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Sex-specific relationship between digit ratio (2D:4D) and romantic jealousy

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Abstract

The ratio of index finger length to ring finger length (2D:4D) is an index of prenatal androgen exposure. In a study with 71 female and 52 male undergraduate students, we assessed the relationship between 2D:4D and jealousy with respect to various dimensions of rival characteristics. Following the presentation of a jealousy-evoking scenario, participants rated the extent to which they would feel jealous if the rival possessed various characteristics (some which have been found to be more jealousy evoking for men, others which have been found to be more jealousy evoking for women). Men with higher, more feminine 2D:4D reacted more jealously toward socially dominant rivals. Women with lower, more masculine 2D:4D reacted more jealously toward physically attractive rivals. These results show that the level of prenatal testosterone affects which rival characteristics elicit the highest level of jealousy, and differently for men and women.

Keywords: androgens; 2D:4D; digit ratio; jealousy; sex differences; sex hormones; testosterone

1. Introduction

The second-to-fourth-digit ratio (2D:4D) is lower among men than women, which is presumed to be the result of differences in prenatal testosterone exposure (Manning, 2002). Strong evidence for the link between higher embryonic exposure to androgens and lower 2D:4D comes from a recent study of dizygotic twins showing that 2D:4D is more masculinized among females with a male twin than among females with a female twin (van Anders, Vernon, & Wilbur, 2006). There is also experimental evidence that injecting testosterone into eggs leads to changes in digit ratio in the ring-necked pheasant (Romano, Rubolini, Martinelli, Alquati, & Saino, 2005).

Within each sex, 2D:4D has been found to be associated with a variety of physical and psychological characteristics. For example, men with lower 2D:4D are more aggressive, more athletic, less feminine (on the Bem Sex Role Inventory), and more musically talented (Bailey & Hurd, 2005; Manning & Taylor, 2001; Rammsayer & Troche, 2007; Sluming & Manning, 2000). Women with lower 2D:4D have higher waist-to-hip ratio, are more masculine (on the Bem Sex Role Inventory), and are more athletic (Csathó et al., 2003; Manning et al., 2000; Pokrywka, Rachon, Suchecka-Rachon, & Bitel, 2005). Among both men and women, 2D:4D is correlated positively with verbal intelligence and agreeableness, and negatively with numerical intelligence and physical fitness (Hönekopp, Voracek, & Manning, 2006; Luxen & Buunk, 2005).

The present research examined the relationship between 2D:4D and romantic jealousy. Jealousy is thought to be an evolved psychological response with distinct differences between men and women (Buss, 2000). Feelings of jealousy are evoked partly through a process of social comparison in which jealous individuals compare their own characteristics with those of the rival—when the rival is believed to surpass them on these characteristics, the rival is likely to be perceived as a threat to the relationship and therefore evoke feelings of jealousy (Buunk, Dijkstra, & Massar, 2007; DeSteno & Salovey, 1996). Because men and women value different

characteristics in a mate, they may pay attention to different characteristics in a rival. Cross-cultural studies on mate preferences have shown that women (more than men) prefer mates with high social status and dominance, which is presumably an evolved preference for men who can provide them and their children with resources. In contrast, men (more than women) prefer mates who are high in physical attractiveness, which may serve as an important cue to a woman's health and fertility (Buss, 1994). Paralleling sex differences in mate preferences, males respond more jealously to a rival with status- and dominance-related characteristics, whereas females respond more jealously to a rival who is physically attractive (e.g., Buss, Shackelford, Choe, Buunk, & Dijkstra, 2000; Dijkstra & Buunk, 2002).

Because women desire status- and dominance-related (typically "masculine") features in a mate, these features observed in a rival are likely to evoke a particularly high level of jealousy among less masculine men. Likewise, because men desire physically attractive (typically "feminine") features in a mate, these features observed in a rival are likely to evoke a particularly high level of jealousy among less feminine women.

Assessment of 2D:4D offers an unobtrusive means of examining the relationship between masculinity/femininity and jealousy, as individuals are not likely to be aware of their own digit ratio. The present study tested the following hypotheses: (1) The higher (i.e., less masculine) their 2D:4D, the more jealously men will respond to a rival with masculine features such as those related with social status, physical dominance, and social dominance; and (2) the lower (i.e., less feminine) their 2D:4D, the more jealously women will respond to a rival with feminine features such as those related with physical attractiveness.

