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Depression and performance outcomes in athletes- A narrative literature review

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Abstract

Background. Depression is a common mental disorder that may affect athletes as much as the general population, challenging the long-standing assumption that sport protects against it. **Aim.** To summarize current evidence on the impact of depression on athletic performance outcomes.

Material and methods. A narrative review was conducted using PubMed, Scopus, and Google Scholar, covering studies published between 1994 and 2026 on depression, athletes, and performance.

Results. Reported depression prevalence among athletes ranges from 4% to 68%, with female sex, individual-sport participation, and injury history as consistent risk factors. Depression affects performance through biological mechanisms (HPA-axis dysregulation, elevated cortisol, sleep disturbance, inflammation, monoaminergic dysfunction) and psychological mechanisms (reduced motivation, loss of confidence, fear of failure, social withdrawal), increasing fatigue and impairing endurance, recovery, attention, and reaction time. Depression is closely linked to injury risk, overtraining, performance inconsistency, and possible career stagnation. The causal direction remains unresolved.

Conclusions. Early recognition and a multidisciplinary approach (screening, psychotherapy, coach support) are essential; further longitudinal, sport-specific research is needed linking depression directly to objective performance outcomes.
Key words: depression; athletic performance; elite athletes; sports psychology; mental health.

1. Introduction

Depression is one of the most common mental disorders worldwide. It is characterized by persistent low mood and loss of interest or pleasure in activities, lasting most of the day for at least two weeks and often accompanied by poor concentration, sleep and appetite disturbances, feelings of worthlessness, and, in severe cases, suicidal [1]. Current global estimates indicate that approximately 5.7% of adults live with depression, with women affected roughly 1.5 times more often than men. The condition remains one of the leading contributors to disability-adjusted life years globally, generating a substantial personal, social, and economic burden [1]. Given this scale, depression has become a central focus of public health research across nearly all population groups, including populations traditionally assumed to be protected from mental illness, such as competitive athletes.

For decades, a common belief held that regular physical activity and sport participation protect against depression, largely due to the well-documented psychological and physiological benefits of exercise. Evidence from the last two decades tells a more complicated story: this protective effect does not straightforwardly extend to high-performance and elite athletes, who may face a distinct set of risk factors not present in recreational exercisers [2, 3]. Gorczynski, Coyle, and Gibson [2] found in a comparative meta-analysis that high-performance athletes report depressive symptoms at rates comparable to non-athletes, directly challenging the assumption that elite sport confers a mental health advantage. A survey of Australian elite athletes similarly found that more than a quarter reported symptoms consistent with depression, a proportion similar to that observed in general community samples, with injured athletes reporting even higher symptom levels [4]. Taken with subsequent systematic reviews describing highly variable prevalence rates across sports and countries, these findings indicate that depressive symptoms are not rare among elite athletes and may in some subgroups exceed general population rates [3, 5]

Several sport-specific factors help explain why elite athletes may be particularly vulnerable to depression. Athletic careers are frequently marked by chronic training and competition-related

stress, cumulative exposure to demanding stressors, and periods of overtraining that can precede or coincide with mood disturbance [6, 7]. Injury is another well-established risk factor: it can disrupt an athlete's identity, routine, and social support network while limiting the very physical activity that might otherwise support mental well-being [4, 5]. Performance expectations from coaches, sponsors, and the public, intense media scrutiny, financial and selection pressures, and the difficult transition out of competitive sport at retirement have all been described as contributing to elevated psychological distress in elite populations [8–10]. Qualitative accounts from elite athletes who have experienced depression further show how these overlapping stressors, combined with cultural norms in sport that discourage help-seeking and disclosure of mental health difficulties, can delay recognition and treatment [9, 10]

Beyond psychosocial stressors, depression involves several interrelated biological mechanisms relevant to the athletic context. These include dysregulation of monoaminergic neurotransmission, particularly serotonergic and dopaminergic pathways involved in mood, motivation, and reward processing, alongside disturbances of the hypothalamic-pituitary-adrenal axis and elevated cortisol reactivity to chronic stress [5, 11] Low-grade systemic inflammation and disrupted sleep architecture have also been linked to depression, and both can be further exacerbated in athletes by intensive training loads, travel, and competition schedules [11]. Training-induced physiological stress and psychological stress may act on overlapping neuroendocrine and inflammatory pathways, so athletes could be exposed to a combined biological burden that increases susceptibility to depressive episodes [6, 11]

The consequences of depression in athletes are not limited to psychological well-being; they may extend directly to athletic performance. Physically, depressive symptoms such as fatigue, reduced energy, and psychomotor slowing can impair training capacity and physical output [5]. Cognitively, depression has been associated with impaired concentration, slower decision-making, and reduced attentional control, all critical to performance in most sports [11]. It may also interfere with the execution of technical skills that rely on confidence, timing, and automaticity, and can compromise recovery by disrupting sleep and increasing perceived fatigue, which prolongs the time needed to return to baseline performance after training or competition [11, 12]

A substantial body of research has examined the prevalence, risk factors, and correlates of depression among athletes, yet this literature remains fragmented across disciplines, sports, and study designs, spanning epidemiological surveys, systematic reviews, and qualitative accounts of athletes' lived experiences [3, 13]. No narrative synthesis to date has specifically consolidated this evidence around how depression affects athletic performance outcomes, leaving practitioners, coaches, and sport psychiatrists without a unified overview connecting mental health status to on-field or in-competition performance.

