Difference in the expression of anxiety in elite athletes and non-athletes

A meta-analysis

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submitted by

Roger Untersander

at the
University of Fribourg, Switzerland
Faculty of Mathematics, Natural Sciences and Medicine
Department of Medicine
Department of Neuro- and Movement Sciences

in cooperation with the
Swiss Federal Institute of Sport Magglingen

Expert
Dr. Thomas Wyss

Supervisor
Dr. Philipp Röthlin

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Abstract

Introduction: The worldwide increase of mental illness has prompted research into potential preventive strategies, such as physical activity. However, there is a lack of research comparing mental health disorders in athletes and non-athletes in competitive sports. This study aims to raise awareness of mental health disorders in athletes and non-athletes and to provide a systematic analysis of relevant literature on whether general anxiety disorders are more prevalent in athletes than in non-athletes.

Method: The meta-analysis was conducted using PRISMA guidelines, and inclusion and exclusion criteria were defined using the PICOS scheme. Studies that met the criteria were analyzed to determine the prevalence of general anxiety disorders in athletes and non-athletes.

Results: Eight studies were included in the meta-analysis, with a total of 2.283 participants. The results indicated that there was no significant difference (ES = - 0.035, $SE = 0.090$, $z = - 0.391$, $p = 0.696$) in the prevalence of general anxiety disorders between athletes and non-athletes.

Discussion: The results suggest that generalized anxiety disorders are not more prevalent in athletes than in nonathletes. This study has some limitations, such as the limited number of studies available for analysis and the lack of consistency in methods used to assess anxiety. Further research is needed to investigate the relationship between anxiety and athletic performance and to develop effective strategies for preventing mental illness in athletes.

Keywords: anxiety, mental health, athlete, non-athlete

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1 Introduction

An estimated 654 million people worldwide suffered from mental illness in 1990. In 2019, there were about 970 million people suffering from mental illness, an increase of about 48%. The two most common mental health disorders are generalized anxiety disorder, which accounted for about 301.4 million people, and depression, which accounted for about 279.6 million people. In the year 2017 about 1.43 million people from Switzerland suffered from mental health disorders, which accounts for about 16.6% of the total population of about 8.6 million (Dattani et al., 2021).

Early research by Paffenbarger et al. (1986) suggested an association between physical inactivity and risk of all-cause mortality, with the least active individuals at the greatest risk. Regular physical activity has health benefits, making physical activity an important primary and secondary strategy for preventing chronic disease (Rhodes et al., 2017). The study by Schultz et al. (2012) showed that physical activity has positive effects on mental health in both people with mental health problems and healthy people. Physical activity results in a 20-30% lower average risk of multiple chronic conditions in active individuals (Warburton et al., 2007, 2010).

A meta-analysis by Samadi H. (2021) indicated that the mental health of a total of 1252 individuals who were barely physically active was significantly lower than that of the 1451 more physically active individuals. Another meta-analysis by Rebar et al. (2015) indicated that increasing physical activity among non-clinical populations may reduce symptoms of depression and anxiety. Thus, the occurrence of depressions and anxiety may be prevented with increased physical activity. Studies by Neumann and Frasch (2007) have shown that physical activity has positive effects not only on physical health but also on mental health and suggest the use of physical activity for preventing and treat mental health disorders. As the study by Doria et al. (2015) showed, breathing exercises and yoga also help prevent mental disorders or provide therapeutic effects against mental health symptoms. While physical activity has been shown to have numerous benefits for mental health (Neumann & Frasch, 2007), it is important to also consider the mental health of individuals who engage in high levels of physical activity, such as elite athletes (Rice et al., 2019). Increasing international competitive sports have led to increased pressure on elite athletes (Gouttebarge et. al., 2019). The increase in training loads and performance demands may have a negative impact on the mental health of athletes. Previous studies have highlighted the prevalence of mental illness within the athlete population, leading

to concerns (Foskett & Longstaff, 2018; Schaal et al., 2011). Furthermore, athletes' careers are often unpredictable and involve periods of progress, stagnation, and regression. Mental health plays a crucial role in athletes' decision-making and management of various athletic and non-athletic transitions. A lack of mental health may impede effective decision-making and transition management (Schinke et al., 2018). During sport-specific phases and transitions, such as injuries, high training loads, extensive travel, or relocation to a new culture, athletes' mental health requires special attention. Ending a sports career can be an especially challenging transition, potentially exacerbating pre-existing or previously unrecognized life challenges and issues (Cecić Erpič et al., 2004). While many elite athletes transition smoothly to retirement from high-performance competition, some have trouble adjusting to non-athlete status (Cecić Erpič et al., 2004; Kuettel et al., 2018). A variety of factors can cause athletes to suffer through this transition. These include unforeseen factors, such as injury and deselection, that cause athletes to retire early or the failure to plan and make financial and other post-career arrangements (Cecić Erpič et al., 2004; Kuettel et al., 2018).

