

# Depression in Athletes: Prevalence and Risk Factors

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## Abstract

Depression affects an estimated 6.7% of today's adult population in a 12-month period. The prevalence rates for certain age groups, such as young adults and older adults, are higher. There are approximately 400,000 National Collegiate Athletic Association student athletes competing each year and 5 to 7 million high school student athletes involved in competitive interscholastic sports. Given such a high prevalence rate in certain age groups and a large denominator pool of athletes, past notions that athletes are devoid of mental health issues have come under scrutiny by sports medicine providers. Initial data suggest that athletes are far from immune to depression. The purpose of this article was to review the current research on athletes and depression; particularly this article will provide an overview of studies, which have investigated the rate of depression among athletes, and discuss relevant risk factors, which may contribute to depression among athletes.

understudied, initial data suggest that athletes are far from immune to depression. In fact, empirical studies indicate that athletes are just as likely to experience depression as the general population (26). The purpose of this article was to review the current research on athletes and depression and to highlight that this is an issue in much need of further study and inquiry. In particular, this article will provide an overview of studies, which have investigated the rate of depression among athletes, discuss relevant factors (*e.g.*, injury), which may contribute to depression among athletes, and consider how an integrative approach involving sports

medicine and sports psychology can best serve athletes.

## Introduction

Depression affects an estimated 6.7% of today's adult population in a 12-month period (21). According to the U.S. Department of Health and Human Services, the prevalence rates for certain age groups, such as young adults and older adults, are higher — for example, for the 18-to-25 age group, the 12-month depression prevalence rate was 8.7% in 2008. There are approximately 400,000 National Collegiate Athletic Association (NCAA) student athletes competing each year and 5 to 7 million high school student athletes involved in competitive interscholastic sports. Given such a high prevalence rate in certain age groups and a large denominator pool of athletes in these age groups, it is reasonable to surmise that there are thousands of athletes with depression participating at the high school and college levels. Recently, sports medicine and sports psychology practitioners and researchers have turned their attention to this important issue, as past notions that athletes have reduced mental health issues due to increased levels of exercise have come under scrutiny in the popular media (24). Although vastly

## Depression Prevalence and Athletes

To date, the majority of studies investigating the prevalence rate of depression among athletes have been conducted with college athletes. Findings from these studies suggest that the prevalence rate of depression among college athletes ranges from as low as 15.6% to as high as 21% (25,35). On the basis of these prevalence rates, as many as one in five athletes may be depressed. However, there has been a general lack of consistency thus far in the findings.

Storch et al. (29) were the first investigators to compare rates of depression symptoms between athletes and nonathletes. This study hypothesized that because athletes deal with more stress than nonathletes, they would report higher levels of alcohol use, depression symptoms, and social anxiety. The study also hypothesized that athletes would report having less social support than nonathletes. There was partial support for these hypotheses, as female athletes reported experiencing depression symptoms, social anxiety, and non-support to a greater extent than male athletes and male and female nonathletes. In another study, Yang et al. (35) demonstrated similar findings regarding gender, as female athletes reported the highest levels of depression among a sample of 257 Division I college athletes. These findings are consistent with data from the general population, which repeatedly have found women to report higher rates of

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1537-890X/1401/56-60  
Current Sports Medicine Reports  
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depression than men. In total, 21% of the athletes surveyed reported symptoms of depression. Freshman athletes and those who endorsed pain reported more depression symptoms in this study.

According to Yang et al. (35), athletes in their sample experienced depression at approximately the same rate as that of a comparison group of nonathletes who participated in the study. However, Armstrong and Oomen-Early (3) found that college athletes reported lower levels of depression than those reported by nonathletes. This study used a sample consisting of 227 participants, 104 of which were male and female athletes from various sports. Overall it was found that 33.5% of the sample reported clinically significant levels of depression. The percentage of athletes endorsing clinically significant levels of depression was reported to be “significantly lower” than that of nonathletes. This study also found that athletic status was not a statistically significant predictor of depression when compared with other variables investigated in the study including gender, self-esteem levels, social connectedness, and rested sleep. Armstrong and Oomen-Early (3) contended that having a social network and team support are two factors that most strongly protect college athletes from developing depression.

Proctor and Boan-Lenzo (25) conducted another recent college athlete and depression prevalence study. This study investigated depression symptoms among a group of 61 Division I male baseball players and 51 male nonathlete college students. Proctor and Boan-Lenzo (25) found that male athletes reported fewer depression symptoms than those reported by male nonathletes. Although nonathletes reported higher levels of depression (29.4%), 15.6% of the athletes met criteria for a possible diagnosis of clinical depression.

