

2008


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Recommended Citation

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Original Article

Female Mate Choice is Influenced by Male Sport Participation

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Abstract: Sexual selection theory argues that females invest more heavily in reproduction than males and thus tend to be choosier in terms of mate choice. Sport may provide a context within which females can gain information about male quality to inform this choice. Males may be able to display attractive traits such as athleticism, strength, and physique to females while participating in sport. We predicted that females would favor males that participated in team sports over individual sports and non-athletes because team sport athletes may be more likely to display qualities such as the ability to work well with others and role acceptance. We used a questionnaire, a photograph, and manipulated descriptions to gauge the effects of sport involvement, attractiveness, and status on 282 females' willingness to participate in various types of relationships. Team sport athletes were perceived as being more desirable as potential mates than individual sport athletes and non-athletes. It is suggested that team sport athletes may have traits associated with good parenting such as cooperation, likeability, and role acceptance, and/or these athletes may be better able to assert dominance in a team setting. Results are discussed in terms of further implications and future research.

Keywords: sexual selection, mate choice, sport, status.

¹ Each investigator contributed significantly to the research for this article and considers its authorship as joint.

Introduction

Sexual selection theory argues that males tend to compete amongst themselves for access to mates, and that females tend to be more selective of their mates than males (Andersson, 1994). These sex differences are the result of the asymmetry in reproductive investment between the sexes. The production of male gametes is considered to be relatively cheap, and generally males in most non-human animals do not provide parental care. Female investment in reproduction, however, is generally costly because they produce large, energy rich gametes and often are the sole providers of parental care. Thus, females can increase Darwinian fitness by carefully selecting mates that provide good genes for their offspring or material benefits such as high quality parental care or resources that can be used to aid in raising offspring (Andersson, 1994; Trivers, 1972).

Similarly, in humans, females can enhance their Darwinian fitness by choosing partners who offer genetic benefits or resources (Buss, 1998). The assessment of mates in light of genetic quality or resource-holding potential is thus critical and can occur in a number of contexts in which males must compete on some level (Buss, 1998). Physical competition through sport is an important and visible way that males compete amongst each other. In particular, sport may allow males to demonstrate athletic qualities such as speed and strength (Manning and Taylor, 2001). The importance of sport in terms of mate competition has been self-reported by males. For example, they believe that traits such as “acquire athletic ability” and “use risk in athletics” are attractive to females and important to demonstrate when competing with other males (Walters and Crawford, 1993). Females find males with athletic physiques to be more attractive than males with average physiques (Dixon, Halliwell, East, Wignarajah, and Anderson, 2003; Li and Kenrick, 2006; Singh, 1995), and men have been shown to bias their exercise toward enhancing upper body definition and gaining muscle mass (Jonason, 2007). Men may focus on enlarging the upper body because females prefer males with a more pronounced V-shaped torso (Jonason, 2007). In sum, the level of performance that a male attains within a sporting context may provide an honest signal of his physical condition and ranking among other males with respect to motivation, competitiveness and athletic ability. These signals may thus render successful males as more attractive to females.

If sport is an appropriate context for assessing male quality, then a number of hypotheses can be (and have been) tested. As one example, participants in sport should have more sexual partners than non-participants, and the *level* of sport performance should also predict the number of sexual partners. Faurie, Pontier, and Raymond (2004) provided a questionnaire to French students who were either registered in sport courses or non-sporting courses and these predictions were confirmed. Male students that competed in sports self-reported more sexual partners than non-participants, and within athletes, higher levels of performance were positively correlated with the number of partners (Faurie et al., 2004).

If females are using participation in sport as a measure of male quality, the ability of a male to display his quality may be dependent on the *type* of sport he participates in. For example, male athletes that participate in team sports may be able to display more attractive qualities than athletes that participate in sports in which individuals compete against one another. By being part of a team, an athlete may be able to reliably display attractive qualities amongst a group of males, a context that is not consistently available to individual

sport athletes. The team sport context may thus provide females with a greater opportunity to assess a particular male's quality by providing a number of potential rivals for comparison. Attractive qualities may include the ability to work with others and role acceptance (Li, Kenrick, Bailey, and Linsenmeier, 2002, Minervini and McAndrew, 2006). In addition, qualities associated with physical dominance and prowess may be easier to display in a team sport context because athletes must compete for status against their teammates, as well as members of other teams.

