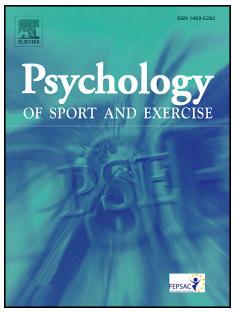

Mental Health and Elite Female Athletes: A Scoping Review

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Carly Perry [1] , Francesca M. Champ [2] , Jessica Macbeth[1], & Helen Spandler [3]

[1] *School of Sport and Health Sciences, University of Central Lancashire, Preston, United Kingdom,*

[2] *Research Institute for Sport and Exercise Sciences, Liverpool John Moores University, Liverpool, United Kingdom*

[3] *School of Social Work, Care and Community, University of Central Lancashire, Preston, United Kingdom*

Author Note

Carly Perry https://orcid.org/0000-0002-7763-7857

Declaration of interest: None

Correspondence concerning this article should be addressed to Carly Perry, School of Sport and Health Sciences, University of Central Lancashire, United Kingdom.

Email: cyperry@uclan.ac.uk

ABSTRACT

Objectives This article examines the current state of literature focusing exclusively on mental health and mental illness of elite female athletes. The scoping review aimed to (1) identify the methodology used in this research, (2) explore the use of theory in these studies, and (3) provide an overview of the research purposes to identify gaps in the literature and provide recommendations for future research.

Design Scoping Review

Method Following the methodological framework by Arksey and O'Malley (2005), four databases were searched for studies that fulfilled the inclusion criteria. Following the identification of studies using broad search criteria, specific exclusion criteria were applied.

Results Twenty-four studies met the review criteria, of which twenty studies (83.3%) used quantitative methods and a cross-sectional research design. Of these studies, the majority (95%) focused on eating disorders and/or disordered eating prevalence rates in elite female athletes who compete in 'lean-physique' or endurance sports (e.g., gymnastics, long-distance, running). The restricted sample population of USA collegiate athletes, overreliance on quantitative methods, and heavy focus on eating disorder prevalence rates demonstrates an ongoing need for sport scholars to expand their research samples, methods, and aims.

Conclusion Findings highlight the need for greater methodological diversity to advance our conceptual and theoretical understanding of elite female athletes' experiences of mental health and mental illness beyond numeric interpretations. Future research is needed to explore mental health in elite female athlete populations beyond 'lean-physique' athletes.

Keywords: mental health, mental illness, elite female athletes, sport, review

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[2] *Research Institute for Sport and Exercise Sciences, Liverpool John Moores University, Liverpool, United Kingdom*

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Author Note

Carly Perry https://orcid.org/0000-0002-7763-7857

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Mental health and Elite Female Athletes: A Scoping Review

Since the turn of the decade, research into mental health and mental illness has received increased attention in elite sport (Kuettel & Larsen, 2019; Poucher et al., 2021; Rice et al., 2016). In the elite athlete population, the prevalence of mental illness ranges from 5-35% annually, which is comparable to that of the general adult population (Castaldelli-Maia et al., 2019; Gorczynkski, Coyle, & Gibson, 2017). Rates of mental illness amongst elite female athletes are, however, higher than their male counterparts and the general population (Kuettel & Larsen, 2019). Despite the above suggestions, prevalence rates are difficult to concretely establish and have been subject to debate among researchers due to limited research, definitional issues, a lack of awareness and stigma, and inconsistent measures (Gorczynkski, Coyle, & Gibson, 2017; Kuettel & Larsen, 2019; Poucher et al., 2021). Nonetheless, sport scholars agree that athletes who compete at the elite level are exposed to unique mental health and mental illness risk factors such as intense performance demands, rigorous training schedules, media attention, injury, and de-selection (Kuettel & Larsen, 2019; Rice et al., 2016). Moreover, improving the mental health of elite athletes is now a priority for many sporting organisations and governing bodies, and is an area that warrants further study (Henriksen et al., 2019).

Whilst ‘mental health’ has been defined and conceptualized in various ways, we (the research team) utilized the definition of mental health presented in the International Society of Sport Psychology consensus statement (Henriksen et al., 2019) “a state of well-being in which every individual realizes his or her own potential, can cope with the normal stresses of life, can work productively and fruitfully, and is able to make a contribution to his or her community” (The World Health Organisation, 2014 pp. 231). Throughout our review, we refer to ‘mental health’ and ‘mental illness’ as two distinct concepts (Henriksen et al., 2019). Mental illness is usually perceived to be a diagnosable ‘condition’ or ‘disorder’ related to

experiences (such as depression, anxiety, addiction, obsessions, psychoses, etc.) that impact an individual's thinking, feeling, mood, and behaviours (CDC, 2020). In contrast, mental health is viewed more broadly as one component of a person's overall wellbeing (CDC, 2020). An elite athlete, for example, may suffer from poor mental health during injury, but this does not necessarily mean that they would meet the criteria for diagnosable mental illness.

Much of the current research and several systematic reviews in this area have narrowly focused on identifying prevalence and incidence rates of mental illness amongst elite (male) athletes (Bar & Markser, 2013; Gorczynski et al., 2017; Reardon & Factor, 2010). However, two reviews have explored both mental illness and mental health, for example, Rice et al. (2016) conducted a narrative review to synthesise literature on both mental illness and mental health amongst elite athletes, and Kuettel and Larsen (2019) utilized a scoping review method to explore various risk and protective factors of mental health in elite athletes. The work of Rice et al. (2016) and Kuettel and Larsen (2019) enhanced our knowledge and understanding of mental health and mental illness in elite athletes. For example, Kuettel and Larsen (2019) identified elite female athletes to be at an increased risk for anxiety, depression, and disordered eating when compared to elite male athletes. Using a holistic approach around mental health (Henriksen et al., 2019) to interpret their findings, gender (female) emerged as a risk factor for poor mental health more broadly amongst elite athletes (Kuettel & Larsen, 2019). This finding was an impetus of this review.

Kuettel and Larsen (2019) speculated that the increased rate of poor mental health and mental illness in elite female athletes compared to elite male athletes is due to biological differences. However, this speculation was not discussed in any further detail. We attribute the lack of knowledge and understanding around why elite female athletes suffer from a greater level of mental ill health to much of the existing research overlooking elite female

athletes meaning that causality cannot be appropriately identified (Kuettel & Larsen, 2019). Subsequently, sports scholars are left to make (often) ill-informed assumptions regarding the many possible risk factors contributing to mental health difficulties in elite female athletes. For example, Castaldelli-Maia et al. (2019) hypothesised that the lack of acceptance of female athletes in certain cultures, unequal training opportunities, limited financial support, sexualisation, sexuality stereotypes, and societal and personal expectations around traditional gender roles will likely negatively impact the mental health of this population. The aforementioned unique psychosocial and contextual demands faced by elite female athletes must be considered when designing and delivering strategies to support the mental health of this population (e.g. gender and context specific interventions) (Foskett & Long-staff, 2018).

Research specific to elite female athletes is essential for creating effective mental health programs and interventions. Relying on findings from predominantly male-focused studies, such as Gouttebarge et al. (2015), to inform the design and implementation of mental health interventions with elite female athletes is not appropriate due to the distinct differences between males and females at a biological, psychological, and social level (Castaldelli-Maia et al., 2019). Breslin et al. (2017) argues that gender-specific and sport-specific data should be used to inform and design mental health interventions as neglecting such factors substantially reduces the quality and efficacy of mental health interventions. Additionally, utilising appropriate and well-aligned psychological theory when developing mental health interventions has been evidenced to increase their quality (Breslin et al., 2017). Taken together, the above findings highlight the importance of conducting further research on mental health and elite female athletes before delving into the design of support programs and interventions.

Prior to conducting mental health research with elite female athletes, it is important for researchers to consider study design and use of theory to undertake research into mental

health with elite athletes (Poucher, Tamminen, Kerr & Carney, 2021). While several recommendations are offered in a commentary by Poucher et al. (2021), our review offers a systematic approach to the literature and focuses on the methods and theories used in research conducted exclusively with elite female athletes to improve future research. Our review differs from others conducted in this area due to our focus on methods, consideration of how theory has been used, and our exclusive focus on elite female athletes.

A scoping review was deemed the most appropriate approach to identify knowledge gaps in research concerning elite female athletes and mental health or mental illness and offer informed suggestions relating to the future research that should be conducted to fill the identified gaps. More specifically, the purpose of a scoping review is to summarise existing research findings with the aim of systematically mapping implications for practice and identifying research gaps (Arksey & O'Malley, 2005). Scoping reviews are currently receiving substantial attention within sport and health research (Ross, Donaldson & Poulos, 2020) and have previously been used to address unexplored topics within mental health and sport (see Kuettel & Larsen, 2019). Given the paucity of research regarding mental health and elite female athletes, a systematic review or meta-analysis would not be appropriate in yielding sufficient studies to assess study quality (Grant & Booth, 2009). Furthermore, while narrative reviews are increasingly popular in sport and mental health research (see Rice et al., 2016) and were recently used in a review exploring men, mental health, and elite sport (see Souter, Lewis & Serrant, 2018), narrative reviews do not follow a strict research criteria and risk missing studies.

To the best of our knowledge, our review is the first (of any kind) to explore the way(s) that mental health or mental illness has been studied exclusively with elite female athletes. We focused on (1) identifying the methodology used in research concerning mental health or mental illness and elite female athletes, (2) exploring the use of theory in these

studies, and (3) providing an overview of the research purposes with the aim of identifying gaps in the literature and providing recommendations for future research.

Method

In this review, we followed the methodological framework suggested by Arksey and O'Malley (2005); (1) identifying the research question, (2) identifying relevant studies, (3) selecting studies, (4) charting the data, and (5) summarizing and collating the data and reporting the results. Additionally, this scoping review adhered to all items on the recently developed PRISMA checklist for scoping reviews (Tricco et al., 2018).

Identifying the research question

Our overriding research question was 'how has mental health and mental illness concerning elite female athletes been researched?' In order to answer this, we focused on three underlying aims: (1) to identify the methodology used in research concerning mental health or mental illness and elite female athletes, (2) to explore the use of theory in these studies, and (3) to provide an overview of the research purposes with the goal of identifying gaps in the literature and making recommendations for future research.

