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Original Article

Sexual Dimorphism in Stature (SDS), Jealousy and Mate Retention

Gayle Brewer, School of Psychology, University of Central Lancashire, Preston, UK. Email: GBrewer@UCLan.ac.uk (Corresponding author).

Charlene Riley, School of Psychology, University of Central Lancashire, Preston, UK.

Abstract: Previous research has investigated the manner in which absolute height impacts on jealousy and mate retention. Although relative height is also important, little information exists about the potential influence of sexual dimorphism in stature (SDS) within established relationships. The current study investigated the relationship between SDS and the satisfaction, jealousy and mate retention behaviors reported by men and women. Heterosexual men (n = 98) and women (n = 102) completed a questionnaire. Men in high SDS relationships reported the lowest levels of cognitive and behavioral jealousy, although the impact of SDS on relationship satisfaction was less clear. SDS was not associated with the overall use of mate retention strategies; SDS did however affect the use of three specific strategies (vigilance, monopolization of time, love and care). SDS did not affect women's relationship satisfaction, jealousy (cognitive, behavioral, or emotional) or the use of mate retention strategies (with the exception of resource display).

Keywords: SDS, height, jealousy, mate retention, relationship satisfaction

Introduction

Previous research has investigated the manner in which absolute height impacts on jealousy and mate retention. Although relative height is also important, little research has been conducted to explore the association between sexual dimorphism and these aspects of romantic relationships. We examine whether sexual dimorphism is associated with satisfaction, jealousy and mate retention behavior within established relationships.

Height, Mate Quality and Sexual Relationships

Male stature provides important information about the quality of a potential mate. For example, height provides an indication of both physical health and standard of living (Komlos and Baten, 1998; Persico, Postlewaite, and Silverman, 2004) and is related to established measures of genetic quality such as fluctuating asymmetry (Manning, 1995).

Furthermore, male stature is related to socioeconomic status and access to resources (Judge and Cable, 2004; Peck and Lundberg, 1995; Silventoinen, Lahelma, and Rahkonen, 1999), and tall men are perceived as more dominant and assertive than shorter men (Melamed, 1992). These findings indicate that height may signal the possession of both physical and non-physical qualities.

Compared to the amount of male oriented height research, minimal research has been conducted to explore the potential role of female height. Silventoinen et al. (1999) however report that both tall and short women are susceptible to illness when compared to those of medium height. For example, incidence of breast cancer has been related to female height (Brinton and Swanson, 1992; Palmer et al., 1995). These findings suggest that medium height women are advantaged compared to their tall or short rivals.

The association between height and the possession of valued characteristics has contributed to the relationship between height and desirability as a mate. In particular, height is associated with attractiveness (Courtiol, Raymond, Godelle, and Ferdy, 2010), the ability to attract a mate (Lynne and Shurgot, 1984), dating frequency (Shepperd and Strathman, 1989) and the attractiveness of the partner obtained (Feingold, 1982). Height may also impact on overall reproductive success, as tall men are less likely to be childless (Nettle, 2002) and report a greater number of children (Mueller and Mazur, 2001) than shorter men.

Jealousy and Mate Retention

The association between height, attractiveness and reproductive success suggests that height may also impact on emotions and behavior within established relationships. For both men and women in long term relationships, extra-pair relationships and desertion represent substantial threats to reproductive success. In this context, jealousy may serve a number of adaptive functions (Buss, 2000; Buunk, Massar, and Dijkstra, 2007). The elicitation of jealousy may identify individuals or situations that threaten the existence or exclusivity of the existing relationship. The identification of a threatening individual or situation may promote the use of mate retention behaviors intended to strengthen the pair bond or deter rivals (Buunk et al., 2007). This response (if elicited by an appropriate threat) may promote reproductive success by reducing the likelihood of extra-pair relationships or termination of the primary partnership. Jealousy may also promote positive aspects of the romantic relationship (Dugosh, 2000) if the jealousy is interpreted as a sign of commitment to the relationship or strength of feelings towards the partner. In addition, individuals that believe their partner is admired by a potential rival may raise their assessment of the partner's mate quality, increasing subsequent attraction or attentiveness.