According to Mayer & Hermann (2009), competitive sports are a special form of sporting activity, and it aims at performance improvement and achievement of records, victories, or a combination of both. Competitive anxiety is currently one of the most urgent issues in the field of sports psychology (Mellalieu et al., 2006). Psychological factors, particularly anxiety, have been recognized as playing a large role in competition, and all players experience anxiety and tension before, during, and after competition (Iizuka et al., 2005). Moran's (2013) research found that fear of failure and lack of confidence, among other factors, can trigger anxiety in players. Anxiety is like worry. It is the uncomfortable feeling that most athletes sometimes experience when confronted with a challenge (Athan & Sampson, 2013). Coupled with the pressure to perform in competitive sports, stress and anxiety have a profound impact on both the performance and health of athletes (Hanin, 2000). When competitive athletes feel they have lost control over these stressors, they develop anxiety symptoms that can impair their performance (Jones, 1995).

There are no meta-analyses that systematically summarize and compare anxiety disorders in athletes and non-athletes. Therefore, a meta-analysis of studies comparing elite athletes to non-athletes will have significance.

The meta-analysis by Chapman and Woodman (2016) examined the differences between male athletes and non-athletes, regarding eating disorder symptoms. They showed that when all studies were considered homogeneous groups, there were no significant differences between the two groups. However, they found significant differences in the sport of wrestling. Athletes in wrestling had a higher incidence of eating disorders. A meta-analysis by Gorczynski et al. (2017) examined depressive symptoms and showed that high-performance athletes were no more likely than non-athletes to report mild or severe depressive symptoms. Overall, male high-performance athletes were 52% less likely than female high-performance athletes to report mild or severe depressive symptoms.

According to Fazey and Hardy (1988), somatic anxiety refers to the physiological symptoms of anxiety, such as increased heart rate, rapid breathing, sweating, and muscle tension. Cognitive anxiety, on the other hand, refers to the mental symptoms of anxiety, such as worry, negative self-talk, and apprehension about performance outcomes.

By exploring the possible differences between athletes and non-athletes, this study will contribute to the existing body of research on the relationship between physical activity and mental health by investigating the potential benefits of sports participation for athletes' anxiety levels.

The purpose of this paper is to raise awareness of mental health in athletes and non-athletes. The goal of this study is to provide a systematic analysis of all relevant literatures to address the question of whether general anxiety disorders are more prevalent in athletes than in non-athletes. In this study, non-athletes will be considered as those who do not meet any of the following criteria: holding a Swiss Olympic Card, which is a card given to elite Swiss athletes who meet specific performance criteria; participating in national, international, or competitive-level college sports competitions; completing at least three guided workouts per week; or training for more than 5.5 hours per week in a structured and consistent manner.

2 Method

2.1 Procedure

The meta-analysis was performed using the guidelines of the PRISMA statement according to Moher, Liberati, Tetzlaff, and Altmann (2011). The use of this flowchart was essential because it helped to improve the transparency and reproducibility of the review process. The definitive PRISMA flow chart can be seen in the appendix under Figure 2.

2.2 Selection Criteria

The inclusion and exclusion criteria for the literature search were defined using the PICOS scheme (Liberati et al., 2009). Only studies that met the criteria as shown in Table 1 below were included.

Table 1

PICOS Scheme (Population, Intervention, Control, Outcome, and Study design) for the criteria to include or exclude studies.

P	Healthy adults, without handicap, aged 16 years or older. All sports from individual and team sports were considered. To be considered an athlete, individuals must meet at least one of the following criteria: holding a Swiss Olympic Card; competing in national, international, or competitive-level college sports competitions; completing at least three guided workouts per week; or training for more than 5.5 hours per week. Those who do not meet any of these criteria are considered non-athletes.
I	Mental health surveys of athletes and non-athletes addressing at least one or more of the defined fears (phobic, social, obsessive-compulsive disorder, post-traumatic stress disorder, generalized anxiety disorder). Whether a questionnaire or diagnostic interview was used to record fears did not matter.
C	All studies in which a comparison group from the general population was present.
O	Results on at least one of the defined fears in a comparison between athletes and non-athletes.
S	Original studies in German and English language. The publication date, study design, and quality of the study were not considered.