Identifying relevant studies

We included studies that: *(a) involved female athletes only.* This review included all studies that exclusively sampled 'female athletes' according to the author(s) of each study. In sport research, a binary approach (e.g. male or female) is most often utilized. Despite gender and sex being far more complex, the elite sporting environment is predominantly structured with reliance on gender binaries (Phipps, 2021). While there is a need for more inclusive research in future studies in sport, we involved studies where 'female athletes' were the identified population in order to report on the current state of knowledge. In this review, the studies on 'female athletes' may have included athletes who do not identify themselves in relation to this binary category, however, no studies raised or identified this. In contrast to

most previous reviews (e.g. Kuettel & Larsen, 2019; Rice et al., 2016), we excluded studies involving both male and female athletes given the exclusive focus on female athletes and the aims of this review; *(b) involved athletes competing at the elite sporting level*. In this review, 'elite athletes' are defined as a population comprising high-performance, elite, or professional athletes, and/or National Collegiate Athletic Association (NCAA) Division One (D1) standard student-athletes (see Rice et al., 2018; Swann, Moran, & Piggott, 2015). Studies including athletes competing at the provincial/regional/county level were included if defined by the author as elite athletes. Additionally, studies comprising both elite and non-elite athletes or junior and senior elite athletes were only included if we could distinguish between the findings; *(c) involved current athletes.* Retired athletes were excluded unless we were able to distinguish between athletes who were retired at the time of the study versus those still competing; *(d) involved a focus on mental illness, mental health, or mental wellbeing as defined by the authors of each individual study in their research aims*. Studies that indicated the research purpose was to explore 'mental illness,' 'mental health,' or 'mental wellbeing' were included. Additionally, studies that aimed to explore a specific mental illness (e.g. anxiety or depression) from an established criteria (e.g. DSM-IV (American psychiatric Association, 2000) or ICD-10 (World Health Organisation, 1993) were included; *(e) were published between 1996 and 2020.* In the development of women's sport, 1996 was a pivotal year as women were allowed to participate in football and softball at the summer Olympic games for the first time, and the first International Olympic Committee (IOC) world conference on 'Women and Sport' took place in Lausanne, Switzerland; *(f) were qualitative, quantitative, or mixed method studies.* Systematic and scoping reviews, meta-analyses, commentaries, grey literature, and dissertations were excluded from data analysis.

Study selection

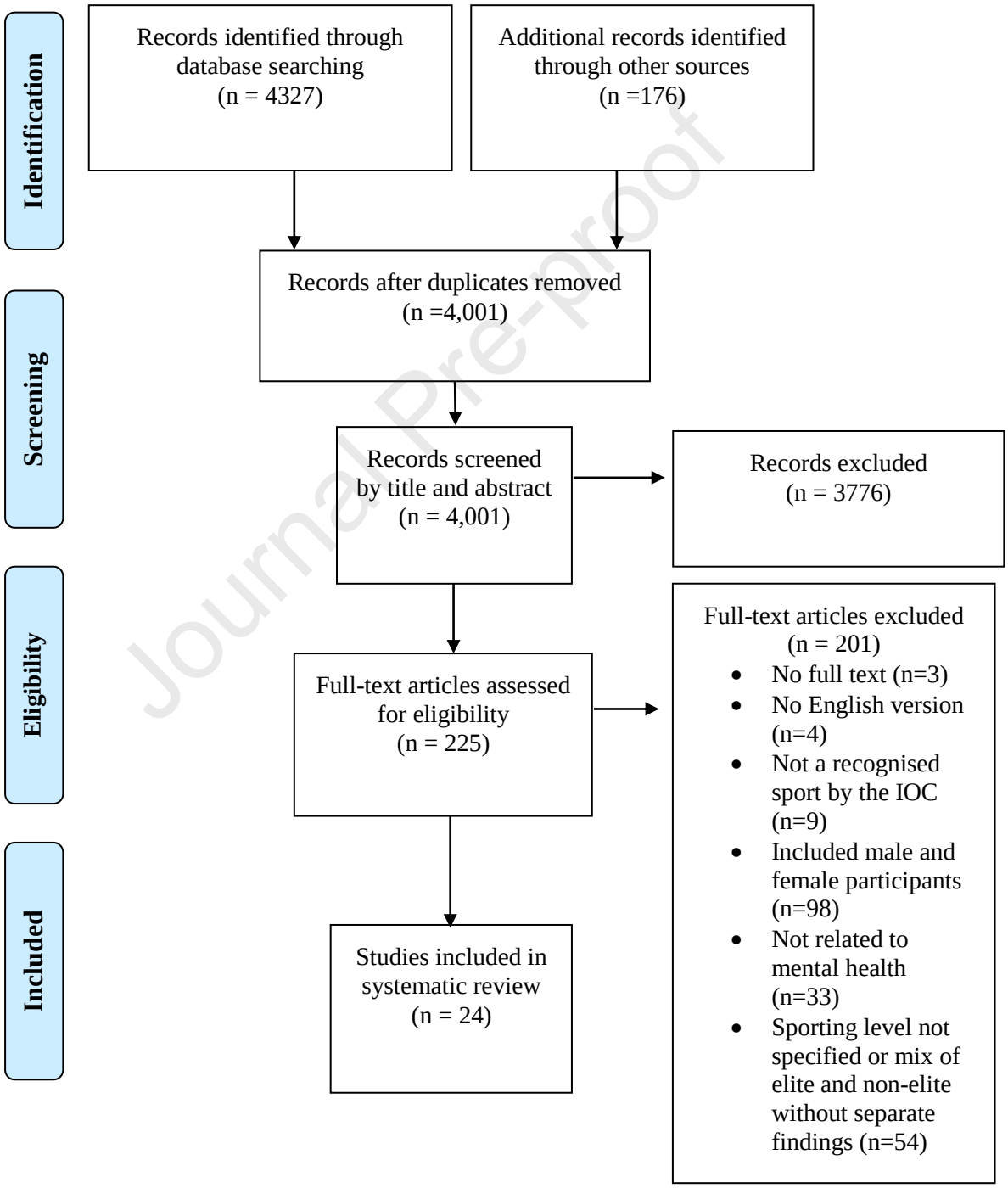
The search was initiated in March 2020 and ended in June 2020. The following databases were searched: SPORTDiscus, PsychINFO, CINAHL, and MEDLINE. These databases were chosen because their scopes were most closely aligned with the research question and aims of this review and they have been used in recent reviews of a similar nature (Kuettel & Larsen, 2019; Rice et al., 2016). In addition to the identified databases, academic journals, reference lists, and previous reviews were manually searched.

The search terms spanned four core categories: *gender* (female or woman), *mental health* (e.g. mental health or mental illness or mental wellbeing), *competition level* (e.g. elite or international) and *sport* (sport or athlete). We decided to include four specific mental health disorders as search terms (depression, anxiety, eating disorders/disordered eating, and substance abuse) given the focus on these disorders in past reviews (Rice et al., 2016). Due to the ambiguous conceptualisation of mental illness and mental health in sport research, and the broad research question outlining this review, we included 'mental wellbeing' as a search term as it sometimes used interchangeably with 'mental health' in the sport literature (see Breslin et al., 2017; Kuettel & Larsen, 2019; Rice et al., 2018). For a full example of the search terms we used, please see the appendix.

Screenings of the four databases were performed in three phases, at the beginning, middle and end of the process (see Levac et al., 2010). First, titles and abstracts of identified articles were screened by the first author with the aim of eliminating those studies that did not meet the predefined eligibility criteria. Following this, full texts of the potential studies for inclusion in the review were screened for eligibility by the first and second author independently. Following the completion of article screening, the co-authors came together to critically discuss findings. Finally, the third author completed a full-text screening of those articles that were deemed eligible. Following study selection, the research team mapped key findings, identified gaps in existing literature, and charted the data. Data charting involved

recommendations from Arksey and O'Malley (2005) and included: year of publication, study aim/purpose, characteristics of study populations (e.g. sporting level, sport-type), type of design, measurements used, identification of theory, key findings, and limitations.

Figure 1. Prisma Flow Diagram



Results

The search yielded a total of 4,327 records. After removing the duplicates, 4,001 articles were screened for eligibility by title and abstract. Then, 3,776 were excluded and the remaining 225 full text articles were assessed for eligibility. Following the full text review, 201 articles were excluded leaving 24 to be included in this review.

[INSERT TABLE 1.]

Study characteristics

Of the twenty-four studies, eleven (45.8%) were conducted in the United States, three (12.5%) in the United Kingdom, two (8.3%) in Australia, two (8.3%) in Norway, two (8.3%) in Germany and finally one (4.2%) study was conducted in Poland. The remaining three (12.5%) studies did not indicate a country. The participants ranged from thirteen to thirty years of age, with twenty-two (92%) of the studies including participants between the ages of sixteen and twenty-six, and the sample size varied from one participant (case study) to nine hundred and thirty-eight participants.

With regards to competition level, eleven studies (45.8%) included NCAA D1 student-athletes, and eleven studies (45.8%) included professional, national, international, and provincial athletes. Only one study (4.2%) included elite athletes defined through ambiguous terminology. Between one and fifty-eight different sports were explored across the studies. More specifically, ten studies included only one sport, nine studies included two to ten sports, and four studies included ten or more sports. The most commonly studied sports were football (or 'soccer' if referring to studies in the USA) (n=11), swimming/diving (n=10), track and field (n=8), volleyball (n=8), basketball (n=8), gymnastics (n=9), and running (n=8).

Study design and instrument

In this review, a large proportion of the included studies (83.3%) used quantitative methods and self-report measures. Moreover, nineteen (95.8%) of the quantitative studies employed singular cross-sectional designs whereas only one study (4.2%) used a longitudinal design (Anderson, Petrie, & Neumann, 2012). In using a longitudinal research design, the researchers were able to examine the influence of sport pressures, body dissatisfaction, and dietary restraint across a 5-month competitive season.

A total of four studies (16.6%) employed qualitative research methods. Two of which used semi-structured interviews (Kroshus, Goldman, Zubzanksy, & Austin, 2014; Stirling & Kerr, 2012), one used a life history approach (Papathomas & Lavallee, 2014), and the final qualitative study utilized a mix of phenomenological interviews and ethnographic research methods (de Bruin & Oudejans, 2018).

A total of thirty-four validated scales were used in the twenty quantitative studies (see Table 2. for a list of the scales). Eighteen studies (75%) utilized scales to explore eating disorders (ED)/disordered eating (DE), with three scales appearing frequently: the Bulimia Test Revised (BULIT-R; Thelen et al., 1984) (included in four studies), the Eating Disorder Inventory (EDI; Garner, 1982) (included in four studies) and the Eating Attitudes Test (EAT-26; Garner, 1982) (included in six studies). Five studies used validated body satisfaction measures, four of which used the Body Parts Satisfaction Scale–Revised (BPSS-R; Petrie &. Austin, 1997), and three studies used the Weight Pressures in Sport for Females (WPS-F; Reel et al., 2010). Notably, the WPS-F was the only sport-specific measure used in the studies included in this scoping review. In addition to body satisfaction measures, three studies used the Social Physique Anxiety Scale (SPAS; Hart, Leary, and Rejeski, 1989). Two studies explored depression and/or anxiety using the Centre for Epidemiologic Studies Depression Scale (CES-D; Radloff, 1977), the General Anxiety Disorder scale (GAD-7; Spitzer, 2006), or the Beck Depression Inventory (BDI; Beck et al., 1961).

