Scandinavian Journal of
Sport and Exercise Psychology

difo
Dansk Idrætspsykologisk Forum

REVIEW OPEN ACCESS

Psychiatric Disorders in Elite Athletes: A Systematic Literature Review of Studies Using Clinical Interviews

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Abstract

Previous literature has described the importance of increased knowledge about the mental health of elite athletes. This systematic literature review aimed to investigate clinically diagnosed psychiatric disorders in elite athletes, including possible connections between being an elite athlete and psychiatric disorders. The databases EMBASE, MEDLINE, SPORTDiscus and Psychinfo have been systematically searched from January 1975 to December 2022. Two authors have conducted title-, abstract- and full-text screening as well as quality assessment independently. The search identified 12,490 records up until December 2022. After a removal of duplicates and double screening, 11 studies consisting of 4,492 elite athletes were included. The mean age of the included athletes was 18.6 years, and most studies included were Scandinavian. Most studies investigated multiple types of sport simultaneously. Findings revealed that eating disorder was the most studied psychiatric disorder in this population, while depression and anxiety were more sparsely investigated. Furthermore, female athletes had a higher occurrence of both eating disorders, depression, and anxiety than male athletes. Additional studies based on diagnostic interviews need to be conducted to investigate possible associations between elite athletes and psychiatric disorders.

Keywords: *Elite athletes, Psychiatric disorders, Clinical diagnosis*

Over the last decade, there has been an increased focus on the mental health of elite athletes. Some studies have suggested that the prevalence of mental illness among this population is slightly high-er compared to the general population (Gouttebarge et al., 2019). Furthermore, psychiatric disor-ders could affect elite athletes' career in various ways, e.g., inhibited performance and involuntary retire-ment (Gouttebarge et al., 2019). The prevalence of psychiatric disorders, in general, has been increasing all over the world, and about one in every five people meets the criteria for a psy-chiatric disorder (Steel et al., 2014). Furthermore, living with a psychiatric disorder has a major impact on both personal and societal levels (Flores et al., 2018). In general, people with psychiat-ric disorders deal with not only the disorder, but also the stigma and taboo that comes with it (Cor-rigan & Watson, 2002). Similar stigmatization and taboo tendency have also been reported in elite athletes and their environment (Hainline & Reardon, 2019).

Elite athletes from competitive high-level sports are exposed to both physical, emotional, and psychological stress, which has been found to increase the risk of psychiatric disorders (Rice et al., 2016). However, the specific research regarding psychiatric disorders in elite athletes is still scarce and has mainly been focused on selected diagnoses. Eating disorders are well-known and better investigated in elite sports in both male and female athletes. Especially females in aesthetic sports, such as gymnastics, have been shown to have a high occurrence of eating disorders (Jiang & Ramoa, 2022). Other psychiatric disorders, such as anxiety and depression, are much less inves-tigated, yet some studies have discovered the opposite; for instance, that depression is the most investigated disorder (Küttel et al., 2020; Rice et al., 2016). In addition, several recent studies based on questionnaires with self-reported psychiatric symptoms among elite athletes have sug-gested higher levels of psychiatric symptoms compared to the general population;

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not only regard-ing eating disorders symptoms but also symptoms of anxiety and depression (Gouttebarge et al., 2015; Nicholls et al., 2020; Poucher et al., 2021).

Previous studies have reported connections between psychological factors and injuries in elite athletes, describing that anxiety and dealing with adversity are two significant predictors of the injury duration. For instance, a difference in the occurrence of competitive anxiety was discov-ered to be higher in athletes who had previously been injured compared to those who had not (De-vantier, 2011). Furthermore, injuries may also increase the risk of developing psychiatric disorders in elite athletes (Nixdorf et al., 2013).

In recent years numerous famous elite athletes, such as Simone Biles (gymnastics), Naomi Osaka (tennis) and Michael Phelps (swimming), have been open about their personal experiences with depression and other mental health issues (Tardelli et al., 2021). Their stories have supported the increased awareness about mental health in elite athletes. The International Olympic Committee (IOC) convened a consensus statement on mental health in 2018, which led to the development of assessment tools for early detection of psychiatric disorders in athletes (Gouttebarge et al., 2021; Reardon et al., 2020). However, there is still a lack of knowledge about psychiatric disorders in elite athletes. Little is known about psychiatric disorders based on clinical interviews conducted by licensed caregivers according to the ICD-10/DSM-5 criteria in elite athletes. Additionally, even though eating disorders in elite athletes are well described in previous literature, other common psychiatric disorders, e.g., depression, anxiety, OCD, and ADHD are yet to be further investigated.

