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Running head: INFLUENCE OF SPORT MOTIVATION ON EATING DISORDERS

Motivation for Sport Participation and Eating Disorder Risk Among Female Collegiate Athletes

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Abstract

In light of conflicting research regarding eating disorder risk and sports participation, the current study examined the relationship between specific aspects of sports participation (i.e., level of competition, leanness requirements, physical/cardiovascular intensity level), an individual's motivation for sports participation and eating disorder symptomatology/risk. Participants included 319 female collegiate athletes (M age=19.88; SD =1.62) representing a variety of sports and competition levels. Multilevel modeling found that level of competition, receiving a scholarship, age, and years of collegiate sport played did not predict eating disorder risk. In the final model, there was a significant interaction between intrinsic motivation and sport intensity. For high intensity sports, higher levels of intrinsic motivation were associated with lower eating disorder risk. For low intensity sports, the level of intrinsic motivation did not impact eating disorder risk. For all sport intensities, extrinsic motivation was associated with a higher eating disorder risk. Results suggest that it is not the specific sport, but athletes' motivation for those sports with high physical/cardiovascular intensity and leanness requirements that is associated with untoward consequences. The results clarify conflicting results previously reported in the literature that have primarily employed univariate analyses and have implications for athletic development programs.

Key Words: Athletes; Eating Disorders; Motivation; Risk Factors; Sports Participation

Clinical Implications

- Specific sport type does not predict eating disorder risk in female collegiate athletes
- Athletes' motivation for those sports with high physical/cardiovascular intensity and leanness requirements was found to be associated with eating disorder risk.
- Intrinsic motivation was associated with a lower eating disorder risk and extrinsic motivation was associated with a higher eating disorder risk in sports that involve high physical/cardiovascular intensity and in leanness-oriented sports

Motivation for Sport Participation and Eating Disorder Risk Among Female Collegiate Athletes

Participation in sports confers many benefits to female athletes' health, self-esteem, confidence, skill development, and social functioning (Armstrong & Oomen-Early, 2009; Bowker, 2006; Dodd & Vetter, 2015; Snyder et al., 2010). However, some aspects of athletic competition and training may undermine the physical and psychological health and well-being of female athletes. The emphasis that the sport environment places on physical development and training as well as nutritional strategies and diets to optimize performance may increase athletes' risk for developing eating disorders. Additionally, specific body type or weight requirements necessary for athletic success have been associated with increased risk (Engel et al., 2003; Holm-Denoma, Scaringi, Gordon, Van Orden, & Joiner, 2009; Smolak, Murnen, & Ruble, 2000; Torstveit, Rosenvinge, & Sundgot-Borgen, 2008). Furthermore, the psychological stress associated with athletic competition and the focus on performance-related goals over psychological needs may also increase athletes' risk (Bartholomew, Ntoumanis, Ryan, & Thøgersen-Ntoumani, 2011; Forsberg & Lock, 2006). Although difficult to estimate, point prevalence of eating disorders (i.e., anorexia nervosa) in female athletes ranges from 0.3% (Schaal et al., 2011) to 12.9% (Torstveit et al., 2008) and female athletes are more likely more likely to be diagnosed with an eating disorder than their male counterparts (Martinsen & Sundgot-Borgen, 2013; Milligan & Pritchard, 2006; Schaal et al., 2011).

Despite research suggesting an association between athletic participation and eating disorder risk, the literature on the relationship between specific aspects of sports participation and eating disorder symptoms is mixed. Results from several studies suggest that the prevalence of eating disorders is especially high among female athletes competing in sports that require: 1) elite levels of competition (Picard, 1999), 2) specific weight status or leanness for performance

(Sherwood, Neumark-Sztainer, Story, Beuhring, & Resnick, 2002; Torstveit et al., 2008), 3) performance associated with physical appearance (Schwarze et al., 2013; Jorunn Sundgot-Borgen & Torstveit, 2004; Zucker, Womble, Mlliamson, & Perrin, 1999), and/or 4) high physical/cardiovascular intensity exercise (Jorunn Sundgot-Borgen & Torstveit, 2004). However, other research has not found these associations (Berry & Howe, 2000; Greenleaf, Petrie, Carter, & Reel, 2009; Kirk, Singh, & Getz, 2001). Consequently, the aspects of sports participation associated with eating disorder symptoms is unclear.