The objective of this narrative review was to summarize current evidence regarding the effects of depression on athletic performance outcomes.

2. Research materials and methods

This narrative review summarizes current evidence on the effects of depression on athletic performance outcomes, focusing on prevalence, underlying biological and psychological mechanisms, physical and cognitive performance consequences, and prevention and intervention strategies. Relevant literature published in peer-reviewed journals, systematic and scoping reviews, and consensus statements was identified through a non-systematic search of PubMed, Scopus, and Google Scholar, covering publications from 1994 to 2026, with the majority published after 2015. The search targeted publications addressing depression, depressive symptoms, athletic and sport performance, injury risk, overtraining syndrome, and mental health interventions in adolescent, collegiate, and elite athletes. Priority was given to recent systematic reviews, meta-analyses, and validated assessment instruments, including the Patient Health Questionnaire (PHQ-9), the Center for Epidemiologic Studies Depression Scale (CES-D), and international consensus statements from sport psychiatry bodies such as the International Olympic Committee. Selected publications were analyzed narratively to provide an up-to-date overview of the epidemiology, mechanisms, performance-related consequences, and management approaches associated with depression in athletic populations.

3. Research results

3.1 Prevalence of depressive disorders in athletes

Reported rates of depressive symptoms and disorders in athletes vary widely, a pattern attributable more to methodological inconsistency than to genuinely divergent underlying rates. Reviews of the athlete mental health literature describe prevalence ranging from 4% to 68%, depending on the screening instrument, cut-off threshold, and population sampled; the CES-D was the most frequently used tool across the sixteen studies identified in one systematic review [3, 14]

Elite athletes face an increased risk of mental health problems, driven partly by the intense demands of a sporting career, which include sport-related stressors such as injury and pressure to perform, alongside non-sport stressors such as bereavement or abuse [2, 15]. Elite-level athletes experience organizational stressors more frequently, more intensely, and for longer durations than athletes competing at lower levels, and during periods of heightened stress they appear more susceptible to depression and anxiety [16, 17]. Kuettel and Larsen [14], in a scoping review mapping risk and protective factors for elite athlete mental health, concluded that athletes face a distinct set of risk factors, including injury, overtraining, and constant performance pressure. These can be offset by personal protective factors such as balanced role acceptance and adequate recovery, and by sport-environmental protective factors such as reduced stigma and a climate of trust. The same review noted an important gap: most existing studies use cross-sectional, self-report designs, and no qualitative research had yet examined risk factors such as adverse life events and injury specifically within professional team-sport settings.

Among amateur and collegiate athletes, prevalence estimates cluster somewhat lower but still represent a meaningful clinical burden. Wolanin, Hong, Marks, Panchoo, and Gross [18] found that 23.7% of a large NCAA Division I sample reported clinically relevant depressive symptoms on the CES-D, with 6.3% classified as moderate-to-severe. A more recent incoming-athlete cohort using the PHQ-9 reported considerably lower rates, illustrating how instrument choice and testing timing shape prevalence figures even within comparable populations [19]. Data specific to adolescent athletes remain more limited, but available reviews suggest depressive symptom rates of roughly 16–31% among high school and collegiate athletes, with

academic pressure, identity formation, and parental involvement proposed as compounding factors at this age [14].

Consistent sex differences emerge throughout this literature. Golding, Gillingham, and Perera [3] identified higher competition level, injury history, a history of more than three concussions, and female sex as potential risk factors for depression in high-performance athletes, and found that female athletes and those competing in individual sports carried a particularly high risk of elevated depression symptom scores. Several studies estimate that women are roughly 1.8 times more likely than men to report clinically relevant depressive symptoms across age and competition levels [4, 18, 19].

Certain disciplines appear to carry elevated risk, though sport-specific comparative evidence remains limited. Golding and colleagues [3] flagged individual sports as carrying greater risk than team sports, a category that spans many endurance, combat, and aesthetic disciplines. Narrative reviews of mental health in ultra-endurance sport describe a non-trivial depressive symptom burden among endurance athletes, which may be compounded by extreme training volumes interacting with the organizational stressors described above. Combat and aesthetic sports typically combine an individual competition format with additional pressures such as weight-making or subjective judging, and may share this elevated risk profile, though dedicated comparative prevalence data across these disciplines remain a clear gap for future research.