Use of theory

The majority of studies did not specify whether a theoretical framework informed the study objectives or the design, implementation or evaluation of programs or interventions. One intervention, grounded in dissonance theory, featured in this review and aimed to reduce eating disorder symptomology (Smith & Petrie, 2008). Of the studies that did specify the use of theory in the rationale, two studies (Anderson, Petrie & Neumann, 2011; Anderson, Petrie, & Neumann, 2012) employed and tested the Petrie and Greenleaf (2007) Sociocultural Model. The sociocultural model was created by Petrie and Greenleaf (2007) to identify potential mediators and moderators that shape an athlete's experiences of sport and non-sport specific pressures regarding weight, body, appearance and eating, and the development of ED symptoms.

One study (Wilinski, 2012) utilized two theories, the Gender Schema Theory (Bem, 1981) and the Body Conceptualization Theory (Franzoi, 1995) to explore the relationship between gender identity and depression in female footballers. Torstveit, Rosenvinge, & Sundgot-Borgen (2008) used the Female Athlete Triad (see Yeager et al., 1993) to explore stress fractures and eating disorders in soccer players which allowed the researchers to show female footballers were at more of a risk for stress fractures than previously believed. Additionally, Papathomas and Lavallee (2014) used Narrative Theory to analyse and understand the life experiences of an elite female athlete engaging in self-starvation.

One study used the Contextual Body Image Framework to inform their rationale (de Bruin & Oudejans, 2018); the contextual framework perceives body image as a multifaceted reactive concept (Loland, 1999). In this study they found that for some athletes' negative body evaluations were only present in the sport context whereas in daily life they were satisfied with their bodies and did not compare themselves with others. For other athletes, the researchers found negative body evaluations existed in both their daily life and sport which

indicated that elite sport represented a "high-risk culture" that overemphasized body and weight (de Bruin & Oudejans, 2018).

Research purpose

The aim of each individual study is stated in Table 3. The studies in this scoping review focused on: *(1) mental illness, (2) elite female athletes competing in 'lean-physique' sports, (3) the elite sporting environment and mental illness, and (4) intervention, theory, measures, methods.*

Mental illness. The majority of studies were quantitative and focused on the presence or absence of mental illness amongst elite female athletes. The qualitative publications focused on female athletes' subjective experiences of mental illness, specifically, ED/DE at a personal, social and cultural level. There was a heavy focus on the prevalence of ED/DE across the studies included in this review. Eighteen of the twenty quantitative studies (90%) focused on ED/DE whereas only two of the twenty quantitative studies (10%) explored the prevalence of depression and anxiety.

The majority of the quantitative studies also explored one of, or a combination of the following factors; physique or social physique anxiety (Hasse, 2009; Hausenblas & Mack, 1999), pathogenic weight behaviours (Greenleaf et al., 2009; Torres-McGhee et al., 2011), body image (Anderson, Petrie, & Neumann, 2012; Hulley & Hill, 2001; Torres-McGhee et al., 2011), body (dis)satisfaction (Anderson, Petrie, & Neumann, 2011; Anderson, Petrie, & Neumann, 2012; Brannan et al., 2009; Kong & Harris, 2015; Smith & Petrie, 2008), thin-internalization (Smith & Petrie, 2008), sexual harassment (Sundgot-Borgen et al., 2003), academic status (Torres-McGhee et al., 2011), personality traits/qualities (e.g. perfectionism) (Brannan et al., 2009), psychosocial skills (e.g. emotional regulation) (Shriver, Wollnbereg, & Gates, 2016), stress fractures and menstrual dysfunction (Prather et al., 2016), societal

ideals (Anderson, Petrie, & Neumann, 2011; Anderson, Petrie, & Neumann, 2012; Kong & Harris, 2015) and gender identity (Wilinski, 2012).

Elite female athletes competing in 'lean-physique' sports. Eleven studies (45.8%) specifically explored ED/DE in elite female athletes competing in 'at-risk' sports such as those that are 'appearance-based' or require a 'lean-physique' (e.g. gymnastics and running) (Anderson, Petrie & Neumann, 2011; Anderson, Petrie, & Neumann, 2012; de Bruin & Oudejans, 2018; Hulley & Hill, 2001; Kroshus et al., 2014; Kroshus, Kubzansky, Goldman, & Austin, 2015; Klinkowski, et al., 2008; Kong & Harris, 2015; Shriver, Wollnbereg & Gates, 2016; Torres-McGhee et al., 2011; Torstveit et al., 2008). Three of the twelve studies explored and compared the presence of ED symptomology in athletes who compete in 'leanness' and 'non-leanness' sports (Kong & Harris, 2015; Shriver, Wollnbereg, & Gates, 2016; Torstveit et al., 2008). A further study explored the prevalence of ED/DE in elite female athletes competing in individual versus team sports (Hasse, 2009).

The elite sporting environment and mental illness. Three studies focused on comparing the prevalence of mental illness between elite female athletes and various other populations (e.g. recreational athletes or the general female population) to gain insight into the elite sporting environment/culture (Hausenblas & Mack, 1999; Kong & Harris, 2015; Sundgot-Borgen et al., 2003). For example, Kong and Harris (2015) investigated body image perceptions of women in sporting and non-sporting contexts to explore how the sporting environment may positively or negatively influence body image and mental health. In relation to this, a further three studies explored the influence of the elite sport environment on the development of eating disorders through lived experiences (de Bruin & Oudejans, 2018; Papathomas & Lavallee, 2014; Stirling & Kerr, 2012).

Intervention, theory, measures, methods. One study extended the work of Stice et al. (2000) and tested their three-session cognitive dissonance program among elite female

athletes to reduce the risk of disordered eating (Smith & Petrie, 2008). Another study aimed to test and further develop a theory/model/framework to examine the appropriateness of the Sociocultural Model of DE by Petrie and Greenleaf (2007) (Anderson, Petrie, & Neumann, 2011). A further study developed, proposed, and evaluated the reliability and validity of an athletics-oriented measure of psychological predictors of DE (Hinton & Kubas, 2005). Two studies aimed to highlight the importance of using qualitative methods to gain insight into elite female athletes' subjective experiences of mental illness in elite sport (de Bruin & Oudejans, 2018; Papathomas & Lavallee, 2014). For example, Papathomas and Lavallee (2014) used a life history methodology to attain an in-depth understanding of how the 'performance narrative' shaped a female athlete's personal experiences of DE in sport.

Discussion

Our scoping review provides an overview of research aims, methods, and theories that have been used in studies focused exclusively on elite female athletes and mental health or mental illness. In this section the study characteristics, research purpose(s), study design, methods, measurements, and use of theory are critically discussed and recommendations for future research are presented. In the concluding section, several additional avenues for future studies are offered. To guide this discussion and further interpret the findings, we used a gender lens to highlight specific gender-related issues.

Study characteristics

Variety of sports. A variety of sports were researched across the included studies (see Table 4 for a full list of the sports that appeared in this review). Over half of the studies (65%) involved more than two sports (e.g. gymnastics, swimming and athletics), allowing us to attain a broad insight into mental health across a wide range of sports. Concurrently, the breadth of sports explored in a number of the studies was also a methodological weakness due to the limited sport-specific insight provided. Each sport contains its own unique risk

factors that impact mental health and mental illness (Castaldelli-Maia et al., 2019). However, the vast majority of the studies in this review overlooked sport-specific risk factors. One study provided insight into risk factors specific to gymnastics (Anderson, Petrie, & Neumann 2012) and findings revealed that the uniforms required for gymnasts heighten their susceptibility for body image concerns. Beyond this, the included studies did not provide insight into risk factors specific to any one sport. Since mental health interventions and awareness/education programs should be tailored to sport-specific demands (Breslin et al., 2017), future research is needed to explore the risk factors related to each individual sport.

Competition level. The study samples varied in competition level due to inconsistencies in the definition of 'elite' athletes (Kuettel & Larsen, 2019; Swann et al., 2015). For example, Prather et al. (2016) identified both professional female athletes and NCAA D1 female student-athletes as 'elite participants'. Findings suggested that NCAA D1 female soccer players were at a significantly higher risk for an eating disorder (17.4%) when compared with professional players in the USA (6.1%), however, no further insight was provided as to why there is a significant statistical difference between these two sub-categories of 'elite athletes'. This example demonstrates the need for more targeted research to better understand an individual's experiences of mental health and mental illness across various competition levels and the elite athlete spectrum.

The definitional inconsistencies of 'elite athlete' made comparison between findings difficult. If researchers could refer to a universal definition of 'elite', that accurately covers all gender and sport types across the world, comparing findings would be made easier. This is supported by Swann et al. (2015), however, significant economical, societal, sociocultural, and environmental differences in sport across different continents present a significant barrier to adopting such a universal definition. Perceptions of 'elite' are likely to be based on male sport due to its hegemonic status thus, in research concerning elite female athletes, defining

405 'elite' is particularly important in order for accurate insight and comparisons to be made
406 (Schell & Rodriguez, 2000). We recommend that future researchers provide a clear rationale
407 and description of the competition level of their research subjects in the context of their
408 studied sport(s). This would allow for findings to be more easily compared and more accurate
409 conclusions to be drawn.

410 **Country**. The largest proportion of studies were conducted in the USA (45.8%),
411 which allowed insight into elite female athletes in the USA and particularly those competing
412 at the NCAA D1 level. However, more research is needed to explore mental health and
413 mental illness amongst elite female athletes in countries and cultures beyond the USA. More
414 specifically, it is necessary to explore the mental health or mental illness experiences of elite
415 female athletes living and competing in non-western societies given that different risk factors
416 are likely to exist (e.g. acceptance of women's sport) (Castaldelli-Maia et al., 2019).

417 Differences in levels of professionalisation between countries will also likely result in
418 athletes having vastly different experiences of mental health (Castaldelli-Maia et al., 2019).
419 For instance, female athletes competing in countries and/or sports with lower levels of
420 professionalization are more likely to experience financial strain and encounter poorer injury
421 management, which may in turn negatively impact their mental health and increase risk of
422 mental illness (Castaldelli-Maia et al., 2019; Moesch, Mayer, & Elbe, 2012). Even in
423 countries where elite female athletes are relatively well-supported (e.g. USA), elite female
424 athletes receive substantially poorer quality training resources, lower pay, less mainstream
425 mass media attention, and fewer sponsorship opportunities in comparison to elite male
426 athletes (Allison, 2020). For example, in the USA, 5% to 8% of sport media coverage is
427 focused on women's sports even though women account for 40% of sports participation
428 (Hardin & Greer, 2009). The lack of media attention and subsequent sponsorship deals only
429 furthers the financial strain and disparity in pay that often accompanies being a professional

female athlete. This often forces these athletes to engage in some form of alternative paid employment in addition to their elite sporting career and training (Allison, 2020; Culvin, 2019). These resource related factors may negatively impact mental health and warrant consideration for future research (Castaldelli-Maia et al., 2019; Culvin, 2019). Taken together, it is important for future research to explore the mental health experiences of athletes in a range of cultural contexts to develop a more nuanced understanding of mental health and deliver culturally informed mental health support services.