With consideration for the mixed epidemiological data, taking a more nuanced look at the factors that may contribute to depression among athletes is particularly relevant. To date, one of the most widely studied risk factors for psychological distress among athletes has been sports injury. In a recent survey of sports medicine physicians, it was found that 80% of the time, athletes coming to treatment for an injury also discuss psychological issues related to the injury (19). However, there only have been a handful of studies, which have investigated depression symptoms directly among athletes following sports injury.

### Sports Injuries and Depression

Brewer and Petrie (7) were among the first researchers to compare depression symptoms between athletes who had and had not experienced injuries. In this retrospective study, it was found that athletes who experienced an injury during the previous year reported significantly higher depression symptom scores than those reported by noninjured athletes, as measured by the validated Center for Epidemiological Studies Depression (CES-D) scale. The sample in this study consisted of 916 NCAA Division I college football players. Brewer and Petrie (7) also found that both groups of athletes in their study reported high levels of depression symptoms, as 33% of athletes with injury and 27% of noninjured athletes could be classified as depressed on the basis of the CES-D results. In another study, Leddy et al. (16) used a prospective design to examine depression symptoms in athletes following injury. The results from this study indicated that over half of

the athletes (51%) who sustained an injury during the course of the study endorsed mild-to-severe depression symptoms, as measured by the Beck Depression Inventory (BDI). Thus far, a limitation in the research has been sole reliance on self-report measures to assess depression. However, Appanell et al. (2) sought to address this issue by including two measures (semistructured interview and self-report) of depression in their study examining athlete's postinjury depression symptoms. In this study, the researchers used a sample of 164 athletes competing at the NCAA Division I, NCAA Division II, and high school levels. Athletes in the study were assessed using the CES-D and the semistructured interview guide for the Hamilton Rating Scale for Depression (SIGH-D). In this study, it was found that depression symptoms of athletes with injury were elevated 1 wk after injury and remained this way 1 month after injury when compared with healthy controls, as measured by the SIGH-D. No significant differences between groups were found in this study, as measured by the CES-D.

There has been a recent surge of evidence suggesting that sports concussions can lead to changes in emotional state (14,17). Furthermore there is recent evidence to suggest that sports concussions can have long-lasting emotional impact. In a recent survey of 1,044 retired National Football League (NFL) players, it was found that the 9-year risk of a depression diagnosis increased with the number of self-reported concussions (15). According to the survey, retired athletes reporting three or more concussions were three times more likely to report being diagnosed with depression when compared with athletes with no history of concussions.

Strain et al. (30) conducted a study with 26 retired NFL athletes who underwent a magnetic resonance imaging technique identified as diffusion tensor imaging scanning. They reported that certain voxels negatively correlated with BDI-II scores and that specific brain areas of the forceps minor, right frontal aslant tract, right uncinate fasciculus, and left superior longitudinal fasciculus negatively correlated ( $P < 0.01$ ) with total BDI-II scores. Fractional anisotropy maps, which reflect fiber density, axonal diameter, and myelination in white matter of the forceps minor differentiated depressed from nondepressed athletes with 100% sensitivity and 95% specificity, from which the authors conclude that diffusion tensor imaging is a promising biomarker predictor of depression symptoms. Additionally Hart et al. (13) conducted a neuroimaging study measuring cognitive impairment and depression in a sample of 34 retired NFL players and found a 23.5% prevalence of depression and a high rate of cognitive deficits compared with those of a control group. They concluded that cognitive deficits and depression symptoms appear to be more prevalent in retired NFL players when compared with those in a healthy control group.

While the relationship between concussion and depression may be significant, there is also evidence to suggest that a concussion may have the same effect as other injuries on mental health. For example, Mainwaring et al. (18) conducted a study to examine the differences between emotional responses in athletes who had a concussion compared with anterior cruciate ligament (ACL) injury. They found that athletes with ACL injuries had more severe levels of depression and longer duration of depression compared with those of athletes with concussion. The authors concluded that ACL injuries have a higher level of emotional disturbance compared with

that of athletes with concussion and that screening and intervention should be focused on athletes with ACL injuries and concussions. While the sample size of this particular study was small, it does illustrate that there is increased risk of maladaptive psychological response to various types of injuries and that concussion may or may not be an increased risk factor for depression over other types of sports-related injuries.

Although not due to the result of an acute injury, overtraining syndrome (OTS) also can threaten the overall mental and physical well-being of an athlete. OTS is characterized by psychological and physiological disturbances, along with decreases in performance (20). There is much debate about the causes and consequences of OTS, but the research does indicate that the symptoms of major depression and OTS can appear similar (23). As such, those professionals working with athletes should be mindful of not mistaking depression for OTS and *vice versa*. However, they also should be aware that the two conditions are not necessarily mutually exclusive and can co-occur.

