

Why do some women prefer submissive men? Hierarchically disparate couples reach higher reproductive success in European urban humans

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Abstract

OBJECTIVES: Equality between partners is considering a feature of the functional partnerships in westernized societies. However, the evolutionary consequences of how in-pair hierarchy influences reproduction are less known. Attraction of some high-ranking women towards low-ranking men represents a puzzle.

METHODS: Young urban adults (120 men, 171 women) filled out a questionnaire focused on their sexual preference for higher or lower ranking partners, their future in-pair hierarchy, and hierarchy between their parents.

RESULTS: Human pairs with a hierarchic disparity between partners conceive more offspring than pairs of equally-ranking individuals, who, in turn, conceive more offspring than pairs of two dominating partners. Importantly, the higher reproductive success of hierarchically disparate pairs holds, regardless of which sex, male or female, is the dominant one. In addition, the subjects preferring hierarchy disparity in partnerships were with greater probability sexually aroused by such disparity, suggesting that both the partnership preference and the triggers of sexual arousal may reflect a mating strategy.

CONCLUSION: These results challenge the frequently held belief in within-pair equality as a trademark of functional partnerships. It rather appears that existence of some disparity improves within-pair cohesion, facilitating both cooperation between partners and improving the pairs' ability to face societal challenges. The parallel existence of submissivity-dominance hierarchies within human sexes allows for the parallel existence of alternative reproductive strategies, and may form a background for the diversity of mating systems observed in human societies. Arousal of overemphasized dominance/submissiveness may explain sadomasochistic sex, still little understood from the evolutionary psychology point of view.

Abbreviations:

BDSM - so called "somasochistic sex" includes S/M (sadism and masochism, involvement of strong physical stimuli)

D/S sex - dominance and submissivity in sex – the emphasis is on manifestation of hierarchical disparity between partners, strong physical stimuli are not necessary

Bondage - the use of physically-restraining devices or materials that have sexual significance for at least one partner

INTRODUCTION

Although the existence of hierarchy between the male and the female in pairs of socially living mammals is a well known fact, the existence of hierarchy between partners is often neglected in humans. Whereas many studies on human reproduction have focused on the hierarchical rank of an individual in the society (social hierarchy) (Hopcroft 2006; Klindworth & Volland 1995; Mealey & Mackey 1990), less is known about the influence of within-couple hierarchical rank (within-pair hierarchy) on human reproduction, and about the role of sexual arousal by higher- or lower-ranking partner (sexual hierarchy).

Firstly, we focus on the advantages and disadvantages of mating with a partner that ranks lower or higher in social hierarchy, assuming that the within-pair hierarchy of a subject is related to his/her social hierarchy rank. If a lower-ranking individual couples with a higher-ranking individual, the lower-ranker increases the fitness of her/his progeny by acquiring the “good genes” of the higher-ranker (Gangestad *et al.* 2004; Simmons *et al.* 2004), as well as the resources the higher-ranker provides (Laurens *et al.* 2009; Vanpe *et al.* 2009). Importantly, it is advantageous for *both* lower-ranking female and male to couple with a higher-ranker of the opposite sex.

On the other hand, the preference for lower-ranking partner(s) should, according to this standard view, apply only for high-ranking males in polygynous mating systems. Given that the polygynous male maximizes his reproductive output via mating with multiple partners, he should mate with as many females as possible, including lower-ranking ones. What this standard view fails to explain is the preference of higher-ranking females for lower-ranking males. In a study targeting the general population, 20.5% of women and 36.6% of men preferred a dominant partner, and 13.8% of men and 20.5% of women preferred a submissive partner (Jozifkova & Flegr 2006). Women preferring submissive men risk both evolutionarily, if their offspring partially inherit the presumed lower fitness of lower-ranking men, and culturally, if parental status partially passes to the offspring, so that the children acquire the lower status of their fathers.

It is not easy to find mammalian models for preferential pairing with subordinate males. One example may be the red deer *Cervus elaphus*, in which females paired with subordinated males conceive fawns that are heavier at birth (both genders) and male more likely than the offspring of dominant males (Bartos *et al.* 2008). Presumably, the male fawns inherit the superior traits from their mothers, who selected their mates according to other qualities than those associated with hierarchical rank.