There are a number of male traits other than sport participation that influence female mate choice. Both physical attractiveness and status are important factors that have been found to influence mate preferences (Bereczkei, Voros, Gal, and Bernath, 1997; Li et al., 2002; Rhodes, Chan, Zebrowitz, and Simmons, 2003; Rhodes, Simmons, and Peters, 2005). Females tend to prefer physically attractive males, often for short term relationships, and males of high status, often for long-term relationships (Singh, 1995). Both attractiveness and status are thus important factors with which to compare the relative effects of sport participation on female mate preferences.

In the present study, we use a questionnaire with a population of females to test a series of predictions based on the hypothesis that sport participation is used by females to assess male quality. We test three main effects, predicting that (a) females will prefer team sport athletes over both individual sport athletes and non-athletes, (b) males of high status will be preferred over males of low status, and (c) attractive males will be preferred over less attractive males. We also test for interactions among the three main effects, predicting that males participating in team sports, of high status, and physically attractive will be most preferred relative to other male types.

Materials and Methods

Participants

The participants were 282 female undergraduate students from a central Canadian university enrolled in a variety of academic programs in the natural (e.g., biology, chemistry; $n = 107$) and social sciences (e.g., psychology, physical education, arts; $n = 175$). The majority of participants were enrolled in their first year of study ($n = 169$) while the remaining individuals were in their second ($n = 45$), third ($n = 29$), and fourth years ($n = 39$). The ages of the participants ranged from 18 to 29 years ($M_{age} = 19.50$, $SD = 1.74$ years) and 114 participants indicated that they had some previous involvement in a sporting context. Finally, participants also provided information on their own ethnicity, ethnic preferences for mates, sexual orientation, and beliefs/behaviors regarding sexual practices. Those described above represent participants who self-categorized as Caucasian, had no specific preference or a preference for a Caucasian mate, were heterosexual, and not opposed to sexual intercourse prior to marriage. Participants used in the analysis were drawn from an initial pool of 374 participants.

Demographic questions

A series of demographic questions were asked of the participants: age, ethnicity, program of study, current year of study, sexual orientation, ethnic preferences for mates, current and past sport involvement, and relationship history and beliefs. These latter questions assessed, via yes/no response options, whether or not the participants (a) had past

romantic relationships, (b) have a current romantic relationship, (c) believe in sexual intercourse prior to marriage, and (d) are currently sexually active. Finally, participants were asked if they were currently taking oral contraceptives and to provide an estimate of when they expected their next menstrual period to begin.

Independent variables: Stimulus (picture) and description

Each participant received a picture of one of two possible Caucasian males (either high or low in attractiveness) and one of six possible descriptions of this individual. To assess the physical attractiveness of the two individuals in the pictures, a pilot study was conducted with 35 female participants (who did not take part in the main study) similar in demographic characteristics outlined in the *Participants* section above. The women were asked to rate the attractiveness of twelve males based on black and white, non-smiling, head-shot pictures. Attractiveness was assessed on a 7-point Likert-type scale from 1 *very unattractive* to 7 *very attractive*. The two photos chosen for the main part of the present study consisted of the individual rated most attractive ($M = 5.49$, $SD = 1.44$) and an individual rated low in attractiveness ($M = 2.49$, $SD = 1.04$) as determined by this pilot study. Mean rating differences among the pictures was found to be significant, Wilks' $\lambda = .08$, $F(11,24) = 25.75$, $p < .001$, and a post-hoc analysis demonstrated a significant difference between the two pictures utilized in the present study ($p < .001$). Thus, it can be reasonably concluded that the two pictures differed in physical attractiveness.

The information contained within the description was manipulated to highlight the type of sport involvement of the individual (i.e., 3 levels; team sport vs. individual sport vs. no sport involvement) and the degree of status he has obtained in that particular context (i.e., 2 levels; high status vs. low status). Specifically, the description read:

This is Brian. He is a member of a(n) [either (a) varsity team sport, (b) varsity individual sport, or (c) extra-curricular club that does not involve physical activity and does not play sports]. He is ranked as one of the [either (a) more skilled players within his sport/club and is regarded highly, or (b) less skilled players within his sport/club and is not regarded highly] by other members. He grew up in [location of study] and has a younger sister and an older brother. He loves to eat out and watches television occasionally. He loves dogs.