### Career Termination

The end of an athlete's career marks a major life transition that can result in changes to an athlete's interpersonal relationships, roles, and daily routines (28). Although sports career termination represents a significant life transition for athletes, this necessarily does not mean that it results in psychological distress. For some athletes, the transition from competitive athletics to sports retirement is done with ease, allowing them to pursue new career paths and opportunities. For others, this transition is a difficult process that has been correlated with behavioral difficulties and emotional distress (21). For example, sports career termination has been associated with maladaptive coping strategies, depression, anxiety, increased hostility and anger, and substance abuse (11,28,33,34).

It is likely that several moderating and mediating variables impact an athlete's response to career termination. One particular variable that has received considerable attention is voluntary (*i.e.*, personal decision to retire) versus involuntary (*i.e.*, injury, getting cut from team) career termination. It has been hypothesized that involuntary career termination is more likely than voluntary career termination to impact an athlete's mental health negatively (9).

Wippert and Wippert (34) garnered additional support for this contention in a study that found that involuntary career termination was associated with significantly greater psychological symptoms, including depression symptomatology, as measured by the Symptom Checklist-90-R, than voluntary career termination among a sample of skiers. However, it also was found that symptoms of psychological distress for those athletes dealing with involuntary career termination decreased over time. This finding may indicate that, initially, athletes have a difficult time adjusting to involuntary career termination but experience overall reduction in psychological distress the farther removed they are from the event. Alfermann et al. (1) demonstrated similar findings in their investigation of the cognitive, behavioral, and emotional consequences associated with career termination among a sample of 256 amateur European athletes. Alfermann et al. (1) found that planned retirement from sports was associated with fewer negative emotional

reactions (including sadness) when compared with unplanned retirement.

Whereas voluntary versus involuntary career termination has been the most well-studied situational factor related to the end of athlete's career, athletic identity has received the most attention as a potential individual factor that can impact the process of transitioning out of sports. Athletic identity is defined as the degree to which an athlete defines himself or herself in terms of the athletic role (8). Baillie and Danish (4) found that athletes rating high in athletic identity were prone to experience emotional and social adjustment issues after they ended their sports career. Strong and exclusive athletic identity also has been associated with heightened stress and anxiety following sports career termination (11). Brewer (6) found that athletes scoring high on the Athletic Identity Measurement Scale responded to hypothetical career-ending injuries with depression reactions. In summary, research findings consistently suggest that individuals with a strong and exclusive athletic identity experience more intense and frequent psychological and emotional difficulties following retirement from sports (1,4,11,21).

The potential for loss of an athlete's identity following sports career termination was the primary reason, as hypothesized by a recent investigation, why former college athletes would report greater depression symptoms than current college athletes (32). However, the opposite was true, as depression was significantly higher among current athletes when compared with that among former athletes. On the basis of the results, 17% of current college athletes met the criteria for depression whereas 8% of former college athletes had levels of depression consistent with a diagnosis for the disorder. Weigand et al. (32) concluded that these findings suggest that voluntary sports career termination for the college athlete — *i.e.*, the end of their college athletic career — necessarily does not put the athlete at higher risk for the long-term development of depression. These findings may or may not be applicable to the athlete whose career is ended or interrupted by injury or who is cut from the team or sports, especially if the athlete's identity and self-worth are related intricately to continuation in sports.

### Performance and Depression

From a psychological perspective, athletes may be prone to experience depression symptoms when they face declines in their athletic performance or a catastrophic ("choking") athletic performance. Conceptually poor athletic performance may result in lack of external reinforcement, behavioral deactivation, negative self-perceptions and evaluations, and feeling of helplessness or hopelessness, which are consistent with depression symptoms. When viewed in an objective context, the nature of athletic competition can yield higher rates of loss throughout the year and ultimately only one team or athlete may achieve the pinnacle while all others end their season or career with a competitive loss. Hammond et al. (12) conducted a study to examine the relationship between the prevalence of diagnosed failure-based depression and self-reported symptoms of depression within a sample of 50 elite swimmers. Of note in this study was a 68% lifetime prevalence of depression episodes among the participants, with significantly more females endorsing history of depression. The authors found that after an athletic competition, 34% of

the athletes had clinically elevated depression scores on the BDI-II but the top quartile of elite performance had 2 times higher rate of elevated depression scores. Considering the fact that the Olympics only occur every 4 years may account for this effect, it is still important to note that within this elite performer group, there was a significant relationship between the athlete's performance and depression symptoms. This study illustrates that some high-performing athletes actually may be more susceptible to depression when faced with performance outcomes that are below expectation and that sports medicine personnel need to be aware of the psychological consequences of losing or personally failing during competition. Those providing comprehensive care for the athlete should understand that the expectations for athletic performance have a number of influences and may include not only the athlete's viewpoint but also the perception of teammates, coaches, and family.