The sex of the offspring is crucial in this respect. In polygynous mammals, a high-quality (i.e., potentially high-ranking) male can produce considerably more

offspring than a high-quality female, because female lifetime fecundity is limited by the necessities of gestation and lactation (Trivers & Willard 1973). Had a similar strategy applied to humans – i.e., had high-ranking women selected males according to other qualities than low-ranking women – such women would conceive sons with a greater probability than low-ranking women.

However, a substantial part of the human population lives in (serial) monogamy (Dupanloup *et al.* 2003; Maddern 2007), with both parents investing energy in their offspring. In the prairie vole *Microtus ochrogaster*, a popular model of mammalian monogamy and human attachment, some individuals form monogamous pairs, whereas some do not (Ophir *et al.* 2008). Paired prairie voles have greater breeding success than single voles (Ophir *et al.* 2008). Cohabitation with a female, and caring for pups, have costs for male prairie voles, detectable as a significant loss of subcutaneous (inguinal) fat (Campbell *et al.* 2009). In the social vole *Microtus socialis guentheri*, the male forces its female partner to stay in the nest with the pups (Libhaber & Eilam 2002).

Within-pair cooperation increases the reproduction success of monogamous pairs (Saraux *et al.* 2011; Schuett *et al.* 2011; St-Pierre *et al.* 2009). Although both pair members share a common goal, however, the competition at the individual or gene level does not disappear (Manning & Dawkins 2009). Conflicts of interest may appear even in paired subjects. If the two individuals rank at a similar degree, even minor conflicts may escalate due to social competition (for more see Dunbar & Abra 2010; Haas & Gregory 2005). On the other hand, hierarchy disparity may reduce the frequency and intensity of conflicts.

It therefore can be expected that hierarchy itself facilitates cooperation. If so, the existence of hierarchical difference within a couple should increase the number of offspring, independently of which sex assumes the superior position. If a similar situation (herein “vole strategy”) applies to humans, both the within-pair lower- and higher-ranking women could invest more energy into reproduction, compared to women in non-hierarchical couples.

Two testable predictions can be derived when considering within-pair hierarchy. In the case of the “deer strategy”, women coupled with lower-ranking men should conceive sons more often than women coupled with higher-ranking men. In case of the “vole strategy”, couples with either higher-ranking woman or higher-ranking man should conceive more offspring than couples formed by equally ranking partners. Given that cooperation between higher- and lower-ranking partners represents a successful strategy, individuals preferring within-pair hierarchic disparity should exhibit sexual arousal by lower- or higher-ranking partner, because a preference for sexual hierarchy facilitates pairing with the appropriate partner.

In this study, we analyzed the connection between sexual arousal by hierarchical disparity (sexual hierar-

chy), hierarchic disparity in partnership (within-pair hierarchy), and the number of offspring and their sex ratio, using a questionnaire approach on young human adults. We demonstrate that independently of the subject's sex, the arousal by hierarchical disparity is associated with expectation of hierarchical disparity in future partnership, and that descendants of hierarchically disparate couples indeed have more siblings. Furthermore, we analyzed indices of a hereditary component in this partnership preference.

MATERIALS AND METHODS

Participants

The participants were 340 (157 men, 183 women) high school students aged 18–20 (18: n=222, 19: n=112, 20: n=6) from a capital city, Prague. The sample included schools specialized for future careers in medicine, technical fields and science, attended mostly by students from the educated middle class (although Czech society exhibits relatively mild class divisions), and Caucasian ethnicity. The targeted group thus represents a homogeneous population of European young urban adults, who had already attained their first experiences with sex, but have not met their lifelong partners yet, and whose partnership preferences were not

yet biased by experiences of later adult life. We assumed that they were already aware of their sexual preferences, and were able to imagine their future partnership. We also assumed that they were able to assess their parents' within-pair hierarchy.

The students were asked to voluntarily participate in a human behavior research study and were instructed to feel free to terminate their participation in the study. In case they did not want to answer a particular question, they were instructed to skip it rather than provide false information. They signed an informed consent form. The data were collected anonymously. The recruitment of the study subjects and data handling practices complied with Czech legal provisions and was approved by the IRB Faculty of Science, Charles University, Prague. The questionnaires were collected in the autumn and winter of 2004/2005.