Previous research has documented the manner in which height is related to jealousy and mate retention. Buunk, Park, Zurriaga, Klavina and Massar (2008) report that tall men are less jealous than short men when confronted with physically attractive or (physically or socially) dominant rivals. In addition, Brewer and Riley (2009) found that tall men report lower levels of cognitive or behavioral jealousy than short men. Whilst the researchers found no association between height and the overall use of mate retention strategies, relationships were found with a number of specific mate retention behaviors. Tall and short men were shown to engage in different mate retention behaviors. Specifically, tall men

were less likely to use appearance enhancement or love and care to retain a partner, but were more likely to employ vigilance, monopolization of time and jealousy induction. The tendency to use these mate retention tactics may indicate tall men's ability to adopt undesirable behavior without lowering their desirability as a mate. In contrast, shorter men are reluctant to reduce their own attractiveness and use tactics which enhance the desirability of the current relationship. The relationship between female height and jealousy is less established. Buunk et al. (2007) demonstrate that female height is curvilinearly related to jealousy, with women of average height reporting the lowest levels of jealousy and partner's sexual interest in others. The researchers also found that women of average height were less jealous of physically attractive rivals but reported increased jealousy of "masculine" rivals that were physically dominant with a high social status. The greater jealousy of tall and short women when compared to women of medium height was supported by Buunk, Pollet, Klavina, Figueredo and Dijkstra (2009).

Sexual Dimorphism in Stature (SDS)

The relative height of an individual, in relation to a partner, operationalized as sexual dimorphism in stature (SDS: male height / female height) is also important. Both men and women adjust their preference for partner height in relation to their own stature (Fink, Neave, Brewer, and Pawlowski, 2007; Pawlowski, 2003). The importance placed on relative, in addition to absolute height allows individuals to select a mate whose appearance is consistent with the male taller norm and maintain a relatively large pool of potential mates, whilst avoiding individuals at each extreme (i.e., extremely tall or short). Furthermore, the extent to which high or low SDS relationships are preferred is not static. Research has identified a number of factors such as menstrual cycle stage and sexual strategy (Pawlowski and Jasienska, 2005) that influence women's preferred SDS.

Previous findings highlight the potential importance of SDS and suggest that additional research exploring this variable would be beneficial. Those able to secure a partner with the optimum SDS (i.e., observing the male taller norm whilst avoiding extreme differences in height) may be more satisfied with their partner and subsequent relationship. The level of SDS within a relationship may also influence a partner's jealousy and use of mate retention tactics. For example, men in low SDS relationships may feel threatened by the number of rivals that may be attractive to their partner.

The Current Study

The manner in which absolute height impacts on behavior within a relationship has been investigated. A number of factors influencing the degree of SDS preferred in a relationship have also been identified (Pawlowski and Jasienska, 2005). However, little information exists about the potential influence of SDS on emotions and behavior within established relationships. The current study investigated the relationship between SDS and the relationship satisfaction, jealousy and mate retention behaviors reported by men and women.

Materials and Methods

Participants

Heterosexual men (n = 98) aged between 19 and 72 (M = 27.28, SD = 11.09) and women (n = 102) aged between 18 and 68 (M = 31.41, SD = 13.05) participated in the current study. Individuals were recruited from the local community through opportunity sampling. All participants were in a romantic relationship at the time of the study. Men's height ranged from 155cm to 196cm (M = 178.42, SD = 8.14) and men's SDS ranged from .79 to 1.25 (M = 1.08, SD = .08). Women's height ranged from 145cm to 201cm (M = 163.62, SD = 8.09) and women's SDS ranged from .97 to 1.23 (M = 1.09, SD = .06).