The preponderance of literature has focused on the role of the athletic context to understand the relationship between athletic performance and eating disorder symptoms. While individual differences in responding to the athletic milieu have not been considered, one randomized control trial found no new cases of eating disorders in elite female athletes who participated in a one-year school based intervention program aimed at preventing the development of eating disorders using a social cognitive framework which included the concepts of intrinsic and extrinsic motivation (Martinsen et al., 2014). Potentially, it is not the sports participation per se but individual differences in responding to this participation that contributes to the increased risk of eating disorders in female athletes. One characteristic that may be relevant to risk and protection from eating disorders is the motivational approach female athletes bring to their sport participation.

Several motivational approaches related to sports performance have been identified. Intrinsically motivated athletes engage in sports for the inherent enjoyment, satisfaction, and pleasure derived from the sport (Deci, 1975; Deci & Ryan, 1985). These athletes are driven by feelings of pleasure, contentment, and competence when they are learning new skills, mastering difficult techniques, or experiencing sport-related sensations (Pelletier et al., 1995). Extrinsically

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4 motivated athletes are influenced by external factors for participation such as winning, obtaining
5 material rewards, gaining public approval, or avoiding disapproval of others (Pelletier et al.,
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9 1995). Rather than for the value of the participating in the sport itself, these athletes tend to
10 participate for the outcome rather than the process (Deci, 1975; Deci & Ryan, 1985). Finally,
11 athletes are considered amotivated when they are unable to identify the reason for their
12 participation and perceive a disconnect between their actions and the outcomes of their actions
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19 (Deci & Ryan, 1985). Consequently, amotivated athletes may eventually stop competing
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21 (Pelletier et al., 1995).
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24 The three motivational categories reflect varying levels of self-determination with
25 intrinsic motivation constituting the greatest level of self-determination and extrinsic motivation
26 with the lowest levels of self-determination (Deci & Ryan, 1985). Amotivation is separate from
27 this continuum, representing a lack of self-determination and absence of motivation (Deci, 1975;
28 Deci & Ryan, 1985; Pelletier et al., 1995). Less self-determined forms of motivation (i.e.,
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extrinsic motivation, amotivation) are associated with increased feelings of helplessness,
incompetence, and uncontrollability; poor psychosocial adjustment; dropout or burnout in one's
chosen sport; and poor psychological adjustment (Baker, 2004; Deci & Ryan, 1985; Pelletier et
al., 1995; Sarrazin, Vallerand, Guillet, Pelletier, & Cury, 2002).

Many of the behavioral features that characterize extrinsically motivated and amotivated
individuals are associated with eating disorders. Individuals with eating disorder
symptoms/disorders show high levels of ineffectiveness (Froreich, Vartanian, Grisham, &
Touyz, 2016; Kitagawa, Asakura, Kusumi, Denda, & Koyama, 2002), helplessness (Troop,
Allan, Treasure, & Katzman, 2003), lack of control (Froreich et al., 2016; Kitagawa et al., 2002;
Troop et al., 2003), and low self-esteem (Kitagawa et al., 2002; Troop et al., 2003) with the level

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4 of each significantly related to severity of eating disorder symptoms (Troop et al., 2003). To
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6 date, no research has investigated the relationship between motivational style and eating disorder
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8 symptoms in female athletes. Further, the relationship between motivational style, factors related
9
10 to the athletic context (e.g., level of competition, intensity), and eating disorders symptoms has
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12 not been addressed.
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16 The purpose of the current study was to examine the relationship between motivational
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18 style for sports participation, factors related to sport participation (i.e., level of competition,
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20 physical/cardiovascular intensity level, leanness requirements) and eating disorders symptoms in
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22 female collegiate athletes. Other factors that may impact sport engagement were also considered
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24 including athletes age, receiving a scholarship, and years of collegiate sport played. It was
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26 hypothesized that athletes who endorse less self-determined forms of motivation will have
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28 increased rates of eating disorder symptoms. Further, it was hypothesized that athletes in sports
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30 requiring high physical intensity and/or leanness will endorse higher rates of eating disorder
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32 symptoms. No specific hypotheses were made for the impact of level of completion, scholarship
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34 receipt, years of participation and age because of the dearth of literature addressing these factors.
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41 Methods