The overall aim of this systematic literature review was to provide an overview of the studies that included clinical diagnoses of elite athletes in terms of reported psychiatric diagnoses, study design, nationality, type of sport, gender, and age. Furthermore, we aim to investigate if there were any factors related to participating in elite sports that could affect either the development of a psychiatric disorder or the performance of the elite athletes.

Methods

A systematic literature review has been performed according to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines (Page et al., 2021). The study pro-tocol was published on the International Prospective Register of Systematic Reviews (PROS-PERO) in advance, registration number: CRD42023406356.

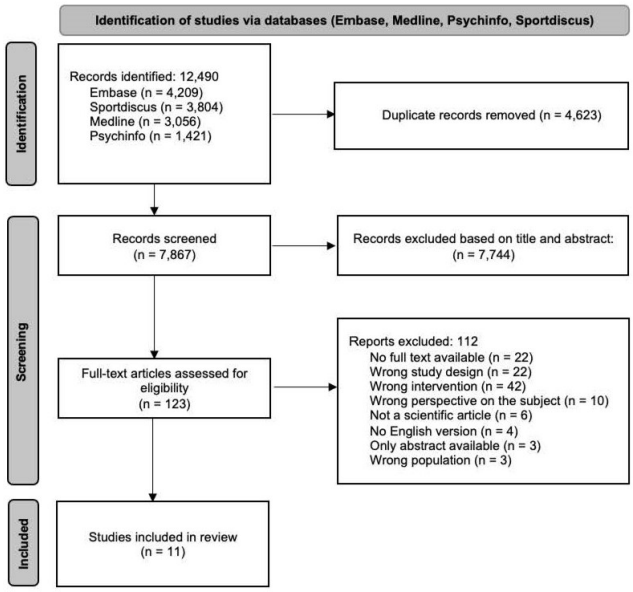
Literature search

Four electronic databases (EMBASE, MEDLINE, SPORTDiscus, Psychinfo) were systematically searched on the 2nd of March 2023. All articles were uploaded and screened individually by two authors with the use of Covidence, which is a software package that helps improve the efficiency of the systematic review process (Cleo et al., 2019). The full search strategy can be obtained by request from the corresponding author.

Study inclusion

Two researchers individually assessed the eligibility of each article (see Figure 1 for study selection flowchart). The first screening was conducted based on title and abstract. When a disagreement occurred, the specific article moved on to the next round of screening, which was full-text evaluation. If any disagreements regarding full-text screening arose, the articles were sub-sequently re-screened by a third researcher.

Figure 1: Flowchart showing study selection according to PRISMA guidelines



All included studies were required to meet the inclusion and exclusion criteria which were established in advance. Inclusion criteria consisted of: 1) participants were required to be elite athletes, defined as an athlete that competes on olympic, paralympic, national, international or professional level or is attending an elite programme at school or college; 2) participants were required to be currently active in their representative sport; 3) participants had to be formally di-agnosed with a psychiatric disorder by a licensed healthcare professional according to current di-agnostic manuals DSM-4/5 or ICD-10 (APA, 2013); 4) studies had to be published between Janu-ary 1975 and December 2022, and 5) no specific age limit was applied. Exclusion criteria consist-ed of: 1) psychological issues described without documentation of a psychiatric diagnosis; 2) stud-ies in languages other than English and Scandinavian; 3) unpublished abstracts, and 4) other re-views.

Data extraction

Thematic data extraction was performed by use of pre-developed extraction sheets. Extraction sheets were discussed and agreed upon by three researchers. After the final article selection two authors sought the required information from the included studies regarding both demographic information (study design, data collection method, nationality, type of sport, subject number, gender, age, and psychiatric disorders) and descriptive information with the purpose of addressing possible connections between elite athletes and psychiatric disorders. The study designs for inclu-sion in the review were expected to be of heterogeneous character, and therefore a narrative syn-thesis of the results was provided.

Quality appraisal

The overall quality of the chosen articles was analyzed and described in the review by using the appraisal tool QuADS which is a tool for methodological and reporting quality in systematic re-views of mixed- or multimethod studies (Harrison et al., 2021). Quality appraisal was assessed individually by two researchers. According to the QuADS User Guide (Harrison et al., 2021) the scores of the

studies were discussed to resolve any discrepancies and finalize the scores. The checklist consists of 13 items, where a score between 0-3 was given to each study included. The different scores are further explained in the note of table 1. A maximum score of 39 points was attainable, and the score was converted into a percentage of item scores divided by the total max-imum score. As Harrison et al. describes, there is no cut-off score that categorizes a study as either high or low quality. The cut-offs were arbitrary and therefore final cut-off scores were narratively discussed.

