

# Examining Sex Differences in Motivations to Participate in Sports

Senior Honors Thesis

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## Examining Sex Differences in Motivations to Participate in Sports

### ***Abstract***

Sports have a dominating presence in cultures around the world, but how can psychologists explain the mass interest in winning races, scoring goals, and hitting home runs? A number of evolutionary psychology hypotheses attempt to address why men play sports and are supported by strong empirical evidence, but these same hypotheses fail sufficiently to explain why women participate in sports. To address this gap, a survey investigating sports and exercise motivations, self-perceived mate value, and social dominance orientation was distributed to athletes and non-athletes at Carnegie Mellon University. We compared results from athletes to non-athletes as well as athletes on a team and individual sport. Key findings include males were more motivated to exercise for social reasons where females were more motivated by improving their appearance. Additionally, athletes on a team sport reported a greater motivation to win and a higher mate value where athletes on an individual sport reported greater social motivations for exercising. Ultimately, these results support an evolutionary-based explanation for why we play sports.

### ***Introduction***

#### *Why are Sports Important?*

Sports are an integral part of daily life. Sixty-three percent of Americans consider themselves sports fans with American Football being the most popular sport to support (57%) (How Many, 2017). Over 100 million people watched the Philadelphia Eagles beat the New England Patriots in the 2018 Super Bowl (Number, 2018) while the Super Bowl itself generated \$414 million in advertising revenue (Lafayette, 2018). An NPR and Harvard study reported that

73% of adults surveyed played sports as a child and while only 25% play sports as adults, 48% report exercising regularly. There is a considerable sex difference in this statistic: 35% males versus 16% of females play sports as adults (Poll: Three, 2015). Moreover, there is a sex difference in sports fandom whereby 75% of males say they are sports fans but only 50% of females are sports fans (Lombardo, 2012).

At the collegiate level, 494,992 athletes competed in 24 sports during the 2017-2018 seasons, 425 coming from Carnegie Mellon University. Although this only makes up a small proportion of the student body, the annual expenses for the 2018-2019 athletics seasons amounted to \$4,285,458 (Equity, 2018). Americans do not shy away from buying tickets to see their favorite teams or purchasing the jersey of their favorite quarterback. From September 2016-September 2017, Americans spent \$100 billion on sports (Kutz, 2017). The three most expensive professional sports teams in the U.S., the Dallas Cowboys, New York Yankees, and New England Patriots, are worth a combined \$10.6 billion (Badenhausen, 2016). Clearly, sports are an empire that is here to stay, but how did they become so popular? What motivates so many people to watch and play sports? And do men and women have different motivations, and are these motivations predicted by an evolutionary approach to understanding the mind and behavior?

### *Background on Evolutionary Psychology*

Evolutionary Psychology explains many phenomena of everyday life and is based on Darwin's theory of Natural Selection. Darwin hypothesized that favorable genetic variations will increase an organism's 'fitness', or ability to produce viable offspring, and these variations will continue to be passed to genetic relatives (Darwin, 1859). Favorable genotypic changes are called *adaptations*, which are inherited from parents and produced by natural selection to solve an adaptive problem faced by our ancestors. Byproducts are features of something that evolved

for one purpose but can also be used for other things. For example, the nose evolved to facilitate the olfactory sense but the unintended byproduct of the nose is it holds up glasses. Additionally, Darwin proposed a theory of Sexual Selection in which adaptations arise from successful mating and are more favorable if they foster successful mating in the future. Because of this, there becomes intrasexual competition for mates (Darwin, 1859).

Thus, humans are ultimately motivated by surviving and passing on their genes to the next generation (Darwin, 1859). David Buss studied sex differences in mating preferences across 37 cultures and found consistent results. Women are more selective of their mates, preferring mates who have many economic resources to provide for themselves and their offspring. This includes men who have good financial prospects for the future and/or high status, both of which imply resources. Additionally, women prefer older men because older men should have more resources, physical strength (for protection), hunting prowess, and maturity. Finally, women find athletic men attractive because they can provide protection, are likely to be healthy, and have high status (Buss et al., 1989).

Males prefer to mate with young, attractive females. One problem they must overcome is finding a mate that will successfully pass on their genes to the next generation. Because of this, fertility and reproductive value are important factors males consider in a mate. Males prefer young women because youth implies high fertility and attractive women which is a cue for health (Buss et al. 1989). It is no coincidence that a symmetrical face is linked to beauty and health (Thornhill, 1999). One indicator of attractiveness is the optimal waist-to-hip ratio of 0.7 in females which implies fertility and that the female is not pregnant and therefore an available mate (Singh, 1993). These basic principles on evolution and mating are extended to provide unique, alternate, and mostly valid explanations for modern day behaviors.