It should be noted that similar procedures and stimulus constructions have been used in past research (e.g., Townsend and Levy, 1990). As a result of the above process, the main study contained 12 independent conditions through the interaction of physical attractiveness (2 levels), sport involvement (3 levels), and status (2 levels).

Dependent variables

Subsequent to examining the picture and reading the description given to them, participants responded to four 7-point Likert-type scales from 1 (not willing) to 7 (very willing) assessing their willingness to engage in various levels of relationships with the depicted male. These questions are similar to those used in previous research by Singh (1995) and Furnham, Moutafi, and Baguma (2002). Specifically, the participants were asked: (a) Please indicate your willingness to go on one date with this person, (b) Please indicate your willingness to engage in a short term relationship with this person (less than 1 month), (c) Please indicate your willingness to engage in sexual intercourse with this

person, considering a situation where there is no risk of pregnancy or contracting an STD, and (d) Please indicate your willingness to engage in a long term/serious committed relationship with this person (more than 6 months).

Procedure

Ethical approval was obtained through the authors’ university research ethics board to conduct the study. Subsequent to consent being provided by course instructors, participants were recruited through their undergraduate classes. At the conclusion of a lecture, females were asked to remain seated and the general purpose of the study was explained to them. Participants read a letter of information and completed a consent form if they were interested in taking part. Upon receiving the completed consent form, the researcher gave the questionnaire to the participants consisting of demographic questions, a picture and description of a male (see above for details), and the Likert-style questions. Participants were randomly assigned to one of the twelve conditions and were further asked to complete the questionnaire individually. The data collection context was monitored by a researcher to ensure that no interaction took place among participants.

Results

A 3 (sport involvement) x 2 (status) x 2 (physical attractiveness) between subjects multivariate analysis of covariance was performed on the four dependent variables associated with females’ willingness to engage in various levels of relationships with their depicted male: one date, short term, sexual intercourse, and long term. Adjustment was made for three covariates: age, menstrual phase, and previous sport involvement of the female participants.

Table1. Means (Standard Deviations) for Females’ Willingness to Engage in Various Relationships Based on Sport Involvement, Status, and Attractiveness.

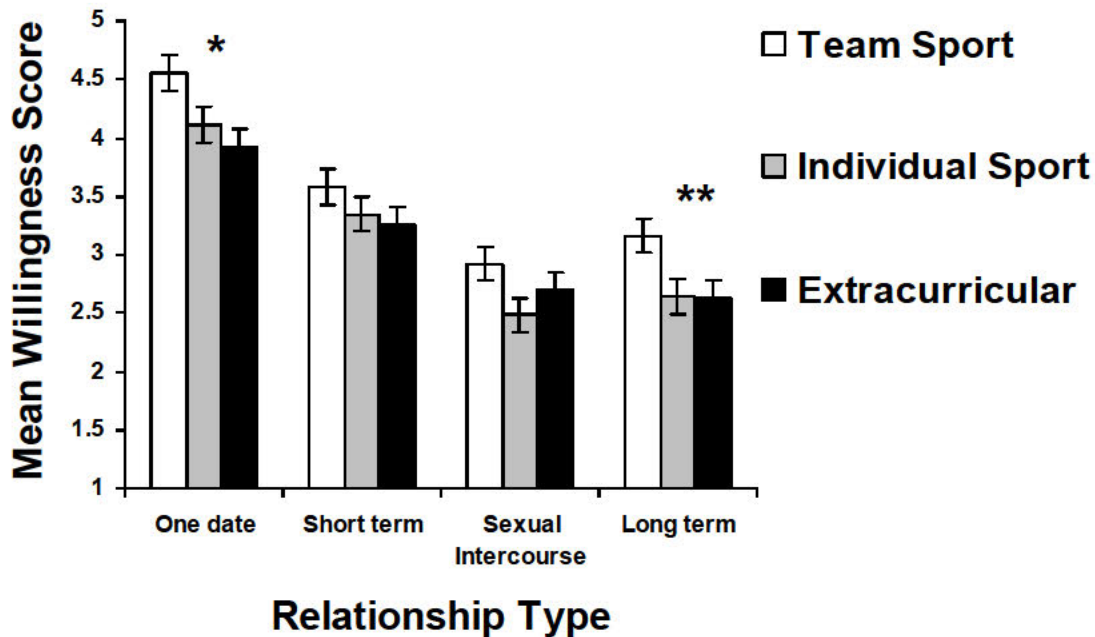
Variable	<u>Sport Involvement</u>			<u>Status</u>		<u>Attractiveness</u>	
	Team	Individual	Non	High	Low	High	Low
One date	4.56 (1.68)	4.11 (1.70)	3.93 (1.72)	4.60 (1.76)	3.76 (1.56)	5.00 (1.39)	3.37 (1.62)
Short term	3.58 (1.69)	3.35 (1.82)	3.26 (1.71)	3.71 (1.80)	3.05 (1.61)	4.22 (1.58)	2.55 (1.47)
Sexual intercourse	2.92 (1.88)	2.48 (1.72)	2.70 (1.84)	3.10 (2.00)	2.26 (1.55)	3.64 (1.84)	1.73 (1.25)
Long term	3.16 (1.86)	2.64 (1.67)	2.63 (1.61)	3.24 (1.82)	2.34 (1.49)	3.55 (1.73)	2.04 (1.35)