42 *Participants*

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44 Female collegiate varsity athletes (i.e., training and competing in a sport, participating on
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46 a team formally registered with a sport federation, training and competing take a substantial
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48 amount of time; Araújo & Scharhag, 2016; $n = 319$; M age=19.88; $SD=1.62$) from a convenience
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50 sample of universities located in the Midwest and Mountain regions of the United States
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52 participated. The majority of athletes identified as White ($n=301$, 94.4%), followed by
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54 Hispanic/Latina ($n=11$, 3.4%), Asian American ($n=4$, 1.3%), Black American ($n=2$, 0.6%), and
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56 mixed ethnicity ($n=1$, 0.3%). Athletes represented eight sports: basketball ($n=35$), cheerleading
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($n=33$), cross-country ($n=31$), golf ($n=26$), soccer ($n=49$), softball ($n=38$), track and field ($n=48$), and volleyball ($n=59$) and competed at two levels: the National Collegiate Athletic Association (NCAA) Division I ($n=101$) and the National Association of Intercollegiate Athletics (NAIA; $n=218$). The NCAA is the largest association for collegiate athletes generally representing the bigger colleges and universities as compared to the NAIA. Athletes who attend NCAA Division I universities are considered to be competing at a higher level of competition as compared to athletes who compete at NAIA universities as NCAA universities are able to recruit the most competitive athletes, manage the largest athletics budgets, offer world-class facilities, receive the most media attention, and offer the most generous number of scholarships. On average, athletes participated in sports at the college level for 2.18 ($SD=1.12$) years and the majority (86.8%) received an athletic scholarship.

Athletes were divided by type of sport and competition level, as well as into the following groups: sports in which leanness and/or weight are considered important ($n=102$; cheerleading, cross-country, track and field-running, track and field-jumping events) and sports in which leanness and/or a specific weight are considered less important ($n=217$; basketball, golf, soccer, softball, track and field-throwing events, volleyball); and high physical/cardiovascular intensity sports ($n=145$; basketball, cross-country, soccer, track and field-running events) and low physical/cardiovascular intensity sports ($n=174$; cheerleading, golf, softball, track and field-throwing events, track and field-jumping events, volleyball). Athletes were not divided based on sports dependent on physical appearance because only one sport surveyed, cheerleading, has performance dependent on physical appearance