*Why Do We Play Sports? Theories from Evolutionary Psychology*

Knowing the basics of Evolutionary Psychology, we should be able to explain sports through this discipline. It is generally agreed that sports arose as a by-product of other adaptations that are critical for survival and there are four main theories that expand on this (Deaner et al., 2016). First is the Spectator Lek hypothesis proposed by Lombardo (2012). This hypothesis is mainly applicable to men as it is based on the prediction that sports are used to prepare males for hunting. Lombardo hypothesized that males use sports to gain status and evaluate potential allies or competitors by watching other men compete. Sports are essentially a mating display for male spectators to assess their rivals without the cost of competing. The Spectator Lek hypothesis predicts that sports allow males to develop physical skills and behaviors necessary to succeed in male-male competitions. These same skills are also valuable for hunting and fighting in wars. Reproductive opportunities are directly correlated to athletic success and sports increase in cultural importance as the status of the champion increases (Lombardo, 2012). Lombardo also claimed that females have evolved cognitive adaptations used to assess athletic ability, fitness, status, and competitiveness in males. Finally, according to this hypothesis, men are more avid sports fans than women. 75% of males versus 50% of females are sports fans (Lombardo, 2012). According to this hypothesis, females will judge males based on status increases from athletic success. Ultimately, the Spectator Lek hypothesis is not applicable to female athletes because women gain status by marrying a male of high status, not by excelling in sports.

Another hypothesis is the Courtship Display hypothesis which states that sports are used for men to show off their physical attributes and good genes to attract a mate (Deaner et al., 2016). When applied to females, this hypothesis would predict that excelling in sports should

increase female attraction (Deaner et al., 2016). One study assessed this statement by presenting men with a vignette about a woman who was either athletic or not athletic. The main finding was that males who themselves were athletes found the hypothetical female athlete as more attractive (Michael et al., 1984). Another study reported that women were more likely to report that they participated in sports to improve their appearance (Apostolu, 2014). The Courtship Display hypothesis is especially applicable for stylistic sports that emphasize femininity such as gymnastics or figure skating. One study even found that female's dancing attracts male mates (Hanna, 2010). The issue with this hypothesis is it would predict that women are the main spectators of men's sports which is not true (Deaner et al., 2016).

The Allying with Coalitions hypothesis best explains men's interest in sports and sports fandom, predicting that sports fosters strong alliances between men. This hypothesis predicts that allying with a team is greatest when the competition between groups shows characteristics that are relevant to warfare, such as fighting or mate access. It has also been shown that sports fans act as if they are members of the actual team they support. This hypothesis is relevant to females, especially since women would form strong alliances to help with child care, gathering food, and taking care of household chores. The downfall of this hypothesis is it fails to explain why people participate in sports (Deaner et al., 2016).

The fourth hypothesis is the Development of Skills hypothesis that says sports foster the development of critical skills for other activities such as hunting, war, or general survival. In addition, sports build character and fosters social and motor development. There are correlational studies that show that participating in sports yields higher academic performance and other benefits that aid in survival (Eccles et al., 2003). This hypothesis fails to determine which

specific skills promote positive development and if there is a difference between organized competitive sports and noncompetitive exercise (Deaner et al., 2016).

### *Other Explanations*

There are other explanations outside of Evolutionary Psychology that account for why humans play sports. From a biological standpoint, prenatal androgens have been shown to correlate with athleticism, especially in females. This prenatal exposure can be quantified in the ratio of the second digit to the fourth digit on the hand. A lower 2D:4D ratio is correlated with higher achievement in sports. Females, whose main sex hormone is estrogen, can also be exposed to high levels of prenatal androgen. This condition is called Congenital Adrenal Hyperplasia and affected females are higher achieving in sports than unaffected females and show a stronger interest in traditionally male-dominated sports (Deaner et. al., 2016).

Traditionally, sports were considered to be activities for males and only in the last fifty years has it become the norm for females to participate in sports. Even at a young age, males are socially more predisposed to be athletes. A study that examine a co-ed tee-ball team comprised of 5-year-olds showed that coaches paid more attention to the males on the team than to the females, giving them more coaching, encouragement, and playing opportunities (Landers & Fine, 1996). Parents have also been shown to perceive their sons as having greater athletic abilities than their daughters (Fredricks & Eccles, 2005). Moreover, there is evidence of an 'older brother' effect and one study showed that females with an older brother were 18% more likely to play a sport (Videon, 2002). Although it seems like a plausible explanation, more research needs to be conducted on this topic to draw stronger conclusions. The social and biological explanations on their own are not sufficient to explain why humans play sports but they do contribute to the evolutionary hypotheses (Deaner et. al., 2016).

