

# Depression among Elite Athletes: Prevalence and Psychological Factors

## *Depressionen im Hochleistungssport: Prävalenzen und psychologische Einflüsse*

### Summary

- › **Depression** among elite athletes has raised public awareness. Interestingly, empirical data on the issue are rare. Neither representative prevalence rates nor insights into the special mechanisms leading to depression in the field of elite athletes are known in detail. The following work reviews the current state of research trying to get a first summary in what is known about underlying mechanisms leading to depression and trying to answer the question whether or not depression are widespread among German elite athletes.
- › **By analyzing current studies** in this field, the present article provides a scientific overview of first findings and academic voids. Initial studies on German elite athletes point out that the prevalence for depressive symptomatology in elite athletes is comparable to the general German population. Due to the small number and quality of studies there are no representative data. Therefore, future studies using clinical criteria of assessing depressive episodes are needed.
- › **Associated factors in competitive sports** are high levels of chronic stress, coping strategies, and the balance of physical and psychological stress and recovery. Therefore, the sport specific physical stress seems to play an important role. There are uncertain hints for social factors, such as team cohesion, and individual factors (e.g. perfectionism). However, there are insufficient studies to draw statements about relevance or effect of these topics. Further studies could gain scientific evidence by examining the causality and theory driven hypotheses of these factors.

### Zusammenfassung

- › **Depressionen** im deutschen Hochleistungssport stehen immer mehr im Fokus des öffentlichen und medialen Interesses. Interessanterweise sind aber nur wenige empirische Daten über die Thematik vorhanden. Weder repräsentative Prävalenzraten noch zugrundeliegende Entstehungsmechanismen dieser Krankheit in einer Population von Hochleistungssportlern sind empirisch abgesichert. Die folgende Übersichtsarbeit fasst den aktuellen wissenschaftlichen Stand zusammen, versucht erste Einblicke in mögliche Zusammenhangsfaktoren zu bieten und widmet sich der Frage, ob Depressionen im deutschen Hochleistungssport besonders vertreten sind.
- › **Eine Auswertung der aktuellen Studien** zu diesem Thema soll erste Erkenntnisse sowie Forschungslücken kritisch darstellen. Erste Untersuchungen im deutschsprachigen Raum deuten darauf hin, dass depressive Symptomatik im Spitzensport mindestens so ausgeprägt ist wie in der deutschen Bevölkerung. Aufgrund der immer noch zu geringen Anzahl und Qualität an Studien lassen sich allerdings keine empirisch gesicherten Zahlen finden. Hierfür fehlen repräsentative Studien mit klinischen Beurteilungskriterien.
- › **Als für den Sport relevante Faktoren** haben sich bisher chronischer Stress, Stressverarbeitungsstrategien und die Balance zwischen Erholung und Belastung aufdecken lassen. Dabei scheint auch die sport spezifische körperliche Belastung eine wesentliche Rolle zu spielen. Auch lassen sich vage Hinweise auf soziale Faktoren, wie etwa der Mannschaftszusammenhalt und individuelle Faktoren (z.B. Perfektionismus) finden. Die Studienlage ist hier allerdings noch zu gering, um Aussagen über Relevanz und Wirkung dieser Themen treffen zu können. Weitere Forschung könnte vor allem durch die Untersuchung von Faktoren im Hinblick auf kausale und theoriegeleitete Hypothesen einen Mehrwert darstellen.

### KEY WORDS

Depression, elite athletes, prevalence, stress, coping, recovery

### SCHLÜSSELWÖRTER

Depression, Hochleistungssport, Verbreitung, Stress, Coping, Erholung

### Introduction

Media reports on athletes suffering from psychological disorders have recently become more frequent. In the past, this topic had been largely excluded if not tabooed. Accordingly, clinical sport psychological approaches are scarce. Health in elite athletes seems to be mainly considered in terms of proper physical functioning. Incidences of athletes with psychological disorders are rarely recognized and often stigmatized (36). If prevalences are examined at all, diverse assumptions on determinants are given. On the one hand it is argued, that athletes are highly vulnerable for developing depressive symptoms due to their outstanding position in society, and the tremendous pressure and level of stress they experience. On the other hand the position is found that athletes are especially resilient and therefore are less vulne- ➤

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Table 1

Overview of the included studies concerning their sample, methods, results of prevalence and assessed factors related to depression. POMS (Profile of Mood States); CES-D (Center for Epidemiologic Studies Depression Scale, 32); ADS (Allgemeine Depressionskala, 14); PAI (Personality Assessment Inventory, 25). \*labeled studies were added subsequently and have not been identified by data base research. The studies were ordered by quality of assessment of depression.