Research purpose(s)

A narrow focus on mental illness. Twenty studies (83.3%) utilizing quantitative methods explored the presence or absence of mental illness. More specifically, of the quantitative studies, eighteen studies (90%) focused on assessing ED/DE prevalence. In the qualitative studies, the focus was centred upon better understanding how contextual and cultural influences shape elite female athletes' experiences of ED/DE. The narrow focus on ED/DE is particularly surprising considering researchers have evidenced females are at a heightened risk compared to males for all types of mental illness (Kuettel & Larsen, 2019; Rice et al., 2016). Thus, we recommend more research is conducted with this population to explore other types of mental illness.

Limited risk factors explored. In relation to the studies exploring ED/DE, the most commonly explored risk factor was 'sport-type.' More specifically, twelve studies (50%) focused on elite female athletes competing in 'aesthetic/appearance-based' or 'lean-physique' sports (e.g. dance, figure skating, long-distance running). This sub-population of elite female athletes is considered 'vulnerable' for ED/DE given the pressures they face around body, weight, eating, and performance from coaches, teammates, judges, and the media (Anderson, Petrie, & Neumann, 2011; Anderson, Petrie, & Neumann, 2012; Kong & Harris, 2012). Additionally, researchers in the included studies claimed 'lean-physique' athletes are at a far

greater risk for ED/DE than elite female athletes who compete in power-based sports where the focus tends to be on more masculine qualities such as strength and muscularity (e.g., football, field hockey, rugby). However, only one study showed 'lean-physique' athletes to be at an increased risk for ED/DE when compared with elite female athletes who compete in power-based sports (Kong & Harris, 2012).

Assumptions that elite female athletes competing in power-based sports are less objectified or impacted by ideals of emphasized femininity are misguided and problematic (Connell & Messerschmidt, 2005). The two studies (see de Bruin & Oudejans, 2018; Shriver, Wollenberg, & Gates, 2016) that support this claim also suggested that females who compete in non-traditionally gendered sports (power-based and/or contact sports) will face unique challenges in relation to their body type/image and gender identity. Individuals who compete in power-based sports are likely required to develop muscular bodies in pursuit of sporting success. These body types may clash with societal determinations of the 'feminine ideal' and, thus, related insecurities might influence the onset of ED/DE (de Bruin & Oudejans, 2018; Krane, 2001). Elite female athletes competing in power-based sports (e.g. female footballers in England) have reported feeling that their bodies are under constant scrutiny as they are constantly tasked with the responsibility of promoting/conforming to a brand image that emphasizes femininity (Culvin, 2019). We recommend future research specifically exploring ED/DE with elite female athletes include sports beyond just 'lean-physique' athletes.

In addition to sport-type, several studies explored personality characteristics and/or social physique anxiety (SPA) as risk factors for ED/DE (Brannan, Petrie, Greenleaf, Reel, & Carter, 2009; Hausenblas & Mack, 1999; Haase, 2009; Klinkowski, Korte, Pfeiffer, Lehmkuhl, & Salbach-Andrae, 2007). Sport scholars have found that certain personality characteristics (e.g. perfectionism) might lead to an obsessive focus on improving personal eating habits which in turn might result in the onset of ED/DE (Klinkowski, Korte, Pfeiffer,

Lehmkuhl, & Salbach-Andrae, 2007). Person-specific risk factors such as personality traits can contribute to disordered eating behaviours. This viewpoint, however, is overly simplistic and constitutes ED/DE as an individual pathology whilst neglecting various social, cultural, and environmental factors that are also likely to contribute to an athlete's experiences of ED/DE (Busanich, McGannon, & Schinke, 2012; Papathomas & Lavallee, 2012; Papathomas & Lavallee, 2014). Moreover, the literature concerning ED/DE and elite female athletes is almost entirely made up of prevalence studies and focused on person-specific risk factors. Consequently, current insight and future advances in this area of research is severely limited (Papathomas & Lavallee, 2012).

The over-exploration of person-specific risk factors in the ED/DE literature and the overuse of prevalence studies is limiting given eating disorders are a consequence of various combinations of biopsychosocial factors which are not easily, or appropriately, explored using quantitative methods (Breuner, 2010; Papathomas & Lavallee, 2012). To address this limitation, experts in sport and eating disorder research have suggested a focus on individual circumstances and real experiences of elite female athletes to obtain a deeper insight (Papathomas & Lavallee, 2012). To this end, researchers should diversify their methodology by utilising qualitative methods, such as narrative inquiry, to allow for interpretive insight (Papathomas & Lavalle, 2012; Papathomas & Lavallee, 2014). Taken together, we recommend future studies exploring ED/DE with elite female athletes explore a variety of psychosocial risk factors and transition periods (e.g. caring responsibilities, injury, financial strain, de-selection) and/or utilize different methodological approaches to gather insight into elite female athletes personal experiences.

Study design, methods & measurements

Study design. Twenty-three studies (95.8%) used a cross-sectional research design and twenty studies (83.3%) used self-report data collection. A cross-sectional research design

is valuable for gathering insights into athletes' mental health at one moment in time. Several studies have suggested a longitudinal research design would be advantageous for future research as it would allow for a deeper understanding of existing patterns and insight into sociocultural and contextual factors that influence elite female athletes' experience with mental health and mental illness (Anderson, Petrie, & Neumann, 2011; Brannan, et al., 2009; Haase, 2009; Torstveit, Rosenvingee, & Sundgot-borgen, 2008). Yet, only one study used a longitudinal research design (Anderson, Petrie, & Neumann, 2012; Haase, 2009). Anderson et al. (2012) assessed the stability and influence of sport pressures, body satisfaction, and dietary restraint over a 5-month season, findings demonstrated that athletes' body satisfaction stayed stable over the entire season. We recommend that future studies employ longitudinal research design when possible as it provides insight into the progression and stability of various risk factors that influence elite female athletes' experiences with mental health and mental illness.

Methods. Twenty studies (83.3%) utilized quantitative methods and only four studies (16.6%) utilized qualitative methods. The studies that employed qualitative methods allowed for a more holistic understanding of the sociocultural and environmental factors of the sporting environment that impacted the elite female athletes' experience of mental health or mental illness (e.g. de Bruin & Oudejans, 2018; Papathomas & Lavaelle, 2014). For example, all participants in the qualitative study conducted by de Bruin and Oudejans (2018) believed the sporting environment was a 'high risk' culture and it influenced their susceptibility to poor mental health. Peer influence was noted as a factor influencing many athletes' experiences of body dissatisfaction and DE behaviours (de Bruin & Oudejans, 2018). These insights illuminated the importance of conducting future research that aims to better understand the role of macro and micro stakeholders in shaping athletes' experiences of mental health and mental illness. This holistic understanding will enable applied practitioners

to create mental health programs and/or interventions that target influential others (e.g. teammates and coaches). We suggest that studies exploring highly personal topics such as mental health and ED/DE are best explored through qualitative methods such as unstructured interviews (Papathomas & Lavaelle, 2014). Such methods provide athletes with the opportunity to talk freely about their unique and deeply personal experiences as opposed to restricting them to Likert scale type questions (Eklund et al., 2011; Papathomas & Lavelle, 2012). Additionally, depending on the research question, we propose that mixed-method or multi-method approaches will allow for numeric interpretation and a more holistic understanding than would be possible through using quantitative methods alone (Papathomas, Petrie, & Plateau, 2018).

Measurements and screening tools. There is general uncertainty around the most appropriate measures to use when exploring mental health and mental illness within the elite female athlete population. We found thirty-four validated measures employed in this review alone (see table 3 for a list of the screening tools that were used). Researchers often used different measures to identify the prevalence of the same disorders. For example, eight different measures were used to explore ED/DE prevalence. The use of different measures to study the same phenomenon can make accurate comparisons across different research studies more difficult than necessary (Poucher et al., 2021). The most commonly used measure was EAT-26 (Garner, 1982) which was used in five studies. Torres-McGhee et al. (2011) identified their use of EAT-26 as a limitation given this measure often results in false-positive high EAT-26 scores and does not allow for any contextual insight. Overall, the large variety of screening tools found in this review and the lack of consistent measures evidences the difficulties in choosing appropriate mental health screening instruments to use with elite female athletes (Pope et al., 2015). Due to the unique psychological, social, and biological demands placed on athletes, it may be more appropriate to utilize questionnaires that are

tailored towards athletes and validated for different competition levels (e.g. grassroots, recreational, sub-elite, elite) (Knapp, Aerni, & Anderson, 2014).

The Weight Pressures in Sport Questionnaire (WPS-F), one such validated athlete-specific questionnaire, was used in three of the studies. The findings from the three studies that utilized the WPS-F identified female athletes felt the most pressures around weight from teammates (36.8%), uniforms (34.3%), and coaches (33.8%) (Reel, Soohoo, Petrie, et al., 2010). The use of the WPS-F in three studies allowed us to draw links between these findings and the qualitative findings whereas the other screening tools featured did not allow for the same level of insight. For example, the results from the WPS-F are similar to the qualitative findings in the study by de Bruin and Oudejans (2018). In that study, participants indicated that weight-pressures were most heavily influenced by their coach, teammates, and other sport-specific environmental factors (e.g. sports attire) (de Bruin & Oudejans, 2018). Thus, we argue it is critical that coaches recognize the power they have over athletes and remain aware of their possible impact on elite female athletes' experiences with ED/DE (de Bruin & Oudejans, 2018). Two additional studies indicated that the way in which coaches verbally communicate about food impacts how team members communicate about the same topics amongst one another. Depending on how such topics are communicated within a team, this in turn impact how an elite female athlete experiences ED/DE (Kroshus, Goldman, Zubzanksy, & Austin, 2014; Kroshus, Kubzansky, Goldman, & Austin, 2015). Given the impact coaches have on athletes' experiences with ED/DE, there is a need for future research to design and evaluate mental health education programs for coaches and teammates.

Measurements suggested by the International Olympic Committee (IOC) in their Sport Mental Health Assessment Tool 1 (SMHAT-1) and Sport Mental Health Recognition Tool 1 (SMHRT-1) (Gouttebarge et al., 2020) should be considered in future research. Several of the measurements provided in these tools are specifically designed for the athlete

population (e.g. 'Brief Eating Disorder in Athletes Questionnaire'). This has the potential to elicit valuable insight that could not be discovered in questionnaires made for the general population. Another questionnaire that might be considered in future research is the Athlete Psychological Strain Questionnaire (APSQ) designed by Rice et al. (2019) to measure psychological stress amongst elite athletes (Rice et al., 2020). This has been validated amongst 1,093 elite athletes, yet only eighty-four were females (Rice et al., 2020).