Measures

General demographic and background information. General demographic and

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4 background information collected from each athlete included age, ethnicity/race, collegiate sport,
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6 level of competition, years participated at the collegiate level, and participation on athletic
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8 scholarship. Athletes were also asked about their ideal weight and ideal weight for their sport,
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10 whether they were currently on a diet, if they tried to lose weight in the past, and if they have
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12 been diagnosed or have received treatment for an eating disorder.
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16 *Eating Disorder Inventory–3.* The Eating Disorder Inventory–3 (EDI–3; Garner, 2004) is
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18 a 91-item self-report measure used to assess eating disorder symptomology and psychological
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20 characteristics associated with the development and maintenance of eating disorders. Items are
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22 scored on a 6-point Likert scale ranging from *always* to *never* with higher scores indicating a
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24 greater severity of eating disorder symptoms and increased psychological maladjustment
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26 (Garner, 2004). The validity and the reliability of the EDI–3 have been well established
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28 (Cumella, 2006; Garner, 2004; Thiel & Paul, 2006). Internal consistency reliability for the scale
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30 for study data was .97.
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36 *Sports Motivation Scale.* The Sports Motivation Scale (SMS; Pelletier et al., 1995) is a
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38 28-item self-report measure used to assess an athlete’s drive to participate in their sport, with
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40 seven subscales measuring different motives for sport participating varying in levels of self-
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42 determination (i.e., intrinsic motivation to know, intrinsic motivation to accomplish, intrinsic
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44 motivation to experience, identified regulation, introjected regulation, external regulation,
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46 amotivation). Items are scored on a 5-point Likert scale ranging from *corresponds exactly* to
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48 *does not correspond at all* to the extent to which it corresponds to the reasons why they are
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50 presently participating in their current sport (Pelletier et al., 1995). The factor structure of the
51
52 original version of the SMS has not been found to be psychometrically sound (e.g., Mallett,
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54 Kawabata, Newcombe, Otero-Forero, & Jackson, 2007; Martens & Webber, 2002) with
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subsequent factor analytic studies have supported a 3-factor structure (Alexandris, Tsorbatzoudis, & Grouios, 2002; Baker, 2004; Zahariadis Tsobatzoudis, & Grouios, 2005) and the revised version of the SMS (the SMS-II) collapsing the three intrinsic motivation subscales into one measure of intrinsic motivation (Pelletier, Rocchi, Vallerand, Deci, & Ryan, 2013). As a result, the seven scales were combined into three factors reflecting the three motivational approaches (Baker, 2004): intrinsic motivation (e.g., “For the pleasure I feel in living exciting experiences,” “For the pleasure of discovering new training techniques”), extrinsic motivation (e.g., “For the prestige of being an athlete,” “Because it allows me to be well regarded by people that I know”), and amotivation (e.g., “I used to have good reasons for doing sports, but now I am asking myself if I should continue doing it”; Pelletier et al., 1995). Participants receive a score on each of the motivational styles. Evidence for the validity and reliability of the 3-factor structure of the SMS has been reported (Alexandris, Tsorbatzoudis, & Grouios, 2002; Baker, 2004; Zahariadis Tsobatzoudis, & Grouios, 2005). Similar to previous research (e.g., Baker, 2004; Pelletier et al., 1995), intrinsic motivation and extrinsic motivation evidenced a low positive correlation in this study ($r=.31$). Internal consistency reliability for the SMS subscales were .86, .78, and .87 for intrinsic, extrinsic, and amotivation respectively for study data.

Procedure

Permission was obtained from each university’s athletic director and each sport’s coach prior to collecting data. Athletes were recruited during a team meeting before or after practice. Participation was voluntary and all procedures were completed in accordance with university and federal guidelines for protection of human subjects. Procedures for the study were approved by the Institutional Review Board of both universities where data collection took place. No athletic department personnel or coaches were present during data collection. Following the completion

of the demographic survey, EDI-3, and SMS, the researchers measured athletes' height and weight in a private space with only the researcher present. In exchange for participation, the names of the athletes from each division were placed in a pool from which a \$50 gift card was rewarded. Information regarding appropriate professional referral sources was provided to athletes suspected of engaging in eating disorder behaviors.

Analysis Plan

Given the clustered nature of the data, multilevel modeling was used to investigate the relationships between predictor variables and eating disorder risk. For all models, athletes (Level 1) were grouped into their sport (Level 2). Following a null model (intercept only), a top down model building approach was used. Predictors were added as fixed factors and non-significant predictors were dropped iteratively. Interactions were investigated between motivational strategies and sport variables (i.e., leanness requirements, physical/cardiovascular intensity level). Sport variables were also investigated as random factors. The final model was identified by considering parsimony and the lowest log likelihood, and statistical comparison of the log likelihood using a chi-square test. Analyses were conducted using the nlme4 package in R.