DEPRESSION ASSESSMENT	SAMPLE OF ATHLETES	DESIGN	PREVALENCE, ROUNDED	ASSESSED FACTORS RELATED TO DEPRESSION	STUDY
Interview by experts	N=2067	cross-sectional design for assessment of prevalence	last 6 months: 4%	differences across sport disciplines and gender	Schaal et al., 2011
	Representative sample in France sport disciplines unknown		life-time: 11%	further clinical disorders	
ADS	N=162 (99 profess.; 35 youth)	cross sectional; correlational online study	professionals: 15%	chronic stress,	Nixdorf et al., in press*
Cut-off=23	German athletes 18 sport disciplines		youths: 20%	coping, exhaustion & recovery	
CES-D Cut-off=16	N=257 College, USA 13 Sport-teams	cross sectional; correlational study	21% (Cut-off=23: 6%)	state und trait anxiety „freshman“	Yang et al., 2007
	N=66 College, USA Baseball player	cross-sectional; comparison athletes vs. Non-athletes	16%	coping	Proctor & Boan-Lenzo, 2010
	N=104 (Athleten) College, USA sport disciplines unknown	cross sectional; correlational study	33.5%	self-worth, social connectedness, sleep	Armstrong & Oomen-Early, 2009
PAI Cut-off=32	N=105 (athletes) College, USA soccer, volley-, basket- and football, tennis, swimming	cross-sectional; comparison athletes vs. Non-athletes	female 10% male 4%	social anxiety, problems with alcohol, perceived social support differences between gender	Storch et al., 2005
single questions on "melancholy, depression, unhappiness"	N=723 German athletes Handball, athletics	cross-sectional	2-4% (several times a week)		Thiel et al., 2010*
self-rating on categories „honestly yes“, „honestly no“, „no answer“	N=1154 German athletes sport disciplines unknown	cross-sectional; online assessment, Randomised Response Technique	9%		Breuer & Hallmann, 2013*
positive testing on antidepressants	N=82880 50 nations 178 sport disciplines	cross-sectional and longitudinal	1%		Machnik et al., 2009

table. Hoyer and Kleinert (19) provide a first, general overview of different views on psychological disorders in competitive sports and the importance of the topic. The following article is specifically focusing on the topic of depression and provides a summary of empirical data regarding this syndrome. Research on prevalence rates and possible factors in the development of depression in elite athletes, as well as gaps in research, are discussed critically.

Methods

For reviewing the current research data the following databases were searched: PubMed, MEDLINE, PsycINFO, PSYINDEX and The Cochrane Library. Terms for the searching process were: depression & athlete(s), depressive mood & athlete(s), depressive symptoms & athlete(s) and depression & sport(s) (same terms were entered in German, too). No article was excluded due to publication date. Studies meeting the following selection criteria were included: Empirical study, sample with elite athletes and assessing depression as a dependent variable. Six studies meeting the criteria were identified (see tab. 1). Afterwards, references were searched for further articles, which might not

be found through original database search. Three additional articles were included, which met the above mentioned criteria. Table 1 provides an overview of all included studies. Articles assessing only reactive depressive syndromes due to injuries were excluded. Articles on the topic burnout were not included due to the insufficient definition and therefore its unknown relation to depressive syndromes.

For illustrating the reported prevalences, articles were first searched accordingly. Secondly, the included articles were searched for further assessed factors. The following review is structured accordingly. The mentioned prevalence rates are structured through the origin of the assessed sample, whereas the factors were grouped by their topic.

Prevalence of depressive symptoms

Epidemiologic data from the general German population

Depressive disorders are widespread in the German general population. The lifetime prevalence is reported to be 17% (42, 20). The 12-month prevalence is 11% and the 4-week prevalence is 6% (20). Women are more prone with a lifetime prevalence of 25% than men with a prevalence of 12%.