Note. PICOS is an auxiliary scheme to define inclusion and exclusion criteria. The literature search and study selection can be guided by the criteria. The five categories are derived from the first letters of PICOS.

2.3 Sources of the Study Search

An extensive systematic literature review refers to anxiety and its expression in comparison of athletes and non-athletes. The search was conducted between the 25th of November 2022 and the 3rd January 2023. The databases of MEDLINE (PubMed), SPORTDiscus, PubPsych (PSYNDEX), Cochrane Central Register of Controlled Trials (TRIALS), PsycInfo and Scopus were systematically searched. Search terms for MEDLINE, SPORTDiscus, PubPsych and Scopus included the following: anxiety AND *elite athlete*; anxiety AND *elite sport*; anxiety AND *professional athlete*; *angst* AND *leistungssport*; *angst* AND *spitzensport*. For searches in PsycInfo, following terms were used: anxiety AND "elite athlete"; anxiety AND "elite sport"; anxiety AND "professional athlete"; angst AND leistungssport; angst AND spitzensport. The following terms were used to search the database of Cochrane: Anxi* AND *elite athlete*; Anxi* AND *elite sport*; Anxi* AND *professional athlete*; *angst* AND *leistungssport*; *angst* AND *spitzensport*. An overview of the database search can be seen in the appendix under Table 2.

2.4 Study Selection

For the selection of the studies, a flow chart according to Moher et al. (2011), which can be seen in Figure 2 in the appendix was created to filter the studies found. Each selection was justified and documented. Duplicates were removed in the first step. In a second step, the title was analyzed, and a decision was made whether to include or exclude the study. In a further step, the abstract was read to exclude further studies. Finally, the full text was read to exclude further studies. Those excluded Studies from the full text analysis are documented in Table 4 and can be seen in the appendix. Additionally, studies from the bibliography could be included after the full-text screening. For the study selection of this meta-analysis, the four-eyes principle applied, whereby the supervisor Dr. Philipp Röthlin performed the last steps of the study selection.

2.5 Data Extraction

With the number of subjects, the mean values representing anxiety levels, and the standard deviations of those values, the effect size calculator (Wilson D.B., n.d.) was used to calculate the effect size (ES) and standard error (SE) of the included studies.

2.6 Meta-Analytic Procedures

For data collection, the program JASP (JASP, Amsterdam, The Netherlands) was used to evaluate, statistically analyze, and graphically display the data. In this program, information about the authors and the years of publication could be inserted at the beginning of the analysis. However, all data must have previously existed as an Excel file to be inserted and analyzed in JASP.

2.7 Risk of Study Bias or Quality

For the analysis to include as many relevant studies as possible, no restriction was made regarding quality.

3 Results

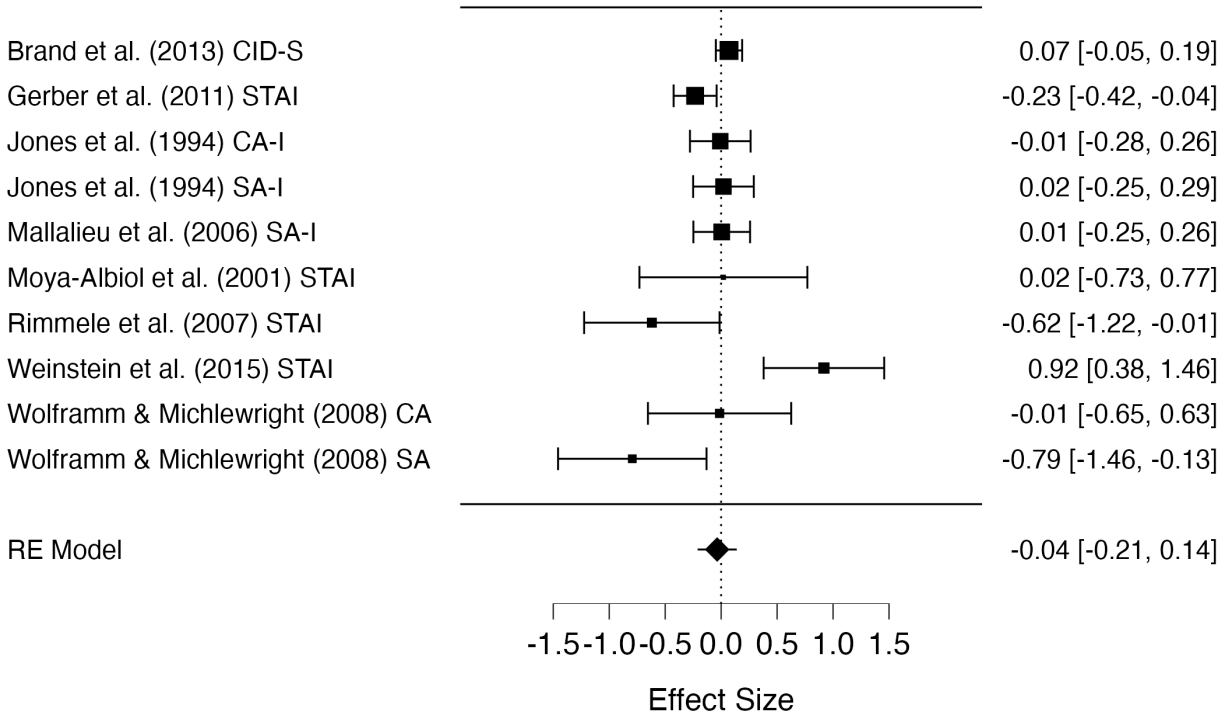
The present study aimed to investigate the association between elite athletes and non-athletes in terms of anxiety levels. In total eight articles were included in this systematic review reporting data from 1.309 athletes and 974 non-athletes. The included studies were from six different countries (Germany, Israel, Spain, Switzerland, United Kingdom, Wales) and covered a wide range of sports, from swimming to equestrian riding.