### *Present Experiment*

Overall, these hypotheses go some way to explain why men play sports, but they fail to provide a concrete explanation for why women play sports. Spectator Lek does not apply to women at all, Allying with Coalitions only applies for women sports fans. The Courtship Display hypothesis applies to women but only for stylistic and feminine sports such as gymnastics and figure skating. Development of Skills is feasible for women, but can these skills be developed noncompetitive exercise? To address this gap, a survey was distributed to undergraduate athletes on a team sport (basketball, soccer), individual sport (tennis, swimming and diving, track and field), and non-athletes at Carnegie Mellon University. Although the individual sports comprise a team, athletes compete individually and therefore we expect to see differences between individual sport athletes and team sport athletes.

This survey was comprised of four surveys that have been previously used in other studies and proven to be reliable. These surveys are The Sports Orientation Questionnaire (SOQ), The Exercise Motivations Inventory (EMI), The Mate Value Questionnaire (MVQ), and the Social Dominance Orientation (SDO) Questionnaire. The SOQ assesses attitudes regarding sports and competition with questions such as “I am a determined competitor”. The EMI surveys various motivations to exercise such as health, social, appearance, and enjoyment. The MVQ assesses your perceived mate value (how good of a mate you think you are) and also how you think others perceive your mate value. Finally, the SDO measures social dominance through belief in a societal hierarchy and where their ‘group’ falls on this hierarchy.

### *Hypotheses*

This study is novel in that no one has previously examined specifically why women play sports by looking at sex differences in sports participation, exercise motivations, mate value, and social dominance. Additionally, studying Division III athletes is unique because none of the athletes received a scholarship to play their sport at Carnegie Mellon. Because of this, we eliminated any monetary motivation to participate that could exist in Division I, Division II, or professional levels, while still maintaining a high level of athletic success and enjoyment of the sport. We predicted a number of sex differences for students who play sports as well as differences between athletes who play a team sport, athletes who play an individual sport, and non-athletes.

Females should be motivated to exercise to improve their appearance. Evolutionary psychology suggests more attractive females will gain access to male mates with a higher mate value. Males are expected to be motivated to exercise to form social bonds with other males because male coalition formation is stronger than females, consistent with the Allying with Coalitions hypothesis (Tooby & Cosmides, 1988). Additionally, males should be motivated by competing and winning to show they are the best athlete. Athletic success increases mate value according to Lombardo so the top athlete should gain access to the best mates. Athletes in general should score higher on measures of competitiveness and sports interest than non-athletes and we would predict that athletes on a team sport will score higher in competitiveness and win orientation than athletes on an individual sport due to intrinsic intrasexual selection and the desire to be the best athlete on the team/group. Female non-athletes are expected to be highly motivated to exercise to improve their appearance and manage their weight. Female athletes should also score high for measures of weight and appearance than male athletes and male non-athletes. Female athletes typically have a 'fit' appearance and therefore are less concerned about

exercising to look good than female non-athletes, although there should be strong sex differences as males should score lower in these categories.

Athletes on a team sport should report a greater motivation to exercise based on appearance to stand out among the team as a superior mate. It is easier for individual sport athletes to show they are superior as there is a clear hierarchy in the results so therefore they should be less motivated by improving their appearance. Individual sport athletes are expected to be more motivated to exercise for social reasons since the nature of their sports are very isolated making them more motivated to form social bonds. Team sports already have an automatic group that's success relies on these social bonds so they should be less motivated by this social measure. Additionally, we would predict that individual sport athletes would have a higher self-perceived mate value and higher social dominance, followed by athletes on a team sport and then non-athletes. Within each group, males are expected to score higher than females. This is expected because individual sports athletes should have higher self-confidence in order to be more successful in their sport which should then translate to measures of mate value and social dominance.

## ***Methods***

### *Participants*

Participants were 190 undergraduate students at Carnegie Mellon University ranging from 18-23 years of age. Informed consent was obtained from all participants. Participation was voluntary and responses were assured to be confidential. Athletes were recruited by email and there was no compensation for participating. There were 96 athletes on a varsity sport at Carnegie Mellon who participated: 40 members of team sports (22 female) and 56 members of

individual sports (30 female). Additionally, 94 non-athletes (59 female) participated in this study. Team sport athletes participated in basketball or soccer (age  $20.08 \pm 1.23$ ). Nine basketball players (5 female) and 31 soccer players (17 female) took the survey. Individual sport athletes participated in swimming and diving, tennis, or track and field (age  $19.45 \pm 1.16$ ). 16 swimmers and divers (7 female), 8 tennis players (5 female), and 32 track and field athletes (18 female). Non-athletes (age  $19.81 \pm 1.42$ ) were recruited through the Carnegie Mellon Psychology Department Participant Pool and received course credit. Forty-six participants failed to complete the survey so they were excluded from the final results. This study was approved by Carnegie Mellon's IRB.

