	5	3	5
Finance	1195.0	0.103	4	1	5	3	4	3	1	5	3	4
Status	1436.5	0.917	4	2	5	3	4	4	2	5	3	4

Dominant men (Dom) compared with men without these sexual preferences (No), tested by Mann-Whitney U test.

Tab. S2. Attractiveness, education, financial situation, and socioeconomic status in women aged 25–34 years.

	U	p-value	Group No n=68					Group Sub n=43				
			Median	Min	Max	Q ₁	Q ₃	Median	Min	Max	Q ₁	Q ₃
Attractive	1377.0	0.571	4	1	5	3	4	4	2	5	3	4
Education	1343.0	0.444	4	2	5	3	5	4	2	5	3	5
Finance	1419.0	0.778	3	1	5	3	4	3	1	5	3	4
Status	1459.0	0.984	3	2	5	3	4	3	1	5	3	4

Submissive women (Sub) compared with men without these sexual preferences (No), tested by Mann-Whitney U test.

Tab. S3. Number of offspring in men aged 25–34 years.

	U	p-value	Group No n=79					Group Sub n=33				
			Median	Min	Max	Q ₁	Q ₃	Median	Min	Max	Q ₁	Q ₃
Children	1245.0	0.689	1	0	3	0	2	1	0	3	0	2
Sons	1231.5	0.588	0	0	3	0	1	0	0	3	0	1
Daughters	1279.5	0.846	0	0	2	0	1	0	0	2	0	1

Dominant men (Dom) compared with men without these sexual preferences (No), tested by Mann-Whitney U test. Analyzed variables: number of all children, number of sons, and number of daughters.

Tab. S4. Number of offspring in women aged 25–34 years.

	U	p-value	Group No n=65					Group Sub n=41				
			Median	Min	Max	Q ₁	Q ₃	Median	Min	Max	Q ₁	Q ₃
Children	1211.0	0.399	1	0	2	0	2	1	0	2	0	1.5
Sons	1196.0	0.299	0	0	2	0	1	0	0	2	0	1
Daughters	1298.5	0.790	0	0	2	0	1	0	0	2	0	1

Submissive women (Sub) compared with women without these sexual preferences (No), tested by Mann-Whitney U test. Analyzed variables: number of all children, number of sons, and number of daughters.