Procedure

Participants were presented with a questionnaire which asked a range of autobiographical questions (age, own height and partner's height). Participants were then asked to rate their relationship satisfaction on a 7-point Likert scale (from 1 = *very dissatisfied* to 7 = *very satisfied*). Participants were also asked to complete the 24 item Multidimensional Jealousy Scale (Pfeiffer and Wong, 1989), assessing cognitive (8 items), emotional (8 items) and behavioral (8 items) jealousy. Cognitive jealousy constitutes the individual's appraisal of a situation, emotional jealousy concerns how a person responds to potentially provoking situations, and behavioral jealousy includes a range of behaviors intended to reduce a specific threat. Each subscale proved to be reliable (Cronbach's alpha: cognitive: male, .92, female, .88; emotional: male, .86, female, .89; behavioral: male, .90, female, .92). All items relating to jealousy were completed on a 7-point Likert scale.

Finally, participants completed the Mate Retention Inventory-Short Form (Buss, Shackelford, and McKibbin, 2008), consisting of 38 items, rated on a 3-point Likert scale. The scale proved to be reliable (Cronbach's alpha: male, .88, female, .87). The scale captured 19 different tactics (2 items per tactic). As shown in Table 1, each subscale of the questionnaire was also largely reliable.

Table 1. Cronbach's alpha for each subscale of the Mate Retention Inventory-Short Form

Mate Retention Subscale	Male	Female
Vigilance	.77	.62
Concealment of mate	.75	.73
Monopolization of time	.86	.78
Jealousy induction	.89	.88
Punish mate's infidelity threat	.39	.68
Emotional manipulation	.78	.85
Commitment manipulation	.45	.44
Derogation of competitors	.66	.73
Resource display	.88	.84
Sexual inducements	.68	.51
Appearance enhancement	.90	.87
Love and care	.71	.81
Submission and debasement	.72	.72
Verbal possession signals	.57	.69
Physical possession signals	.79	.72
Possessive ornamentation	.82	.70
Derogation of mate	.60	.57
Intra-sexual threats	.89	.94
Violence against rivals	.59	.37

Results

Consistent with previous research, the data generated by both male and female participants demonstrate a male taller norm. There was a correlation between participant height and the height of their current partner. Controlling for age, these correlations were $r = .27$, $p < .05$, and $r = .38$, $p < .001$ for male and female participants respectively. Multivariate analyses of variance (MANOVA) were conducted to investigate SDS category differences in relationship behavior. The analyses were conducted separately for male and female participants. SDS categories were established on the basis of available data. Consequently, SDS was divided into six categories for male participants and only three categories for female participants. The effects of age and absolute height were controlled for during all analyses. For all findings the more robust Pillai's Trace is reported due to the relatively small sample size and unequal *N* values.

Male Emotions and Relationship Behavior

A one-way between groups MANOVA was performed to investigate SDS category differences in male emotions and relationship behavior. Five dependent variables were selected: cognitive jealousy, emotional jealousy, behavioral jealousy, overall mate retention

behaviors and relationship satisfaction. There was a statistically significant difference of SDS categories on the combined dependent variables, $F(25,375) = 2.03$, $p < .005$; Pillai's Trace = .60, partial eta squared = .12.

When the results for the dependent variables were considered separately, the three SDS category differences to reach statistical significance were cognitive jealousy, $F(5,75) = 2.47$, $p < .05$, behavioral jealousy, $F(5,75) = 2.76$, $p < .05$, and relationship satisfaction, $F(5,7) = 5.59$, $p < .005$. As shown in Table 2, men in high SDS relationships reported the least cognitive and behavioral jealousy. Whilst significant, the pattern of relationship satisfaction showed little consistency across SDS categories.

Table 2. Total cognitive, emotional and behavioral jealousy, overall mate retention behaviors and relationship satisfaction reported by male participants

Relationship	**SDS Category**					
Characteristic	**.8**	**.9**	**1.0**	**1.1**	**1.2**	**1.3**
Cognitive jealousy*	21.00	34.80	15.12	15.66	15.14	9.00
Emotional jealousy	37.00	48.40	36.47	39.68	36.64	31.00
Behavioral jealousy*	33.00	29.80	14.59	13.52	14.93	8.00
Mate retention	89.00	83.80	86.94	83.68	86.29	105.00
Relationship satisfaction*	6.00	3.80	6.06	6.14	5.71	6.00

Note: * Indicates differences significant at the $p < .05$ level.

