

The psychology of the female athlete: how mental health and wellness mediate sports performance, injury and recovery

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Abstract: The increase in athletic participation of girls and women over the last half-century has brought into focus the need to better understand the psychology of female athletes. This review explores various non-physical factors that contribute to athletic success, such as resilience, mindfulness and sleep. The role of anxiety and depression in sport-related injury is another key issue that those invested in an athlete's training must be able to recognize and manage. Additionally, disordered eating and the harmful effects of social media affect females differently and at a higher rate than their male counterparts. Lastly, understanding how the female athlete views injury and recovery may allow us to successfully return injured athletes to sport. The goal of this article is to provide an overview of how a female athlete's mental and emotional well-being affect her athletic performance, injury risk and recovery following sports-related injury.

Keywords: Psychology; female athlete; resilience; anxiety and depression; burnout; kinesiophobia

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Introduction

As athletic participation for girls and women has risen in popularity, prevalence and stature over the last half-century since the enactment of Title IX legislation, an increasing amount of attention has been paid to understanding the physical aspects of women's sports participation. As a result, a significant body of literature exists regarding optimization of sport performance through weight and high-intensity interval training; prevention of musculoskeletal injuries such as anterior cruciate ligament (ACL) tears through the use of focused neuromuscular training programs; and rehabilitation of orthopedic injuries such as fracture or dislocation through advances in physical and occupational therapeutic techniques. However, less attention has traditionally been given to understanding the psychological traits and behaviors—both innate and learned—that mediate a female athlete's experience with sport. This review will

focus on what is known about the unique psychology of the female athlete, with the goal of identifying traits and behaviors that are particularly adaptive (or maladaptive) in the setting of sport.

The psychology of athletic success

Although the term “psychology” may at first conjure thoughts relating to mental disorder and dysfunction, in fact the term encompasses a host of traits and behaviors that may contribute significantly to an individual's athletic success. Indeed, the psychological makeup of an athlete—male or female—is likely as important in determining that individual's ability to persevere and perform than a more easily measured physical trait such as height or fast-twitch muscle fibers. This section focuses specifically on three traits, behaviors or practices that have been associated with enhanced athletic performance: resilience, mindfulness,

and sleep.

Resilience

Psychological resilience has been defined as “*the role of mental processes and behavior in promoting personal assets and protecting an individual from the potential negative effect of stressors.*” (1). Resilience may be referred to colloquially as “grit” and athletes who demonstrate resilience may be called “copers”—individuals who are able to continue to grow and perform in the face of hardship and triumph despite experiencing adversity.

In 2019, Sorkkila *et al.* reviewed the responses of 491 Finnish female student athletes in upper secondary school collected over the course of three years in a study that looked at the relationship between resilience, burnout and sport attrition (2). These authors found that the female athletes who reported more burnout symptoms demonstrated less resilience and were more likely than athletes without burnout symptoms to drop out from sport. In addition, those athletes with the fewest burnout symptoms scored the highest on the validated questionnaires regarding resilience, in which respondents are asked to rate their agreement with questions such as, “*I tend to bounce back quickly after hard times*” (3). This study underscores the importance of personal resilience in mitigating against both the development of overtraining and burnout symptoms and an athlete’s decision to leave her sport. This finding may be particularly important for adolescent female athletes, who are more prone to burnout and its negative consequences (e.g., sports-related injury and dropout) than their male peers (4).

Another recent study investigated the relationship between resilience and stress coping mechanisms for 374 Japanese university athletes. The authors reported statistically significant associations between resilience and stress coping behaviors. For example, these researchers note that highly resilient individuals tend to employ problem-focused coping skills such as seeking information and/or assistance with handling a stressful situation, removing the source of the stress and/or removing oneself from the stressful situation. They additionally note that resilient athletes are less likely to manage stressful situations with emotion-focused coping behaviors; these might include venting of emotions and disengagement (5). Importantly, the ability to recognize protective and harmful coping behaviors may enable the trainers, coaches and health care professionals who take care of female athletes both to

identify those who may be at increased risk of experiencing stress and its associated negative effects as well as to create behavioral interventions for female athletes with maladaptive stress coping patterns.

The importance of personal resilience for female athletes was highlighted in an article published in 2013 by Tamminen *et al.*, that used interviews with female athletes from around the world to better characterize the athletes’ experiences with adversity and subsequent personal growth (6). Athletes shared with the researchers their personal struggles related to sports which included experiences being the victims of bullying behavior, suffering from eating disorders and sustaining sports-related injuries. Athletes described being able to transform personal obstacles into tools for personal and professional growth. Experiencing adversity and finding themselves equal to the task—resilient—served to increase each individual’s sense of self-confidence and personal efficacy and to ultimately contribute to her athletic success.