Summaries of all the studies included in the analysis are presented in Table 3 in the appendix, and the ESs that were included in the overall analysis are presented in a forest plot in Figure 1 below.

The analysis did not reveal any significant difference in anxiety between the two groups, which supports the hypothesis (ES = - 0.035, $SE = 0.090$, $z = - 0.391$, $p = 0.696$). The effect size (ES) of the comparison was small, indicating a negligible practical difference. The analysis of ES values showed significant heterogeneity ($Q = 27.678$, $p = 0.001$, $I^2 = 67.483\%$), with ES values ranging between - 0.79 and 0.92. The mean sample size of the studies included in this analysis was 285.38. Overall, these findings suggest that elite athletic status does not have a significant impact on anxiety levels when compared to the impact of non-athletic status on anxiety levels of non-athletes.

Figure 1

Forest Plot



Note. The Forest Plot shows the weighted ES (sizes of the squares reflects the weight of each study) and coefficients interval (CI) used to determine the combined ES (diamond). A positive ES means that athletes show higher anxiety than non-athletes. RE Model = Overall ES and 95% CI. CA-I = Cognitive anxiety intensity. CID-S = Composite International Diagnostic-Screener (Wittchen et al., 1999). SA-I = Somatic anxiety intensity. STAI = State-Trait Anxiety Inventory (Spielberger et al., 1983; Laux et al., 1981).

4 Discussion

Physical inactivity is a known risk factor for chronic diseases and premature death (Paffenbarger et al., 1986). Regular physical activity has been shown to have positive effects on mental health (Schultz et al., 2012; Rebar et al., 2015). Neumann and Frasch (2007) found that physical activity can prevent and treat mental disorders. However, the potential differences in the expression of anxiety disorders between elite athletes and non-athletes remains unclear. Therefore, the aim of this meta-analysis was to investigate this relationship by analyzing the effect sizes of anxiety outcomes in studies that compared elite athletes and non-athletes. For this purpose, the effect sizes of the anxiety outcomes for the included studies of this meta-analysis were calculated. No significant difference in terms of anxiety symptoms were found, which confirms our null hypothesis that there are no differences between elite athletes and non-athletes. The results of the present study are consistent with previous research on the relationship between athletic status and anxiety. For example, a meta-analysis by Gerber et al. (2010) found that physical activity was associated with lower levels of anxiety in both athletes and non-athletes.

4.1 Theoretical Implications

These observations have important implications for theory and practice. From a theoretical perspective, the results provide the first causal evidence for the null hypothesis, which states that there are no significant differences in anxiety between elite athletes and non-athletes.

Therefore, non-athletes may be relieved to know that being an elite athlete does not necessarily mean having lower or higher levels of anxiety compared to non-athletes. This information could be helpful for non-athletes who may have anxiety related to performance in areas other than sports. In addition, non-athletes who may have been discouraged from participating in sports due to the fear of increased anxiety levels may feel more motivated to take up sports as a form of physical activity without worrying about the negative impact on their anxiety levels.

Elite athletes may be reassured by these findings and feel less pressure to perform or meet certain expectations, which could help to alleviate anxiety. The study suggests that other factors, such as personality traits, social support, and coping mechanisms, may play a more significant role in determining an individual's level of anxiety than athletic status.