Results

Descriptive data. Approximately one-third ($n=99$; 31.0%) of athletes reported being dissatisfied with their current weight and 41.1% ($n=131$) believed that they would be classified as overweight according their BMI. Additionally, 55.5% ($n=177$) of athletes reported attempts to lose weight in the past and 23.2% ($n=74$) reported current efforts to lose weight. Most athletes ($n=146$; 61.9%) indicated that their weight remained stable varying between one and five pounds while 24.2% ($n=57/231$) and 14.0% ($n=33/231$) reported that their weight increased or

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4 decreased, respectively.¹ Only 2.2% ($n=7$) of the athletes reported being previously diagnosed
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6 with an eating disorder and four (1.3%) reported receiving treatment.
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9 *Preliminary analyses.* For the overall sample, the mean intrinsic motivation was 3.90
10 ($SD=0.06$), mean extrinsic motivation was 3.40 ($SD=0.06$), mean amotivation was 2.20
11 ($SD=0.09$), and mean EDI Risk was 27.60 ($SD=18.00$). Correlations between predictor variables
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13 were calculated (Table 1). Intrinsic and extrinsic motivation were positively related ($r=.307$).
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15 Intrinsic motivation was negatively related to amotivation ($r=-.448$) while the relationship
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17 between extrinsic motivation and amotivation was negligible ($r=.060$). The remainder of the
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19 relationships were generally small.
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25 *Modeling results.* Approximately twenty models were tested including two- and three-
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27 way interactions between motivation variables, two-way interactions with motivation variables
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29 and sport variables, and sport variables as random factors. The final model included intrinsic and
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31 extrinsic motivation, sport intensity, sport leanness and the interaction between intrinsic
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33 motivation and sport intensity, as is presented in Table 2. The estimated beta weights (β) in the
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35 table can be interpreted in the same way as univariate regression beta weights. The first step in
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37 understanding the model is to interpret the intrinsic motivation by intensity interaction, displayed
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39 graphically in Figure 1. For low intensity sports, the level of intrinsic motivation does not impact
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41 eating disorder risk as indicated by the solid, nearly parallel line depicting that across low,
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43 medium, and high levels of intrinsic motivation (the x axis) eating disorder risk is relatively
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45 unchanged. However, for high intensity sports, higher levels of intrinsic motivation are
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47 associated with lower eating disorder risk. In other words, as the level of intrinsic motivation
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49 increases, eating disorder risk decreases appreciably as depicted by the dashed line in Figure 1.
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60 ¹Due to a clerical error, 88 athletes were not asked if their weight remained stable over the past year.
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4 Extrinsic motivation was also statistically significant, with a positive beta weight.
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6 Interpretively, the interaction between intrinsic motivation and eating disorder risk is consistent
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8 at all levels of extrinsic motivation. However, as extrinsic motivation increases, the interaction
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10 will “move up” or increase such that values of both intrinsic motivation and eating disorder risk
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12 will be higher. Similarly, if extrinsic motivation was very low, the interaction would “move
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14 down”. Figure 1 depicts the relationship for an average level of extrinsic motivation. Finally,
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16 sport leanness was statistically significant. As indicated in Table 2, non-lean sports have a
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18 negative beta weight. Therefore, the interaction depicted in Figure 1 will be lower for non-lean
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20 sports and higher for lean sports. Thus, based on the model results, the highest level of eating
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22 disorder risk would be for an athlete with low intrinsic motivation, high extrinsic motivation,
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24 playing a high intensity, leanness focused sport.
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31 Discussion

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33 The present study found a unique interaction between specific components of the sport
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35 environment, motivational approach to sports participation, and eating disorder risk. In
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37 particular, sports with high physical/cardiovascular intensity (e.g., basketball, cross-country),
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39 sports in which leanness and/or a specific weight are considered important (i.e., cheerleading,
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41 track and field-running and jumping events), and athletes’ motivation for participating in their
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43 sport provided both risk and protection from eating disorder symptoms. That is, in sports that
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45 involve high but not low physical/cardiovascular intensity, intrinsic motivation was associated
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47 with a lower eating disorder risk and extrinsic motivation was associated with a higher eating
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49 disorder risk. This overall relationship also held for leanness-oriented sports. Thus, it appears
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51 that it is not the specific sport but how an athlete responds to the unique challenges of the sport
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53 that conveys risk and protection from eating disorder symptoms. The results of this study are
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4 consistent with previous research that finds athletes who adopt an external approach experience
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6 negative psychological sequelae (Baker, 2004; Deci & Ryan, 1985; Pelletier et al., 1995;
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9 Sarrazin et al., 2002).