### *Survey*

The survey was presented on Qualtrics, an online survey tool. Participants first provided consent to participate, demographic information, and then completed the four surveys; SOQ, EMI, MVQ, and SDO. The SOQ consists of 25 items rated on a scale of 1 (Strongly Disagree) to 5 (Strongly Agree) (Gill & Deeter, 1988). Questions examined three prominent motivations to participate in sports; competitiveness (13 items), win orientation (6 items), and goal orientation (6 items). The scores were calculated as an average of the subset of questions corresponding to the three motivations. Gill and Deeter (1988) originally presented the effectiveness of the survey, compiling data from high school and collegiate athletes. This study has been extended to many populations of athletes and non-athletes (Gill & Deeter, 1988, Deaner et al., 2015).

The EMI is a 51 question survey examining various motivations to exercise created by Markland and Ingledew (1997). For scoring, the questionnaire is divided into 14 subsections or motivations that are each assessed with 3-4 questions. It is scored on a scale from 0 (not at all true for me) to 5 (very true for me). Some of the relevant subsections assessed in this paper were

appearance, weight management, social recognition, and affiliation. We calculated an average for questions about appearance and weight management and also an average for social recognition and affiliation questions. From these, single questions were assessed separately to see if they produced more of a difference than the combination score. Some individual questions include, “personally I exercise (or might exercise) to stay slim”, “to look more attractive”, “to spend time with friends”, and “to gain recognition for my accomplishments”.

The MVQ (Edulund & Sagarin, 2014) is a four question inventory developed to determine one’s self-reported mate value. The first two questions are rated on a scale from 1 (extremely undesirable) to 7 (extremely desirable), asking, “Overall, how would you rate your level of desirability as a partner on the following scale?” and “Overall, how would members of the opposite sex rate your level of desirability as a partner on the following scale?” The next question is, “Overall, how do you believe you compare to other people in desirability as a partner?” from 1 (very much lower than average) to 7 (very much higher than average). The last question asks, “How good of a catch are you?” on a scale of 1 (very bad catch) to 7 (very good catch). This survey measures how good of a mate you perceive yourself to be and this measure has been shown to correlate with confidence and body-esteem (Goodwin et al., 2012, Bale & Archer, 2013). Mate value is an important aspect of evolutionary psychology so it was important to include this survey because we predicted a positive correlation between mate value and sports participation.

The final survey used was the 16-item SDO used to measure one’s preference for a social hierarchy and degree of inequality amongst groups. Men have been shown to score higher on the SDO, the scores correlate with social and political ideologies, employment seeking where high SDO people prefer jobs with a hierarchy with opportunity for advancement, and many

personality traits such as empathy and authoritarianism (Pratto et al., 1994). Participants rated statements on a scale of 1 (very negative) to 7 (very positive) regarding the degree to which they agreed or disagreed with those statements. Some examples of questions are, “Some groups of people are simply inferior than others”, “All groups should be given an equal chance in life”, and “No one groups should dominate in society”. This survey was included because we predicted sex differences in social dominance as well as differences between athletes and non-athletes.

## Results

### *Athletes vs. Non-athletes*

Data from athletes on team and individual sports were combined and compared to non-athletes for males and females separately. Initial analyses revealed that the data were not normally distributed.

Consequently, permutation tests were used to estimate p values for all of the analyses presented here. For the SOQ, there were main effects for athlete status

and sex and a significant interaction between these

variables ( $p < .01$ ). Male athletes ( $M = 4.41$ ,  $SD = 0.38$ ) scored significantly higher than male non-athletes ( $M = 3.97$ ,  $SD = 0.72$ ),  $t(77) = 3.43$ ,  $p < .001$ . Female athletes ( $M = 4.35$ ,  $SD = 0.39$ ) also scored significantly ( $p < 0.001$ ) higher on the SOQ than female non-athletes ( $M = 3.56$ ,  $SD =$