2. Method

2.1. Participants

Seventy-one female (mean age = 21.62, *SD* = 2.13) and 52 male (mean age = 21.98, *SD* = 2.28) heterosexual students at the University of Groningen participated in exchange for €5.

2.2. Procedure

Participants were presented with a jealousy-evoking scenario that has been used in a series of previous studies (e.g., Buunk & Dijkstra, 2001; Dijkstra & Buunk, 1998, 2002; see Appendix) and were asked to indicate their level of jealousy if the rival possessed one of several characteristics. For each characteristic, participants provided their response on a 5-point scale (*1 = not jealous at all*, *5 = very jealous*). Following Dijkstra and Buunk (2002), mean jealousy scores were calculated for five dimensions of rival characteristics: *social dominance* (17 items; Cronbach's α = .93; e.g., is more charismatic, is more self-confidence, has more ascendance, is a better talker, is more popular), *physical attractiveness* (8 items; α = .93; e.g., is more slender, has a better figure, has a more attractive body), *seductive behaviors* (7 items; α = .80; e.g., dresses more revealingly, behaves more provocatively, is more of a seducer), *physical dominance* (8 items; α = .82; e.g., is more muscular, is more athletic, has a heavier build), and *social status* (4 items; α = .77; e.g., has a better job, has more money, has a better education).

A Hewlett Packard 4670 VP see-through scanner (resolution 300 DPI) was used to acquire digital images of both hands. The digits were then measured with the measurement tool in Adobe Photoshop CS to the nearest 0.1 mm. 2D:4D was calculated by dividing the length of the second digit by the length of the fourth digit. To assess the reliability of the measurements, 24 pairs of left and right hands were measured twice. Finger measurements were highly reliable across the two measurements (all *r*s[22] > .99, all *p*s < .01).

3. Results

Right and left 2D:4D were highly correlated, (r[121] = .72, p < .01). Consistent with previous reports, the mean male 2D:4D was lower than the mean female 2D:4D (t[121] = 2.49, p = .014, d = .46; M_{male} = .96, SD_{male} = .028, M_{female} = .98, SD_{female} = .028).

Table 1 reports mean levels of jealousy in response to the five dimensions of rival characteristics, as well as tests of sex differences. Compared with women, men tended to be more jealous of physically dominant rivals; compared with men, women tended to be more jealous of physically attractive rivals, results which are fairly consistent with previous reports (e.g., Dijkstra & Buunk, 2002).

Insert Table 1 here

Table 2 reports the correlations between 2D:4D and jealousy in response to each of the five rival characteristic dimensions. Men with higher 2D:4D were especially jealous of socially dominant rivals (left hand: r[50] = .28, p < .05; right hand: r[50] = .35, p < .05), and women with lower 2D:4D were especially jealous of physically attractive rivals (left hand: r[69] = .25, p < .05; right hand: r[69] = -.32, p < .01). Unexpectedly, women with lower right-hand 2D:4D were more jealous of physically dominant rivals (r[69] = -.24, p < .05).

Insert Table 2 here

It is somewhat surprising that 2D:4D did not predict jealousy in response to a physically dominant rival, especially since jealousy ratings toward socially dominant and physically dominant rivals were highly correlated (r[50] = .59, p < .01).

4. Discussion

This study examined sex differences in the relationship between 2D:4D and jealousy in response to different rival characteristics. In partial agreement with the first hypothesis, men with

higher, more feminine 2D:4D were more jealous of socially dominant rivals; in line with the second hypothesis, women with lower, more masculine 2D:4D were more jealous of physically attractive rivals. These effects were observed for both hands. We also found that women with lower right-hand 2D:4D were more jealous of physically dominant rivals. Although we have no clear explanation for this latter finding, the trend toward negative correlations between 2D:4D and jealousy among women across all rival characteristics suggests that the effect might not be exclusive to physical attractiveness.