### International research in competitive sports

Most articles regarding depressive symptomatology in elite athletes origin from US Colleges. Yang et al. (43) surveyed 257 athletes reporting a prevalence of 21% for depressive syndromes in this sample. It is noteworthy, that this study employed the CES-D, a validated and widespread questionnaire for assessment of depressive syndromes.

Yang et al. (43) rated scores above 16 points as an indication of depression. This relatively low cut-off might contribute to the comparatively high prevalence rate in their study.

Armstrong and Oomen-Early (2) reported a prevalence of 33.5%, using the same cut-off. In this study athletes were reported with significant lower levels of depressive symptoms compared to non-athletes. Proctor and Boan-Lenzo (29) used the same cut-off. They report lower rates of prevalence in athletes than in non-athletes, too.

Further studies, for example Storch, Storch, Killiany and Roberti (38) who compared athletes with non-athletes, could not find empirical support for this difference. In their study a general, clinical instrument for assessment (PAL, 25) was used with a conservative cut-off of 32 points. The prevalence rate was rather low and athletes did not differ significantly from non-athletes regarding depressive symptoms. In this sample, athlete's prevalence was between 10% (females) and 4% (males).

Summarizing these results (see table 1) of the few studies addressing the topic of prevalence of depressive syndromes at US Colleges, the data seems to be rather inconsistent. Furthermore, the data is not gathered from a sample of elite athletes. Schaal et al. (34) conducted a representative study on psychological problems among elite athletes in France. They assessed the presence of a depressive episode with clinical interviews. In this study 4% of the athletes indicated having a current depressive episode. Lifetime-prevalence was reported to be 11%.

### Research in German elite athletes

The before mentioned studies are of interest concerning the question of a possible connection between sports and depressive symptoms. However, the generalization to German elite athletes is not possible. Different supporting systems (colleges vs. squad) as well as the selective sample (only students) and possible cultural differences between the participants rule out a transfer of the found prevalence rates to German elite athletes. Thiel, Mayer and Digel (40) assessed a sample of German handball players and track and field athletes (1<sup>st</sup> and 2<sup>nd</sup> national league and A, B C and D national squad). They found that 2-4% of the athletes were experiencing feelings of melancholy, depression and unhappiness several times a week.

In a clinical perspective, these results are not valid due to missing diagnostic instruments such as a clinical interview or a validated questionnaire and therefore cannot account as prevalence rates for depression. Neither has the prevalence rate of 0.6% for antidepressants, which was gathered in a samples of athletes tested for drug abuse (23), information on the presence of depressive symptoms or a major depressive episode in elite athletes. The finding does not allow any conclusion regarding the presence of a depressive disorder, because not all depressive episodes are treated (with antidepressants) and antidepressants are also prescribed for other purposes.

However, the study from Machnik et al. (23) did find a relatively large increase of positive testing for antidepressants since 2006. The first study directly addressing the prevalence of depressive syndromes in German elite athletes was conducted by Nixdorf, Frank, Hautzinger and Beckmann (27). The study employed the clinical, validated questionnaire (ADS, German

version of the CES-D, 14) to assess depressive symptoms. A conservative cut-off with a sum-score of 23 points was used in this study, in order to distinguish depression from a short-termed symptomatology or fatigue through sport related stress. With this conservative cut-off a 15 % prevalence of depressive syndromes was found among the 99 elite athletes who participated in the study. For the 35 junior elite athletes in the study a prevalence of 20% was found.

Compared to the general German population the prevalence rates are approximately the same (in the general population a prevalence of 12% for male and 16% for female was measured with the same questionnaire). Breuer and Hallmann (3) used the randomized response technique to assess Depression. 9% of all 1154 athletes in the sample indicated to suffer from a depressive disorder. At the same time 50% indicated not to be suffering from a depressive disorder and 41% did not give an answer to that question. In terms of a clinical perspective, these findings are rarely significant due to the high amount of abstention and high subjective influence of what the participating athletes considered to be a depressive disorder by using a 3-staged answering format.