Questionnaire

The respondents completed an original questionnaire containing eight questions related to the respondents' dominance/submissiveness to his/her friends, to his/her partner (preferred within-pair hierarchy), their sexual preference (sexual hierarchy) and hierarchy between parents of the respondents (parents' within-pair hierarchy) (Table 1). The respondents scored the

Tab. 1. Questionnaire used and definition of the scoring the answers.

No	Abbrev	Question
1	Higher partner	For male respondents: When watching a movie or reading a book I would be excited by a situation in which a (male) partner would be behaving equally to his (female) partner rather than a lower-ranking one. equally ▶ 1 2 3 4 5 6 7 ◀ lower-ranking For female respondents: When watching a movie or reading a book I would be excited with a situation in which a (female) partner would be behaving equally to her (male) partner rather than lower-ranking one equally ▶ 1 2 3 4 5 6 7 ◀ lower-ranking
2	Lower partner	For male respondents: When watching a movie or reading a book I would be excited with a situation in which a (male) partner would be behaving equally to his (female) partner rather than higher-ranking one equally ▶ 1 2 3 4 5 6 7 ◀ higher-ranking For female respondents: When watching a movie or reading a book I would be excited with a situation in which a (female) partner would be behaving equally to her (male) partner rather than lower-ranking one equally ▶ 1 2 3 4 5 6 7 ◀ higher-ranking
3	Father never sub	My father submits to my mother every day ▶ 1 2 3 4 5 6 7 ◀ never
4	Mother never sub	My mother submits to my father every day ▶ 1 2 3 4 5 6 7 ◀ never
5	Relation-ship	My future relationship will be based on equality between the partners ▶ 1 2 3 4 5 6 7 ◀ one of the partners will be subordinate
6	Me not sub	In my future relationship, I will have to submit to my partner's demands definitely yes ▶ 1 2 3 4 5 6 7 ◀ definitely no
7	Partner not sub	In my future relationship, my partner will submit to my demands definitely yes ▶ 1 2 3 4 5 6 7 ◀ definitely no
8	Preferred partner	If I were to select from two potential partners, I would prefer a person who would guide me and protect me ▶ 1 2 3 4 5 6 7 ◀ admire me and serve me
9	Dating behaviour	I behave toward somebody whom I would wish to date submissively (as a lower ranking persona) ▶ 1 2 3 4 5 6 7 ◀ dominantly (as a higher ranking persona)

questions on the scale ranging from 1 to 7. An additional control question (“State, in percentage, how truthful your answers were?”) was included at the end of the questionnaire.

Questions 1–2 targeted the subject’s sexual preference (*sexual hierarchy*), questions 3–4 the hierarchy between subject’s parents (*parents’ within-pair hierarchy*), and questions 5–9 the subject’s preferred partnership dynamics (*preferred within-pair hierarchy*).

For the subject’s parents’ within-pair hierarchy, couples with the mother submitting to the father more frequently were subsequently classified as “maledom”, the opposite case was “femdom”. For some analyses, the groups “maledom” and “femdom” were merged into group “hierarchy”. If the answers were 4 and 4, the parents were marked as “equal”. The couples consisting of both partners marked above 4 were classified as “bothdom”, those with both partners marked below 4 as “bothsub”. For investigating indices of heredity, value *Parental disparity* was recalculated as absolute value of difference between question 3 and question 4.

Respondents admitting that they cheated in more than twenty-five percent of the answers (n=33) were excluded from the analysis.

Statistics

The data obtained from questionnaires were analyzed separately for males and females, using SPSS version 16.

Nonparametric statistics were applied because of the ranked character of the data. We tested the difference between types of parental couples in numbers of offspring, and numbers of sons, using the Kruskal-Wallis test, and compared the pairs of parental couple types using the Mann-Whitney U-test. Spearman’s *r* was used to study correlations between sexual hierarchy and future within-pair hierarchy to verify the existence of mating strategy and for possible correlation between *sexual hierarchy* preferences, *parents’ within-pair hierarchy* and subject’s *preferred within-pair hierarchy*.