Results

Literature search

The systematic literature search identified 12,490 records. After duplicates were removed a total of 7,867 records were screened for inclusion by title and abstract. A total of 123 records were as-sessed for eligibility, and after full-text screening 11 records fulfilled the inclusion criteria and were included in the narrative synthesis of the review (see Figure 1 for the full study selection flowchart). Of the 11 studies, two investigated the same study sample but were separate articles with different perspectives and angles on the topic (Lebrun et al., 2018, 2019).

Quality appraisal

The quality assessment of the 11 included studies is summarized in Table 1. The specific score from 0-3 for each criterion is also depicted in Table 1. The overall quality of the included studies proved to vary from 62% to 85%. In general, all studies included provided a thoroughly reported description regarding theoretical underpinning to the research, research aims, and data collection procedure. However, some categories turned out to vary a lot between the studies in terms of their scores; for instance, recruitment data provided, strengths, and limitations. Almost every study in-cluded no, or very limited information provided regarding justification of the analytical methods and considerations regarding stakeholders. Given the cross-sectional study design in almost every study included, the high scores given in the quality assessment should be interpreted with caution as drawing causal relationships can be challenging with this type of study design (Rice et al., 2019).

Descriptive characteristics

Descriptive baseline characteristics are summarized in Table 2. Overall, the final study sample with 11 studies consisted of 4,492 elite athletes. The study design of the 11 included studies varied. Most studies were cross-sectional studies (n = 8), while the other types of designs were either qual-itative studies (n = 2) or mixed methods design (n = 1). The data collection methods varied among the 11 studies. Most of the studies used clinical interviews combined with self-reported data (n = 7). Other types of data collection methods were retrospective pooling (n = 2) and clinical inter-views only (n = 2). In all the included studies the clinical interviews were conducted by either trained psychologists, psychiatrists, people with a PhD in the disease, or people trained in using the specific interview-guides.

The participants of the studies covered a broad age range but were primarily adolescents and young adults. The age ranged from 12 (Schaal et al., 2011) to 37 years old (Lebrun et al., 2018). The mean age for the total population included was 18.6 years old. Mainly, both genders were in-cluded in the studies; however, two studies only included females (Thiemann et al., 2015; Torstveit et al., 2008). The total sample consisted of 2,154 females (47.9% of the study sample) and 2,338 males (52.1% of the study sample). The nationality of the participants in the studies consisted of multiple countries, but the majority were Scandinavian. Multiple types of sport were investigated simultaneously in almost every study included, but Hammond et al. (2013) investigated swimming alone. Byrne & McLean (2002) and Thiemann et al. (2015) classified the included sports in sub-categories which were "thin-build"/aesthetic compared to "normal-build"/ballgames. Both studies reported a significantly higher occurrence of psychiatric disorders among the "thin-build" and aes-thetic subcategories compared to the "normal-build" and ballgames. Furthermore, Schaal et al. (2011) subcategorized sports into seven categories where they found a higher occurrence of anxie-ty among aesthetic sports compared to the remaining six categories.

Psychiatric disorders in the included population

The types of psychiatric disorders in elite athletes varied amongst the included studies (see Table 2). Several types of psychiatric disorders were investigated in the 11 studies. The psychiatric dis-orders most frequently reported were eating disorder, depression, and anxiety. ADHD and OCD were only investigated in the study population of Lebrun et al. (2018, 2019), as a comorbidity. Eat-ing disorders were investigated in eight of the included studies (72.7%). Eating disorders were of-ten divided into subcategories according to ICD-10/DSM-4/5, e.g., anorexia nervosa, bulimia ner-vosa, and eating disorder not otherwise specified. Depression and anxiety were investigated in re-spectively five and four of the included studies (45.5% and 36.4%). Lebrun et al. (2018, 2019) mentioned ADHD and OCD as comorbidities to depression.

Potential factors influencing psychiatric disorders of elite athletes

The possible connections between elite athletes and psychiatric disorders are shown in the last two columns in Table 2.

Several factors with a possible influence on the development of psychiatric disorders in the various elite sports were reported in four of the studies. None of these four studies investigated specific types of sport. Two of the studies reported that two important factors leading to the devel-opment of an eating disorder were body ideals and lack of control regarding performance, which led to increased control in terms of eating habits (Byrne & McLean, 2002; Lichtenstein et al., 2022). Two other studies reported that multiple important factors leading to the development of depression were; participating in elite sports in general, bad outcomes during games, injuries, and bullying within the sports organizations (Lebrun et al., 2018, 2019).