Theory

We charted the use of theory to rationalise and inform study objectives, and in designing, implementing, and evaluating programs or interventions. As a result, the studies in this review rarely mentioned theory in their rationale, which is unsurprising given much of the research in sport is atheoretical (Sabiston et al., 2019). Theory is more likely to be utilizd in designing mental health interventions than in prevalence studies, therefore the lack of theory included in this review may be a result of the lack of interventions included (Smith & Petrie, 2008). The intervention by Smith & Petrie (2008) showed that cognitive-based interventions may be useful in reducing DE symptomology, however, such interventions will need to be redesigned to address important issues and factors that are unique to female athletes and the elite sport environment. In order to effectively design and then evaluate future mental health interventions in relation to their planned outcomes, researchers should be able to refer back to the underpinning theory (Breslin et al., 2017).

Future directions

Expanding on the recommendations made in the aforementioned sub-sections, there are several considerations for future research concerning mental health in elite female athletes. These considerations emerged as a direct consequence of the results in this scoping review and focus primarily on research aims to be explored. In addressing each of these

considerations we believe that a more holistic and detailed understanding of the mental health of elite female athletes will be attained.

Researchers looking to explore elite female athletes and mental illness, particularly ED/DE, should look to diversify their research methodology and extend their population beyond 'lean-physique' athletes. Currently there is a narrow focus on 'lean-physique' athletes, body image and personal risk factors within ED/DE research. The assumption that elite female athletes only suffer from ED/DE due to internalized pressures from society around what they 'should' look like and personal risk-factors (e.g. personality traits) is overly simplistic. Instead, a deeper understanding of elite female athletes' experiences with ED/DE is needed. Elite female athletes are susceptible to other types of mental illness beyond ED/DE. Future research should explore elite female athletes' experiences of different mental illnesses (e.g. depression, anxiety, addiction) both as distinct entities but also in tandem as mental illnesses are often comorbid (Wells et al., 2020).

Studies in this review identified the positive and negative role coaches and teammates can play in elite female athletes' experiences with ED/DE. Researchers should consider exploring how support and performance staff and teammates can positively influence mental health and better support athletes with mental illness. Researchers may first look to explore mental health literacy, stigma, and help-seeking behaviours amongst elite female athletes before designing programs and interventions targeted at coaches and teammates (Junge & Prinz, 2017). As noted by Castaldelli-Maia et al. (2019), help-seeking behaviours may be impacted by cultural factors including gender norms, sexuality, country, and age. However, the included studies rarely focused on cultural factors and no studies directly explored mental health help-seeking behaviours among elite female athletes. As identified by Castaldelli-Maia et al. (2019), elite female athletes are often stereotyped as lesbian which may negatively impact mental health and influence help-seeking behaviours. Exploring elite female athletes'

experience of sexuality and the possible mental health implications is a novel place to start. This is especially important given research into the general population demonstrates that individuals identifying as lesbian can experience higher rates of poor mental health and mental illness (Herek & Garnets, 2007; Meyer, 2003). Taken together, more research into elite female athletes and their experiences of mental health and mental illness are needed before we can properly provide support for this vastly under researched population.

Strengths and Limitations

We believe that the following four limitations are appropriate given the objectives of this scoping review. Firstly, the broad nature of the research question resulted in a wide scope of studies incorporating elite female athletes to be included. Secondly, although all participants fell within the blanket term 'elite', their level of competition varied due to definitional inconsistences. From the findings, we suggest that there are different risk factors for poor mental health and mental illness across the spectrum of 'elite' competitors. Thirdly, we did not include studies that involved males and females given our exclusive focus on elite female athletes. Inclusion of studies with both genders may have allowed for a more balanced view, however, that was not the intention of this review. Often research that includes both male and female respondents tends not to draw out the specificities of women's experiences. Consequently, female-specific data can get subsumed under men's which further limits the already scarce insight that is available. Further, given the way that sport tends to be organised separately, along binary lines (male or female), female athletes will likely have specific issues and difficulties that may differ from those of male athletes. Finally, the quality of study design was not assessed as the purpose of such a review is breadth opposed to depth of information on a specific topic (Tricco et al., 2016).

Conclusion

The main findings from this scoping review highlight the need for greater methodological diversity to advance our conceptual and theoretical understanding of elite female athletes' experiences of mental health and mental illness. The restricted sample population of USA collegiate athletes, overreliance on quantitative methods, and heavy focus on ED/DE prevalence demonstrates an ongoing need for sport scholars to expand their research samples, methods, and aims. More specifically, our scoping review highlights the narrow focus on aesthetics, body satisfaction, and personal-risk factors used in determining the nature of the research questions explored in elite female athlete populations. Further, the almost exclusive use of quantitative methods and screening tools has restricted insight into mental health and mental illness amongst this population to numeric interpretations and prevalence rates. In order to better support this population, in-depth longitudinal research exploring the social, cultural, and environmental factors that contribute to athletes' experiences of poor mental health and mental illness is warranted. Designing appropriate support programs for elite female athletes requires utilising qualitative research methods in future studies. In adopting such methods, a more holistic understanding of the lived experiences of elite female athletes in relation to mental illness and mental health will be attained. Such a holistic understanding will allow for effective interventions and education programs to be designed for coaches, teammates, other members of the sporting environment, and athletes themselves.

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Appendix

Example of Search 1: SPORTDiscus (EBSCO) (Conducted 03/2020)

1.clinical OR counsel* OR help-seeking OR help seeking OR mental health care OR mental health disorder* OR mental health service* OR mental health stigma* OR mental health sympt* or mental* ill* OR mental* tough* OR mental well* OR psyc* assistance OR psych* help OR psych issue* OR psych* support* OR psych* service* OR psych* therap* OR psych* well* OR depression OR anxiety OR disordered eating OR eating disorder OR substance abuse

AND

2. elite OR elite-level OR elite level OR high level OR high-level OR professional OR national OR international

AND

3. sport* OR athlete*

AND

4. female* OR wom?

Figure 1. Prisma flow Diagram (This has been moved to the manuscript and numbers are updated

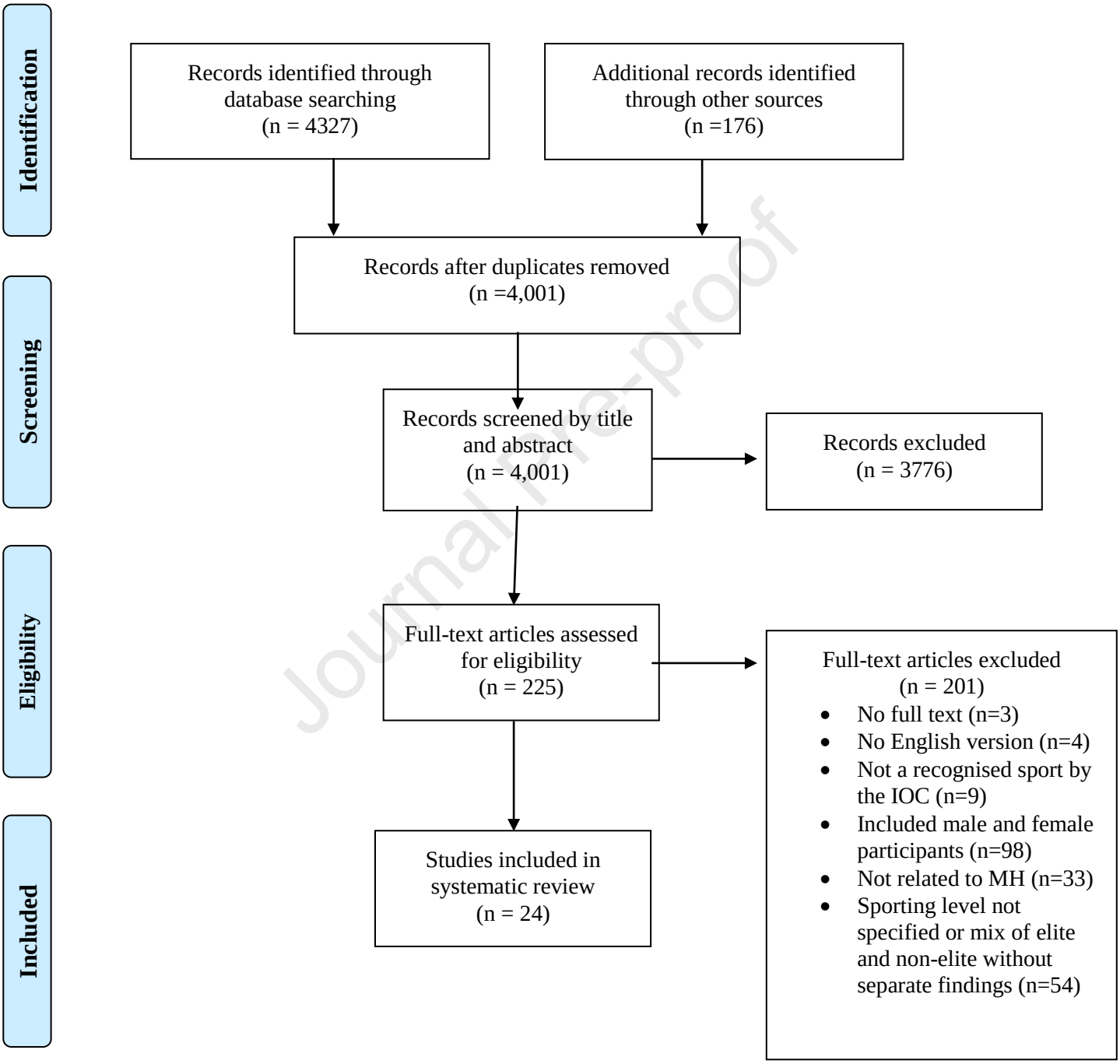

Table 1. Scoping review included articles *(Chart is updated to include study #13)