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11 Given the potential demands for overtraining, exhaustion, and burnout in high
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13 physical/cardiovascular intensity sports (Cresswell & Eklund, 2006), an intrinsic motivational
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15 style and inherent focus on the process (e.g., learning new skills, fun/enjoyment) over the
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17 outcome (e.g., winning, avoiding disapproval) may allow athletes to encounter challenges and
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19 difficulty without a negative self-focus and consequent reliance on unhealthy behaviors to
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21 manage negative emotions. Conversely, when athletes are unable to control the outcome they
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23 desire, the focus on external motivators such as social comparisons, reward and winning may
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25 encourage control over eating, weight, or shape.
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31 In sports that emphasize physical/cardiovascular intensity and leanness, a focus on
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33 optimizing nutrition, dieting, and controlling weight and shape also may be seen as relevant to
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35 enhancing performance. Given a lesser emphasis on overall success or outcome in comparison to
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37 process, an athlete with an intrinsic motivational style may be less likely to take extreme
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39 measures to control their eating and weight in order to improve athletic performance. In contrast,
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41 athletes with an extrinsic motivation may be more likely to adopt such behaviors in an effort to
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43 enhance performance, behaviors that may place them at risk for an eating disorder. In sports that
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45 do not emphasize leanness or cardiovascular fitness, extrinsically motivated athletes may be less
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47 inclined to adopt such behaviors, as they may not see such behaviors as relevant to enhancing
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49 overall success.
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55 Given that amotivation has been associated with burnout from sports (Pelletier et al.,
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57 1995; Vallerand & Losier, 1999) and negative psychological sequelae among athletes (Baker,
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4 2004; Deci & Ryan, 1985; Pelletier et al., 1995; Sarrazin et al., 2002), it is unclear why
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6 amotivation was unrelated to eating disorder risk among these sports types. It is possible that a
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8 focus on controlling eating, weight, or shape requires considerable determination, and, therefore,
9
10 is not consistent with an amotivational orientation. An amotivational style may relate more to
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12 depression or sports burnout than eating disorder symptoms (Kenttä & Hassmén, 1998). Because
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14 this study did not examine depression or other psychopathology, it is unclear whether this
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19 motivational style led to other difficulties in adjustment.
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21 In addition to the cross-sectional nature of the research, a primary limitation of this study
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23 includes the reliance on self-report measures which introduces shared method variance and
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25 potential self-presentation biases. In particular, athletes who may fear detection related to
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27 jeopardizing their athletic career to protect their athletic department and coaches may have been
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29 inclined to underreport eating disorder symptoms (Garner, 2004; J. Sundgot-Borgen, 1993,
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31 1994). In addition, this study may contain some selection bias as some athletes' decision to
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33 participate in the study may have been influenced by the topic of the study. Finally, this study is
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35 also limited in its ability to generalize to other athletic populations, particularly high school
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37 athletes and male athletes. Given prior research suggesting males with eating disorders are more
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39 likely to use exercise to regulate emotions, motivations for sports participation may apply
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41 differently to eating disorder risk for males (Murray, Griffiths, Rieger, & Touz, 2014). As such,
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43 future research examining motivation for sports participation in males is necessary examine this
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51 question.
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53 Despite these limitations, this study has several strengths including the diverse range of
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55 sports sampled and representation of both elite and non-elite collegiate varsity athletes. In
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57 addition, the focus on motivational style adds nuance to understanding the complex relationship