A second one-way between groups MANOVA was conducted to examine SDS category differences in male mate retention. Nineteen dependent variables (vigilance, concealment of mate, monopolization of time, jealousy induction, punish mate's infidelity threat, emotional manipulation, commitment manipulation, derogation of competitors, resource display, sexual inducements, appearance enhancement, love and care, submission and debasement, verbal possession signals, physical possession signals, possessive ornamentation, derogation of mate, intra-sexual threats, and violence against rivals) were employed.

There was a statistically significant difference of SDS categories on the combined dependent variables, $F(95,340) = 1.30$, $p < .05$; Pillai's Trace = .1.33, partial eta squared = .27. When the results for the dependent variables were considered separately, the three SDS category differences to reach statistical significance were vigilance, $F(5,82) = 2.97$, $p < .001$, monopolization of time, $F(5,82) = 2.67$, $p < .005$, and love and care, $F(5,82) = 2.33$, $p < .005$. As shown in Table 3, men in high SDS relationships were more likely to use vigilance and monopolization of time to retain a partner than men in low SDS category relationships. Love and care was most frequently used by men in either high or low SDS relationships.

Table 3. Total mate retention behaviors reported by male participants

Mate Retention Tactics	**SDS Category**					
	.8	**.9**	**1.0**	**1.1**	**1.2**	**1.3**
Vigilance*	3.00	3.20	5.25	5.51	5.53	6.00
Monopolization of time*	4.00	4.40	5.80	5.83	5.87	6.00
Jealousy induction	6.00	4.40	5.65	5.51	5.87	6.00
Appearance enhancement	2.00	4.40	3.35	2.70	3.00	4.00
Love and care*	4.00	4.40	2.65	2.55	2.40	4.00
Resource display	4.00	5.20	3.40	3.32	3.20	6.00
Concealment of mate	6.00	4.60	5.70	5.70	5.80	6.00
Punish infidelity threat	4.00	3.60	3.70	3.32	3.67	4.00
Emotional manipulation	6.00	5.20	5.20	5.02	5.40	6.00
Commitment manipulation	3.000	4.80	4.50	4.23	4.27	5.000
Derogation of competitors	6.00	4.00	4.95	4.49	4.87	6.00
Sexual inducements	4.00	3.60	4.00	3.60	3.27	5.00
Submission and debasement	6.00	4.80	5.05	5.23	5.53	5.00
Verbal possession signals	4.00	5.20	4.60	4.53	4.73	6.00
Physical possession signals	3.00	4.40	3.15	3.06	3.27	6.00
Possessive ornamentation	6.00	4.00	4.65	4.77	4.93	6.00
Derogation of mate	6.00	4.40	5.70	5.40	5.33	6.00
Intra-sexual threats	6.00	4.00	4.80	4.72	4.53	6.00
Violence against rivals	6.00	5.20	5.45	5.00	5.00	6.00

Note: * Indicates differences significant at the $p < .05$ level.

Female Emotions and Relationship Behavior

A one-way between groups MANOVA was conducted to investigate SDS category differences in female emotions and relationship behavior. Five dependent variables were selected: cognitive jealousy, emotional jealousy, behavioral jealousy, overall mate retention behaviors, and relationship satisfaction. There was no statistically significant difference of SDS categories on the combined dependent variables, $F(10,142) = .85$, $p > .05$; Pillai's Trace = .11, partial eta squared = .06. No dependent variables reached statistical significance separately.

A one-way between groups MANOVA examined SDS category differences in female mate retention. Nineteen dependent variables were employed. There were no statistically significant difference of SDS categories on the combined dependent variables, $F(38,128) = 1.05$, $p > .05$; Pillai's Trace = .48, partial eta squared = .24. When the results for the dependent variables were considered separately, the only SDS category difference to reach statistical significance was resource display, $F(2,81) = 5.32$, $p < .05$. Resource display was most frequently adopted by females in high SDS relationships. Total relationship satisfaction, jealousy and mate retention behaviors reported by females are shown in Tables 4 and 5.