Mindfulness

Both innate and learned practices of mindfulness can have markedly positive effects on the performance and wellbeing of athletes. In 2014, Baltzell *et al.* reported on their experience introducing a structured mindfulness meditation training program to a Division I women’s soccer team (7). After twelve mindfulness training sessions given over the course of 12 weeks, the participants reported an “*...enhanced ability to accept and experience a different relationship with their emotions, both on and off the field*” (7).” This demonstrates how mindfulness ties into resilience as a possible positive stress coping behavior, and how it may be a useful tool for athletes to harness in the face of adversity.

Mindfulness can shape how athletes process and react to physical feelings as well as emotions. Jones *et al.* recently conducted a retrospective study on how mindfulness can mediate the relationship between mental toughness and pain catastrophizing for injured cyclists (8). Mindfulness was defined as the “*...nonjudgmental focus of attention on experiences that occur in the present moment and involves self-regulation, which, in the case of acute pain, comprises the maintenance of controlled but open and nonjudgmental attention to bodily sensations*” (9).” As no intervention occurred, this study looked specifically at the innate quality of mindfulness, rather than learned or practiced mindfulness. These authors found a negative association between mindfulness and pain catastrophizing and a positive correlation between mindfulness and mental toughness. In other words, this trait enabled these athletes to moderate their

reactions to their surroundings, adapt to the challenge faced and ultimately persevere.

Sleep habits

A third factor that greatly affects not only the physical performance of a female athlete, but also her mental state, is sleep. In fact, a wealth of literature has demonstrated that sleep both enhances athletic performance and is protective against sports-related injury (10). In 2018, Dumortier *et al.* published the results of a study that investigated the sleeping habits of 26 elite female gymnasts (11). These authors reported statistically significant relationships between decreased total sleep time, increased training load and ultimately inferior athletic performance. These findings support the principle that appropriate sleep during recovery are critical for maximizing the athlete's ability to compete.

As indicated above, impaired or limited sleep is a risk factor for musculoskeletal injury. Recently, Von Rosen *et al.* looked at 340 adolescent athletes and found that sleeping at least eight hours per night reduced the odds of sports-related injury in this population by 61% (OR, 0.39; 95% CI, 0.16–0.99) (12). In a study of cross country athletes, Hayes *et al.* reported that poor sleep quality likely increases both new injury risk and exacerbation of existing injuries (13). This study suggests that the incorporation of sleep hygiene into an athlete's recovery and rehabilitation program can make them stronger and safer athletes when they return to play.

Importantly, when athletes are not getting the sleep they need to perform, they complain about greater mood disturbances (12). As athletes often under report their psychological issues, it's imperative that coaches and health professionals are aware of associated risk factors to look out for—such as fatigue. De Souza *et al.* demonstrated a statistically significant correlation between fatigue and increased psychological distress and stress symptoms for both male and female athletes (14). The exact causative relationships between insufficient sleep, mood disturbance and performance are unclear, but it is well established they are all intertwined.

Anxiety, depression and sports-related injury

Anxiety and depression

A central aspect of the psychology of the female athlete is her overall mental health. Here, we explore the incidence, risk factors and negative effects of anxiety and depression in

the female athlete population.

Looking at anxiety and depression in the general population, females have been shown to have higher rates of these disorders than their male counterparts: Altemus *et al.* is one of many groups of researchers who have found higher rates of psychological disorders in female patients, reporting that females suffer from depression and anxiety at roughly twice the rate of males (15). Additionally, when the athletic population is studied as whole, high rates of anxiety and depression have consistently been reported. In a review of the literature published in 2018, Wolanin *et al.* found that reported rates of depression in athletes ranged from 15.6% to 21% (16). They identified risk factors for experiencing anxiety and depression that are unique to athletes, including: performance expectations, overtraining, sports-related injury and involuntary career termination.