Note. Scores for willingness variables range from 1 (*not willing*) to 7 (*very willing*).

These covariates were chosen based on previous research suggesting that mate preferences are potentially influenced by these variables. For example, a study conducted by Buunk, Dijkstra, Kenrick, and Warntjes (2001) demonstrated that preferences for mates of both males and females are somewhat dependent on age. Specifically, these investigators found that women typically preferred partners who were a similar age to themselves. With regard to menstrual phase, for example, Scarbrough and Johnston (2005) noted that women “tested during the high probability of conception phases of their menstrual cycle have been

found to prefer a more masculinized male face than their stated preference outside this fertile window” (p. 511). Finally, there is a large body of literature suggesting that our choices for friends and potential mates are highly influenced by perceived similarities (see Jones, Pelham, Carvallo, and Mirenberg, 2004). Given the focus of the present study (i.e., male sport involvement), controlling for previous sport experiences of female participants was imperative.

Figure 1. Main effect of sport involvement on female’s willingness to engage in four types of relationships. * = significant difference between team sport and extracurricular groups ($p < .01$). Approached significance between team sport and individual sport groups ($p = .06$). ** = significant differences between team sport and both individual sport ($p < .05$) and extracurricular groups ($p < .01$).

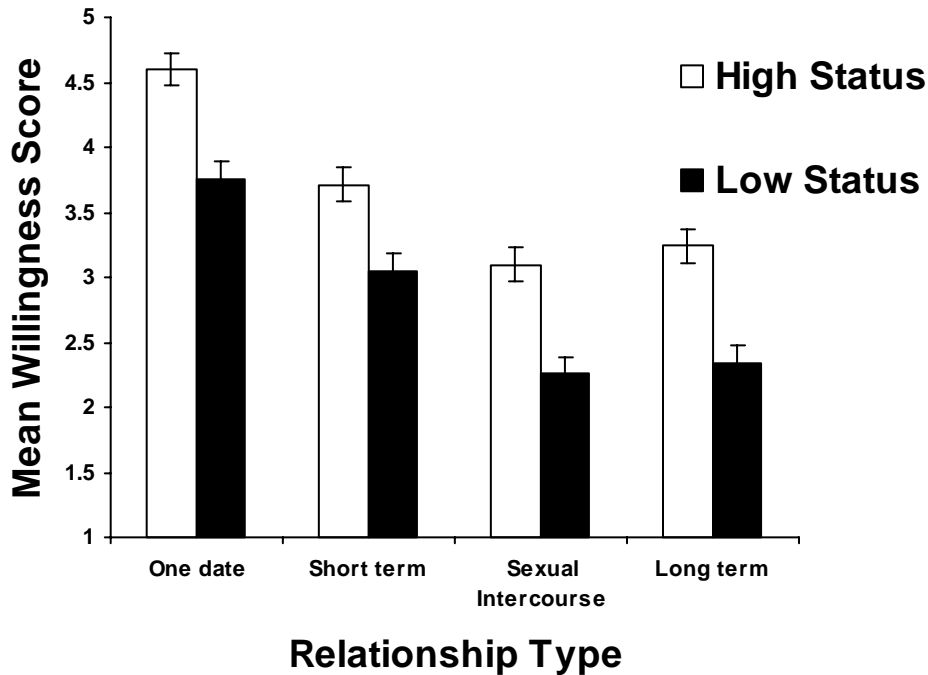


Mean values for all variables can be found in Table 1. A 3-way factorial MANCOVA was conducted. No significant 2 or 3 way interaction effects were found ($p > .05$). Consequently, the following sections discuss the main effects that were found in the present study.