Possible influences of a psychiatric disorder on performance were reported in six studies. Three studies which investigated eating disorders reported that performance was influenced by a psychiatric disorder. For instance, a higher drive for thinness, increased dietary control, and exces-sive training was reported to affect the performance negatively (Byrne & McLean, 2002; Lichten-stein et al., 2022; Martinsen & Sundgot-Borgen, 2013). Three other studies on depression de-scribed negative effects on both performance and motivation (Hammond et al., 2013; Lebrun et al., 2018, 2019). The negative effects were, for instance, drop in both performance time and rank-ing (Hammond et al., 2013). Only Hammond et al. (2013) described a specific type of sport; name-ly swimming.

Table 1: Quality assessment of the 11 included studies according to QuADS criteria

STUDY	CRITERIA													
	1. Theoretical/ conceptual underpinning to the research	2. Research aims	3. Research setting and target population	4. Appropriate study design	5. Appropriate sampling	6. Rationale for data (collection)	7. Appropriate tools	8. Data collection procedure	9. Recruitment data provided	10. Justification analytical methods	11. Appropriate analysis	12. Stakeholders considered in the design or conduct	13. Strengths and limitations discussed	Total score (%)
Byrne & McLean, 2002	2	3	3	3	2	2	3	3	3	1	1	0	1	27 (69%)
Hammond et al., 2013	2	3	3	3	1	2	2	3	1	2	2	0	1	25 (64%)
Lebrun et al., 2019	3	3	1	3	2	3	3	2	1	3	3	2	3	32 (82%)
Lebrun et al., 2018	3	3	2	3	2	3	3	2	1	3	3	2	3	33 (85%)
Lichtenstein et al., 2022	3	3	3	2	1	2	2	3	2	2	1	1	2	27 (69%)
Martinsen & Sundgot-Borgen, 2013	2	3	3	3	2	3	3	3	3	3	2	0	3	33 (85%)
Schaal et al., 2011	3	3	2	1	3	2	2	3	1	1	2	0	1	24 (62%)
Sundgot-Borgen & Torstveit, 2004	3	3	3	3	3	2	3	3	3	1	2	0	2	31 (79%)
Thiemann et al., 2015	3	3	2	3	2	3	2	3	3	1	2	0	3	30 (77%)
Torstveit et al., 2008	3	3	2	3	3	3	3	3	3	1	2	0	2	31 (79%)
Åkesdotter et al., 2022	3	2	3	3	2	3	2	3	2	1	2	0	3	29 (74%)

Note: The quality assessment with diverse studies checklist (QuADS; Harrison et al., 2021) consists of 13 items, where a score between 0-3 is given to each study. A higher score in general represents a higher quality. For example, related to criteria 2 (Research aims), the scoring is as follows: 0 = no mention at all; 1 = reference to what the sought to achieve embedded within the report but no explicit aims statement; 2 = aims statement made but may only appear in the abstract or be lacking detail; 3 = explicit and detailed statement of aim/s in the main body of report.

Table 2: Descriptive baseline characteristics and factors that influence the relationship between psychiatric disorders and performance in the 4,492 elite athletes

STUDY	STUDY DESIGN	DATA COLLECTION METHOD	SUBJECT NUMBER	AGE	GENDER M/F	NATIONALITY	TYPE OF SPORT	PSYCHIATRIC DISORDERS	ELITE SPORTS AND PSYCHIATRIC DISORDER	PSYCHIATRIC DISORDERS AND PERFORMANCE
BYRNE & MCLEAN, 2002	Cross sectional	Clinical interviews (CIDI, DSM-4) combined with self-reported data (EDI-II, BULIT-R, TFEQ)	263	M: 20.4 (SD±4.9) F: 18.7 (SD±4.4)	41.1% / 58.9%	Australia	Different types of sports categorized as: - "Thin build" *(e.g., ballet, gymnastics)* - "Normal build" *(e.g., tennis, basketball)*	Eating disorders - AN - BN - EDNOS	Females are subject to intense pressure to conform to a lean body ideal.	The athletes have a higher drive for thinness and higher levels of dietary restraints than controls.
HAMMOND ET AL, 2013	Cross sectional	Clinical interviews (DSM-4-TR) combined with self- reported data (BDI-II)	50	20.5	56.0% / 44.0%	Canada	Swimming	Depression	None described.	A significant relationship between change in swimming performance and current depression was observed in highly elite athletes.