Rates of anxiety and depression are high amongst females and high in athletes in general. It is therefore perhaps not surprising that female athletes report higher rates of anxiety and depression than their male athlete counterparts. In a recent systematic review and meta-analysis of the existing literature, Rice *et al.* found that female athletes were significantly more likely to report anxiety than male athletes ($P < 0.001$) (17). Yang *et al.* studied depression rates in competitive collegiate student athletes and found that female athletes have 1.32 greater odds of being depressed (18). In their 2018 study of anxiety and depression rates in athletes, Weber *et al.* also found that female athletes were more than male athletes to experience anxiety and depression; interestingly, they additionally reported that there was no significant correlation with age (19). This is important because it highlights that young athletes—even those attending middle school—are at risk for mental health disturbances typically thought of as occurring solely in older athletes. In sum, athletes as a group are prone to experiencing anxiety and depression, and within the athletic population, females are more likely than males to do so, regardless of age.

Within the female population, single sport athletes are at greatest risk of anxiety and depression (20,21). The common conclusion of many studies that have found higher rates of mental health illnesses in athletes is that the team component is protective against the development of anxiety and depression. Working with a team gives an athlete a constantly present support system during training and in competition, a fact which seems to be therapeutic in overcoming obstacles and processing adversity in sports. Additionally, being a

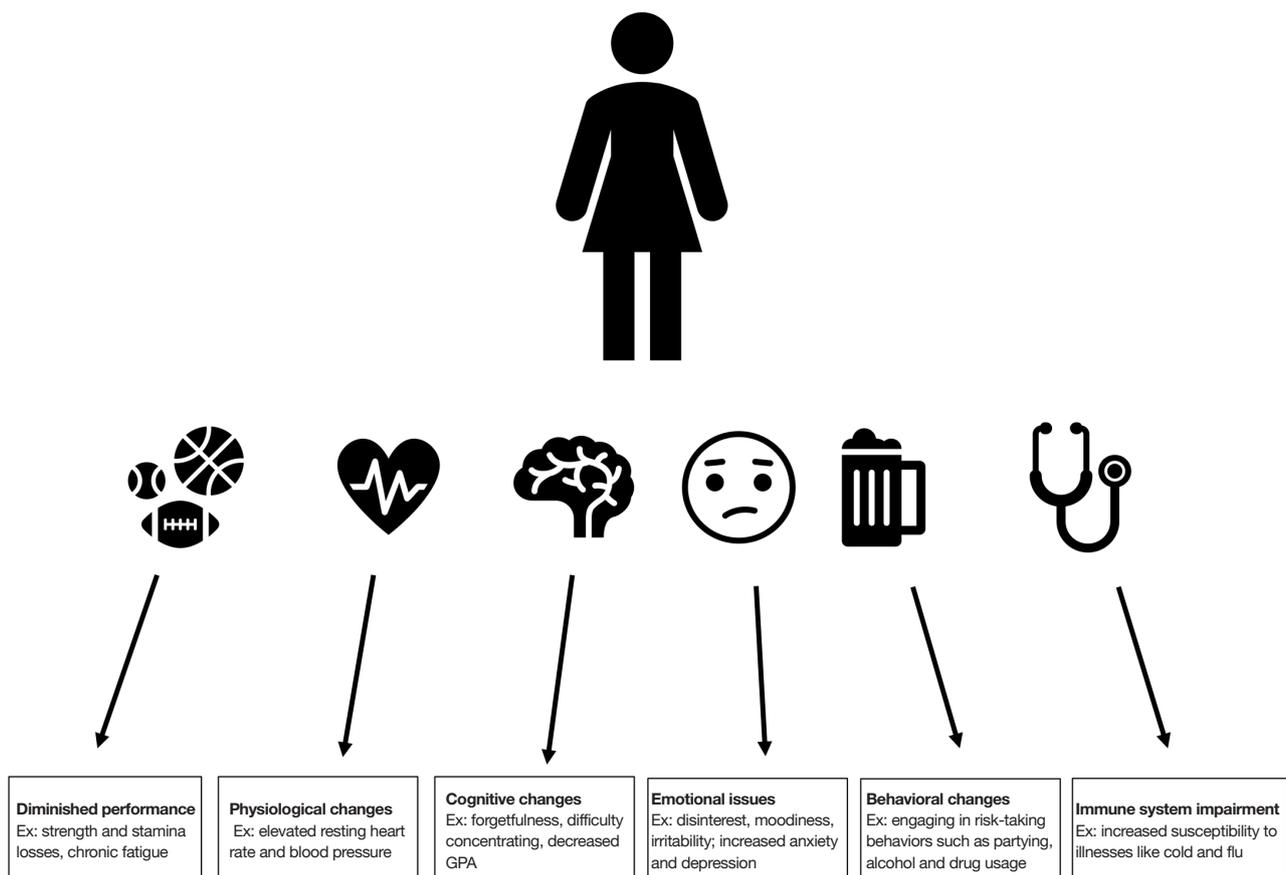


Figure 1 Signs and symptoms of burnout in athletes. Adapted from Stankovich (24) and Sitzler *et al.* (25).