### Discussion on prevalence of depressive symptomatology

As stated above, the current state of knowledge on prevalence rates of depressive symptomatology in German elite athletes is insufficient. As illustrated in table 1, some of the few existing studies did not employ valid instruments for the assessment of depression. Different cut-off values are leading to difficulties in comparison of studies and less conservative cut-off scores tend to overestimate prevalence rates. The only German study on prevalence rates using a valid questionnaire indicates that elite athletes seem to have a comparable prevalence of depressive syndromes to the general German population (27).

However, the sample of this study is not representative of German elite athletes and does not cover all sport disciplines. Furthermore, it is unclear, whether there is an overlap between some of the samples in the presented studies. In addition, there is no data on clinically diagnosed depressive episodes in German elite athletes. Furthermore, differences in prevalence for depressive symptoms between male and female, as shown in the general population, are rather speculative until now.

Whereas Storch et al. (38) found a difference in their study, showing higher prevalences in female US college students, there was no gender difference found by Nixdorf et al. (27) in their study in German elite athletes. Interestingly, the authors found a difference between athletes in team and individual sport disciplines, which was also shown in French athletes (34). Athletes in individual sports showed higher scores of depressive symptoms than athletes in team sports. This could imply that there may be specific mechanisms in elite athletes and that knowledge from the general population cannot be transferred to the population of competitive athletes without reconsideration. To focus on such mechanisms, knowledge about possible determinants will be presented in the following.

### Possible determinants of depression among elite athletes

In general, the development of depressive disorders can be described by a multifactorial model of causality (42). There are biological (e.g. genetics), psychological (e.g. cognitive deficits) and social (e.g. conflicts) influences to be assumed as factors causing the incidence of a depressive disorder. While looking closer at structures in sport systems and the demands on athletes, factors associated with the incidence of depressive >

symptoms can be identified. The following will present current topics relevant for a depressive symptomatology in elite athletes.

### Stress

The tremendous psychological stress athletes are exposed to on a daily basis is frequently reported (31). Different stressors range from exercise-based and competition-based stressors (e.g. loss of a competition, cost and effort of the exercise) to everyday stressors. A growing amount of studies mentions that both, competition-based as well as sport-unrelated daily stressors are equally impairing. For example: Worrying about one's performance potential, the loss of a competition and resulting fear of failure and disaffection, conflicts with trainers, partner or family and costs of the exercise and physical demands are mentioned by ice figure skaters, golfers and tennis players as highly affecting stressors (8, 12, 33, 30).

The association between stress and psychological disorders, especially between stress and depression, is empirically validated (13, 22, 24). This has recently been replicated in elite athletes, by findings showing a connection between chronic stress and depressive symptoms (27). The question whether acute, competition-related stress has a negative impact is still uncertain up to date.

### Coping

Looking at stress individual differences in how people cope with stressors play an important role. Not all athletes do perceive the above-mentioned stressors equally negative. In this connection the coping strategies of the individual athlete are of particular importance. Coping is a term, covering many strategies and behavioral activities in the process of dealing with stressors and stressful situations (35).

Studies regarding coping behavior in the general population have shown significant differences between healthy and clinical populations in the use of certain coping strategies (cf. 41). Wingenfeld et al. (41) report, that clinically depressed patients are using significantly more emotion-related coping (e.g. self-pity) than healthy control groups. Following the authors, emotion-related coping correlates positive and problem-focused coping (e.g. reaction control) correlates negative with psychopathological disorders like depression. Furthermore, studies have shown that coping strategies vary between gender (9, 18, 11). Nicholls, Polman, Levi, Taylor and Coble (26) found differences in quantity and quality regarding the use of coping strategies between different sport disciplines as well as between athletes in individual sports and team sports. First hints concerning an association between coping strategies and depressive symptomatology in elite athletes are indicated by results in German and American athletes (27, 29). Notably, the studies found a positive correlation between depressive symptoms and negative, emotion-focused coping.

### Exercise stress

There seems to be an important connection between tremendous physical stress through exercise and negative mood. Exercise and therefore physical stress is essential in order for athletes to improve their performance.

However, a long-lasting imbalance between exhaustion and recovery can develop into overtraining (37). If this state persists although the athlete took a resting period of at least 2 weeks it is referred to as overtraining syndrome (4). Besides the mentioned decrease in performance this chronic state manifests itself in symptoms such as fatigue, loss of weight and appetite,

sleep disturbances, emotional instability, anxiety, depressive mood, heavy transpiration, heavy muscles and frequent, small infections (4, 5, 6, 7).