Table 1. Prevalence of depressive symptoms across selected athlete samples

Author	Country	Sport	Sample	Depression prevalence
Gulliver et al. [4]	Australia	Multiple (national sporting organisations)	224 elite athletes	27.2%
Gorczynski, Coyle, & Gibson [2]	International (meta-analysis)	Multiple high-performance sports	Pooled across included studies	Comparable to non-athletes; ~3.7–36.5% by sex/study
Golding, Gillingham, & Perera [3]	International (systematic review)	Multiple high-performance sports	16 studies	Highly variable (instrument-dependent); higher with more concussions, higher competition level, individual sports
Wolanin, Hong, Marks, Panchoo, & Gross [18]	USA	NCAA Division I, multiple sports	465 college athletes	23.7% (28% women vs. 18% men)*
Sanfilippo, Haralsdottir, & Watson [19]	USA	NCAA Division I, multiple sports	792 incoming college athletes	6% women / 2% men (mild-to-severe)*
Kuettel & Larsen [14]	International (scoping review)	Multiple elite sports	43 empirical studies	4–68% (range across athlete mental health literature)

Table 1. Prevalence of depressive symptoms across selected athlete samples [2–4, 14, 18, 19]

3.2. Biological mechanisms linking depression and performance

Hypothalamic–pituitary–adrenal (HPA) axis dysregulation. Depression is consistently associated with disturbances of the HPA axis, the body's central stress-response system. In athletes, chronic exposure to training and competition stress is thought to interact with this same neuroendocrine pathway, so that the physiological stress of intensive training and the psychological stress of depression converge on overlapping regulatory circuits [6, 11]. An already taxed stress-response system has reduced capacity to support the physiological demands of training and competition, which offers one biological explanation for performance decline.

Cortisol elevation. Elevated or dysregulated cortisol output is a frequently studied marker of HPA-axis disturbance in depression. A comprehensive systematic review of randomized controlled trials on the biological effects of exercise in major depressive disorder found that results for cortisol and other stress-response markers remained limited and variable across studies, reflecting small sample sizes and heterogeneous methodology rather than an absence of a genuine relationship [20] Chronically elevated cortisol, driven by combined training and mood-related stress, may impair muscle protein synthesis and recovery in athletes, providing a mechanistic link to reduced physical performance.

Sleep disruption. Sleep disturbance is both a core diagnostic feature of depression and a direct contributor to impaired physical and cognitive function. Disrupted sleep reduces the restorative processes necessary for muscular and neural recovery, and its co-occurrence with depressive symptoms compounds fatigue and slows adaptation to training load. This is a direct pathway through which mood disturbance translates into measurable performance decrements [11].

Inflammatory pathways. Depression has been linked to low-grade systemic inflammation, though the exercise–depression–inflammation literature shows mixed results. Reviews of the biological effects of exercise on depression describe inconsistent but potentially anti-inflammatory effects on markers such as interleukins, C-reactive protein, and tumor necrosis factor-α. Regular physical activity has been proposed to improve depressive symptoms partly by modulating this inflammatory response, alongside enhanced neuroplasticity and HPA-axis regulation, although the authors of this evidence base stress that the precise mechanisms still require clarification [20, 21] Elevated inflammatory activity has also been proposed to contribute to fatigue and reduced exercise capacity, both of which would directly undermine athletic performance.

Serotonin/dopamine dysfunction. Depression is characterized by dysregulation of monoaminergic neurotransmission, particularly within serotonergic and dopaminergic systems involved in mood regulation, motivation, and reward processing [11] Dopaminergic signaling underlies motivation and reward-driven behavior, so its disruption offers a direct biological explanation for the reduced drive to train and compete commonly observed in depressed athletes.

These five interacting systems suggest that performance decline in depressed athletes reflects a convergence of physiological disturbances rather than any single mechanism. A recent systematic review adopting a broader perspective than prior work found that, despite examining numerous underexplored biological systems, existing studies remain limited by small sample sizes, methodological heterogeneity, and an overreliance on biochemical markers. The authors recommended that future research employ larger, standardized trials and omics-based approaches to clarify these mechanisms more precisely [20].

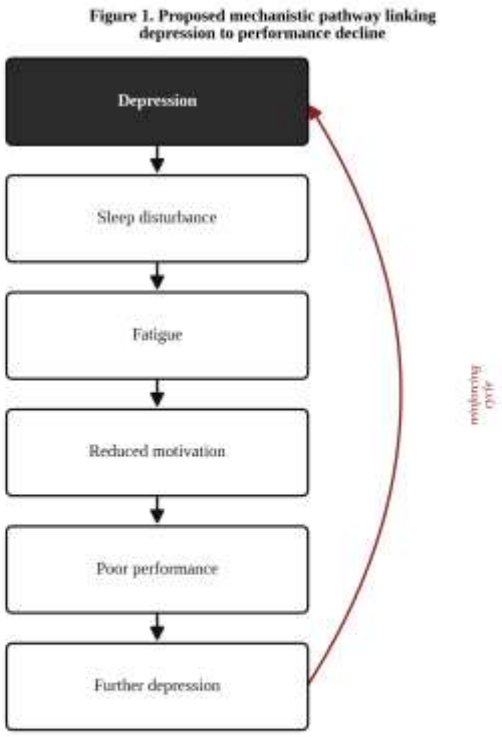


Figure 1. Proposed mechanistic pathway linking depression to performance decline.