member of a sports team positively affects the experience of recovering from injury. In 2000, Junge *et al.* reviewed the influence of psychological factors on sports injuries and one central point made by these authors was the positive buffering effect of a social support network on how athletes cope and recovery from injuries (22). Particularly when it comes to recovering from injuries, the presence of a team can be a turning point in an athlete's ability to recover, both physically and emotionally.

The prevalence of anxiety and depression in female athletes is particularly important because it portends increased injury risk. In 2017, Li *et al.* found female athletes who were anxious sustained sports-related injuries at a rate that was 1.9 times higher than that found for female athletes who did not report anxiety symptoms (23). Worse, it has been shown that athletes recovering from injuries are at increased risk of experiencing psychological issues during the treatment and recovery periods. Wolanin *et al.* found

that fully 80% of players who treated for sports-related injuries also reported psychological issues related to their injuries (16). Finally, it bears mention that anxiety and depression may be signs of overuse and overtraining and the impending onset of athlete burnout (Figure 1).

Negative effects of social media

As social media becomes increasingly prevalent in our lives, it will be important for trainers, coaches and medical staff to understand how interactions with social media might affect physical and mental/emotional health and sports performance. There is limited research on this topic; however, the current literature suggests that social media exerts a negative impact on athletes. In a recent study of 112 National Basketball Association members, Jones *et al.* found that late-night tweeting activity resulted in making shots at a lower rate—1.7 percentage points less (26). While the

distraction of social media may be a concern for both male and female athletes, female athletes may disproportionately suffer from the negative effects of body image portrayed through social media. Prichard *et al.* recently reported on the results of their study of 108 women interacting with social media; these authors found that the women who were exposed to images on Instagram with the hashtag #fitspiration had higher levels of body dissatisfaction and negative mood (27). It will be imperative to investigate the effects that social media has on female athletes so that we may understand how best to support them; we may find that interacting with some forms of social media may in fact be a risk factor for impaired mental health and athletic performance.

Traits that mediate injury recovery

Fear, anxiety and return to sport

The presence of mental and emotional illness, including anxiety and depression, not only increases injury risk for female athletes, but also makes the recovery process much more difficult. For example, Iverson *et al.* recently reported that athletes with a preinjury history of mental health problems are at a greater risk of having persistent symptoms after sustaining a concussion (28).

Recently, a significant amount of attention has been placed on the role of mental health and wellness in mediating a successful return to sport following anterior cruciate ligament reconstruction (ACLR). One recent study found that following ACLR, athletes cited psychosocial barriers to return to sport with greater consistency than physical barriers (29). These psychosocial barriers included the feeling that sports-based activity was associated with injury, uncertainty regarding full recovery and comparison to other athletes who had undergone ACLR (28). Importantly, these feelings of anxiety and fear may affect the athlete's return to sport. In a study of 40 patients who underwent ACLR, Paterno *et al.* showed that patients with greater self-reported fear as measured by an abbreviated version of the Tampa Scale for Kinesiophobia were both less active and at an increased risk of suffering a second ACL injury in the ipsilateral knee (30). Thus, in the setting of return to sport following ACL reconstruction, fear of re-injury may actually become a self-fulfilling prophecy. As a result, the assessment of kinesiophobia and implementation of interventions to minimize it are rapidly becoming integral components of a comprehensive postoperative return to sport evaluation.

As previously discussed, mental health issues arise not uncommonly in the setting of sport-related injury (17). Additionally, McGuine and his colleagues have demonstrated that knee injuries negatively affect knee function as expected, but that a female athlete's overall health-related quality of life is similarly reduced (31). Whether female athletes have preinjury predisposition to anxiety and depression or an injury acts as a triggering event, mental health issues can both impair recovery from injury and have a negative impact on an athlete's overall health and wellness.