Main Effect for Sport Involvement

The multivariate analysis indicated significant main effects for sport involvement, Wilks’ $\lambda = .93$, $F(8,528) = 2.40$, $p = .01$, $\eta^2 = .04$, indicating general differences in willingness to engage in the various relationship levels based on team sport, individual sport, and non-sport involvement. Univariate analyses revealed that the three conditions differed with regard to *willingness to go on one date* with the depicted male, $F(2,267) = 6.57$, $p = .002$, $\eta^2 = .05$ and *engage in a long term relationship*, $F(2,267) = 5.78$, $p = .012$, $\eta^2 = .04$. However, the groups did not differ with regard to *willingness to engage in a short term relationship*, $F(2,267) = 2.00$, $p = .062$, or *sexual intercourse* with the depicted male, $F(2,267) = 2.46$, $p = .067$.

Figure 2. Main effect of status on female's willingness to engage in four types of relationships. All between group differences are significant ($p < .001$).

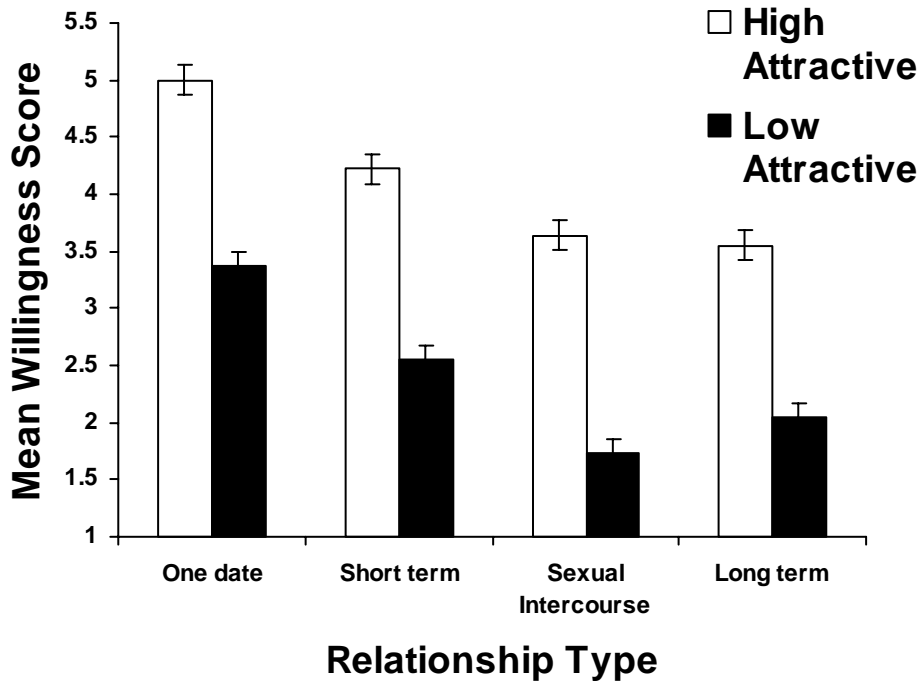


Post-hoc examinations of the two significant univariate findings yielded relatively similar patterns of results (see Figure 1). With regard to *willingness to go on one date*, the mean for the team sport condition ($M = 4.56 \pm 1.68$) was significantly higher than the extracurricular condition ($M = 3.93 \pm 1.72$, $p = .001$) and approached significance in relation to individual sport involvement ($M = 4.11 \pm 1.70$, $p = .06$). For *willingness to engage in a long term relationship*, the mean for the team sport condition ($M = 3.16 \pm 1.86$) was significantly higher in comparison to both the individual sport ($M = 2.64 \pm 1.67$, $p = .039$) and extracurricular conditions ($M = 2.63 \pm 1.61$, $p = .024$).