The cyclical model illustrates how depression and performance decline may reinforce one another over time, consistent with the interacting biological and psychological pathways described in this and the following section [11, 12]

3.3. Psychological and behavioral mechanisms

Reduced motivation is a hallmark feature of depression and appears directly relevant to sustained athletic engagement. Elite athletes who experienced depression have described a marked decline in training motivation in qualitative accounts, to the point that some continued attending sessions without genuine engagement, participating out of external obligation rather than intrinsic drive [10]. Behavioral participation and motivational engagement can become decoupled in this way, so depression may erode training quality even when an athlete continues to physically show up.

Diminished self-confidence and negative self-evaluation frequently accompany depressive episodes. Athletes questioning their competitive ability and doubting whether they can meet the performance standards they previously held for themselves is one manifestation in athletic populations, a dynamic that compounds the pressure many elite athletes already report from coaches, family, and their own expectations [3, 10]

Fear of failure surfaces repeatedly in athletes' own accounts of depression. Lebrun and colleagues [10] described elite athletes experiencing intense pressure to perform from themselves, coaching staff, and family simultaneously, along with a perceived obligation to maintain consistently high standards of behavior and performance. When combined with depressive symptomatology, this fear of failure can generate a self-reinforcing cycle in which anticipatory anxiety about underperformance itself contributes to poorer performance and, in turn, to worsening mood.

Withdrawal and a pattern resembling learned helplessness round out this cluster of mechanisms. Cumulative lifetime stress exposure fosters poor mental health in elite athletes partly by promoting maladaptive long-term coping strategies and limiting interpersonal relationships, consistent with broader social withdrawal [12]. Depressed athletes have also described feeling excluded from team activities, which some identified as a specific trigger for further deterioration in mood and behavior. Withdrawal and diminished social integration can develop into a self-perpetuating cycle in this way, resembling learned helplessness [10]

3.4 Physical performance outcomes

Fatigue. Fatigue and depression show a high degree of clinical overlap across numerous medical conditions, and this relationship holds even after accounting for shared diagnostic criteria between the two constructs. Research on fatigue linked to other medical disorders has demonstrated a strong association between depression and constructs such as "vital exhaustion" (unusual fatigue, demoralization, irritability); this overlap persists even when fatigue-related items are removed from depression measures, suggesting shared underlying etiological factors rather than simple diagnostic redundancy [22]. Chronic, unexplained fatigue lasting six months or more shows a similarly strong bidirectional association with depression: a lifetime history of major depressive disorder is present in a substantial proportion of individuals with chronic fatigue syndrome, and proinflammatory cytokines have been proposed as a shared biological

contributor to both conditions [22]. Applied to athletes, depression-related fatigue is unlikely to be merely subjective tiredness; it may instead reflect genuine shared neurobiological and inflammatory disturbances that directly undermine training capacity and readiness to perform.

Endurance reduction. Clinical accounts of athletes experiencing depression describe measurable declines in endurance capacity, consistent with the fatigue mechanisms above and compounding the direct effects of reduced energy and motivation [5]. Pharmacological treatment adds a further layer of complexity: certain SSRIs, including paroxetine and fluoxetine, have been associated with reduced endurance performance in some athletes, so both the untreated illness and, in some cases, its treatment can affect this domain [23].

Strength and explosiveness. Declines in strength and power output have similarly been associated with depressive episodes, alongside endurance and speed, in athlete populations [5]. Psychomotor slowing, a core clinical feature of depression, offers one mechanism for reduced explosive force production, since rapid, forceful muscle activation depends on efficient neural drive that may be blunted during depressive episodes.

Slower recovery. Depression's effects on sleep architecture, HPA-axis regulation, and inflammatory signaling (Section 3.2) converge and may extend recovery time following training and competition. Fatigue sharing etiological roots with depression, as described above, has been linked specifically to prolonged recovery trajectories in clinical populations. There is no clear reason to expect this relationship to differ qualitatively in athletes, although sport-specific confirmatory studies remain limited [22].

Table 2. Summary of proposed effects of depression on physical performance domains

Outcome	Effect	Supporting studies
Fatigue	Strong bidirectional overlap with depression; shared etiological/inflammatory factors	Arnold [22]
Endurance	Reported decline; possible additional impairment from SSRI treatment	Beable [5]; Glick et al. [23]
Strength / explosiveness	Reported decline associated with depressive episodes; plausible via psychomotor slowing	Beable [5]
Recovery	Plausibly prolonged via sleep, HPA-axis, and inflammatory pathways	Arnold [22]; Ströhle [11]
Reaction time	Slower latent reaction speed associated with lower stress tolerance (pre-elite athletes)	Volgemute et al. [24]
Coordination	Inferred impairment via psychomotor slowing; direct athlete-specific evidence lacking	Beable [5]

Table 2. Summary of proposed effects of depression on physical performance domains [5, 11, 22–24]

3.5 Cognitive performance outcomes

Attention. Depression is associated with impaired sustained attention, documented mainly in clinical (largely non-athlete) samples using objective computerized testing. Patients with major depressive disorder respond more slowly than healthy controls on tasks requiring sustained attention, and this pattern holds regardless of task complexity [25]