Disordered eating and eating disorders

Females athletes face unique challenges when recovering from injury. In 2019, Prnjak *et al.* demonstrated that body satisfaction plays an important role in disordered eating development in female athletes (32). For these athletes, whose source of self-identity may be inextricably linked to the appearance and athleticism of their bodies, an injury can be devastating to their sense of body satisfaction. Female athletes with injuries causing changes in their bodies may be more vulnerable to disordered eating and dieting that may affect their recovery process. MacAlpine *et al.* recently showed that pediatric and adolescent patient experienced significant increases in BMI up to 2 years postoperatively from ACL reconstruction surgery; for some, this may be an inciting event that triggers disordered eating patterns (33). While this topic is reviewed in depth elsewhere in this issue, it is essential to understand the unique challenges that female athletes face during injury recovery. Armed with this knowledge, the trainers, coaches and medical staff may help make changes in the recovery process—for example, the introduction of peer mentoring groups and other psychosocial support systems—that can facilitate a female athlete's successful return to sport.

Summary

While physical health and physical ability are essential components of a female athlete's successful sport performance, the critical role of the psychological traits and behaviors that mediate her experiences cannot be overstated. Resilience, mindfulness and sleep routine are intimately related to the optimization of a female athlete's sport performance and minimization of her risk for sport-related injury. Anxiety, depression and burnout are mental health disorders that are particularly common in the female

Table 1 Smartphone Apps that may be used as resources for female athletes

Mental health topic	Smartphone apps
Anxiety/mindful meditation	Calm, Rootd, Headspace, Acupressure, Relax & Rest Guided Meditations, Stop Panic & Anxiety Self- Help, Stop, Breathe, and Think, Colorfy
Depression	TalkLife, Depression CBT, Daylio, What's Up?, Youper, Pacifica, Happify
Sleep	Sleep Time, Pzizz, Nature Sounds, Slumber, Noisli, Sleep Cycle, 10% Happier

athlete population; unfortunately, the presence of one of these illnesses significantly increases an athlete's risk of injury and impairs her subsequent recovery. While the existing literature is not robust, recent research efforts have led to an increasing awareness amongst the trainers, coaches and medical staff who work with female athletes about the critical need to incorporate psychological and mental health screening and supportive interventions for this population. Athletes themselves may be proactive in this regard, and some examples of useful smartphone app-based resources are listed in *Table 1*.

Conclusions

Much of today's understanding of athlete psychology and recovery from injury is drawn from research that studies both males and females. As more women become involved in sports at all levels of ability and competition, a more nuanced understanding of psychology specific to female athletes will be important to support their athletic success, injury recovery and overall health and wellness.

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Supplementary discussion

Dr. Sommer Hammoud: Can the trait of Resilience be acquired/taught? Please comment.

Authors' answer: There is a large component of resilience that is natural—dependent on the individual and on their innate personality. In regards to the individual—this includes age, gender and intelligence; and in regards to one's personality this includes: “hardiness, locus of control, self-efficacy, self-esteem, optimism, hostility (component of type A personality) and type D traits (negative affectivity and social inhibition) (34). Aside from the above doctors that cannot be taught, there is a large component of resilience that can be acquired. This is related to one's previous experiences, any previous training on social skills, mental-self-awareness and largely due to coping mechanisms—further addressed in the next question. Finally, there is a large amount of literature available addressing “resilience training” teaching individuals or teams different skill sets they believe will strengthen and further hone their ability to overcome adverse situations (35).

Dr. Sommer Hammoud: what are some examples of protective and harmful coping behaviors of athletes?

Authors' answer: Athletes experience pressure regarding their performance and use various strategies to cope with their stress. Emotion-oriented and distraction-oriented coping behaviors can be harmful; whereas, task-oriented coping behaviors can be protective (36).

Some protective coping behaviors include: meditation, dependence and time spent with support systems, art, hobbies outside of their sports, therapy—many kinds and venting/expressing one's feelings (37). Some harmful coping behaviors include: drug use, alcohol use, poor sleeping habits—either over or under sleeping, partying and more

extreme examples include self-harm.

Dr. Sommer Hammoud: What gaps in knowledge on this topic currently exist that most warrant our research efforts?

Authors' answer: The majority, if not all, of the subsections and topics introduced in this paper deserve further investigation. There has been some research on mental illness in athletes, but there is scarce information on how it affects the FEMALE athlete. Our gender is unique from a biochemical, societal, intellectual, physical and emotional standpoint and all of these environmental factors significantly affect how we are affected and subsequently react to mental illnesses. A stronger understanding of this relationship can shed light on the additional topics introduced that also merit further investigation including: sleep habits, effects of social media on the female athlete's health, risk of injury, return to sport and the possibility and opportunity for interventions, support and even resilience training for female athletes.

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