RESULTS

The males did not differ from females in the frequencies of reported couple types ($\chi^2=2.8$, $df=4$, $p<0.59$). The females and males did not differ in numbers of reported maledom and femdom couples ($\chi^2=1.1$, $df=1$, $p<0.30$). The number of hierarchic disparity couples exceeded the number of couples with partners ranking at the same level (Table 2).

Very few respondents reported parental couples consisting of both submissive partners, and we did not include these couples into analyses.

In both sexes, the sexual arousal by lower-ranking partner increased with sexual arousal by higher-ranking partner (Table 3). Respondents of both sexes sexually aroused by lower-ranking and higher-ranking

Tab. 2. Division of parental couples reported by high-school students questioned for their parental couples hierarchy.

Offspring gender	PARENTAL COUPLES				
	Hierarchically disparate couples		Partners ranking on the same degree		
	Maledom	Femdom	Equal	Bothdom	Both sub
Males	44	26	30	15	3
Females	55	42	42	22	2

Tab. 3. Spearman’s correlation matrix among questions tracking relationships between sexual preferences of high school students, their future relationship dynamics, and relationship hierarchy of their parents. See table 1 for complete questions.

Spearman’s <i>r</i>		Q. 1 Higher partner	Q. 2 Lower partner	Q. 5 Relationship	Q. 6 Me not sub	Q. 7 Partner not sub	Q. 8 Preferred partner	Q. 9 Dating behaviour
Q. 1 Higher partner	M	1.000	0.392**	0.189*	-0.071	0.020	0.082	-0.059
	F	1.000	0.417**	0.277**	-0.059	0.103	0.059	-0.184*
Q. 2 Lower partner	M	0.392**	1.000	0.215*	0.130	-0.314**	0.219*	-0.095
	F	0.417**	1.000	0.203**	0.085	-0.042	0.155*	-0.058
Q. 3 Father never sub	M	-0.049	-0.148	-0.039	0.024	0.057	-0.192*	0.010
	F	-0.075	-0.175*	-0.069	0.019	0.023	0.024	0.023
Q. 4 Mother never sub	M	-0.015	0.099	-0.134	0.203*	0.073	0.033	-0.042
	F	-0.037	-0.002	-0.006	0.088	0.069	-0.054	0.042
Parental disparity	M	-0.004	-0.003	0.127	-0.022	0.002	0.038	0.002
	F	0.178*	-0.067	0.056	0.082	0.153	0.064	-0.075

M – males, F – females. ** Correlation is significant at the 0.01 level (2-tailed). *Correlation is significant at the 0.05 level (2-tailed).