Main Effect for Status

The multivariate analysis indicated significant main effects for status, Wilks' $\lambda = .87$, $F(4,264) = 10.00$, $p < .001$, $\eta^2 = .13$, indicating general differences in willingness to engage in the various relationship levels based on high vs. low status. Univariate analyses revealed that the females were more willing engage in all four types of relationships with high status males compared with low status males (see Figure 2). Specifically, these groups differed significantly with regard to willingness to go on one date, $F(1,267) = 28.12$, $p < .001$, $\eta^2 = .10$, engage in a short term relationship, $F(1,267) = 15.27$, $p < .001$, $\eta^2 = .05$, engage in sexual intercourse, $F(1,267) = 24.04$, $p < .001$, $\eta^2 = .08$, and engage in a long term relationship, $F(1,267) = 30.53$, $p < .001$, $\eta^2 = .10$.

Figure 3. Main effect of physical attractiveness on female’s willingness to engage in four types of relationships. All between group differences are significant ($p < .001$).



Main Effect for Physical Attractiveness

The multivariate analysis indicated significant main effects for physical attractiveness, Wilks’ $\lambda = .64$, $F(4,264) = 37.05$, $p < .001$, $\eta^2 = .36$, indicating general differences in willingness to engage in the various relationship levels based on high vs. low attractiveness of the males depicted in the pictures. Univariate analyses revealed that the females were more willing to engage in all four types of relationships with the high attractive male compared with the low attractive male (see Figure 3). Specifically, these groups differed significantly with regard to *willingness to go on one date*, $F(1,267) = 99.81$, $p < .001$, $\eta^2 = .27$, *engage in a short term relationship*, $F(1,267) = 90.46$, $p < .001$, $\eta^2 = .25$, *engage in sexual intercourse*, $F(1,267) = 115.73$, $p < .001$, $\eta^2 = .30$, and *engage in a long term relationship*, $F(1,267) = 80.80$, $p < .001$, $\eta^2 = .23$.

Discussion

The effect of sport participation on female mate preferences was modest relative to both status and facial attractiveness. Both attractive males and males of high status (independent of sport involvement) were significantly more desirable in all social contexts considered. These results were expected given previous work (Bereczkei et al., 1997; Li et al., 2002, Rhodes et al., 2003; Rhodes et al., 2005), but provide important benchmarks with which to compare the effects of alternative factors influencing female mate preferences. One of these alternative factors appears to be the type of sport a male may participate in. Generally, the effects of sport involvement were significant but much smaller than physical attractiveness and status. For example, the effect sizes for physical attractiveness and status

were 3-12 times greater than sport involvement. Nonetheless, it is clear that sport involvement is a significant contributor to female mate choice in this study.

Overall, sport participation may be an important cue for female mate choice because males can display qualities such as physical prowess and agility in this context (Manning and Taylor, 2001). These qualities can provide insight into male body condition and other components of phenotypic quality. More interesting, it was found in the present study that females preferred males that participate in *team sports* over those that participate in individual sports or non-participants. Two hypotheses can be constructed to explain these apparent preferences. The first argues that team sport athletes exhibit behavioral traits associated with good parenting skills and success at long-term relationships such as cooperation, likeability, and role acceptance (Li et al., 2002; Minervini and McAndrew, 2006). Individuals exhibiting these characteristics would likely be better parents and long-term mates.

Alternatively, or perhaps concurrently, males may be better able to assert dominance in a team sport context because they can assume a high rank within the team as well as in competition with other teams. In other words, a female may be able to better assess a male's quality if he participates in a team sport through his relative rank on the team (i.e., is the focus male the captain of the team or a "benchwarmer"?). There is evidence that (a) females may use a mixed mating strategy when selecting a mate, (b) dominance reflects genetic quality, and (c) high quality males are less likely to invest in offspring (Havlicek, Roberts, and Flagr, 2005; Wayneforth, 1998). If this is the case, females may prefer dominant males as short-term partners and prefer males that are more willing/able to invest in offspring as long-term mates. Team sport athletes were most desirable as long-term mates in our study but only marginally more desirable in a "date" social situation, providing some support for the hypothesis that females prefer team sport athletes because their behavior may better indicate their abilities in terms of parental investment.

It is possible that females may be more attracted to team sport athletes than individual sport athletes because of the perceived potential financial benefits team sport athletes may accrue should they pursue their sport at the highest level. The mainstream professional sports in North America are typically team sports, and professional athletes often earn much higher salaries than the average. However, this perceived scenario seems unlikely in the current study because of its context. The present study was conducted at a small Canadian university where the probability of an individual becoming a professional athlete is much less than for athletes in colleges and universities in the United States that participate in the National Collegiate Athletics Association (i.e., NCAA). Thus, it is unlikely that earning potential was a consideration when females assessed the desirability of the candidate males in our questionnaire.