STUDY	STUDY DESIGN	DATA COLLECTION METHOD	SUBJECT NUMBER	AGE	GENDER M/F	NATIONALITY	TYPE OF SPORT	PSYCHIATRIC DISORDERS	ELITE SPORTS AND PSYCHIATRIC DISORDER	PSYCHIATRIC DISORDERS AND PERFORMANCE
LICHTENSTEIN ET AL., 2022	Mixed-method	Clinical interviews (EDIA, DSM-5 + ICD-10) combined with self-reported data (EDE-Q, SCOFF)	28	23	10.7% / 89.3%	Denmark	- Cycling - Orienteering - Triathlon - Swimming - Track and field - Martial arts - Rowing - Ice skating	Eating disorders - AAN - EDNOS - EDNOS -r	Some athletes did not feel they could control their performance, instead, they tried controlling their eating habits.	One athlete placed practice at dinner time, so she/he did not have to eat that night. Additional training was used to avoid feeling guilty after eating.
MARTINSEN & SUNDGOT-BORGEN, 2013	Cross sectional	Clinical interviews (DSM-4) combined with self- reported data (EDI-II, EDE-Q, SCL-5)	306	16.5 (SD±0.3)	33.3% / 66.7%	Norway	50 different sports	Eating disorder	None described.	72.7% of the female athletes and 100% of the male athletes, diagnosed with clinical ED, were, at some point, dieting to enhance performance.
SCHAAL ET AL., 2011	Cross sectional	Retrospective pooling of mandatory, psychiatric evaluation (DSM-4 + ICD-10)	2067	18.5 (SD±4.9)	64.8% / 35.2%	France	Different types of sports categorized as: - Aesthetic sports - Fine motor skills sports - Racing sports - Racquet sports - Team ball sports - Contact sports - High risk sports	- Anxiety - Depression - Eating disorder	None described.	None described.
LICHTENSTEIN ET AL., 2022	Mixed-method	Clinical interviews (EDIA, DSM-5 + ICD-10) combined with self-reported data (EDE-Q, SCOFF)	28	23	10.7% / 89.3%	Denmark	- Cycling - Orienteering - Triathlon - Swimming - Track and field - Martial arts - Rowing - Ice skating	Eating disorders - AAN - EDNOS - EDNOS -r	Some athletes did not feel they could control their performance, instead, they tried controlling their eating habits.	One athlete placed practice at dinner time, so she/he did not have to eat that night. Additional training was used to avoid feeling guilty after eating.
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STUDY	STUDY DESIGN	DATA COLLECTION METHOD	SUBJECT NUMBER	AGE	GENDER M/F	NATIONALITY	TYPE OF SPORT	PSYCHIATRIC DISORDERS	ELITE SPORTS AND PSYCHIATRIC DISORDER	PSYCHIATRIC DISORDERS AND PERFORMANCE
SUNDGOT-BORGEN & TORSTVEIT, 2004	Cross sectional	Clinical interviews (DSM-4) combined with self- reported data (EDI-II)	1259	M: 23.2 (SD±4.9) F: 21.4 (SD±4.6)	54.6% / 45.4%	Norway	68 different sports	Eating disorders - AN - AA - BN - EDNOS	None described.	None described.
THIEMANN ET AL., 2015	Cross sectional	Clinical interviews (SCID, DSM-4) combined with self-reported data (PHQ, EDE-Q, EDI-II, SATAQ-3)	108	Ball game: 22.6 (SD±3.6) Aesthetic : 16.6 (SD±2.7)	Only female	Germany	Different types of sports categorized as: - "Ball game" *(field hockey)* - "Aesthetic sports" *(e.g., vaulters, gymnastics)*	Eating disorders - BN - EDNOS	None described.	None described.
TORSTVEIT ET AL, 2008	Cross sectional	Clinical interviews (DSM-4) combined with self- reported data (EDI-II)	186	22.2 (SD±5.8)	Only female	Norway	66 different sports.	Eating disorders - AN - BN - EDNOS	None described.	None described.
ÅKESDOTTER ET AL., 2022	Cross sectional	Retrospective pooling of data from psychiatric outpatient clinics (MINI, ICD-10)	221	23.5 (SD±5.9)	31% / 69%	Sweden	Majority of all sports	Anxiety Depression Eating disorder - AN - BN - Unspecified	None described.	None described.