Reaction time. Depression-related reaction-time deficits reflect two distinct processes: general information-processing slowing, and higher-order executive dysfunction. Depressed patients show slower reaction times on tasks requiring inhibitory control and sustained attention independent of executive-function demand, indicating both a general processing slowdown and a more specific executive deficit [25]. Executive difficulties of this kind underlie the capacity to plan, initiate, and complete goal-directed activity, so they carry direct relevance to competitive sport, where rapid, accurate responses are frequently decisive. In a separate study, Volgemute, Ulme and Vazne [24] modeled reaction-related performance as a unified cognitive-motor construct in 304 competitive athletes and found that stress tolerance significantly predicted reaction speed, but only among pre-elite athletes, not amateur or elite competitors. This stage-specific pattern suggests that affective and stress-related states may matter most for reaction-based performance during a particular developmental window in an athletic career.

Decision-making. The association between depression and slowed information processing or executive dysfunction extends, in principle, to the rapid decision-making demanded by dynamic competitive environments, although direct sport-specific measurement of this link remains limited [11, 25]. Elite athletes' broader psychological profile is relevant here: McLoughlin, Fletcher, Slavich, Arnold, and Moore [12] found that cumulative lifetime stress exposure significantly predicted depression and anxiety symptoms and reduced well-being in a mixed-method study of elite athletes, using the Patient Health Questionnaire (PHQ-9), a nine-item, validated measure of depressive symptom severity with good internal consistency and test–retest reliability, alongside the GAD-7 and a general well-being scale. Because decision-making under pressure depends on stable affective regulation, the disturbances captured by these instruments may extend to impaired real-time decision-making, though this specific outcome was not directly measured in the cited study.

Competitive execution. The same mixed-method study found that greater cumulative lifetime stressor exposure, in both count and severity, significantly predicted worse well-being and higher depression and anxiety scores in elite athletes (depression: $\beta = .42–.46$, $p < .001$; anxiety: $\beta = .28–.34$, $p \leq .018$; well-being: $\beta = -.30$ to $-.42$, $p \leq .015$). This occurred partly through maladaptive coping strategies and increased vulnerability to future stress [12] Competitive execution depends on an athlete's capacity to regulate attention, emotion, and effort simultaneously under pressure; the cumulative erosion of psychological resources described in this research is consistent with, though does not directly demonstrate, a link between accumulated depressive burden and compromised performance at the moment of execution. Future sport-specific performance-outcome research should test this link directly..

3.6 Depression and injury risk

A substantial and growing literature describes a bidirectional relationship between depression and sport injury. Reviews synthesizing this literature conclude that psychological indicators such as anxiety, depression, sleep disturbance, and stress can each increase the occurrence of injuries while also obstructing and delaying subsequent rehabilitation [26]. Injury itself has also been consistently identified as a risk factor for the development of depressive symptoms; injured elite athletes report significantly higher depression scores than non-injured counterparts [4]

Post-injury depressive and anxious symptoms have been shown to reduce rehabilitation adherence and hinder injury recovery in collegiate athletes. Musculoskeletal injury has been associated with worse mental health outcomes across professional, college-level, and amateur athletes alike, including elevated distress, anxiety, and depression, alongside reduced social functioning and quality of life. In pediatric and adolescent athletes specifically, stronger athlete identity has been identified as a risk factor for more severe depressive symptoms following musculoskeletal injury, with fear, identity loss, and uncertainty proposed as mediating factors influencing both symptom severity and return-to-sport outcomes. Most athletes regain physical function after rehabilitation, but considerably fewer return to their pre-injury competitive level, and psychological readiness, closely tied to mood state, has been proposed as a key determinant of this gap.

3.7 Depression and overtraining syndrome

Overtraining and depression appear closely intertwined in the athlete population. Early work developing scales to monitor training-induced distress established that increasing training load produces mood disturbances, including depressed mood, that track closely with training volume and precede overt performance decrements [6]. Symptoms of overtraining syndrome — including fatigue, appetite changes, muscle soreness, depression, and difficulty concentrating — overlap substantially with depressive symptomatology, such that overtrained athletes frequently present with a mood profile resembling clinical depression.

The scoping review by Kuettel and Larsen [14] formally categorized injury and overtraining together as personal risk factors for elite athlete mental health, alongside adverse life events and low social support, situating overtraining within a broader biopsychosocial framework rather than treating it as a purely physiological phenomenon. This framework proposes a cascading pathway in which chronic training and competition stress contributes to burnout, which in turn increases vulnerability to depressive symptoms, ultimately manifesting as measurable performance decline — a cycle that, without intervention, can perpetuate further psychological strain [6, 14].

3.8 Implications for achieving personal bests: an interpretive synthesis

Performance inconsistency. One of the strongest themes to emerge from qualitative work with elite athletes was a direct, athlete-perceived link between performance outcomes and depressive symptoms. Several athletes described how underperforming in competition could itself trigger

feelings of depression, creating a self-reinforcing loop between mood and results rather than a simple one-directional cause [10]. These athletes also described substantial pressure to perform originating from themselves, their coaches, and their families, alongside a perceived need to maintain high standards of behavior to succeed. Several reported that even when engaging with sport psychologists, conversations were consistently redirected back toward sport-related goals and performance, leaving little space to address non-performance-related aspects of their mental health. This pattern may itself contribute to performance inconsistency by leaving underlying psychological distress only partially addressed [10].