Less easy to explain is the patterns of results among men. Rivals high in social status and physical dominance did not evoke more jealousy among men with higher 2D:4D. The finding that jealousy in response to the social status of the rival was not related to 2D:4D may be explained by the fact that high social status (e.g., more education, more money) might be achieved by men regardless of prenatal androgen exposure. It is more surprising that 2D:4D did not predict jealousy for physically dominant rivals, as prenatal testosterone exposure is expected to exert direct effects on body size and muscular development. One speculation is that although low 2D:4D is associated with physical fitness (e.g., Hönekopff, Manning & Müller, 2006), it is also associated with features such as musical ability, numerical intelligence, and cooperative behavior (e.g., Luxen & Buunk, 2005; Millet & DeWitte, 2006; Sluming & Manning, 2000)—characteristics that may be more directly associated with social rather than physical dominance. Indeed, it has been noted that the adaptive consequences of male masculinity may manifest through socially mediated behaviors, rather than simply through physical characteristics (Gangestad & Thornhill, 2007). The results shown in Table 1 do show that men's jealousy was aroused most strongly by socially dominant rivals (and the least strongly by physically dominant rivals). Nevertheless, future research must examine more directly how 2D:4D is related to various types of dominance. Although there is evidence that men with lower 2D:4D are perceived to be

more dominant and masculine (Neave, Laing, Fink, & Manning, 2003), there is no unequivocal evidence that lower 2D:4D is associated with more socially dominant behaviors.

Despite the limitations, our results suggest that the level of prenatal testosterone predicts in part which rival characteristics are especially likely to evoke jealousy among men and women. These findings corroborate previous research indicating that 2D:4D serves as a useful physical correlate of functional individual differences. The findings also indicate that jealousy is not an invariant response, but is flexibly engaged in a predictable manner, depending on one's sex and characteristics relevant to one's mate value. Future research should investigate which psychological variables—such as sex role identity—may mediate the effects of 2D:4D on jealousy and on other psychological phenomena within the realm of romantic and interpersonal relationships. It would also be useful to examine more complex effects involving 2D:4D. For instance, 2D:4D may moderate other sex differences in patterns of jealousy (e.g., the degree to which men and women are more upset by sexual or emotional infidelity of the partner). Or it may moderate the degree to which individuals engage in mate guarding tactics in specific social situations.

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Table 1

Jealousy in Response to Distinct Rival Characteristics Among Men and Women, and Tests of Sex

Differences

Dimension of Rival Characteristics	Men ($n = 52$)	Women ($n = 71$)	t	p	d
Social Dominance	2.97 (.87)	3.22 (.77)	-1.64	.10	.30
Physical Attractiveness	1.93 (.56)	2.95 (1.06)	-6.86	.01	1.19
Seductive Behavior	1.87 (.73)	2.11 (.83)	-1.68	.10	.31
Physical Dominance	1.80 (.76)	1.46 (.47)	2.85	.01	.54
Social Status	1.99 (.88)	1.96 (.75)	.19	.85	.03

Note. Values in parentheses are *SD*s.

Table 2

Correlations Between Left- and Right-Hand 2D:4D and Jealousy With Respect to Different Dimensions of Rival Characteristics Among Men and Women, and tests of Sex Differences in the Correlations (Fisher's z test)

	2D:4D				Sex Differences	
	Men ($n = 52$)		Women ($n = 71$)		z	z
	Left	Right	Left	Right	Left	Right
Social Dominance	.28*	.35*	-.08	-.14	1.93†	2.66*
Physical Attractiveness	.12	.19	-.25*	-.32*	1.98*	2.74*
Seductive Behavior	.05	.13	-.06	-.11	.59	1.28
Physical Dominance	.08	.19	-.15	-.24*	1.23	2.29*
Social Status	-.04	-.07	-.17	-.16	.68	.51

Note. † $p < .10$, * $p < .05$ (two-tailed).

Appendix

Scenario used to assess jealousy-evoking nature of rival characteristics

"You are at a party with your girlfriend/boyfriend and you are talking with some of your friends. You notice your girlfriend/boyfriend across the room talking to a man/woman you do not know. You can see from his/her face that he/she is very interested in your girlfriend/boyfriend. He/She is listening closely to what she/he is saying and you notice that he/she casually touches her/his hand. You notice that he/she is flirting with her/him. After a minute, your girlfriend/boyfriend also begins to act flirtatiously. You can tell from the way she/he is looking at him/her that she/he likes him/her a great deal. They seem completely absorbed in each other."

Participants were then asked, "When my partner and the man/woman flirt with each other, I would feel particularly jealous if that other man/woman is," which was followed by 1 of 56 characteristics (e.g., "is more charismatic," "has a better figure," "has more money"). Each characteristic was rated on a 5-point scale (*1 = not jealous at all, 5 = very jealous*).