*Note. *Lebrun et al., 2019 and 2018 are built upon the same study material, but are two separate articles.*
Abbreviations: M/F, Male/female; AA, anorexia athletica; AAN, atypical anorexia nervosa; ADHD, attention deficit hyperactivity disorder; AN, anorexia nervosa; BDI-II: beck depression inventory II; BN, bulimia nervosa; BULIT-R, the bulimia test-revised; CIDI, composite international diagnostic interview; DFT, drive for thinness; DSM-IV-TR, diagnostic and statistical manual of mental disorders, 4th edition, text revision; EDE-Q, eating disorder examination questionnaire; EDI-II, eating disorders inventory II; EDIA, eating disorder interview for athletes; EDNOS, eating disorder not otherwise specified; EDNOS-r, EDNOS with restrictive eating patterns; MINI, mini-international neuropsychiatric interview; OCD, obsessive compulsive disorder; PHQ, patient health questionnaire; SATAC-3, sociocultural attitudes towards appearance scale; SCID: structured clinical interview for DSM-5; SCL-5, Hopkins symptoms checklist; SCOFF, sick-control-one stone-fat-food questionnaire; TFEQ, three factor eating questionnaire.

Discussion

This systematic literature review sought to explore clinically diagnosed psychiatric disorders in elite athletes, including descriptive data and possible connections between elite athletes and psy-chiatric disorders. This review is the first to systematically synthesize the findings from existing studies investigating elite athletes formally diagnosed with a psychiatric disorder according to the ICD-10/DSM-5 criteria.

Descriptive characteristics

Most of the studies included in our review were cross-sectional study designs which is the same picture seen in similar previous reviews regarding elite athletes and their mental health (Rice et al., 2016, 2019). Most of the studies in this review used clinical interviews combined with self-reported data. In previous literature this type of data collection method with clinical interviews has been used to a very limited extent. Instead, most previous studies investigating psychiatric disor-ders in elite athletes have primarily relied on self-reported questionnaires alone (Gouttebarge et al., 2017; Gouttebarge & Kerkhoffs, 2017; Gulliver et al., 2015; Küttel et al., 2020).

The age in this review ranged from 12 to 37 years old (Lebrun et al., 2018; Schaal et al., 2011). The mean age for the total population included was 18.6 years old. On average young ath-letes enter the elitist part of their career at the age of 15.9 (Bosscher & Rycke, 2017) and the medi-an age for retirement is 34 years old (Wylleman & Reints, 2010). These ages are comparable to the age data found in this review.

The total sample from the included studies was almost equally distributed in terms of gender (F: 47.9%/M: 52.1%). Some studies in the previous literature only investigated the prevalence of psychiatric disorders for one gender (Hopley, 2022; Perry et al., 2022). However, several studies, including almost every study in this review, have also investigated the occurrence of psychiatric disorders for both male and female elite athletes (Küttel et al., 2020; Poucher et al., 2021). Fur-thermore, some previous studies did not provide results based on the specific gender, but instead chose to report the overall prevalence of the investigated psychiatric disorders for both genders combined (Gouttebarge et al., 2017). This choice

of reporting complicates drawing any conclusive findings on the prevalence of psychiatric disorders based on gender.

The nationalities in the included studies varied as they consisted of Australia, Canada, Eng-land, France, Germany and Scandinavian (Denmark, Norway, and Sweden) with the majority being from Scandinavian countries. Even though the majority of studies were Scandinavian, the total sample size consisted of 55.5% non-Scandinavian elite athletes, primarily based on the population from Schaal et al. from France, which included 2,067 elite athletes (46%). Recent systematic re-views regarding anxiety symptoms and overall mental health of elite athletes have outlined the nationalities investigated in previous literature. The reviews include primarily Australia, Europe, and North America; however, Scandinavian countries seem to appear less frequently than in our included studies (Rice et al., 2016, 2019). A possible explanation for the differences in nationality investigated could be the focus of clinical diagnoses in our review which is not a criterion in the reviews mentioned above. In general, studies and reviews regarding mental health in elite athletes are limited to high-income areas around the world, for instance, Europe, Australia, and North America (Rice et al., 2016, 2019). A potential rationale for this could be related to the structure of both welfare and public health systems in these areas compared to low-income areas (Peters et al., 2008).

Only one study (Hammond et al., 2013) investigated psychiatric disorders in a specific type of sport, namely swimming, while the rest of the included studies included either multiple types of sport or did not specify the types of sport. In previous literature several studies have investigated mental health and common mental disorders based on questionnaires in one specific type of sport. Football/soccer and rugby were the most reported types of sport (Gouttebarge et al., 2015; Nicholls et al., 2020; Rice et al., 2019). However, several studies that also investigated common mental disorders based on questionnaires have included various types of sport as well (Poucher et al., 2021; Rice et al., 2019). The inclusion of multiple types of sport also applies in this review. Re-porting the percentage of psychiatric disorders without taking the specific type of sport into ac-count may blur the possibility of some types of sport having a higher percentage of psychiatric disorders than others. Two of the included studies in this review furthermore divided sport into subcategories to investigate possible differences, which some previous studies also examined (Cur-rie, 2010; Jiang & Ramoa, 2022).