Author & year of publication	Aim/Purpose	Participant demographics, sporting level, sport-type, and country	Study design & Measurers and/or Interview style	Use of Theory	Key Findings	Limitations
Anderson, Petrie, & Neumann (2011)	Examine Petrie and Greenleaf's model in a large diverse sample of female collegiate swimmers and gymnasts.	414 *M*=19.14 NCAA D1 Swimmers & Gymnasts United States	Quantitative Cross-sectional Demographics (age, race, height, weight, ideal weight, year in school, current/past ED, menstrual history, Sport and Weight Pressures (WPS), General Sociocultural Pressures (PSPS), Internalization (SATAQ-3), Body Satisfaction BPSS-RR & BSQ-10), Dietary restraint (DIS), Negative affect (PANAS-X), Modelled Behaviours, Bulimic Symptoms (BULIT-R), Social Desirability (MCSD)	Petrie and Greenleaf (2007) model.	Initial test of the Petire & Geenelaf 2007, model revealed poor fit, but once pathways from sport pressures to body satisfaction, sport pressures to dietary restraint and from body satisfaction to bulimic symptomology, model's fit greatly improved. Model showed sport pressures were directly related to body dissatisfaction and dietary restraint. Negative affect, body dissatisfaction and restrained eating explained 55-58% of the variance in the athlete's bulimic symptoms.	-Self-report. -Cross-sectional -Generalizability: limited to similar groups of athletes (gymnasts and swimmers and divers).
Anderson, Petrie, & Neumann (2012)	Longitudinally explore, using a cross lagged model, the pathways between sport	325 *M*=19.24 *SD*=1.14 NCAA D1 Gymnast &	Quantitative Longitudinal Demographics, Sport Pressures (WPS), Body Satisfaction	Petrie & Greenleaf's sociocultural	All variables were stable across the 5-month season; DR r and BD are the best predictors	-No limitations mentioned in this study.

	environment pressures about appearance, body and weight in female athletes' body satisfaction and self-reported intentions	Swimmers/ Divers United States	(BPSS-R) Dietary restraint (DIS & 10-item DRES)	model of disordered eating.	of future. Variability stability suggests female athletes train and compete in an environment where they are constantly forced to focus on their bodies, eating and weight. Findings sport pressures from coaches and teammates may influence the athletes body satisfaction.	
Brannan, Petrie, Greenleaf, Reel, & Carter (2009)	Explore and extend past research exploring weather perfectionism, optimism , self-esteem and reason for exercise moderated thee relationship between body dissatisfaction and bulimic symptoms amount female athletes.	204 *M*= 20.16 *SD*=1.31 NCAA Division 1 Various Sports United States	Quantitative. Cross-sectional Demographics (age, race/ethnicity, class rank, height weight) BMI, Disordered eating (BULIT-R), Body dissatisfaction (BPSS-R), Perfectionism (MPS), Optimism (LOT-R), Self-esteem (RSE), Reasons for exercise (REI), Social Desirability (12-item Marlow-Crowe).	No theory mentioned	Higher levels of body dissatisfaction were associated with high BULIT-R score; body dissatisfaction accounted for 24% of the variance.	Generalizability. -BULIT-R has been found to be a valid measure of bulimic attitudes and behaviours, however results should be interpreted in terms of symptoms not DSM-IV criteria for diagnosis.
de Bruin & Oudejans (2018)	Explore the role of contextual body image in the development of ED in female athletes participating in at-risk sports i.e.	8 (currently competing= 4; retired=4) *Age*= 18-33 (inter)national level in	Qualitative Phenomenological interviews	Contextual body image framework: poses that athletes	Relationship between ED symptomology and sports environment was recognized by all elite athletes.	Only athletes who had received ED treatment were included.

	aesthetic, endurance and weight-class sports.	their respected sport. Various Sports Country not specified		measure themselves in relation to both the predominant athletic body ideals and the body ideals in general society (Loland, 1999)	Athletes indicated sport as "high risk" culture. Contextual body image appeared to influence development EDs thus confirming quantitative studies from prior research pointing towards the athletic body image as in important factors in athletes disordered eating.	Researcher bias as the they were a former sport psychologist to some of the athletes
Greenleaf, Petrie, Carter & Reel (2009)	Examine the prevalence of clinical and subclinical levels of eating disorders as well as healthy/asymptomatic eating among female college athletes and examine the prevalence of pathogenic eating and weight control behaviours.	204 *M*=20.16; *SD* =1.31 NCAA D1 Various Sports United Sates	Quantitative Cross-sectional Demographics and weight (height, BMI, grade level, sport and years participating in sport), Disordered Eating (QEDD, BULIT-R)	No theory mentioned.	54.4% reported being dissatisfied with their bodies and 88.2% believed they were overweight. QEDD showed 2% symptomatic, 25.5% symptomatic and 72.5% asymptomatic. 15% reported binge eating and 25.5% reported they exercises for two hours specifically to burn calories.	-Self-report. -Small number of women classified as ED which did not allow for examining differences between disordered and symptomatic individuals.
Haase (2009)	Examine social physique anxiety (SPA) and disordered eating correlates in two sport types	137 *M*=19.50 *SD*=3.69 National or International level Various sports Australia	Quantitative Cross-sectional Social Physique Anxiety (SPAS), Disordered Eating (EAT-26), Body mass index (self-report weight and height measures)	No theory mentioned.	Females in individual sports reported higher SPA, dieting and bulimic behaviours than in team sports.	Possible sample bias as recruitment was done through training sessions

Hausenblas & Mack (1999)	Examine the self-presentational concerns related to physique (i.e. social physique anxiety) and eating disorder correlates.	114 (Elite swimmers= 36; Athletic control group=39;nonathleticontrol group=39) *M*=16.33 *SD*=2.44 Various sports National or Provincial level Country not specified	Quantitative Cross-sectional Eating disorder inventory (EDI-2), Social Physique Anxiety Scale (SPAS), Body mass index (BMI) and Demographic information.		Female divers reported significantly less SPA than the athletic control group and nonathletic control group. No differences were found between the divers, athletic control group and nonathletic control group regarding correlates associated with eating disorders. Results showed dissatisfaction with body and extreme concern with dieting and thinness were strong predictors of SPA	-Self-report
Hinton & Kubas (2005)	The objective of this study was to develop an athletics- oriented measure of psychological predictors of disordered eating (ie, the ATHLETE) and to test its initial reliability and validity.	167 *Age*=18 to 22 NCAA D1 Various sports United States	Quantitative Cross-sectional Disordered eating (ATHLETE subscale against external criteria derived from the Q-EDD)	No theory mentioned.	16% had disordered eating. ATHLETE is a reliable and valid measure of the psychological factors associated with disordered eating in athletes. ATHLETE psychological correlates of disordered eating in the context of athletics.	Self-reported attitudes. Additionally, ATHLETE does not represent a comprehensive sampling of the psychological dimensions associated

						with disordered eating behaviours in female athletes (e.g. Other personality characteristics, such as obsessiveness, need for excessive control)
Hulley & Hill (2001)	Explore eating disorder syndromes in elite women distance runners in the United Kingdom	181 *M*=28.5 Elite (as defined by the author) Running UK	Quantitative Cross sectional	No theory mentioned.	Over 50% of total participants were either dieting when they completed the questionnaire or had dieted recently. Dieting was significant more present in eating disorder group. 16% had an eating disorder at the time of the study	-Self-report measures.
Junge & Prinz (2017)	Determine prevalence and risk factors of depression and anxiety symptoms in high-level female football players	290 (first league=184; lower league=106 l) *M* =21.5 *SD*=4.2 Professional /semi-professional Football Germany	Quantitative Cross-sectional Personal and player characteristics (need and use of psychotherapeutic support, current injury and current general health), depression (CES-D) Anxiety (GAD-7), match experience and level of play was also assessed.	No theory mentioned.	First league female footballers had a similar prevalence of depressions symptoms and generalised as females in general population of similar age. Second league players had higher prevalence depression symptoms than first league	No limitations were mentioned.

					players and then a female general population of similar age. 16% stated they currently wanted/needed psychotherapeutic support.	
Klinkowski, Korte, Pfeiffer, Lehmkuhl & Salbach-Andrae (2008)	Explore psychopathology in elite rhythmic gymnasts and anorexia nervosa patients	159 *M*= 15.2 (gymnasts); 15.7 (AN patients); 15.9 (High school group) National or International level Gymnastics Germany	Quantitative Cross-sectional Symptom Checklist (SCL-90-R) abody height, weight, Body Mass Index (BMI) and the presence of amenorrhea were assessed.	No theory mentioned	Rhythmic gymnasts show different profiles in psychopathology from those with diagnosed AN, however the need to maintain a specific weight may lead to weight regulating behaviour and increase the likelihood of an eating disorder in the gymnasts.	Use of a self-report questionnaire and age of the participants.
Kong & Harris (2015)	Investigate the role of body image in sport and non-sport contexts, pressures from coaches, influences from sport that emphasise learner body shapes and the role of competition in motivating efforts to maintain specific body weights or shapes.	320 (elite level=128, recreational level =112 and non-competitive level =80 M=21.7 Various sports Australia	Quantitative Cross-sectional Demographic questions, Eating Attitudes Test (EAT-26), Figure Rating Scale (FRS)	No theory mentioned.	Elite athletes had highest level of eating disorder symptomatology and experienced the most pressures from coaches to maintain a low body weight, or lean physiques compared to other two groups. Of the 23% of the total athletes that scored high on EAT-26 indicating high risk of clinical eating disorder,	-Online surveys (due to anonymity it is not possible to identify how the participants became aware of the study).

					two-thirds were at the elite level	
Kroshus, Goldman, Zubzanksy, & Austin (2014)	Explore two strategies used by two similarly competitive female collegiate cross-country running teams to address teammate eating behaviours perceived to be unhealthy and problematic	35 *M*=19.37 (Team 1) & 20.19 (Team 2) NCAA D1 Cross-country United States	Qualitative Cross-sectional Semi-structured interviews	Bronfenbrenner's ecological model & Social constructivist framework.	Notable between-team differences in communication about eating behaviours considered to be problematic and unhealthy among team members. Differences emerged in role of the teammates and coaches in communication around this topic.	-Cross-sectional.
Kroshus, Kubzansky, Goldman & Austin (2015)	Explore how anti-dieting advice from teammates is distributed by evaluating difference in severity of eating disorder symptomology and evaluating between-team and within team variability.	89 *M*=19.76 NCAA Division 1 Cross-country United States	Quantitative Cross-sectional Disordered eating (EAT-26), Perceived anti-dieting advice (Thompson et al.'s (2007) Friend Anti Dieting advice scale), BMI, height/weight, age, race	No theory	Significant between-team differences in the frequency of anti-dieting advice, controlling for team levels of disordered eating. Eating pathology and BMI were positively associated with anti-dieting advice received.	Self-report. Small sample size Cross-sectional. Anti-dieting measure not previously validated with athletes.
Papathomas & Lavallee (2014)	Explore and provide an alternative to medical understanding of disordered eating in sport through an emphasis on personal perspectives	1 *M*= 20 Basketball at the (elite level) UK	Qualitative 7 hours of life history data was gathered over a period of 8 months using unstructured interviews, or life history interviews, and narrative Inquiry.	Narrative theory	Holly's life is characterised by a struggle to align her life experiences with a culturally specified performance narrative. To fulfil her achievement narrative, she uses self-starvation as	No limitations mentioned by author.