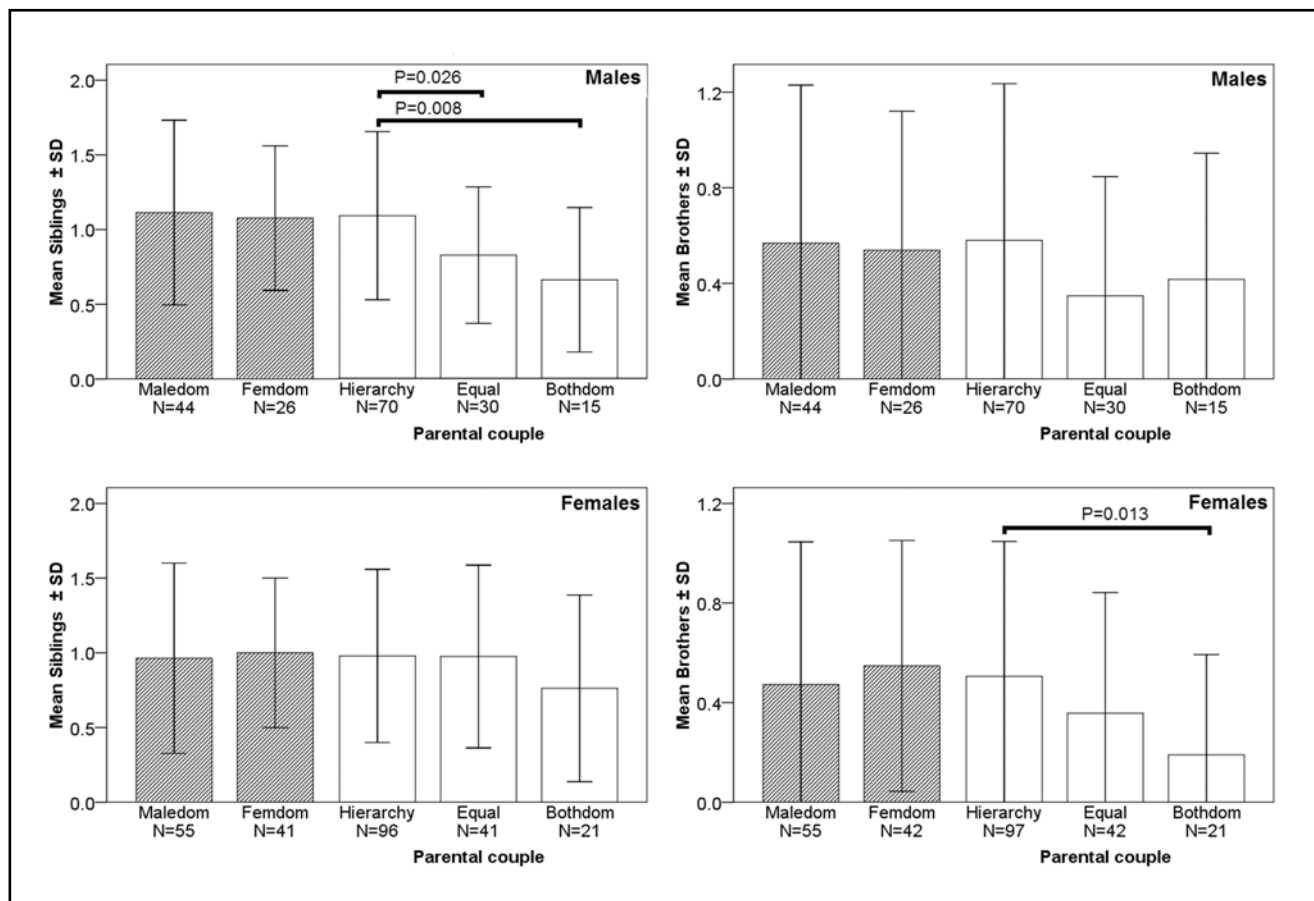


Fig. 1. Numbers of offspring (left column) and brothers (right column) of questioned male and female high school students reporting differing within-pair hierarchies in their parents. Means \pm standard deviations, plus significance levels of Mann-Whitney post-hoc tests, are shown. Students reporting different parental categories differed in numbers of siblings in males ($\chi^2=10.13$, $p=0.006$), but not females ($\chi^2=2.45$, $p=0.294$), and in numbers of brothers in females ($\chi^2=7.10$, $p=0.029$), but not males ($\chi^2=2.76$, $p=0.250$) (Kruskal-Wallis tests with 2 d.f.). Maledom – parental couples with dominant father, Femdom – parental couples with dominant mother, Hierarchy – parental couples with either of the two parents dominant, Equal – couples without distinct hierarchy, Bothdom – both parents showing dominant characteristics.

partner expected one partner to be subordinate in their future relationships (question 5 in Table 1) (Table 3). The descendants of maledom and femdom couples did not differ in numbers of siblings and numbers of brothers (Figure 1).

In contrast, descendants of hierarchy parents had more siblings if males and more brothers if females (Figure 1). More specifically, the sons of hierarchy parents had more siblings than sons of equal and bothdom parents, whereas daughters of hierarchy parents had more brothers than daughters of bothdom parents.

Regarding indices of heredity, daughters of hierarchy parents were more aroused by a dominant partner than daughters of bothdom parents (Table 4). Finally, the offspring partner hierarchy questions (questions 6–9 in Table 1) correlated more closely with questions focused on sexual arousal than with questions focused on parent couple hierarchy (Spearman's r ranges: 0.219–0.314 vs. 0.192–0.203 in males, and 0.155–0.184 vs. no correlation in females).