Furthermore, the results of this study suggest that status as an elite athlete does not significantly influence anxiety levels compared to the influence of non-athletic status on the anxiety levels of non-athletes. It is important to note that although there was no significant difference in anxiety levels, athletes and non-athletes may still experience different levels of anxiety in certain situations. For example, an athlete may experience anxiety before a competition, while a non-athlete may experience anxiety before a public appearance.

The present study fills a critical gap in the literature by providing the first systematic meta-analysis of the comparison of anxiety disorders in elite athletes and non-athletes and sheds light on the magnitude and variability of the effects observed across studies.

4.2 Limitations and Future Directions

The study found no significant difference in the expression of anxiety disorders between elite athletes and non-athletes, which could indicate a lack of effect of exercise on anxiety. The high heterogeneity in the study results, confirmed by the Q-test, suggests that the results are not uniform and may have been influenced by other factors. However, research by Moran (2013) identified fear of failure and lack of confidence as factors that trigger anxiety in athletes. When coupled with the pressure to perform in competitive sports, stress and anxiety can have a profound impact on both the performance and health of athletes (Hanin, 2000; Jones, 1995).

It is important to note that the average sample size of the studies included in this analysis is 285.38. Sample size may have an impact on statistical power and thus the ability to detect differences between groups. In the future, larger samples may be considered to confirm the results of the present analysis.

One possible explanation for the lack of distinction could be that the measurement of anxiety was not precise enough to detect subtle differences between the groups. It is also possible that the type of sport in which the athletes participate, or the intensity and frequency of their training has an influence on their anxiety levels and that this was not accounted for in this analysis.
This information was not considered in the present analysis, and therefore, it is possible that differences in anxiety levels may exist within subgroups of elite athletes. Future studies may consider stratifying the analysis by sport type, intensity, and frequency of training to explore these potential differences.

Overall, the results of this meta-analysis indicate that there is no significant difference between athletes' and non-athletes' experience of anxiety symptoms. This finding could be important for sport psychology research and practice, and further research could focus on identifying other factors that may be related to anxiety symptoms.

The findings of this study are also consistent with the lack of research comparing mental disorders in athletes and non-athletes in competitive sports. This highlights the need for more research in this area. Future research could explore other types of mental disorders, such as depression, in athletes and non-athletes, and investigate whether there are differences in the prevalence of these disorders. Another limitation could be the lack of differentiation between non-athletes who engage in some physical activity versus those who engage in no activity.

4.3 Practical Implications

Previous research has suggested that anxiety can be triggered by factors such as fear of failure and lack of confidence. Therefore, it is important for coaches and sport psychologists to help athletes develop coping strategies to deal with anxiety and stress related to performance. Coping strategies such as relaxation techniques, cognitive-behavioral interventions, and mindfulness training have been shown to be effective in reducing anxiety levels in athletes (Reardon et al., 2019). In addition, it is important to identify and address mental health issues early to prevent them from becoming more severe and interfering with athletic performance and transitions.

This insight is crucial for athletes as they should not feel compelled to participate in their sport and jeopardize their mental well-being for the sake of attaining exceptional results. Nevertheless, psychological assistance is imperative for athletes to help them cope with the stressors associated with sports and mitigate the risk of mental disorders, such as anxiety. According to a study by Neal T. L. et al. (2013), psychological interventions, including cognitive-behavioral therapy and mindfulness-based interventions, can effectively reduce anxiety symptoms in athletes. Thus, providing psychological support to athletes can improve their mental health and overall performance.

Regarding non-athletes, the discovery that there is no significant difference in anxiety symptoms between athletes and non-athletes can provide reassurance to those who believe they are missing out on the mental health benefits of physical exercise. Instead of exercising solely for mental health, they should focus on activities that bring them joy and satisfaction. Nonetheless,

this does not imply that non-athletes should avoid physical activity altogether. Numerous studies have shown that sports have many beneficial effects on mental health, including reducing symptoms of anxiety and depression, irrespective of athletic competence or activity level (Rebar et al., 2015; Schulz et al., 2012; Stubbs et al., 2016). Therefore, engaging in physical activity can be an effective strategy for managing anxiety symptoms in non-athletes, as well.

5 Conclusion

In conclusion, the present meta-analysis provides evidence that no significant difference exists between the anxiety levels of elite athletes and non-athletes. The effect size of the comparison was small, indicating negligible practical difference. These findings suggest that elite athletic status does not have a significant impact on anxiety levels when compared to non-athletic status. Theoretical implications of the study indicate that other factors such as personality traits, social support, and coping mechanisms play a more significant role in determining an individual's anxiety level than athletic status. Furthermore, the results of this study suggest that non-athletes may feel more motivated to take up sports as a form of physical activity without worrying about the negative impact on their anxiety levels. This finding has practical implications for the mental health management of elite athletes and highlights the importance of considering the mental health of athletes when designing training programs and managing athletic transitions. Future research may consider larger samples to confirm the present findings.