					a means to achieve. Narrative as a method and theory allowed for an account of how an athlete lives through disordered eating.	
Prather et al. (2016)	Determine the prevalence of stress fractures, menstrual dysfunction, and disorder eating attitudes in female elite soccer players.	220 NCAA D1 Professional Soccer United States	Quantitative Cross-sectional Disordered eating (EAT-26), menstrual function and Body Mass Index (BMI)	Rationale for study was supported by the 'Female Athlete Triad'	17.9-19.4% professional soccer players and NCAA D1 athletes had menstrual dysfunction. And, 8.3-17.8% of that population had scores on EAT-26 suggesting they were at risk for ED.	-Self-report. -Imaging may not have diagnosed all stress factors. - Only region in USA explored thus does not consider differences.
Reel, SooHoo, Petrie, Greenleaf & Carter (2010)	Develop a reliability and validity measure to explore sport-related body image pressures across a variety of sports rather than a single sport.	204 *M*=20.16 Various sports (17+ represented) NCAA D1 USA	Quantitative Demographic information, weight pressures (WPS-F)	No theory mentioned	Results yielded a 16-item measure with four factors: weight pressures from coaches/team/sports self-consciousness of weight and appearance, important of weight and appearance, and weight limit Emergence of weight pressures from Coaches/team/sport explained 37.5% of variance; the second factors, self-consciousness of	-Self-report. -Sample size: not enough athletes represented in each sport to conduct a meaningful comparison analysis across all. Sports. - Social desirability bias - Sample is Caucasian and lacked diversity to draw meaningful conclusions

					weight and appearance 8.7%, the third and fourth factors (Importance of weight and appearance, and weight limit) only yielded two items with significance; indicating weak factors.	regarding race/ethnicity.
Shriver, Wollenbereg & Gates (2016)	Estimate the prevalence of DE among female college athletes using two validated assessment tools and to examine potential difference between athlete in weight sensitive and less sensitive sports, and examine the emotional regulation, body dissatisfaction, and sport type	151 *M*= 19.5 *SD*=1.2 Various sports NCAA D1 United States	Quantitative Cross-sectional Demographics,weight, height, Disordered eating (EAT-26 & MEBS), Emotional Regulation (DERS)	No theory mentioned	70% of the subjects desired to have a lower weight- highest desire in soccer players (81%) and lowest desire among cross-country runners (40%). Both the EAT-26 & MEBS did not differ statistically. The DE scores did not differ significantly between weight-sensitive and less weight sensitive, sports. The total DE scores positively associated with difficulties with emotional regulation.	-Self-report; Convenience sample; Geographical, cultural, ethnic and other differences not accounted for.
Smith & Petrie (2008)	Extend the work of Stice et al. (2000) by testing their three-session cognitive dissonance program among female athletes	29 *M*=19.32 *SD*=.94 Various sports NCAA D1 United States	Intervention Thin-ideal internalization (BAA-R), Body Image, Concerns (BPSS-R & BSQ-10-R), negative affect (PANAS-X),	The intervention is grounded within dissonance theory	No treatment effects were significant however, post-hoc analyses suggested that the cognitive-dissonance	-Facilitator error as a potential problem. -Time when measures were given

			Disordered eating (BULIT-R & DRES		intervention provided some effects particularly with respect to deceases in sadness and depression. Overall the finding suggest a cognitive dissonance-based intervention may be useful but will need to be redesigned to address the factors unique to female athletes and the sporting environment.	before the intervention began might not have accurately reflected. -Length of intervention sessions.
Stirling & Kerr (2012)	Examine female athletes perceived vulnerabilities to the development of disordered eating.	17 *Age*= 18-25 Various sports Country not specified	Qualitative Cross sectional Semi-structured interview	No theory mentioned	Athletes from both aesthetic and non-aesthetic sports perceive that the vulnerabilities they experience stem from the sport environment; external risk factors like sports' focus on the body, appearance, weight monitoring and media influences and internal characteristics such as self-absorption, achievement-orientation, perfection- ism,	-All participants were currently competing athletes and therefore it is possible that athletes with more severe experiences of disordered eating had retired from sport prior to adulthood

					hyper-competitiveness, and self-control were reported to increase their susceptibility to disordered eating.	
Sundgot-Borgen, Fasting, Brackenridge, Torstveit & Berglund (2003)	First examine the percentage of female elite athletes and controls reporting sexual harassment and abuse (SHAB) and secondly, determine whether a higher percentage of female athletes with eating disorders (ED) had experienced SHAB	1069 (athletes=553; controls=516) *Age*=15-39 Norwegian national senior and junior Olympic teams Various Sports Norway	Quantitative Cross-sectional Phase 1: eating disorders (EDI), SHAB, pathogenic weight behaviors, Phase 2: (athletes that classified at ask by ED questionnaire) engaged in clinical interviews; symptoms according to DSM-5 criteria	No theory mentioned.	A significantly higher percentage of athletes (20%) compared with controls (9%) met the DSM-5 criteria for ED. A higher percentage of ED athletes (66%) compared to Non-ED athletes (48%) met reported experience of SHAB both inside and outside the sporting community. Opposed to previous findings, a significantly lower percentage of female athlete experienced SHAB opposed to non-athlete controls.	No limitations reported by author
Torstveit, Rosenvingee, Sundgot-borgen (2008)	Explore the percentage of female elite athletes and controls with disordered eating (DE) and clinical eating disorders (ED) to evaluate what characterised the athletes with ED.	1838 (athletes=938; non-athletes= 900) *Age*=13-39 Elite athletes and Junior elite. Various Sports Norway	Quantitative Cross-sectional Part 1: Screening Questionnaire; menstrual cycle, self-reported ED, body dissatisfaction (BD), drive for thinness subscales (DT) from EDI. Part 2: Random selection from part 1	The female athlete triad'' (the triad) (Yeager et al., 1993) is mentioned.	A high percentage of both athletes and controls met the criteria for DE and clinical ED (e.g. 46.2% of the athletes and 51.7% of the controls reported one or more of the five indicators of DE). Higher	Cross-sectional design

			invited to clinical interview (EDE interview guide was used).		prevalence of EDs was found among athletes competing in leanness sport compared with athletes competing in non-leanness and controls.	
Torres-McGhee et al. (2011)	Explore prevalence and sources of eating disorder risk classification but academic status and riding discipline; and, examine riding style and academic status variations in body mass index.	211 *M*=19.8 English & Western Equestrian NCAA D1 United States	Quantitative Cross-sectional Demographic and anthropometric, academic status Eating Attitudes Test (EAT-26), Sex-specific BMI figural Stimuli Silhouette (The figural Stimuli Survey)	No theory mentioned.	On EAT-26, 38.5% of English riders scored in clinical range & 48.9% among western riders. No BMI or silhouette differences were found across academic status or disordered eating risk.	-Contextual factors (parental pressure, investment in sport) were not accounted for. -EAT-26 is psychometrically sound instrument but result in false-positive high.
Wilinski (2012)	Define the relationship between gender identity, the perception of the body, depressiveness, and aggression in female football players who represent different levels of competence (playing in premier league vs. second league) and seniority sport.	94 *M*= 20.77 Premier league and second league Football Poland	Quantitative Cross-sectional The Body Image Evaluation Questionnaire, the Bem Sex Role Inventory (BSRI), the Beck Depression Inventory, Buss-Durkee inventory	Gender schema theory & Franzoi's theory	Football does not deprive players of their femineity but it does protect a high level of femineity with masculinity. Female footballers have androgynous gender identities, a higher level of masculinity than among non-training women, a more favourable perception of body-as-process, a higher	-No limitations were mentioned

					evaluation of body-as-object, along with an increase of masculinity and a decrease in indirect aggression at higher competition levels	

Table 2. Study Characteristics (Percentages changed due to study #13 being added)

Study Characteristics	**Reference Number**	***n***	**%**
Country of Study			
Australia	6, 12	2	8.3
Germany	10, 11	2	8.3
Norway	21, 22	2	8.3
Poland	24	1	4.2
UK	9, 14, 15	3	12.5
USA	1, 2, 3, 5, 8, 13, 16, 17, 18, 19, 20	11	45.8
Country not specified 12.5%	4, 7, 20	3	12.5
Number of Sports included			
1 sport	9, 10, 11, 13, 14, 15, 16, 23, 24	9	37.5
2-9 sports	1, 2, 4, 6, 7, 8, 18, 19, 20	9	37.5
10+ sports	3, 5, 12, 17, 21, 22	6	25
Study Design			
Quantitative	1, 2, 3, 5, 6, 7, 8, 9, 10, 11, 12, 14, 16, 17, 18, 19, 21, 22, 23, 24	20	83.3
Qualitative	4, 13, 15, 20	4	16.6
Mixed-method			
Cross-sectional	1, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 14, 16, 17, 18, 19, 20, 21, 22, 23, 24	21	
Longitudinal	2	1	4.2
Sample Size.			
1	15	1	4.2
1≤10	4	1	4.2
11–50	13, 19, 20	3	12.5
51–100	14, 24	2	8.3

101–300	3, 5, 6, 7, 8, 9, 10, 11, 16, 17, 18, 23	12	50
>300	1, 2, 12, 21, 22	5	20.8
Sporting Level			
NCAA D1	1, 2, 3, 5, 8, 13, 14, 17, 18, 19, 23	11	45.8
Professional	10, 12, 16, 24	4	16.6
(Inter)national	4, 6, 7, 15, 11, 12, 20, 21, 22	9	37.5
Elite as defined by author	9	1	4.1
Mixed Samples			
Elite and non-elite or general population	7, 11, 12, 16, 21	5	20.8
Athletic Status.			
Active	1, 2, 3, 5, 6, 7, 8, 9, 11, 10, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24	23	95.8
Active & Retired	4	1	4.2
Mean Age.			
<16	11	1	4.2
16–26	1,2,3,4,5,6,7,8,10,12,13,14,15,16,17, 18,19,20,21,22,23,24	22	92
27–40	9	1	4.2
Use of Theory.			
Yes	1, 2, 4, 13, 15, 19, 24	7	29
No	3, 5, 6, 7, 8, 9, 10, 11, 12, 14, 16, 17, 18, 20, 21, 22, 23	17	70.8
NCAA D1: Number of Universities included per study			
1	18, 19	2	8.3
1≤3	3, 5, 13, 17	4	16.6
4≤	1, 2, 23, 14	4	16.6

Reference numbers: 1 = Anderson, Petrie &. Neumann (2011); 2 = Anderson, Petrie & Neumann (2012);3 = Brannan, Petrie, Greenleaf, Reel & Carter (2009); 4 = de Bruin & Oudejans (2018); 5 = Greenleaf, Petrie, Carter & Reel (2009); 6 = Haase (2009); 7 = Hausenblas & Mack (1999); 8 = Hinton & Kubas (2005); 9 = Hulley & Hill (2001); 10 = Junge & Prinz (2017); 11= Klinkowski et al. (2008); 12 = Kong & Harris (2015); 13 = Kroshus, Goldman, Zubzanksy, Austin (2014); 14 = Kroshus, Kubzansky, Goldman & Austin (2015); 15 = Papathomas & Lavallee (2014); 16 = Prather et al (2016); 17 = Reel, SooHoo, Petrie, Greenleaf & Carter (2010); 18 = Shriver, Wollnbereg & Gates (2016); 19 = Smith & Petrie (2008); 20 = Stirling & Kerr (2012); 21 = Sundgot-Borgen, Fasting, Brackenridge, Torstveit & Berglund (2003); 22 = Torstveit, rosenvingee, Sundgot-borgen (2008); 23 = Torres-McGhee et al, (2011); 24 = Wilinski (2012).