Training interruptions. Injury emerged as another major theme linking depression to disrupted athletic progress. Both short- and long-term injuries were associated with depression, sadness, and anger among athletes, and feeling excluded from team activities during injury-enforced absence was identified as a specific trigger for worsening mood and behavior. Notably, the same athletes described motivation to continue training and remain integrated within their team as a factor supporting recovery from both the injury and the associated depressive symptoms. Training interruptions and depression may therefore be mutually reinforcing when engagement lapses, while maintained social and training connection appears to partially buffer this relationship [10].

Missed competition opportunities. Building on the injury- and performance-related themes above, depressive episodes coinciding with injury, overtraining, or acute performance slumps carry a further downstream cost: missed selection, missed qualification windows, or missed competitive opportunities that cannot always be recovered later in a season or career cycle. No study reviewed here directly quantified lost competitive opportunities as an outcome, but this consequence follows logically from the combination of impaired physical/cognitive performance (Sections 3.4–3.5), elevated injury risk (Section 3.6), and prolonged recovery associated with depression, representing an applied consequence that has received comparatively little direct empirical attention.

Career stagnation and plateauing. This is the most original contribution of the present synthesis. Rather than treating depression purely as an acute, episodic disruptor of single competitive events, the accumulated evidence on cumulative lifetime stress [12], overtraining-related mood disturbance [6], and the mutually reinforcing cycle of injury, exclusion, and low

mood [10] together point toward a longer-term pathway to career-level stagnation. An athlete who experiences repeated cycles of depressive symptoms, training interruption, and partial recovery may plateau below their physiological potential over multiple seasons, even if no single depressive episode is severe enough to end their career outright. This proposed "plateau pathway" is distinct from the acute performance effects documented in Sections 3.4 and 3.5. It has not been directly tested in a longitudinal athletic sample in the literature reviewed here and is proposed as a priority direction for future prospective research.

3.9 Prevention and intervention strategies

Early screening. Structured mental health screening is a foundational prevention strategy, particularly given that most available prevalence data rely on validated self-report instruments such as the PHQ-9 and CES-D [3, 12].Biological research may eventually complement psychological screening: a broad systematic review of the biological effects of exercise in depression argued that future omics-based approaches could help identify biomarkers relevant to diagnosis and treatment response, though current biological evidence remains too heterogeneous and limited by small sample sizes to support biomarker-based screening today [20]

Psychotherapy. Individual psychotherapy is a first-line treatment for mild-to-moderate depression and anxiety, with cognitive behavioral therapy carrying the strongest empirical support; depending on clinical presentation, sport, and life circumstances, psychoeducation, counseling, or family therapy may also be appropriate [11]. Athletes face specific barriers to seeking and accepting psychotherapy, including strong drive, ambition, and competitiveness that can make accepting outside help difficult, alongside a tendency to develop rapid, intense transference reactions toward treating clinicians given their existing reliance on agents, family, and coaches for guidance [27]. These same traits can become assets in therapy: athletes typically bring strong discipline, familiarity with structured instruction and skill practice, and a well-developed capacity for internal focus, which have been proposed to support greater compliance with therapeutic direction than is typically seen in non-athlete patients [11, 27]. This generally favorable picture must be weighed against an important evidentiary gap, however. Glick, Stillman, and McDuff [23] noted that despite consensus that psychotherapy and CBT specifically are effective and appropriate for athletes, no randomized controlled trials currently exist evaluating psychotherapy or medication specifically for mental illness in athlete

populations to directly guide treatment. Controlled studies in collegiate athletes show improvement and offer a partial foundation for elite populations, but the same review called for athlete-specific intervention models, combining individual, family/marital, and group psychotherapy with or without medication, built on evidence-based treatment rather than extrapolation alone.

Cognitive behavioral therapy and exercise. As noted above, CBT carries the best empirical support among psychotherapeutic approaches and is likewise identified as generally effective for athletes by international sport psychiatry sources [11]. Exercise-based intervention offers a complementary evidence base. Heissel and colleagues [28] found in a systematic review and meta-analysis with meta-regression of 41 randomized controlled trials that exercise was efficacious for reducing depressive symptoms, and recommended it be offered as an evidence-based treatment option, particularly supervised, group-based, moderate-intensity aerobic exercise, while cautioning that small trial sample sizes and high methodological heterogeneity should temper interpretation. A separate review of exercise program variables specified that aerobic exercise performed three to four times weekly at moderate or self-selected intensity, for 30–40 minutes per session over at least nine weeks, appeared most consistently effective; the authors noted that these parameters are not substantially different from general population health recommendations or those used for managing type 2 diabetes [29] Translating these general protocols directly to elite athletes already training at very high volumes remains an open question, given the potential for additional exercise load to interact with overtraining-related mood disturbance rather than resolve it.