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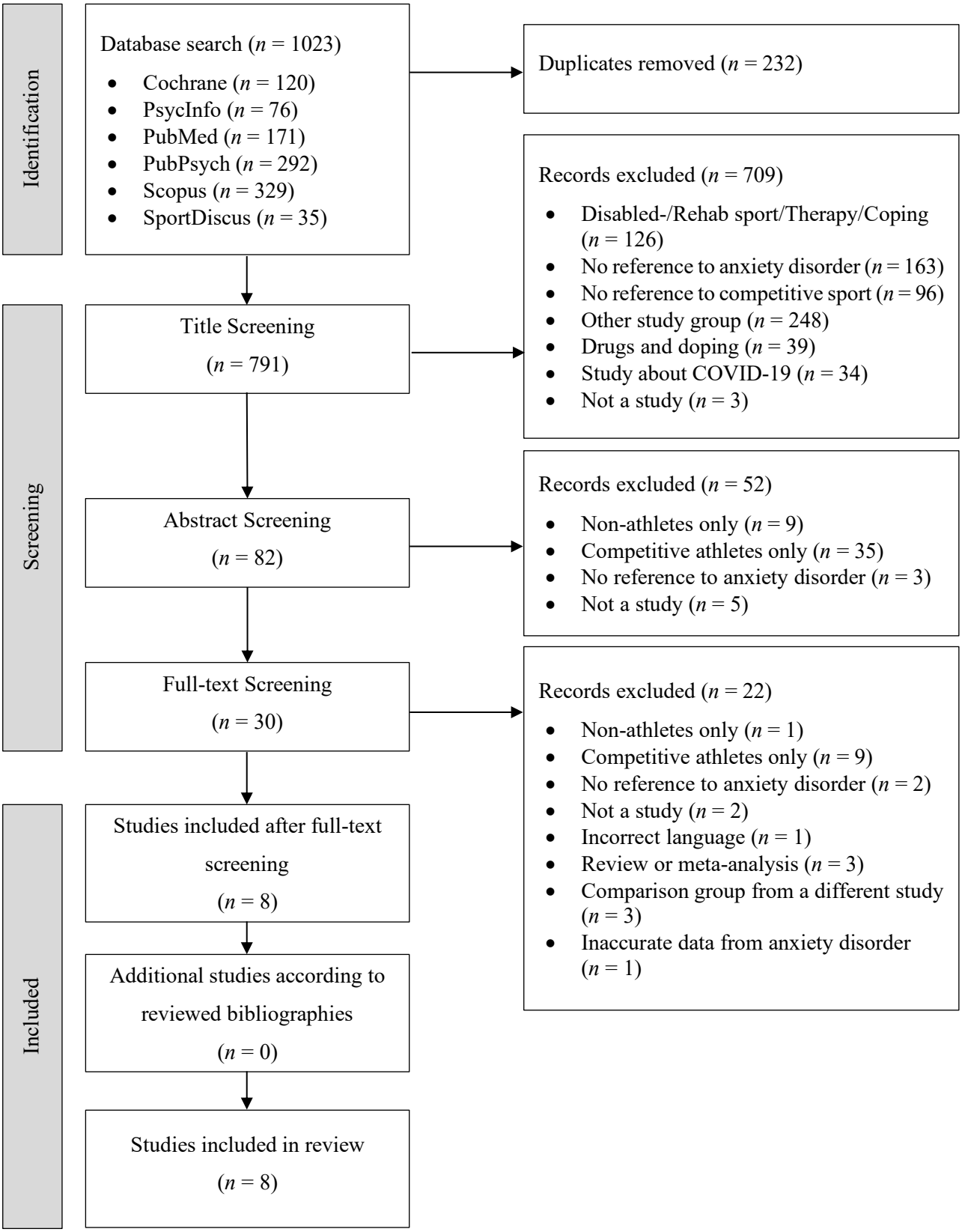
Appendix

Figure 2

PRISMA Flow Chart



Note. PRISMA flow chart according to Moher et al. (2011).

Table 2

Search terms used in the various databases and number of studies and duplicates found.