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4 between sports participation and eating disorders. An additional strength is the use of multilevel
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6 modeling which allowed us to consider eating disorder risk as a multilevel phenomenon
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8 including both individual and shared contextual factors shedding light on mixed findings of
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10 previous literature that primarily relied on univariate analyses.
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14 Given previous findings of eating disorder risk in sport types not examined in this
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16 research such as appearance related sports (e.g., gymnastics, figure skating, karate, wrestling),
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18 individual verses team sports, and adjudicated sports (e.g. gymnastics, diving, cheerleading),
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20 future research should examine similar interactions among these sports types. Replication studies
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22 with larger samples are also needed to answer additional interpretive and mediational questions.
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24 Based on the cross-sectional nature of the study, causal inferences cannot be made. At this time,
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26 it is unclear whether the specific motivational approach for athletic participation influences the
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28 development of eating disorders or whether pathological eating problems affect the specific
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30 motivational approach of the athlete. In order to understand causal influences, prospective
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32 research with large samples of a diverse range of athletes and sports types is warranted.
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38 The results of this study have several implications for supporting female athletes'
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40 psychological health and well-being and preventing eating disorders. In particular, coaches and
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42 trainers of young female athletes should focus on athletic development programs that incorporate
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44 an exploration of athletes' intrinsic values and help them connect their values to their pursuit of
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46 athletic goals. In particular, an athlete who focuses on their values of leadership, teamwork
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48 and/or friendship may support another teammate who is struggling, adding further meaning to
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50 sports participation and reducing unwanted anxiety and emotion driven behaviors such as
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52 controlling weight and shape associated with achievement of extrinsic goals. In the field of
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54 sports psychology, acceptance and commitment therapy (ACT; Hayes, Strosahl, & Wilson,
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4 1999), a third wave cognitive behavior therapy which focuses on values-based living and
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6 reducing avoidance associated with unwanted emotions and distress has emerging support for
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8 reducing performance anxiety, enhancing athletic performance and overall well-being among
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10 athletes (Garcia, Villa, Cepeda, Cueto, & Montes, 2004; Watson, 2008). In addition, third wave
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12 cognitive behavior therapies such as ACT have shown moderate to large effect sizes in
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14 improving primary outcomes in patients with eating disorders suggesting that these treatments
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16 may prove valuable in preventing eating disorders in potentially vulnerable populations such as
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18 female athletes (Linardon, Fairburn, Fitzsimmons-Craft, Wilfley, & Brennan, 2017). In
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20 particular, facets of this treatment may be integrated into sports development programs to
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22 prevent eating disorders and enhance psychological well-being among female collegiate athletes.
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29 In summary, results from the current study add nuance to previous literature on the
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31 relationship between sports participation and eating disorder risk and protection among female
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33 athletes. In particular, these findings suggest that it is not the sport per se, but how an athlete
34
35 relates to the specific challenges associated with the sport that may convey risk or resilience.
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37 These findings speak to examining the quality of motivation when examining eating disorder risk
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39 among female athletes in high-risk sports contexts. As such, coaches, trainers and others working
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41 with young athletes should consider the motivation of the athlete and guide the athlete toward
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43 more self-directed forms of motivation in order to prevent maladaptive outcomes and enhance
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45 the notable benefits of sports participation for young women.
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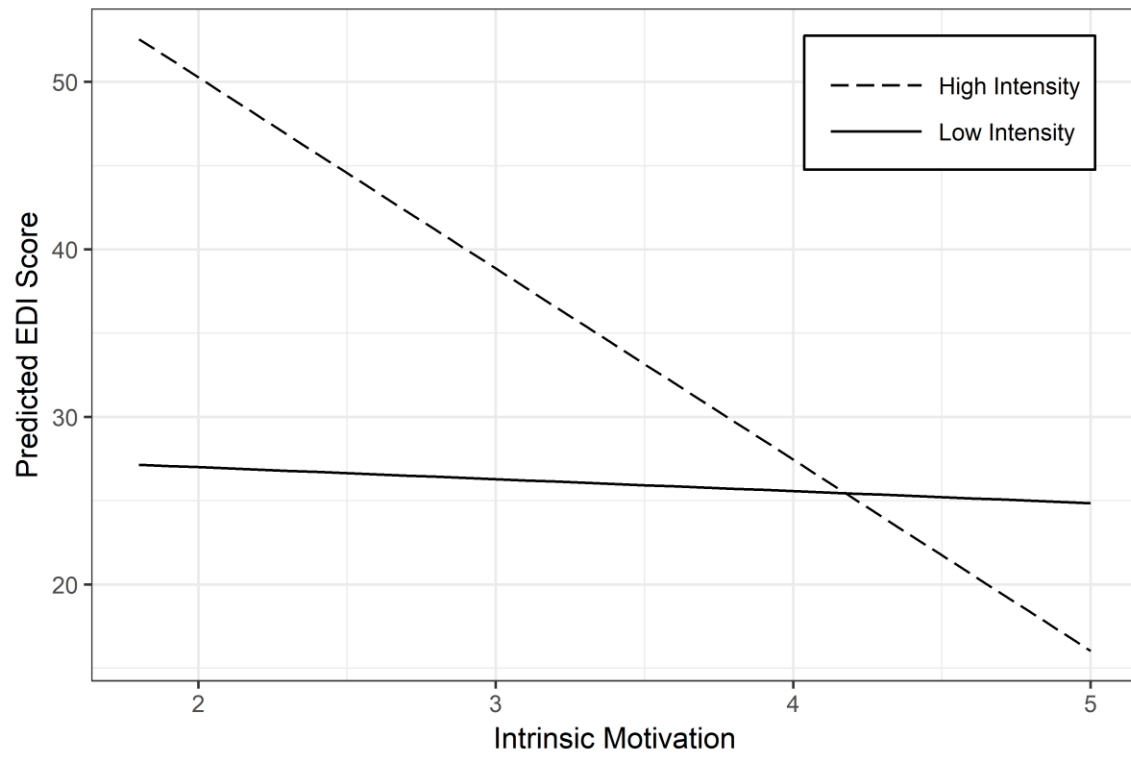