Naming these symptoms strong similarities to the depressive symptoms are obvious. Armstrong and VanHeest (1) indicate, that there are in fact great overlaps in the symptomatology (e.g. loss of appetite and weight, insomnia or fatigue).

Furthermore the authors report, that there are comparable changes in the vegetative nervous system and the associated neurotransmitters. They conclude, that the overtraining syndrome might have a similar etiology to depression. Puffer and McShane (31) also indicate a connection between overtraining and depression. Following their argumentation depression may appear without fatigue, but is far more frequent seen with physiological fatigue in athletes.

Empirical studies point into the same direction. For example, O'Conner, Morgan, Raglin, Barksdale and Kalin (28) found a significant correlation between higher exercise loads and depressive mood in swimmers. In Germany a strong association was found between the balance of stress and recovery and depressive symptoms (27). Athletes with high scores in exhaustion and low scores in recovery were suffering stronger by depressive syndromes than their recovered colleagues. Scientific research on overtraining demonstrates the importance of physiological changes (e.g. through the hormones leptin and insulin or through cytokines) and their influence on central nervous processes in the hypothalamus by chronic exercise loads (37). These changes may be reflected in psychological markers such as mood or feelings of fatigue.

Besides the physiological stress, an interaction with psychological factors (e.g. recreational activities) might be assumed (21). However, the mechanisms and explanations concerning this connection and interaction are still to be explained.

### Individual and social factors

Besides the above-mentioned factors, individual and social aspects in elite athletes should be considered. In this regard, specific personality traits that might have an influence on depressive symptoms are of interest. Research in the general population found associations between perfectionistic personalities and a higher vulnerability for the development of depression (e.g. 15, 16). Regarding elite athletes, empirical evidence for this assumption is still lacking. However, there is evidence for a connection between burnout and perfectionism (17).

Social aspects, for example team cohesion, associated supporting systems like managers and coaches, and social competence and skills of individual athletes might have an impact, too. Results from studies with American collegiate athletes indicate the importance of such social factors. Following these findings, depressive symptoms were associated with feelings of social connectedness (2, 38). However, these results refer to athletes as well as to standard students. In elite athletes, correlations were found indicating such possible mechanisms for depressive syndromes (e.g. 39).

### Conclusion

Following the present studies, depression in elite athletes is more than just a media controversy. Meanwhile, empirical data illustrate the relevance of this topic. However, there are too few studies in order to draw representative conclusions. Especially studies with clinically valid criteria for the assessment of prevalence rates are rarely found. Therefore, diagnoses have to be made by psychotherapists or psychiatrists. In order

to get valid data further research is needed, taking into account clear diagnostic procedures following the ICD-10 criteria (10) and assessment in a representative population in various sport disciplines. In order to be able to evaluate possible overlapping in the sample and the representativeness of the participants, researcher should state in detail their assessed participants which is often not the case in existing studies.

Furthermore, levels of depressive symptomatology and underlying determinants might not be transferred equally from the general population to elite athletes. Specific influences, such as exercise demands, sport specific stressors or differences due to sport disciplines need special attention in research. Hence, knowledge from depression research can be used, but should be empirically validated in elite athletes. In addition, sport specific factors (e.g. stressors, physical demands, etc.) should be taken into consideration. A few associated factors have been identified up to now. These factors are: Chronic stress, which elite athletes might be particularly exposed to; coping strategies, which especially might play an preventative role and an

imbalance in exhaustion and recovery in sport specific areas as well as in general areas. Research assessing detailed association and differentiation to topics such as overtraining might lead to further evidence in this regard.

In order to gain further knowledge (e.g. for prevention programs) determinants and mechanisms should be investigated. Therefore longitudinal study designs are needed in order to draw causal conclusions. The current evidence has potential for hypotheses regarding mechanisms, which must be validated in appropriate study designs. The yet present, explorative studies might be able to gain more evidence by having an approach, which is more driven by hypotheses and theories. Furthermore, in analyzing developmental factors assessment of depressive symptoms through valid instruments is important in order to make clear statements about depressive syndromes and their connections to these factors. In this regard, it is important to have an active communication between researchers, sport organizations, clubs and associated supporters. ■

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