MEDLINE (PubMed) (13.12.2022)	Number of studies: *n* = 171 / Duplicates: *n* = 55
Search terms	Filter
anxiety AND *elite athlete*	Keyword
anxiety AND *elite sport*	Keyword
anxiety AND *professional athlete*	Keyword
angst AND *leistungssport*	Keyword
angst AND *spitzensport*	Keyword

Cochrane (25.11.2022)	Number of studies: *n* = 120 / Duplicates: *n* = 32
Search terms	Filter
Anxi* AND *elite athlete*	All Text
Anxi* AND *elite sport*	All Text
Anxi* AND *professional athlete*	All Text
angst AND *leistungssport*	All Text
angst AND *spitzensport*	All Text

PubPsych (03.01.2023)	Number of studies: *n* = 292 / Duplicates: *n* = 177
Search terms	Filter
anxiety AND *elite athlete*	All Text
anxiety AND *elite sport*	All Text
anxiety AND *professional athlete*	All Text
angst AND *leistungssport*	All Text
angst AND *spitzensport*	All Text

SPORTDiscus (03.01.2023)	Number of studies: *n* = 35 / Duplicates: *n* = 6
Search terms	Filter
anxiety AND *elite athlete*	All Text
anxiety AND *elite sport*	All Text
anxiety AND *professional athlete*	All Text
angst AND *leistungssport*	All Text
angst AND *spitzensport*	All Text

Scopus (19.12.2022)	Number of studies: *n* = 329 / Duplicates: *n* = 159
Search terms	Filter
anxiety AND *elite athlete*	Keyword
anxiety AND *elite sport*	Keyword
anxiety AND *professional athlete*	Keyword
angst AND *leistungssport*	Keyword
angst AND *spitzensport*	Keyword

PsycInfo (23.12.2022)	Number of studies: *n* = 76 / Duplicates: *n* = 7
Search terms	Filter
anxiety AND “elite athlete”	Keyword
anxiety AND “elite sport”	Keyword
anxiety AND “professional athlete”	Keyword
angst AND leistungssport	Keyword
angst AND spitzensport	Keyword

Table 3

Characteristics of samples used in the meta-analysis.

Reference	Effect Size (d) and Standard Error (SE)	Sport	Athletic Sample	Non-Athletic Sample	Dependent Variable
Brand et al. (2013)	*d* = 0.0704 *SE* = 0.06	Varied	*n* = 777 38.5% female Age: 12-15 Training hours per day: 2.8 ± 1.1 Anxiety = 53.8%	*n* = 431 42.0% female Age: 12-15 Unknown training hours Anxiety = 57.3%	CID-S (Expanded 18-item version)
Gerber et al. (2011)	*d* = -0.2323 *SE* = 0.0980	Varied	*n* = 258 54.7% female Age: 17.56 ± 1.34 Training hours per week: 17.7 ± 5.65 Anxiety = 2.17 ± 0.25	*n* = 176 46.1% female Age: 16.96 ± 1.33 Training hours per week: 4.53 ± 1.24 Anxiety = 2.23 ± 0.27	STAI Trait-anxiety
Jones et al. (1994)	CA-I *d* = -0.0076 *SE* = 0.1382 SA-I *d* = 0.0209 *SE* = 0.1382	Swimming	*n* = 97 Age: 13-29 CA-I = 20.21 ± 5.23 SA-I = 18.91 ± 5.94	*n* = 114 Age: 13-29 CA-I = 20.25 ± 5.33 SA-I = 18.79 ± 5.57	Modified CSAI-2

Reference	Effect Size (d) and Standard Error (SE)	Sport	Athletic Sample	Non-Athletic Sample	Dependent Variable
Mallalieu et al. (2006)	SA-I *d* = 0.0054 *SE* = 0.1292	Varied	*n* = 102 Age: 20.46 ± 3.54 SA-I = 18.08 ± 5.62	*n* = 144 Age: 20.46 ± 3.54 SA-I = 18.05 ± 5.46	SAS CSAI-2
Moya-Albiol et al. (2001)	*d* = 0.0203 *SE* = 0.3828	Varied	*n* = 18 100% male Age: 22.39 ± 2.61 Training hours per week: 15-20 Anxiety = 16.94 ± 9.10	*n* = 11 100% male Age: 22.64 ± 2.01 Moderate activity at least 5 days a week Anxiety = 16.78 ± 5.14	STAI Trait-anxiety
Rimmele et al. (2007)	*d* = -0.6189 *SE* = 0.3087	Varied	*n* = 22 100% male Age: 21.5 ± 2.35 Swiss Olympic Card holder Anxiety = 32.19 ± 7.3	*n* = 22 100% male Age: 21.84 ± 2.24 Less than 2h exercise per week Anxiety = 36.45 ± 6.44	STAI Trait-anxiety
Weinstein et al. (2015)	*d* = 0.9184 *SE* = 0.2748	Varied	*n* = 20 Age: 30 ± 10.1 Anxiety = 52 ± 3.7	*n* = 51 Age: 30 ± 10.1 Anxiety = 47.2 ± 5.7	STAI Trait-anxiety