Coach support. Beyond formal clinical intervention, the broader sport environment plays a documented role in outcomes. Sport-environmental protective factors, including a climate of trust and reduced stigma around help-seeking, have been identified as buffering elite athletes' mental health risk [14]. Consistent with this, athletes recovering from injury-related depression specifically identified continued integration with their team and coaching environment, and sustained motivation to train, as facilitating recovery, whereas exclusion from team activities was identified as a risk factor for worsening mood [10]

Multidisciplinary care. The evidence reviewed here points toward multidisciplinary care as the most defensible current model: psychological treatment (psychotherapy/CBT), exercise-

based intervention where appropriate, judicious medication use with attention to sport-specific considerations such as anti-doping regulations, and structural and environmental support from coaches and sporting organizations, combined rather than applied in isolation [11, 23]. This integrated approach directly addresses the call, echoed across several reviewed sources, for athlete-specific intervention models built on evidence-based treatment rather than direct extrapolation from non-athlete populations [14, 23]

Table 3. Summary of intervention categories for depression in athletes

Intervention	Evidence	Performance effect
Early screening (PHQ-9, CES-D)	Established, validated instruments widely used in prevalence research	Enables earlier intervention; not itself a treatment
Psychotherapy / CBT	Recommended as first-line per Ströhle [11]; no athlete-specific RCTs yet exist (Glick et al. [23])	Not directly quantified in performance terms
Exercise	Large effects on depressive symptoms in general-population RCTs (Heissel et al. [28]); optimal parameters ~3–4x/week, moderate intensity, ≥9 weeks (Stanton & Reaburn [29])	Unclear in already highly trained athletes; risk of interacting with overtraining
Medication (antidepressants)	Used per general psychiatric guidelines with sport-specific caveats (doping regulations, side effects)	Inconsistent; some SSRIs linked to reduced endurance
Coach support	Associated with buffered mental health risk and injury recovery	Indirect, via improved recovery, adherence, and reduced withdrawal
Multidisciplinary care	Called for across multiple reviews as the athlete-specific standard of care	Not yet directly evaluated as a combined package

Table 3. Summary of intervention categories for depression in athletes [11, 23, 28, 29]

4. Discussion

The evidence synthesized in this review indicates that depression is a common and clinically meaningful problem among athletes, with prevalence estimates ranging from roughly 4% to 68% depending on instrument and population; elite athletes report depressive symptoms at rates comparable to, or in some subgroups exceeding, the general population [2, 3] Female sex, higher competition level, injury history, and participation in individual sports emerged consistently as risk factors [3]. Biologically, depression appears to act on athletic performance through interacting disturbances of the HPA axis, cortisol regulation, sleep architecture, inflammatory signaling, and monoaminergic neurotransmission [11, 20]. Psychologically, it operates through declining motivation, eroded self-confidence, fear of failure, and social withdrawal [10, 12] These mechanisms converge on measurable declines in fatigue tolerance, endurance, strength, recovery, attention, and reaction time [22, 24, 25], and interact

bidirectionally with injury risk and overtraining syndrome [6, 14]Beyond acute effects, the qualitative literature suggests a longer-term pathway in which repeated cycles of depressive symptoms, training interruption, and partial recovery may contribute to career-level performance stagnation [10]. Several intervention categories, including psychotherapy, exercise, coach support, and multidisciplinary care, show promise, though none has yet been evaluated specifically against objective athletic performance outcomes [23, 28]

A recurring and largely unresolved tension across this literature concerns the direction of causality: does depression cause performance decline, or does performance decline trigger depression? This is the most important open question raised by the present review. The available evidence does not point to a single answer; several strands of research instead support a genuinely bidirectional relationship. Gil-Caselles, Ruiz Barquín, Giménez Egido, and Olmedilla-Zafra [26] concluded in a review of reviews on mental health and sport injury that psychological symptoms such as depression can both precede injury and worsen recovery afterward, while injury itself independently elevates depression risk, pointing to a cycle rather than a one-way causal chain. Longitudinal work on athlete burnout has similarly found reciprocal effects, with burnout predicting later depressive symptoms and depressive symptoms in turn predicting later burnout, rather than one construct simply driving the other [30]. Broader developmental research has likewise described bidirectional associations between sport involvement and mental health across adolescence [31]. This uncertainty is reflected directly in athletes' own accounts: elite athletes have described underperformance as a trigger for depressive feelings while simultaneously describing how depression itself undermined their motivation and preparation, without being able to clearly separate cause from consequence [10] Because the large majority of underlying studies are cross-sectional, the field currently cannot determine whether interventions should prioritize treating mood to protect performance, protecting performance to prevent mood decline, or addressing the cycle at multiple points at once, which may in fact be the most realistic approach.

Taken as a whole, the current evidence consistently indicates that depression impairs the psychological and biological functions most central to high-level sport performance, including motivation, attention, executive function, sleep, fatigue, and recovery, while direct research linking depression to objective indicators of athletic achievement remains comparatively scarce. This gap has practical consequences for how coaches and clinicians should respond.