Table 4. Total cognitive, emotional and behavioral jealousy, overall mate retention behaviors and relationship satisfaction reported by female participants

Relationship Characteristic	**SDS Category**		
	1.0	**1.1**	**1.2**
Cognitive jealousy	16.39	13.71	14.06
Emotional jealousy	44.54	37.77	38.50
Behavioral jealousy	18.92	16.08	19.61
Overall mate retention	85.69	89.02	91.22
Relationship satisfaction	5.62	5.73	6.00

Table 5. Total mate retention behaviors reported by female participants

Mate Retention Tactics	SDS Category		
	1.0	**1.1**	**1.2**
Vigilance	5.00	4.98	5.00
Monopolization of time	5.27	5.75	5.44
Jealousy induction	5.40	5.27	5.28
Appearance enhancement	2.93	2.98	3.22
Love and care	2.53	3.19	3.11
Resource display*	2.40	3.98	4.00
Concealment of mate	5.87	5.69	5.44
Punish infidelity threat	3.07	3.40	3.78
Emotional manipulation	5.33	5.39	5.67
Commitment manipulation	4.73	4.62	4.67
Derogation of competitors	4.87	4.62	4.78
Sexual inducements	4.33	4.50	4.72
Submission and debasement	5.67	5.60	5.61
Verbal possession signals	4.47	4.77	4.94
Physical possession signals	3.40	3.52	4.06
Possessive ornamentation	5.20	5.21	5.78
Derogation of mate	5.53	5.25	5.44
Intra-sexual threats	5.40	4.89	5.00
Violence against rivals	5.40	5.12	5.28

Note: * Indicates differences significant at the $p < .05$ level.

Discussion

Overall, the results indicate that SDS affects male but not female emotions and relationship behavior. Men in high SDS relationships reported the lowest levels of cognitive and behavioral jealousy, although the impact of SDS on relationship satisfaction

was less clear. SDS was not associated with the overall use of mate retention strategies; SDS did however affect the use of three specific strategies (vigilance, monopolization of time, love and care). Men in high SDS relationships were more likely to use vigilance and monopolization of time than other men. Love and care was used most frequently by men in both high and low SDS relationships.

These findings extend previous research (Brewer and Riley, 2009) detailing the relationship between male height, jealousy and the use of mate retention behaviors. Adjusting the preference for partner height in relation to their own stature (Pawlowski, 2003) allows men and women to select a mate whose appearance is consistent with the male taller norm and avoid individuals at each height extreme whilst maintaining a relatively large pool of potential mates. Consequently, men in high SDS relationships may encounter relatively few rivals that display a desirable SDS without extreme height, thus reducing the risk of cuckoldry or abandonment. The relative number of potential rivals may account for the lower levels of cognitive and behavioral jealousy reported by men in high SDS relationships. The use of vigilance and monopolization of time by men in high SDS relationships may reflect their greater size and strength in comparison to female partners. Both tactics may be more effective when used by a physically intimidating partner. In addition, men in high SDS relationships may adopt undesirable retention behaviors, believing that they are at less risk of retaliation from the partner or a rival male.

SDS did not affect women's relationship satisfaction, jealousy (cognitive, behavioral or emotional) or the use of mate retention strategies (with the exception of resource display, which was most frequently used by women in high SDS relationships). These results appear inconsistent with the aforementioned relationship between SDS and male behavior. The dissociation between SDS and women's relationship behaviors was unexpected. These findings may however reflect the use of only three SDS categories for female participants, compared to the more diverse male sample that was divided into six SDS categories. Additional data collection (specifically targeting women in low and high SDS relationships) would be beneficial.

We tentatively offer an alternate explanation of this finding, focusing on the reproductive consequences of a successful high or low SDS reproductive relationship most acutely impacting on women. Cephalopelvic disproportion (CPD) may lead to uterine rupture, operative delivery, maternal and fetal death (van Roosmalen and Brand, 1992), and remains a leading cause of obstetric complications in developing countries (Harrison, Rossiter, and Chong, 1985). Short women are at increased risk of CPD (Aitken and Walls, 1986; Sokal, Sawadogo, and Adjibade, 1991) and the relationship between maternal height and pregnancy outcome has been observed for all social classes (Thompson, 1959). Height is approximately 80% hereditary (Macgregor, Cornes, Martin, and Visscher, 2006; Silventoinen et al., 2003) however, and maternal height has been related to both birth length and weight (Pickering, 1987; Witter and Luke, 1991), with shorter women producing smaller infants. Despite the influence of maternal height, paternal height also influences the height (Alberman, Filakti, Williams, and Evans, 1991; Sichieri, Taddei, and Everhart, 2000) and weight (Shah et al., 2010) of the child. Specifically, infants fathered by tall men are taller and heavier than infants fathered by short men.