Figure 1. *Interaction of intrinsic motivation and sport intensity*

Table 1. *Correlations among predictor variables*

| | 1. | 2. | 3. | 4. | 5. | 6. | 7. | 8. | 9. |
|--|---------|--------|-------|--------|---------|---------|--------|--------|----|
| 1. Intrinsic motivation | – | | | | | | | | |
| 2. Extrinsic motivation | .307** | – | | | | | | | |
| 3. Amotivation | -.448** | .060 | – | | | | | | |
| 4. Leanness requirements | -.074 | .148** | -.003 | – | | | | | |
| 5. Physical/cardiovascular intensity level | .215** | .076 | -.091 | – | – | | | | |
| 6. Scholarship (Y/N) | .011 | -.063 | .106 | – | – | – | | | |
| 7. College years played | .045 | -.049 | -.031 | -.071 | -.147** | – | – | | |
| 8. Level of competition | .005 | -.050 | .100 | – | – | -.154** | .102 | – | |
| 9. Age | .029 | -.039 | .004 | -.123* | -.178** | .030 | .787** | .198** | – |

Note. $N=319$; Correlations between continuous variables are Pearson product moment, correlations between continuous and categorical variables are point biserial. The relation between categorical variables was not assessed

* = $p < .05$, ** = $p < .01$.

Table 2. *Final multilevel model with intrinsic motivation, extrinsic motivation. Leanness, intensity, and intrinsic motivation by intensity interaction predicting eating disorder symptoms (N=319)*

| Fixed Predictors | β | SE | <i>p</i> -value |
|---|---------|-------|-----------------|
| Intercept | 38.77 | 9.48 | < .001 |
| Intrinsic motivation | -11.53 | 2.20 | < .001 |
| Extrinsic motivation | 9.33 | 1.75 | < .001 |
| Leanness requirements–Non-lean | -5.29 | 2.29 | < .05 |
| Physical/cardiovascular intensity level–Low intensity | -46.57 | 13.08 | < .001 |
| Intrinsic motivation*Intensity | 11.08 | 3.30 | < .001 |

Note. Observations = 319, Number of sport groups = 8; Variance components: Intercept (sport) 7.76, residual = 266.32

Clinical Implications

- Specific sport type does not predict eating disorder risk in female collegiate athletes
- Athletes' motivation for those sports with high physical/cardiovascular intensity and leanness requirements was found to be associated with eating disorder risk.
- Intrinsic motivation was associated with a lower eating disorder risk and extrinsic motivation was associated with a higher eating disorder risk in sports that involve high physical/cardiovascular intensity and in leanness-oriented sports