Psychiatric disorders in the included population

The psychiatric disorders most frequently investigated in this review were eating disorders. De-pression and anxiety were also reported in a few studies. The same pattern has been reported in recent published systematic reviews regarding mental health and well-being, including symptoms of eating disorders, depression, and anxiety of elite athletes. However, their data was based on questionnaires alone and not clinical interviews (Gouttebarge et al., 2019; Rice et al., 2016). In this systematic literature review female athletes were found to have a higher occurrence of devel-oping eating disorders, depression, and anxiety compared to male athletes. This gender difference in the occurrence of eating disorders, depression and anxiety has also been reported in previous literature concerning common psychiatric disorders in elite athletes (Küttel et al., 2020; Walton et al., 2021). Studies on common mental disorders in the general population have described this find-ing as well (Steel et al., 2014).

Other psychiatric disorders, which include OCD and ADHD, were mentioned as comorbidi-ties in two of the included studies. These two disorders and other common psychiatric disorders, such as personality- and functional disorders are less investigated in terms of occurrence in elite athletes. The few studies that have previously reported findings regarding these disorders were based on self-reported questionnaires and not clinical diagnoses (Hopley, 2022; Li et al., 2021). These disorders have been investigated more in the general population, where for instance a preva-lence of 5.6% was reported for ADHD among teenagers (Salari et al., 2023), and the prevalence of personality disorders for adults worldwide was 7.8% (Winsper et al., 2020). These prevalences could indicate that the mentioned psychiatric disorders are also present in elite athletes, but they are simply not investigated yet.

This review aimed to investigate studies reporting clinically diagnosed psychiatric disorders in elite athletes as most of the previous literature were based on self-reported questionnaires (Gouttebarge et al., 2017; Gulliver et al., 2015; Rice et al., 2019). The self-reported questionnaires have shown a similar and sometimes even higher percentage of psychiatric disorders than in the in-cluded studies in this review, which are clinically diagnosed by a licensed caregiver. For instance, the studies where self-reported questionnaires were used reported percentages of 22.8% for no gender specific eating disorder (Gulliver et al., 2015), whereas a similar study included in this re-view only reported a percentage of 7% (Martinsen & Sundgot-Borgen, 2013). In the studies in-cluded in this review the different psychiatric disorders are reported separately in terms of the ICD-10/DSM-5 criteria, where many previous studies combined some diagnoses, for instance anx-iety and depression, into one category instead (Gouttebarge et al., 2017; Gouttebarge & Kerkhoffs, 2017). Therefore, the occurrence of these disorders seemed to be even higher. For instance, a study with this type of categorization reported a prevalence of 56.8% (Gouttebarge et al., 2017).

Potential factors influencing psychiatric disorders of elite athletes

The identified factors in this review regarding psychiatric disorders, which were potentially im-pacted by participating in elite sports, were connected to both eating disorders and depression. Factors connected with the development of an eating disorder were body ideals, restrictive eating habits, and lack of control. A recent systematic review, including 22 studies, has investigated pos-sible factors associated with eating disorders in adolescents in the general population. This study found four categories of factors: family-, biological-, sociocultural-, and psychological factors. Some of the factors that were mentioned multiple times were, for instance, female gender, body ideal, media influence, weight related testing, body dissatisfaction, perfectionism, and low self-esteem (Suarez-Albor et al., 2022). One could imagine that several of these factors are frequently present in an elite environment as well and could possibly affect the development of psychiatric disorders even further. A recent scoping review investigated among others protective- and risk fac-tors regarding the mental health of elite athletes in both their personal- and sports environment (Kuettel and Larsen et al., 2020). This review found some similar factors, such as body image, weight control, and perfectionism, which were also reported in the review about the general popu-lation (Suarez-Albor et al., 2022).

Psychiatric disorders were, in this review, found to influence the performance of the elite athletes in several ways. Some of the identified factors associated with negative performance were in-creased dietary control,

excessive training, and bad motivation. Previous literature based on self-reported questionnaires have also shown that psychiatric disorders have a negative effect on elite athletes' performance (Gouttebarge & Kerkhoffs, 2017; Hopley, 2022; Perry et al., 2022). Even though a lot of information about this association can be found in previous literature, this infor-mation is primarily superficial data and selected statements due to the self-reporting method. Furthermore, the elite athletes in this review are primarily adolescents and young adults, placing them in the exact population where psychiatric disorders most frequently occur. This makes increased awareness, early detection, and prevention even more essential (Kessler et al., 2007).