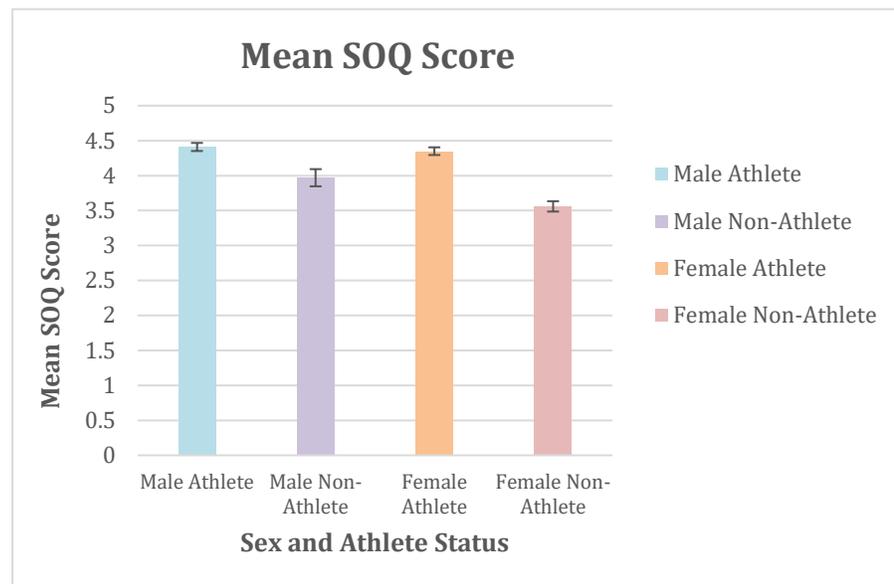


Figure 1: Mean SOQ Score for Sex and Athlete Interactions

0.56),  $t(109) = 6.25, p < .001$ . The data for the SOQ are presented in figure 1. Male and female athletes did not significantly differ with respect to the SOQ. The EMI was assessed as a total score and additional sub-scores for questions regarding appearance and social motivations. There was no significant interaction between athlete status and sex but athletes' EMI scores ( $M = 3.01, SD = 0.70$ ) differed marginally from non-athletes ( $M = 2.79, SD = 0.88$ ), ( $p = 0.056$ ).

For the social score, the main effect of athlete status was significant as well the interaction between sex and athlete status. As predicted, male athletes were significantly ( $p < 0.0001$ ) more motivated to exercise for social reasons than female athletes ( $M = 2.84, SD =$

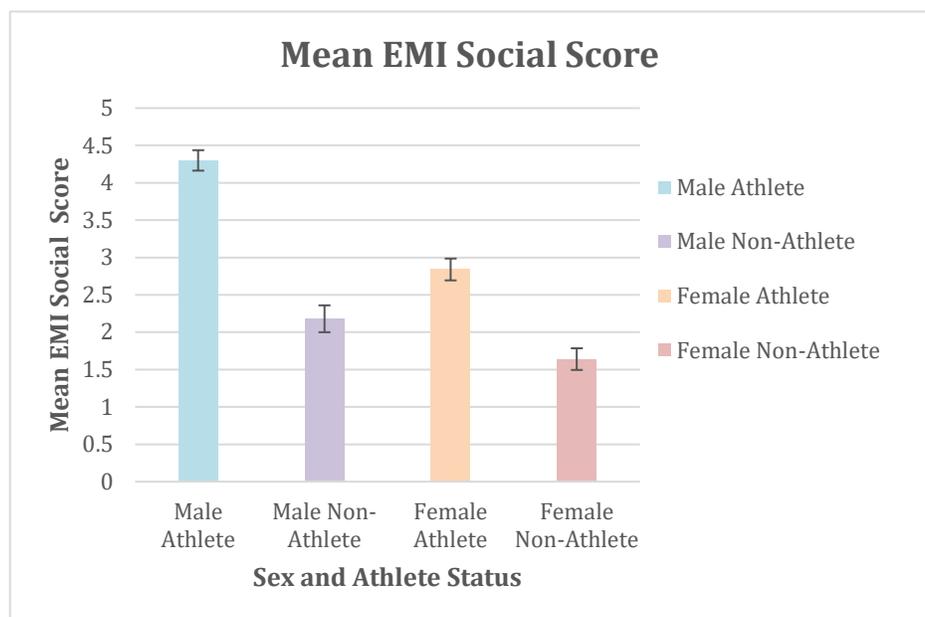
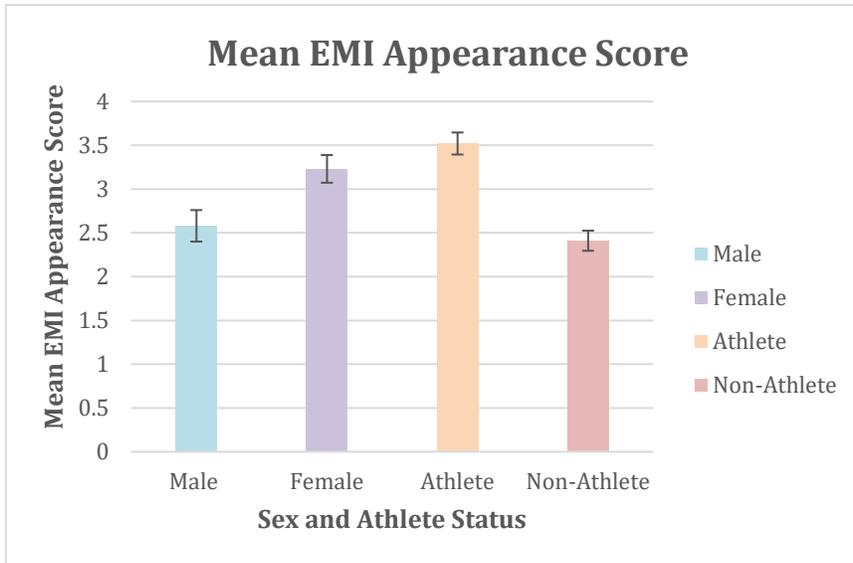