DISCUSSION

We found that descendants of hierarchically disparate parental couples had more siblings and brothers than descendants of equal-ranked and both-dominant couples. This indication of increased reproductive success in hierarchically disparate couples applied regardless of sex of the higher-ranking partner; i.e., even in couples with a man submitting to a woman. In contrast, couples composed of two individuals dominating at the same level displayed the lowest reproductive success, and couples composed of two individuals subordinating to each other were extremely rare. Sexual arousal by hierarchy disparity (sexual hierarchy) correlated with a preference for within-pair hierarchy in presumed future relationships of the respondents, and these correlations were closer than the correlation between presumed future couple hierarchy and hierarchy in their parents. A final intriguing finding applied to female respondents only: daughters of hierarchically dispa-

Tab.4. Comparing numbers of siblings and numbers of respondents' brothers in parental couples differing in relationship hierarchy dynamics. The Kruskal Wallis test used to test for differences among hierarchical, equal and bothdom couples, the Mann-Whitney U-test was used for paired comparison.

Test results		Kruskal Wallis test (df=2)				Mann-Whitney test					
		Maledom × Femdom		Hierarchy × Equal		Hierarchy × Bothdom		Equal × Bothdom		U	p-value
		χ^2	p-value	U	p-value	U	p-value	U	p-value		
Q. 1 Higher partner	M	0.94	0.626	511	0.765	916	0.640	444	0.456	182.5	0.355
	F	9.00	0.011	1142.5	0.926	1687.5	0.147	589	0.004	309.5	0.094
Q. 2 Lower partner	M	0.13	0.938	416.5	0.095	994.5	0.841	482.5	0.74	218	0.862
	F	1.50	0.472	1039.5	0.465	1882.5	0.674	821.5	0.286	339.5	0.252

Number, mean, SD		Maledom			Femdom			Hierarchy			Equal			Bothdom		
		N	m	SD	N	m	SD	N	m	SD	N	m	SD	N	m	SD
Q. 1 Higher partner	M	41	2.27	1.58	26	2.08	1.41	67	2.19	1.51	29	2.38	1.57	15	1.93	1.44
	F	55	2.95	1.96	42	2.83	1.83	97	2.90	1.90	41	2.40	1.67	20	1.70	1.38
Q. 2 Lower partner	M	42	2.71	1.78	26	3.50	1.94	68	3.01	1.87	30	2.93	1.78	15	2.87	1.96
	F	54	2.19	1.36	42	2.43	1.59	96	2.29	1.46	41	2.46	1.63	20	2.05	1.67

M – males, F – females.

rate parents reported sexual arousal by dominant male partners. It is important to note that these patterns were detected in a modern population, where contraception is widely used and the number of offspring in a family is consciously lowered to about two. It might be expected that the differences in pairs' reproductive success would be even stronger in societies not practicing family planning.

Our findings refute the deer hypothesis that couples with a higher-ranking female should have more sons. The fact that the numbers of sons were equal in male and female dominated couples leaves us with the vole hypothesis, stating that establishment of hierarchy itself facilitates cooperation, no matter which gender dominates in the pair. Importantly, the reproductive success of hierarchically disparate couples applied not only to couples with dominant male, which would be predicted by most evolutionary theories of human mating systems (Fieder *et al.* 2005; Mealey 1985), but also to couples with dominant female. Smooth within-couple cooperation appears as more important than the gender of the higher-ranking individual.

The similar reproductive success of dominant-female and dominant-male couples suggests that the reproductively successful preference for higher-ranking or lower-ranking partner is not exclusively bound to a single sex. The existence of this strategy provides a single explanation for the existence of females preferring submissive males and males preferring submissive females, as well as the existence of females preferring dominant males, and males preferring dominant females. Easier cooperation offers an ultimate explanation of the phenomenon, based on the reproductive output of individuals, and hence has evolutionary significance.

Sexual arousal by hierarchy disparity (sexual hierarchy) correlated with a preference for within-pair hierarchy in presumed future relationships. Thus, sexual arousal by hierarchical disparity facilitates pairing with the appropriate partner, allowing the evolutionarily successful reproduction strategy to materialize.