Strengths and limitations

One of the strengths of this systematic literature review lies in the in-depth search in four different databases. Furthermore, the screening of the studies was conducted individually by the authors as the approach increases the precision of study selection in systematic reviews (Stoll et al., 2019). As expected, the amount of previous literature in this field is limited regarding our perspective con-cerning elite athletes with a clinically diagnosed psychiatric disorder. Furthermore, the studies found were of heterogeneous character, which made it challenging to compare the individual re-sults and draw general conclusions. To accommodate this, we used the appraisal tool QuADS be-cause of its ability to take various study designs and their quality into account (Harrison et al., 2021). To additionally strengthen this review QuADS was assessed individually by two research-ers, and afterwards the individual scores were discussed with the purpose of finalizing the scores.

This review study also has limitations. Only studies in English and Scandinavian languages were included which may lead to language publication bias and lack of possible relevant literature (Song et al., 2013). In previous literature reviews (that mostly include self-reported measures), prevalence rates for different psychiatric disorders have been reported, showing that prevalence rates vary heavily depending on the instruments used. In this review, we only included clinical interviews which are more precise and reliable, however, this assessment approach is not feasible in larger population studies investigating prevalence proportions.

Future directions

In the light of the numerous famous elite athletes stepping forward with their personal experiences with psychiatric disorders, the world has witnessed both increased awareness and a strive to break down the long-lasting taboo concerning the mental health of elite athletes (Hainline & Reardon, 2019; Tardelli et al., 2021). In terms of clinical perspectives some actions are already established to prevent and detect psychiatric disorders. The IOC consensus statement on mental health in 2018 resulted in assessment tools for early detection of psychiatric disorders (Gouttebarge et al., 2021; Reardon et al., 2020). Furthermore, several countries have already established mental health clin-ics specifically for elite athletes (Åkesdotter et al., 2022; Van Slingerland et al., 2019). Besides benefitting from the performance and career of the elite athletes themselves, these establishments could also be important for the people surrounding the athletes, e.g., coaches, health staff, family, and friends. From a public health perspective, such actions could encourage the help-seeking be-havior among the elite athletes (Castaldelli-Maia et al., 2019), leading to a potential reduction of the remaining stigmatization regarding psychiatric disorders in this specific population.

Regarding the research perspective, future studies should consider using clinical interviews conducted by licensed caregivers as this method is more trustworthy than self-reported question-naires standing alone (Gouttebarge et al., 2017; Gulliver et al., 2015). However, previous literature has tried to validate some of the questionnaires in the elite athlete population. Lichtenstein et al. points out that the questionnaire EDE-Q (Eating Disorder Examination Questionnaire) is a useful instrument to identify elite athletes with eating disorder symptoms (Lichtenstein et al., 2021). Considering the high expenses and great amount of time spent on conducting clinical interviews with all elite athletes, we suggest that these validated questionnaires, for instance using cut-off points, can be used as a screening tool to detect the specific elite athletes at risk of developing psychiatric disorders. Furthermore, the clinical interviews should continue to screen for eating disorders, depression, and anxiety, but it is also important to acknowledge other common psychiat-ric disorders in the future. One could imagine that psychiatric disorders like OCD, ADHD, or other different types of personality disorders may be detectable in the elite athlete population. In addi-tion, future research would benefit from a longitudinal study design as the cross-sectional design does not allow to conclude anything about causal associations between psychiatric disorders and elite athletes (Byrne & McLean, 2002; Gouttebarge et al., 2019; Li et al., 2021).

Conclusion

This review is the first to systematically report information about clinically verified psychiatric disorders among elite athletes. Despite the limited number of studies investigating clinically veri-fied psychiatric disorders in elite athletes and the varying quality among these studies, this system-atic literature review provides an overview of this topic. Eating disorder is the most investigated psychiatric disorder in this population, however findings regarding depression and anxiety are re-ported as well. Other common clinically diagnosed psychiatric disorders remain unexplored in this specific population. This review also enhances the importance of early detection of psychiatric disorders in elite athletes in various sports considering the mean age in the included population being 18.6 years old. Furthermore, additional research regarding common psychiatric disorders in elite athletes needs to be conducted in the future.

Funding

None declared.

Conflict of interest

None declared.

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