Figure 2: Mean EMI Social Score for Sex and Athlete Interactions

1.05),  $t(94) = 9.38, p < .0001$ . Male athletes reported significantly ( $p < 0.0001$ ) higher social scores than male non-athletes while female athletes reported significantly ( $p < 0.0001$ ) higher social scores than female non-athletes. Male non-athletes reported significantly ( $p < 0.0001$ ) higher social scores than female non-athletes. The data for the EMI social score are presented in figure 2.



For EMI questions regarding motivations to exercise to improve appearance, the main effects for sex and athlete status was significant. Overall, females ( $M = 3.23, SD = 1.25$ ) reported significantly

Figure 3: Mean EMI Appearance Score for Sex and Athlete Status

( $p < 0.0001$ ) greater motivation to exercise

based on appearance than males ( $M = 2.58, SD = 1.18$ ),  $t(188) = 3.59, p < .0001$ . Athletes ( $M = 3.52, SD = 1.04$ ) reported a significantly ( $p < 0.001$ ) higher appearance motivation score than non-athletes ( $M = 2.41, SD = 1.34$ ). Interactions

between sex and athlete status for EMI appearance scores were not significant.

Data for EMI appearance scores can be found in

figure 3. The analyses of

MVQ scores showed only a

significant ( $p < 0.015$ ) main effect for sex with males ( $M = 5.12, SD = 1.05$ ) scoring higher than

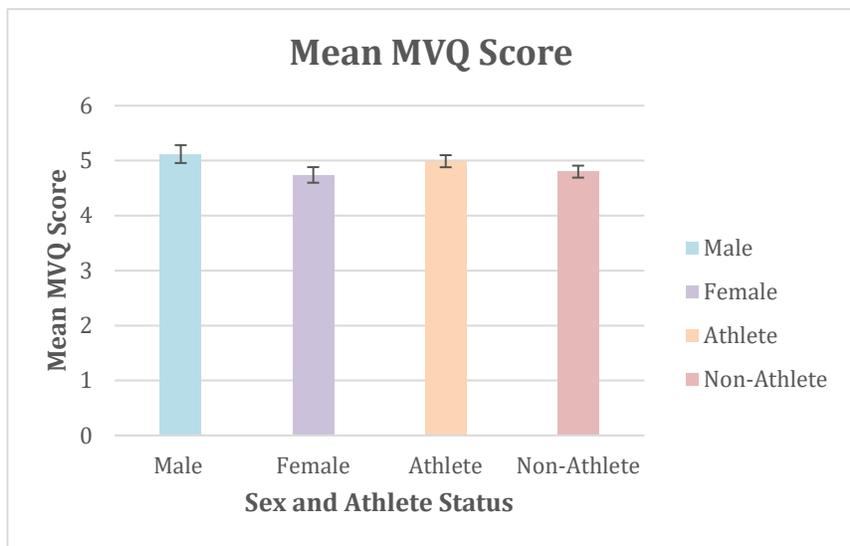


Figure 4: Mean MVQ Score for Sex and Athlete Status

females ( $M = 4.74$ ,  $SD = 1.06$ ). MVQ data is presented in figure 4. There were no significant main effects or interactions between sex and athlete status for the SDO results.

### *Individual Sports vs. Team Sports*

T-tests were performed on all four sub-surveys for athletes on an individual sport (IS) and athletes on a team sport (TS). The SOQ scores for IS and TS were assessed for competitiveness, win orientation, goal orientation, and total SOQ score. A significant effect was found for win orientation and a marginally significant effect was found for goal orientation. TS ( $M = 4.37$ ) reported significantly ( $p < 0.0001$ ) higher scores than IS ( $M = 3.81$ ),  $t(94) = 4.60$ ,  $p < .0001$ , for win orientation. For goal orientation, IS ( $M = 4.55$ ) reported marginally significantly ( $p = 0.082$ ) higher scores than TS ( $M = 4.37$ ),  $t(84) = -1.76$ ,  $p = .082$ . Results of the EMI showed a significant effect for social motivations. IS ( $M = 3.05$ ) reported significantly ( $p = 0.003$ ) higher motivation than TS ( $M = 2.44$ ),  $t(84) = -3.08$ ,  $p = .003$ , for exercising for social reasons. The appearance EMI score and total EMI score did not significantly differ between TS and IS. The MVQ yielded a significant result with TS ( $M = 5.41$ ) reporting significantly ( $p = 0.001$ ) higher scores than IS ( $M = 4.70$ ),  $t(94) = 3.51$ ,  $p = .001$ . There were no significant differences between TS and IS for the SDO.