Reference	Effect Size (d) and Standard Error (SE)	Sport	Athletic Sample	Non-Athletic Sample	Dependent Variable
Wolframm & Micklewright (2008)	CA *d* = -0.0139 *SE* = 0.3266 SA *d* = -0.7937 *SE* = 0.3384	Equestrian Riders	*n* = 15 Age: 24.14 ± 1.74 CA = 18.9 ± 6.8 SA = 15.2 ± 4.4	*n* = 25 Age: 23.48 ± 2.93 CA = 19.0 ± 7.4 SA = 19.0 ± 5.0	CSAI-2R

Note: CA-I = Cognitive anxiety intensity. CID-S = Composite International Diagnostic-Screener (Wittchen et al., 1999). CSAI-2 = Competitive State Anxiety Inventory-2 (Martens et al., 1990). CSAI-2R = 17-item questionnaire (Cox et al., 2003). SA-I = Somatic anxiety intensity. STAI = State-Trait Anxiety Inventory (Spielberger et al., 1983; Laux et al., 1981). All values are given as mean ± standard deviation (if so, recorded in the study).

Table 4

Studies excluded after full-text screening with reason for exclusion.

Nr.	Author and Year	Title of the Studies	Justification
1	Biggin et al. (2017)	An investigation of athletes' and coaches' perceptions of mental ill-health in elite athletes	Competitive athletes only
2	Conrad W. (1976)	Untersuchungen über Persönlichkeitsunterschiede in Abhängigkeit von Niveau und Art des sportlichen Leistungsvermögens	No reference to anxiety disorder
3	Erzeybek & Giritlioglu (2020)	Investigation of the personality, anger and anxiety situation of the professional and amateur football players and the veteran footballers	Competitive athletes only
4	Fossati et al. (2021)	Physical exercise and mental health: The routes of a reciprocal relation.	Review or meta-analysis
5	Gouttebarge et al. (2019)	Occurrence of mental health symptoms and disorders in current and former elite athletes: A systematic review and meta-analysis	Review or meta-analysis
6	Hackfort D. (1985)	Angstdiagnostik im Leistungs- und Schulsport	Not a study
7	Hackfort & Spielberger (1989)	Sport-related anxiety: Current trends in theory and research	Not a study
8	Hagan et al. (2017)	Interaction between gender and skill on competitive state anxiety using the time-to-event paradigm: What roles do intensity, direction, and frequency dimensions play?	Competitive athletes only
9	Hannon B. (2006)	Anxiety and performance in elite non-professional athletes	Inaccurate data on anxiety disorder

10	Hanton S. (2008)	Competitive experience and performance status: An investigation into multidimensional anxiety and coping	Competitive athletes only
11	Junge & Feddermann-Demont (2016)	Prevalence of depression and anxiety in top-level male and female football players	Comparison group from a different study
12	Junge & Prinz (2019)	Depression and anxiety symptoms in 17 teams of female football players including 10 German first league teams	Comparison group from a different study
13	Lundqvist C. (2011)	Directional anxiety responses in elite and sub-elite young athletes: intensity of anxiety symptoms matters	Competitive athletes only
14	Modolo V. B. (2009)	Physical exercise dependence: Mood, quality of life in amateur and professional athletes	Incorrect language
15	Neil R. (2012)	Competitive anxiety intensity and interpretation: A two-study investigation into their relationship with performance	Competitive athletes only
16	Rice et al. (2019)	Determinants of anxiety in elite athletes: a systematic review and meta-analysis	Review or meta-analysis
17	Samadzadeh M. (2011)	Comparison of sensation seeking and self-esteem with mental health in professional and amateur athletes, and non-athletes	No reference to anxiety disorder
18	Silva-Rocha et al. (2019)	Psychometric properties of the Brazilian version of the Sport Anxiety Scale-2.	Competitive athletes only
19	Simon et al. (2021)	Health-related quality of life in former national Collegiate Athletic Association Division I collegiate athletes compared with noncollegiate athletes: A 5-year follow-up	Non-athletes only
20	Wiggins et al. (2006)	Multidimensional comparison of anxiety direction and burnout over time	Competitive athletes only

21	Woods et al. (2022)	Mental health difficulties among professional footballers: A narrative review	Competitive athletes only
22	Zhang et al. (2014)	Psychometric properties of the acceptance and Action Questionnaire-II for Chinese college students and elite Chinese athletes	Comparison group from a different study