Rather than waiting for a decline in results to prompt concern, early recognition should be treated as a performance-relevant issue in its own right, using validated instruments such as the PHQ-9 or CES-D alongside routine injury and load monitoring [3, 12]. Stigma remains the most significant barrier young elite athletes report to seeking help, so intervention strategies aimed at improving help-seeking in this population should focus on reducing stigma, increasing mental health literacy, and strengthening athletes' relationships with potential providers [32]. Coaches are particularly well placed to support this: a trusting, low-stigma team climate has been associated with better athlete mental health, and coaches who maintain engagement with injured or struggling athletes, rather than allowing them to feel excluded from the team, may directly support both psychological recovery and continued performance development [10, 14]. Clinically, the evidence supports a multidisciplinary model combining psychotherapy (with CBT as the best-supported approach), judicious exercise prescription, medication where appropriate with attention to anti-doping regulations, and structured screening tools such as the IOC's SMHAT-1/SMHRT-1, rather than relying on any single intervention in isolation [11, 23]

Several limitations qualify these conclusions and should guide future research. Methodological heterogeneity across the athlete depression literature is substantial: Tahtinen, Shelley, and Morris [13] screened nearly 7,000 records and included 157 studies in their scoping review, finding that researchers had used 28 different self-report depression measures, that most studies were cross-sectional and used student samples as non-athlete comparison groups, and that very few studies examined depressive symptoms within specific individual sports. This inconsistency makes direct comparison across studies difficult and likely inflates the apparent variability in prevalence reported in Section 3.1. The reliance on self-report screening instruments across nearly all reviewed studies also introduces potential self-report bias, including social desirability effects that may be amplified in athletes who fear stigma or exclusion from their team [13, 32]. Closely related to the causality question raised above, the near-absence of longitudinal designs prevents this literature from establishing clear temporal or causal relationships between depression and performance outcomes; the few longitudinal studies that do exist come mainly from burnout research rather than from athletic performance research directly [30]. Current evidence describing reaction time and executive functioning in athletes with depression also remains scarce: most available studies investigate cognitive impairment in patients with major depressive disorder outside athletic populations, which limits direct translation to competitive sport [25]. Finally, even the general, non-athlete evidence base

for exercise as a depression treatment shows important limitations that likely extend to athlete populations. Pérez Bedoya, Puerta-López, López Galvis, Rojas Jaimes, and Moreira [33] found in a systematic review and meta-analysis of exercise for major depressive disorder in adults only a moderate, non-significant effect relative to comparator treatments, with high heterogeneity (I^2 = 78–85%) and evidence quality rated low to very low, underscoring that intervention recommendations for athletes in Section 3.9 rest on a still-developing evidence base rather than definitive proof of efficacy.

5. Conclusions

Depression is a common and clinically significant problem among elite and sub-elite athletes alike, and the evidence reviewed here firmly challenges the long-standing assumption that competitive sport participation protects against it. Athletes report depressive symptoms at rates comparable to, and in some subgroups exceeding, those seen in the general population [2, 3] This is not merely an academic observation. An international consensus statement from the International Olympic Committee has explicitly stated that mental health cannot be separated from physical health in elite athletes, given that mental health symptoms and disorders are common in this population, may present with sport-specific features, and can impair performance [34]. Depression in athletes therefore warrants the same clinical seriousness, systematic screening, and destigmatized attention as any physical injury or illness.

The evidence gathered in this review indicates that depression affects athletic performance through multiple, interacting pathways rather than through any single mechanism. Biologically, disturbances in the HPA axis, cortisol regulation, sleep, inflammatory signaling, and monoaminergic neurotransmission may undermine the physiological foundations of training and recovery [11, 20]. Psychologically, declining motivation, eroded self-confidence, and social withdrawal directly erode the consistency and quality of training and competition [10] These pathways converge on tangible outcomes, including greater fatigue, reduced endurance and recovery capacity, and slower reaction time and impaired executive function [22, 25], alongside elevated injury risk and a close, mutually reinforcing relationship with overtraining syndrome [6, 26].. At the same time, this review is honest about what remains unresolved. Whether depression is primarily a cause of performance decline, a consequence of it, or part of a reciprocal cycle in which each reinforces the other over time is not yet settled, though the strongest available evidence points to the latter [30]

Future research would benefit from greater consistency in the depression screening tools used across athlete populations, along with stronger evidence regarding their psychometric properties in sport-specific samples, since the wide variation in instruments identified across this literature limits direct comparison between studies [13]. Existing research has examined generic and sport-specific factors within athletes' immediate training and competitive environment, but very few studies have looked beyond this to the wider cultural or macro-level influences that may shape depression risk across different sporting systems and countries [13]. Research into within-individual vulnerability to depression similarly remains fragmented and would benefit from closer study in relation to contextual determinants, in order to inform more effective, individually tailored support initiatives rather than one-size-fits-all interventions [13]. Most fundamentally, the field needs longitudinal, sport-specific studies that link depression directly to objective indicators of athletic performance. Despite the volume of research on athlete mental health more broadly, this connection remains the central and largely unaddressed gap identified by this review.

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Supplementary Materials

Not applicable.

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