### *Discussion*

The goal of this study was to examine sex differences in sports participation among athletes on a team sport, athletes on an individual sport, and non-athletes. One hundred ninety athletes and non-athletes from Carnegie Mellon University completed a survey that examined motivations to play sports and exercise, self-perceived mate value, and social dominance. We were specifically interested in motivations for females to play sports and exercise, hypothesizing

that they would align with evolutionary motivations such as attempts to increase physical attractiveness and forming social bonds with other females. Although there is large literature on evolutionarily-based reasons for males to play sports, we were interested in replicating prior results and extending them to examine differences between males and females as well as athletes on team and individual sports.

### *Explanation of Sex Differences between Athletes and Non-Athletes*

Consistent with prior results, athletes scored higher than non-athletes on the measure of competitiveness. Our hypothesis that sex differences exist between male and female athletes and non-athletes was supported as both male and female athletes reported being more competitive than male and female non-athletes. This result was expected but nonetheless important to establish a baseline difference between athletes and non-athletes.

Females were more motivated than males to exercise to improve their appearance, which we predicted. This result supports evolutionary motivations for females to maintain an attractive figure to mate with males with a higher mate value. In a cross-cultural study of sports, Apostolou (2014) also found a sex difference in appearance motivation to exercise. Of the 37 countries surveyed, 24 reported females rating this motivation significantly greater than males. This left 13 countries that did not show a sex difference for the appearance motivation measure. Our results are notable because we deliberately tested athletes and non-athletes and found a significant difference between these two groups. Our more constrained participant pool achieved results that align with prior research that had a larger number and variety of participants. Additionally, the average age of participants in Apostolou's study was 45.8 whereas our participants are much younger showing the greater desire of females to look good is consistent across many ages. We predicted that female non-athletes would report greater motivation to exercise to improve their

appearance than female athletes because female athletes should already have a more 'fit' figure; however, we found no difference among females in motivation to exercise suggesting that all females are equally motivated to improve or maintain their appearance regardless of athlete status. The fact that all females (athletes and non-athletes) are more motivated than males to exercise for their appearance aligns with evolutionary predictions for general exercise participation.

The social motivations from the EMI produced results supporting our predictions that males should be more motivated than females to participate in sports for social reasons. This prediction was based on the notion that male coalition formation is stronger than that of females (Tooby & Cosmides, 1988). In an early study of sex differences in coalition formation, Vinacke & Gullison (1963) showed that college-aged males exhibited stronger and more aggressive coalition formation than females. Tooby and Cosmides (1988) proposed that humans have a specialized mechanism for forming coalitions and males show greater coalition aggression than females. Additionally, this coalition formation benefits males more than females because females typically have access to males whereas forming strong coalitions gives males a greater chance of successful reproductive opportunities (Tooby & Cosmides, 1988). The results of this study showed that males were more motivated than females to play sports for social reasons. To our knowledge, there is only one previous study that examined sex differences in social motivations to exercise: Apostolou (2014) asked if participants were motivated by meeting other people. The effect size was too small, however, and it was concluded that there was no difference between males and females for this measure. This is an exciting and novel finding because it directly supports evolutionary hypotheses regarding male coalition formation and our hypotheses about exercise motivation. These conclusions align with the formation of coalitions hypothesis but that

hypothesis focused more on sports fandom instead of sports participation (Deaner et al., 2016). As expected, male and female athletes reported greater social motivation to exercise than their respective non-athlete counterparts. Male athletes are more competitive than male non-athletes so they should seek out a group of elite males to increase reproductive opportunities. Similarly, female athletes should seek out other females who have food and other resources to share, ensuring survival.

Because males and females have different criteria for a mate, we did not make predictions about overall sex differences in mate value between males and females although we found that males reported a greater mate value than females. This could be explained by men having an inflated perceived mate value compared to females. Part of a study conducted by Brase and Guy (2004) surveyed self-perceived mate value and found males reported a greater mate value than females across all ages surveyed. Specifically in the 18-25 year-old range, males reported a greater mate value than females but this difference was not significant. In contrast, the present study found a significant effect on mate for sex. We predicted sex differences between athletes and non-athletes with athletes reporting a higher mate value but the results showed no such difference suggesting mate value is not influenced by athlete status.

#### *Explanation of Sex Differences between Individual and Team sports*

To our knowledge, no prior study has specifically examined sex differences between individual and team sports. On team sports, players are constantly competing as members of a team in practice and in competitions whereas on individual sports, players compete individually typically contributing points or wins to an overall team result. Because of this difference, we expected differences between athletes on team and individual sports and sex differences between them. The SOQ measure of win orientation showed that TS scored higher than IS. This outcome

was predicted because members of a team should be more motivated to win to be the best athlete on the team. The SOQ measure for competitiveness yielded no difference between TS and IS which is consistent with a prior study that examined college cross country runners and found no difference in the SOQ competitiveness measure for the most elite athletes (Deaner et al., 2015).