### Concerns With Underreporting

As noted by Proctor and Boan-Lenzo (10), one reason for the difference in depression rates in their study may be because athletes were underreporting depression symptoms in an attempt to portray themselves in a favorable light. In contrast to nonathletes, athletes may have some reservations when filling out a depression measure, such as coaches discovering their scores or concerns over imagined reactions to admitting being depressed. The question of how responding impacts reporting on self-report questionnaires is always an important question for researchers and may be particularly critical in measuring depression among college athletes. Anecdotally, athletes tend to portray a picture of psychological strength when assessed for depression symptoms. There appears to be a tendency to put considerable effort into appearing "fine" or "okay" and ready for the next competition or challenge. This is inherent to the culture of athletics, as confidence often is regarded as a necessary state of mind for completion. However, it creates significant difficulty for sports medicine professionals attempting to access an athlete's state of mind accurately. Further research into depression in athletes ideally should take into account the concern for underreporting of depression symptoms, especially if the study relies on self-reported data. We currently are involved in such a study of college athletes that not only employs a validated depression survey tool but also includes an additional validated reporting tool that helps in determining whether symptoms are being underreported.

### Suicide

A number of recent suicides of current or former athletes and related media attention have resulted in heightened focus and discussion on potential risk factors for suicidal behavior in athletes. Athletes, similar to the general population, in fact do contemplate and commit suicide. In a review of the medical and periodical literature, Baum (5) found 71 cases of athletes who contemplated, attempted, or completed suicide. Of these 71 identified cases, 66 were completed suicides. The vast majority of these cases were male athletes (61 cases) with an average of 22 years old for the entire sample. This is consistent with the empirical literature, which indicates that males are more likely than females to commit suicide and that individuals between the ages of 15 and 24 years

represent the group with the highest risk of committing suicide. Although suicide in athletes continues to occur and there are aspects to athletic participation that may lead to increased rates of depression and potential suicide risk, there is paucity of research identifying risk factors for suicidal behaviors in athletes and a lack of information on guidelines to assess suicidal potential in athletes. Smith and Milliner (27) and Baum (5) report case studies of athletes who committed suicide and make inferences to the manner in which athletic trainers and other professionals may assess suicidal risk. For example, on the basis of five case studies of athletes with injury seen in their clinical practice, Smith and Milliner (27) contend that a serious injury necessitating surgery, an extended rehabilitation process (6 wk to 1 year), reduced athletic skills despite adherence to rehabilitation, a perceived lack of competence upon returning to sports when compared with preinjury levels, and being replaced by a teammate at their given position all may contribute to suicidal behavior among athletes with injury.

While the previous research and discussion are worthwhile, the small sample sizes of these studies elicit caution against making clinical decisions without more quantitative findings. Drawing from clinical practice guidelines may be the most effective manner in implementing strategies to assess and manage suicide risk with athletes. Fowler (10) completed a practice review of suicide risk assessment in clinical practice that illustrates the poor predictability of suicide and suicide attempts and the complex interactive nature of variables associated with suicide. Overall, much still remains to be understood about the identification and assessment of athletes at risk, as it relates to suicide and suicide risk reduction.

### Conclusions and Discussion

Review of the literature reveals that depression does occur in athletes and that athletes are not somehow immune or resistant to depression. In fact, it is hypothesized that there are risk factors that are more unique to an athletic population (*i.e.*, injury, involuntary career termination, performance expectations, and possibly overtraining) that may increase the risk of depression compared with the general population. In certain subpopulations of athletes, there may be a higher rate of depression than nonathletes. Clearly depression in athletes exists. Suicide in athletes, a tragic outcome that can be associated with depression, exists.

At this time, there is limited knowledge regarding optimal assessment of depression in athletes and there is paucity of evidence-based interventions that have been shown to be effective for treating athletes with clinical levels of depression. Future studies in depression and athletes should explore how assessment and management of depression may be different in athletes and nonathletes; for example, is evidenced-based therapy more or less effective in athletes or what class of medications may be more helpful to the athlete? It is hypothesized that mental health treatment services may be underutilized by individuals participating in athletics due to a myriad of variables such as time constraints and social stigma (34), which is concerning, considering the high rates of depression among athletes that have been found in some studies. Primary contact regarding depression and mental health issues may occur with sports medicine teams.

Therefore, it is essential that these health care professionals are able to identify the signs and symptoms of depression among athletes and offer appropriate referrals when necessary. Athletes may present with atypical signs and symptoms, such as anger and irritability, and engage in healthy or less healthy coping mechanisms, such as substance abuse or overtraining. Beyond the traditional indicators of depression, athletic trainers and sports medicine teams should maintain increased awareness that (given the nature of the athletic culture) athletes may be likely to deny depression symptoms. Education of sports medicine professionals and the athletic care network is key to the optimal evaluation, management, and outcome of depression in athletes.

The authors declare no conflicts of interest and do not have any financial disclosures.

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