Given on-going concerns regarding decreasing sport and physical activity rates in developed countries, the results of the present study raise interesting questions surrounding motivations for sport participation. For example, do males perceive participation in team sports (or sport in general) as a venue for displaying genetic quality? And, are motivations for participation in team sports (or sport in general) driven in part by sexual selection? It is perhaps pertinent at this point to indicate that these questions delve into more *distal* or *ultimate* explanations for sport participation favored by evolutionary psychologists. In contrast, a review of relevant sport literature highlights numerous *proximal* reasons

identified by participants that include, for example, skill improvement/competition, social activities, general physical fitness enhancement, and other reasons such as simply having something to do (Gill, Gross, and Huddleston, 1983). More specifically, decisions to participate in sport “occur in connection with general socialization processes in people’s lives...[and] are influenced by the availability of opportunities, the existence of social support, the processes of identity formation, and the cultural context in which decisions are made” (Coakley and Donnelly, 2004, p. 110). A greater understanding of participation motivation may be greatly enhanced by considering both proximal and distal approaches. Nonetheless, as it currently stands, motivations associated with sexual selection are not considered in the sport literature despite young male athletes being more sexually active than non-athletes (Faurie et al., 2004). Although not yet explicitly tested, social factors identified as being important for sport participation (e.g., Sirard, Pfeiffer, and Pate, 2006) may include the acquisition of mating opportunities with females.

Another question of particular interest from an evolutionary perspective is the motivations of parents for encouraging team sport participation in their male children. Presumably, if parents encouraged male children to participate in sport, and male athletes have higher mating frequency than non-athletes, then parents of athletes would reap inclusive fitness benefits from their sons. Thus, evolutionary pressures may exist that have led to the encouragement of children, particularly boys, to participate and excel at team sports so that parents may maximize their fitness through the enhanced production of grandchildren.

This study provides a number of interesting avenues to pursue. The first is the need to apply a within-subjects design to more clearly understand the effects of sport participation in female mate preferences. Second, specific delimitations were imposed on this study. For instance, data analysis in the present study was limited to participants who self-categorized as Caucasian, had no specific preference or a preference for a Caucasian mate, and who were not opposed to sexual intercourse prior to marriage. Consequently, the generalizability of results is limited to a population similar in characteristics. However, this affords a number of research avenues to pursue in the future.

Third, the specific types of sports males may participate in may be critical in a female’s assessment of male quality. For example, the social profile of the sport that a male participates in may be more important than whether the sport is team or individual in nature. In North America, high profile sports also happen to be team sports, and so this link may be a confounding factor in our study. In addition, some sports may require varying degrees of muscularity and agility, and these traits may be more or less attractive to females. Further work should attempt to disentangle this relationship and assess whether the profile of the sport is important in mate choice.

Fourth, a study of female perceptions of traits that are associated with success in the context of sport participants (both individual and team sports) is critical. We have hypothesized that team athletes are more attractive because of specific personality traits, but this remains to be tested.

Finally, our results may also have some impact on team dynamics from a sports psychology perspective. If males are motivated to participate in team sports at least in part to enhance mating opportunities, then managing team dynamics and encouraging role acceptance may benefit from evolutionary insights.

Acknowledgements: The authors thank the participants of this study and their faculty instructors. The manuscript was improved by comments and edits by Bob Montgomerie and Andrew Clark. We particularly thank C. Meagher for discussion and development of the ideas explored in this study.

Received 13 November 2007; Revision submitted 16 January 2008; Accepted 17 January 2008