Our hypotheses regarding exercise motivations were supported. IS reported a greater motivation to exercise for social reasons. This was hypothesized because individual sports can be isolating thereby motivating these athletes to want to form social bonds that in the past would benefit survival (Deaner et al., 2016). Group cohesion is a necessary component of team sports so these athletes are less motivated by this factor. But, it could be argued that athletes prefer to play a team sport for easier access to strong social alliances so are originally motivated by this but this social motivation is diminished once they become a member of the team. We could test this result by surveying groups before and after a tryout, to see if this social motivation decreases once they are a true member of the team and need to put less effort into finding a strong coalition. If this is a tryout for multiple levels of teams (i.e. 'A' team, 'B' team), we should expect members of the better teams to report a lesser social motivation than those on a lower level team. The reverse result was observed for females on the EMI appearance score. Female TS reported greater motivation than female IS to exercise to improve their appearance. Consistent with evolutionary hypotheses, appearance is not as important to males as females so it is not surprising there was no difference between male IS and TS for EMI appearance scores. As previously discussed, it is more difficult for members of a team sport to stand out so it makes sense that female TS should be more motivated than female IS to be motivated to exercise to improve their appearance.

We expected IS to report a higher mate value than TS because competing individually requires more confidence which would translate to a higher self-perceived mate value. The opposite result was found as TS reported a higher mate value than IS. Prior research by Howard (2003) examined anxiety and confidence in collegiate athletes and found that TS reported higher self-confidence than IS. Unfortunately, Howard (2003) only surveyed males and the only similar sport surveyed was track and field. The author provided no explanation for this result so we suggest this difference is due to an inflated confidence in team sport athletes. Only the best of the best on the team are recognized, such as the quarterback or star striker whereas there are more opportunities for individual sport athletes to show off their athletic ability with maximal attention. A defender on a soccer team might be just as talented as the star striker but the striker is scoring more goals and gets more attention and recognition so therefore has a greater monetary worth. For example, Neymar Jr., currently considered one of the best strikers in the world set the record for highest transfer fee of \$528 million when he left FC Barcelona to join Paris St-Germain in 2017 (Gaines, 2017). But, Virgil van Dijk, the most expensive defender was transferred from Southampton to Liverpool for just \$100 million also in 2017 (Smith, 2017). The star goal scorer is valued at over five times as much as the best defender so clearly there should be a greater desire to stand out in a team sport because your worth is dependent on your role on the team. The MVQ assesses one's own perceived mate value, so we are unable to compare this to a true value; but this measure is important because it demonstrated that male TS believe they have a higher mate value than male IS and overall TS have a higher self-perceived mate value than IS.

### *Study Limitations*

One main limitation to this study is generalizability concerns. The population surveyed included athletes who play a Division III sport and non-athletes at a strong academic institution. We believe the results can generalize to a larger population but these concerns must be addressed. Division III athletes differ from division I or II athletes in two main ways: they receive no scholarship for playing their sport in college and in division III, academics take precedence over athletics so these athletes tend to be more academically motivated than athletes in other divisions. The non-athletes surveyed are also highly academically motivated and tend to focus their time into academics or other non-athletic activities. Of the surveyed non-athletes, they reported exercising on average, 2.65 days per week, compared to athletes who exercise six days a week while in season. The common focus on academics across athletes and non-athletes could explain many of the null results. Additionally, the population of non-athletes included students who participate in club or intramural sports (24/94, 25.5%) which could also explain why many measures failed to show differences. Likely, these results should at least generalize to other high academic division III institutions, if not to a larger population. Regardless, many notable results were achieved that further our understanding of these sex differences.

### *Conclusions and Future Directions*

Many interesting results emerged from this study that warrant further investigation. The most interesting and novel result was that males reported a greater social motivation to exercise than females. To our knowledge, this is the first experimental finding on this issue, and it would be interesting to investigate further. Consistent with prior findings and what evolutionary psychology would predict, females reported a greater motivation to exercise to improve their appearance than males. We found that males overall had a greater self-perceived mate value than females. Furthermore, athletes on a team sport reported a greater self-perceived mate value than

athletes on an individual sport. Athletes on an individual sport reported greater social motivations for playing their sport. Hopefully these results can further our understanding of why women play sports. In the future, female specific hypotheses could be formulated to explain women's sports participation similar to ones that exist for males. Overall, these results seem to align with an evolutionary explanation for why we play sports and further research should be conducted to support and more deeply examine these results.

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