Therefore, shorter women with taller male partners may have secured a high quality

partner (with respect to physical health and socioeconomic status) but these (high SDS) relationships may result in a greater risk of mortality or injury to the woman or child. In contrast, women in low SDS relationships (where the man is perhaps shorter and subsequently less attractive) may result in a less problematic childbirth. Consequently, there appears to be a trade-off between the selection of a tall man (whose height may indicate mate quality, resource acquisition, status etc) and the risks associated with CPD. Additional research exploring this hypothesis is recommended. In particular, the extent to which the risks of maternal and child mortality impact on both male and female reproductive success should be investigated.

Limitations and Future Research

The current study relies on the accuracy of participant responses. The reliability of self-reported height has been documented (Himes and Roche, 1982) and the use of self-reported height is consistent with previous research (e.g., Pawlowski, 2003). The limitations of this approach and the greater accuracy afforded by direct measurements are however acknowledged. In particular, the widespread Western preference for relationships in which the man is taller (reported by men and women; Gillis and Avis, 1980) may encourage participants to artificially inflate differences between their own and their partner's height. In addition, the association between male height, attractiveness and socioeconomic status (Judge and Cable, 2004; Pawlowski and Koziel, 2002) may increase the likelihood that the male height reported is similarly inflated.

The current study investigated the relationship between SDS and behavior in a Western post-industrial society. This is consistent with previous research addressing the role of height and SDS (e.g., Fink, et al., 2007). Previous research has found no evidence for the male taller norm or relationship between male height and reproductive success in a traditional community (Sear and Marlowe, 2009). The results of this study cannot be generalized to non-Western cultures therefore and additional cross-cultural research is required.

The current study investigated the relationship between SDS and jealousy, and considered three elements of the jealous response in particular. We did not however explore the relative impact of different jealousy evoking scenarios. Previous research has clearly documented the manner in which men are more reactive to sexual infidelity and women are more responsive to emotional infidelity (Edlund, Heider, Scherer, Farc, and Sagarin, 2006; Thomson, Patel, Platek, and Shackelford, 2007). Future research could investigate whether attentiveness to specific stimuli is influenced by the SDS within a relationship.

The recruitment of participants in a current relationship was intended to reduce memory bias and avoid reliance on participants' ability to predict behavior. Despite the anonymity of the study and the involvement of only one member of the relationship pair, participants may have been reluctant to disclose dissatisfaction with their current relationship, or the use of socially undesirable mate retention strategies. Additional research is required to address this issue. In particular, more detailed assessments of relationship quality and behavior are recommended. Longitudinal data outlining the manner in which an individual's behavior may vary when in relationships with different levels of SDS would be particularly informative. Research of this type could also detail the manner

in which the association between SDS and male behavior develops. Conclusions that may be drawn about the causal nature of relationships between absolute height and behavior are not possible when investigating SDS. For example, although SDS may influence a man's behavior within the relationship, his initial personality and behavior may impact on both his selection of a partner and his later behavior towards her.

Conclusion

To conclude, the current study finds that men in high SDS relationships reported the lowest levels of cognitive and behavioral jealousy, although the impact of SDS on relationship satisfaction was less clear. SDS was not associated with the overall use of mate retention strategies; SDS did however affect the use of three specific strategies (vigilance, monopolization of time, love and care). SDS did not affect women's relationship satisfaction, jealousy (cognitive, behavioral or emotional) or the use of mate retention strategies (with the exception of resource display). It is tentatively suggested that the dissociation between SDS and women's behavior within the relationship reflects a trade-off between the qualities associated with male height and the greater risk of difficulties during childbirth.

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