Intriguingly, the role of arousal by a hierarchical disparity in human reproduction may elucidate the frequent preference for overemphasized hierarchy disparity during sex (dominance and submissivity in sex (D/s) is a fraction or a sub-form of sadomasochistic interactions (Hoff 2006; Kolmes *et al.* 2006)). This preference appears to be quite widespread, given that in countries such as the USA, 8–10% of homes own sadomasochistic sex equipment (Janus & Janus 1993). A passive interest in sexual hierarchy must be even more common, which is apparent from the thriving industry of specialized magazines, porn products, and internet resources. Our findings support the suggestion that the arousal by a hierarchical disparity represents a reproductive strategy, and the arousal by overemphasized hierarchy (i.e., BDSM) is just an overemphasized manifestation of this strategy (Jozifkova & Konvicka 2009).

Attempting to detect indices of heredity, we found that daughters of hierarchically disparate parents (independently of dominant sex) inclined towards sexual arousal by higher-ranking males. No such pattern applied to sons. Further research is necessary in this area. The expectation of hierarchy disparity in a future relationship correlated with sexual arousal by a hierarchically disparate partner more closely than with parental couple hierarchy. Although correlation is not a sign of causation, the relative strengths of the two pairs of correlations minimally suggests that the relationship

expectations might contain a hereditary component, rather than just emulating parental relationships. This finding is in accordance with studies of practitioners of sadomasochistic sex, reporting that the practitioners were not victims of abuse and were often socially well-adjusted (Sandnabba *et al.* 2002; Richters *et al.* 2008).

We understand that relying on the respondents to report parental hierarchy ranks could have serious shortfalls. Children from larger families may be more aware of their ranks, because they experience the hierarchic order when competing with their siblings. Single children, in contrast, may not answer such a question reliably, because a family consisting of “mother, father and me” may not be viewed as a hierarchic unit.

Respondents who were aroused by lower-ranking partner were aroused by a higher-ranking partner too. This puzzling indication of a simultaneous arousal by lower-ranking and higher-ranking partner agrees with our previous findings on university students (Jozifkova & Konvicka 2009). Although the males were more aroused by higher-ranking females and females by higher-ranking males in this study, a positive correlation was evident (Table 3). This might be interpreted in several ways. First, the respondents may be attracted to hierarchically disparate partners, but unconscious of their specific preference for dominating or being dominated. Their young age might be a factor: 42% of Finnish SM sex practitioners were not aware of their orientation before the age of twenty (Sandnabba *et al.* 1999). Alternatively, a portion of the respondents may be sexually aroused just by hierarchic disparity. And/or a portion of the subjects may be predisposed for both preferences, or for conditional flexibility, choosing a partner advantageous for them in their specific life situation. A large portion of SM sex practitioners called “switches” are attracted by both sadism and masochism, or both dominance and submissivity (Cross & Matheson 2006; Sandnabba *et al.* 1999). The correlation between “Arousal by a higher-ranking partner” and “Arousal by a lower-ranking partner” may reflect the reality.

Human mating systems range from polygyny through monogamy to polyandry. What is more, the existence of matriarchal populations has been documented (Osborne 1998; Wen *et al.* 2004; Yang *et al.* 2004), although matriarchy is rare in humans. The findings obtained from a monogamous population allow suggesting that the connection between reproductive success and within-couple hierarchy may allow human mating systems plasticity under varying environmental and social conditions.

Too often, mental health specialists view even mild dominance and submissivity as pathology. Although outsized hierarchical disparity is typical for domestic violence (Straus 2008), a mild within-pair disparity does not imply nor incur violence *per se*. As our results suggest, it may represent an important mechanism maintaining within-couple cohesion and cooperation.

In this light, both excessive pressures towards equality in some modern societies, and pressures towards male dominance in some traditional societies, represent a form of oppression.

From the point of view of reproductive success, answering the question why some women are aroused by submissive men is easy. Hierarchy disparity within couples allows the parents to invest more energy into their offspring, presumably by increased cooperation and/or conflict reduction, irrespective of which gender assumes the dominant role. A preference for the disparity seems to be inborn/instinctive rather than learned, which is documented by the fact that the nature of sexual arousal (by partner’s dominance and/or submissivity) is connected with the presumed hierarchy within future relationships. These parallel hierarchies within human sexes, plus the diversity of social and ecological conditions in which humans live, then produce the diversity of mating systems existing in humans.

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