References

- Andersson, M. (1994) *Sexual Selection*. Princeton, NJ: Princeton University Press.
- Bereczkei, T., Voros, S., Gal, A., and Bernath L. (1997). Resources, attractiveness, family commitment; reproductive decisions in human mate choice. *Ethology*, *103*, 681-699.
- Buss, D.M. (1998). The psychology of human mate selection: exploring the complexity of the strategic repertoire. In C. Crawford, and D.L. Krebs, (Eds.), *Handbook of Evolutionary Psychology: Ideas, Issues and Applications* (pp.405-429). New Jersey: Lawrence Earlbaum Associates.
- Buunk, B.P., Dijkstra, P., Kenrick, D.T., and Warntjes, A. (2001). Age preferences for mates as related to gender, own age, and involvement level. *Evolution and Human Behavior*, *22*, 241-250.
- Coakley, J., and Donnelly, P. (2004). *Sport in Society: Issues and Controversies*. Toronto: McGraw-Hill.
- Dixon, A., Halliwell, G., East, R., Wignarajah, P., and Anderson, M. (2003). Masculine somatotype and hirsuteness as determinants of sexual attractiveness to women. *Archives of Sexual Behavior*, *32*, 29-39.
- Faurie, C., Pontier, D., and Raymond, M. (2004). Student athletes claim to have more sexual partners than other students. *Evolution and Human Behavior*, *25*, 1-8.
- Furnham, A., Moutafi, J., and Baguma, P. (2002). A cross-cultural study on the role of weight and waist to hip ratio of female attractiveness. *Personality and Individual Differences*, *32*, 729-745.
- Gill, D.L., Gross, J.B., and Huddleston, S. (1983). Participation motivation in youth sports. *International Journal of Sport Psychology*, *14*, 1-14.
- Havlicek, J., Roberts, S.C., and Flagr, J. (2005) Women's preference for dominant male odour: Effects of menstrual cycle and relationship status. *Biology Letters*, *1*, 256-259.
- Jonason, P.K. (2007). An evolutionary psychology perspective on sex differences in exercise behaviors and motivations. *Journal of Social Psychology*, *147*, 5-14.
- Jones, J.T., Pelham, B.W., Carvallo, M., and Mirenberg, M.C. (2004). How do I love thee? Let me count the Js: Implicit egotism and interpersonal attraction. *Journal of Personality and Social Psychology*, *87*, 665-683.
- Li, N.P., and Kenrick, D.T. (2006). Sex similarities and differences in preferences for short-term mates: What, whether, and why. *Journal of Personality and Social Psychology*, *90*, 468-489.

- Li, N.P., Kenrick, D., Bailey, J., and Linsenmeier, J. (2002). The necessities and luxuries of mate preferences: Testing the tradeoffs. *Journal of Personality and Social Psychology*, 82, 947-955.
- Manning, J.T., and Taylor, R.P. (2001). Second to fourth digit ratio and male ability in sport: Implications for sexual selection in humans. *Evolution and Human Behavior*, 22, 61-69.
- Minervini, B., and McAndrew, F. (2006). The mating strategies and mate preferences of mail order brides. *The Journal of Comparative Social Science*, 40, 111-129.
- Rhodes, G., Chan, J., Zebrowitz, L.A., and Simmons, L.W. (2003). Does sexual dimorphism in human faces signal health? *Proceedings of the Royal Society of London B*, 270, S93-S95.
- Rhodes, G., Simmons, L.W., and Peters, M. (2005). Attractiveness and sexual behaviour: Does attractiveness enhance mating success? *Evolution and Human Behavior*, 26, 186-201.
- Scarborough, P.S., and Johnston, V.S. (2005). Individual differences in women's facial preferences as a function of digit ratio and mental rotation ability. *Evolution and Human Behavior*, 26, 509-526.
- Singh, D. (1995). Female judgment of male attractiveness and desirability for relationships: Role of waist-to-hip ratio and financial status. *Journal of Personality and Social Psychology*, 69, 1089-1101.
- Sirard, J.R., Pfeiffer, K.A., and Pate, R.R. (2006). Motivational factors associated with sports program participation in middle school students. *Journal of Adolescent Health*, 38, 696-703.
- Townsend, J.M., and Levy, G.D. (1990). Effects of potential partners' physical attractiveness and socioeconomic status on sexuality and partner selection. *Archives of Sexual Behavior*, 19, 149-164.
- Trivers, R.L. (1972). Parental investment and sexual selection. In B. Campbell (Ed.), *Sexual Selection and the Descent of Man, 1871-1971* (pp. 136-179). Chicago, IL: Aldine.
- Walters, S., and Crawford, C.B. (1993). The importance of mate attraction for intrasexual competition in men and women. *Ethology and Sociobiology*, 15, 5-30.
- Wayneforth, D. (1998). Fluctuating asymmetry and human male life-history traits in rural Belize. *Proceedings of the Royal Society London B*, 265, 1497-1501.