Table 3. Screening tools used

Screening tool purpose	**Name**	**Reference number**	***n***	**%**
Demographic/General information				

	Menstrual history or amenorrhea	1, 11, 16, 17, 18, 21, 22	7	29.2
	Use of Pathogenic weight	21, 22	2	8.3
	Past and current eating disorders	1, 3, 11, 16, 17, 18, 22	7	29.7
	Family eating disorder history	18	1	4.2
	Participants reported weight satisfaction (e.g. changes in weight experienced in season and out of season	5, 17	2	8.3
	Injury Specifically stress fractures	9, 10, 21, 22 16	5	20.8
	Contraception use and pregnancy Breastfeeding	11, 22 12	3	12.5
	Illness	9, 16	2	8.3
	Wellbeing/	9	1	4.2
	Personal and player characteristics	10	1	4.2
	Current general health	10	1	4.2
	Need and use of psychotherapeutic support	10	1	4.2
	Match experience	10	1	4.2
	Starting Status	10, 17	2	8.3
	Ideal weight	12, 18, 23	3	12.5
	Coach required monitoring of weight	12	1	4.2
	Academic status	23	1	4.2
Mental health				
	Mental health inventory (Berwick et al, 1991)	9	1	4.2
Anxiety				
	GAD-7	10	1	4.2
Depression				
	CES-D	10	1	4.2
	Beck depression inventory	24	1	4.2
Psychopathology				
	Symptom Checklist-90 (SCL-90)	11	1	4.2
Sport weight Pressures				
	Weight pressure scale: WPS (Reel and Gill, 1996)	1, 2, 17	3	12.5

Body satisfaction/ dissatisfaction				
	BPSS-R (Petrie, Tripp & Harvey, 2002)	1, 2, 3, 19	4	16.6
	Single item about body satisfaction	2	1	4.2
Body/figure				
	Body Image Evaluation Questionnaire	24	1	4.2
	Body Cathexis Scale (Mintz & Betz, 1986)	9	1	4.2
	Figure Rating Scale- FRS (Stunkard et al 1983) The FRS was adapted to include an additional question concerning the figure the individual believed would be most suited to and athletically capable for sport (FRS-sport)	12	1	4.2
	Figural Stimuli Survey	12	1	4.2
Thin-Ideal Internalization				
	BAA-R (Petrie, 1996)	19	1	4.2
Eating disorder/ Disordered eating				
	BULTIR (Thelen et al, 1996) -The BULTIR assesses bulimic symptoms based on the DSM-IV criteria	1, 3, 5, 19	4	16.67
	QEDD -Measures symptoms on the bases of DSM-5	5, 8	2	8.3
	EAT-26 (Garner, 1982)	6, 12, 14, 16, 18, 21	6	25
	EDI-2 (Garner, 1991)	7, 8, 21, 22	4	16.6
	SCANS but SPA subcales only	8	1	4.2
	EDE-Q (Fairburn & Beglin, 1994)	9	1	4.2
	MEBS (Klump et al. 2000)	18	1	4.2
Dietary Restraint				
	DIS (Stice 1998)	1, 2	2	8.3
	DRES (Van Strien et al.	2, 19	2	8.3

	1986)			
Social Physique Anxiety				
	SPAS (Hart et al 1989)	6, 7	2	8.3
Negative Affect				
	PANAS-X (Watson & Clark, 1992)	1, 19	2	8.3
General sociocultural pressures				
	Sociocultural pressures scale-PSPS (Stice & Agras, 1998)	1	1	4.2
Internalization				
	SATAQ-3 (Thompson et al.)	1	1	4.2
Modeled Behavior				
	*Modeled Behavior designed for this study to asses to which individuals have seen others engaging in behaviors around disordered eating, body image etc	1	1	4.2
Social Desirability				
	MCSD (Reynolds, 1982	1, 3	2	8.3
Perfectionism				
	MPS (Frost et al 1990)	3	1	4.2
Optimism				
	LOT-R (Scheier, Carver, & Bridges, 1994)	3	1	4.2
Self-Esteem				
	RSE (Rosenberg, 1965)	3, 9	2	8.3
Reasons for Exercise				
	REI (Silberstein, 1988)	3	1	4.2
Perceived anti-dieting advice				
	Anti-dieting advice scale (Thompson et al. 2007) This item was developed for use with adolescent girls and has not been validated with athletes.	14	1	4.2
Emotional Regulation				
	DERS (Hans & Pistole, 2014; Gratz & Roemer, 2004)	18	1	4.2

SHAB				
	SHAB	20	1	4.2
Aggression.				
	Buss-Durkee Inventory	24	1	4.2
Bem sex role inventory		24	1	4.2
Clinical Interview		21, 22	2	8.3

Table 4. Sport type

Sport	**Reference number**
Alpine Skiing	3, 5, 17
Basketball	3, 5, 15, 17, 18, 19, 20
Cheer	10, 17
Cross country running - Running	3, 5, 13, 14, 17, 19 9
Cycling	4
Dance	4, 20
Diving only Divers and Swimmers	3, 5, 7, 6, 17 1, 2
Equestrian	23, 18
Field hockey	5
Figure skating	20
Golf	3, 5, 17, 18, 19
Gymnastics	1, 2, 3, 4, 5, 11, 17, 20
Ice Hockey	3, 17
Judo	4
Lacrosse	3, 5, 7, 17
Netball	6
No-sport clarified	21, 22
Soccer	3, 5, 7, 11, 16, 17, 18, 19, 20, 24
Softball	3, 5, 17, 18, 19
Swimming	3, 5, 17, 19, 20
Synchronized swimming	3, 5, 17
Rowing	3, 5, 17
Tennis	3, 5, 16, 17, 18
Track & Field	3, 4, 5, 17, 18, 19, 20
Volleyball	3, 5, 17, 18, 19, 20

Preferred Reporting Items for Systematic reviews and Meta-Analyses extension for Scoping Reviews (PRISMA-ScR) Checklist

SECTION	ITEM	PRISMA-ScR CHECKLIST ITEM	REPORTED ON PAGE #
TITLE			

SECTION	ITEM	PRISMA-ScR CHECKLIST ITEM	REPORTED ON PAGE #
Title	1	The review title includes 'scoping review'	1
ABSTRACT			
Structured summary	2	Following the journal's guidelines, an unstructured abstract is provided. It includes objectives, amount of studies included, charting methods, results and conclusions	2
INTRODUCTION			
Rationale	3	Although there are existing reviews on mental health in elite sport, no review has systematically screened articles for methods and theory exclusive to elite female athletes	3
Objectives	4	To explore the way(s) that mental health or mental illness has been studied exclusively with elite female athletes. We focused on (1) identifying the methodology used in research concerning mental health or mental illness and elite female athletes, (2) exploring the use of theory in these studies, and (3) providing an overview of the research purposes with the aim of identifying gaps in the literature and providing recommendations for future research.	7
METHODS			
Protocol and registration	5	This study has not been officially registered	n/a
Eligibility criteria	6	Only English peer-reviewed articles were included in the present review. Elite athletes' mental health is an emerging and 1996 was a pivotal year specific to female athletes, therefore we limited the search to the last 24 years.	8-9
Information sources*	7	The search strategy was applied in the following databases: SPORTDiscus, PsychINFO, CINAHL, and MEDLINE	7
Search	8	Key terms of the database search are explained and an example for one database (SPORTDiscus) is provided	8
Selection of sources of evidence	9	Inclusion and exclusion criteria are described in detail	9

SECTION	ITEM	PRISMA-ScR CHECKLIST ITEM	REPORTED ON PAGE #
Data charting process	10	Data charting process involved all members of the research team. The final chart included year of publication, study aim/purpose, characteristics of study populations (e.g. sporting level, sport-type), type of design, measurements used, identification of theory, key findings, and limitations.	9
Data items	11	The 24 included studies are presented and table 1. Even further insight into the studies is provided in table 2 and 3	9
Critical appraisal of individual sources of evidence	12	Not conducted in a systematic way	n/a
Synthesis of results	13	Not applicable for scoping reviews	n/a
RESULTS			
Selection of sources of evidence	14	We describe the selection process including the different stages (identification, screening, eligibility, and inclusion). Figure 1 presents the flow chart	11
Characteristics of sources of evidence	15	Characteristics are discussed extensively and an additional table (see Table 1) provides characteristics of each included study (e.g. authors, year, aims, sample, location, sport, methodology, use of theory and main findings and limitations)	11-16
Critical appraisal within sources of evidence	16	Not conducted in a systematic way	n/a
Results of individual sources of evidence	17	Table 1 provides an overview of all the study aims, methodology and theory of each individual article which relates to the rationale of the study	Table 1.
Synthesis of results	18	Table 2. provides study characteristics. Table 3. Screening tools used. Table 4 sport-type	Table 2,3,4
DISCUSSION			
Summary of evidence	19	The discussion, linked to the review questions and objectives, includes an overview of concepts, themes, and types of evidence	17-28

SECTION	ITEM	PRISMA-ScR CHECKLIST ITEM	REPORTED ON PAGE #
Limitations	20	Discusses limitations of the scoping review process and the results.	28
Conclusions	21	Provides a general interpretation of the results with respect to the review questions and objectives, as well as provides potential implications for future research.	28
FUNDING			
Funding	22	Describe sources of funding for the included sources of evidence, as well as sources of funding for the scoping review. Describe the role of the funders of the scoping review.	On credit author statement

Highlights

- First review to focus on mental health and elite female athletes only.
- Mental health research concerning elite female athletes has almost exclusively focused on eating disorders.
- Majority of studies focused only on lean-physique athletes and/or USA collegiate athletes.
- Recommendations are provided to enhance future mental health research with elite female athletes.

Declaration of interests

☒ The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

☐The authors declare the following financial interests/personal relationships which may be considered as potential competing interests: