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A Systematic Review of Gambling Amongst Elite Athletes With A Focus On Females

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Abstract: *Background and aims:* Over the last decade, research interest has grown around the subject of gambling among elite athletes, with studies showing higher problem gambling rates among this cohort compared with the general population. However, there is little research focusing on elite female athletes and whether the factors that influence gambling differ between males and females. Taking into consideration the rapid growth of professionalisation of female sport, this systematic review aims to identify what is known about gambling amongst elite athletes, males and females, and what methodologies have been used to investigate this research topic. *Method:* This study followed the PRISMA guidelines for systematic reviews and the search was conducted in three electronic databases: Scopus, PsycINFO and PubMed, and a further control search carried out on Google Scholar. Overall, 16 papers met the inclusion criteria. *Results:* The majority of studies captured data either only from or almost exclusively from male athletes. Only five papers had gender balanced samples, and they utilised a quantitative research design, guided by a psychological/pathological perspective. Male athletes were found to be more likely to develop a gambling problem compared with female athletes. Within the qualitative studies, gambling culture at sports clubs was identified as a key factor influencing male athletes to gamble, but it could not be concluded whether this is also the case for female athletes. *Discussion and conclusions:* More work is needed to determine whether sports related factors such as a gambling culture can contribute to gambling problems for female athletes. A lack of qualitative studies was identified and therefore, the review calls for more qualitative research to explore gambling in female sports clubs. Additionally, it is recommended that sporting organisations support researchers in conducting meaningful research to design policies and interventions to reduce gambling harms amongst athletes.

Keywords: Gambling, Elite Athletes, Systematic Review, Gender, Professional Sports Clubs.

Introduction

The highest standard of performance, success and the amount of experience gained at that level are the defining characteristics for elite athletes (Swann et al., 2015). They compete at professional level or at national or international competitive level whether it is individually or as part of a team. Elite athletes became a key subpopulation of interest for gambling researchers as Weiss and Loubier (2010) argued that the prevalence rates for problem gambling amongst athletes are higher than amongst their non-athletic peers. Continuous emphasis on competition has been identified as a factor contributing to the risk of problem gambling in elite athletes (Curry & Jiobu, 1995; Harris et al., 2015). Problem gambling can be described as repetitive gambling behaviour with negative consequences on mental-wellbeing and finances, leading to high psychiatric comorbidities and suicide ideation (Hakansson et al., 2023). Emotional motivations for gambling were also related to trying to capture the thrill and euphoria associated with competitive success on the field for British footballers (soccer players) (Lim et al., 2017). Studies on athletes and gambling in different European countries have shown higher problem gambling rates among athletes than the general population of people meeting the criteria for problem gambling (Hakansson et al., 2023).

A gambling culture at a sports club is another factor which has been associated with increased levels of gambling participation for athletes, coaches and managers. In Sweden, a sports environment, where athletes regularly talk about gambling and a culture in which betting is normalised, has been associated with being at risk for gambling problems, highlighting the risk of normalising gambling at the community level in sports clubs (Vinberg et al., 2020). Influence from older teammates is a factor contributing to both, starting and continuing gambling and problem gambling for British football (soccer) players (Lim et al., 2017). A gambling culture in sports clubs starts communally but it leads to gambling participation happening in isolation, being emboldened by a culture which stigmatises disclosure (Lim et al., 2017). This is also the case with Irish elite athletes as gambling with teammates was found to be a factor associated with a player's moderate to high-risk gambling (Turk et al., 2023).

Constandt et al. (2022) examined the normalisation of gambling within Belgian sports clubs and found this to be enabled by the ease of availability, as well as being presented as 'part of the game', with athletes and coaches often conversing about it in a positive way. This pro gambling atmosphere was also reflected in research participants overestimating the prevalence of gambling amongst their sports friends. It was concluded that gambling's omnipresence in sports through marketing campaigns might act as subtle, indirect forms of pressure for athletes to become involved in gambling.

The growth of sports betting also had an impact on the sports industry, having problematic implications for athletes and society, especially through the introduction of in-play betting or proposition bets (Killick & Griffiths, 2018; Derevensky et al., 2019; Turk et al., 2023). In-play betting, the process of betting on events within a sporting contest, appeared towards the end of 1990s and includes betting on things such as match results, the number of goals scored in the first or second half or the number of yellow cards awarded in a football (soccer) match. Bets can be placed during games with betting options and odds adjusting in real time as those who place bets on an event which has already started have the opportunity to adapt their bets depending on how the event is progressing (Killick & Griffiths, 2018). In the US, proposition bets, also known as 'prop bets,' are placed before or during a game and are focused on betting on specific outcomes or even on aspects of individual player performance (Derevensky et al., 2019). It can be more harmful than other forms of gambling for athletes as it gives them more control over the outcome of certain events (Derevensky et al., 2019). Additionally, in-play betting promotes rapid and impulsive betting as it allows the option for high-speed continuous betting without having time to reflect, which in turn can make an individual more likely to cognitively disassociate regarding frequency and amounts bet (Killick & Griffiths, 2018).

In-play betting or prop bets also generate risks and threats to sports integrity through betting-motivated corruption such as match-fixing, spot-fixing and the misuse of insider information (Huggins, 2018; Lastra et al., 2018; Seker & Sahin, 2018; Moriconi &

de Cima, 2019). Match-fixing-related bets can be linked with the entire game, a team losing or winning, or specific parts of the game, manipulating the outcome of a match to support bets (Lastra et al., 2018). Spot-fixing has become more common in sports such as cricket and involves deliberate under-performance at specific parts in a sporting contest to support bets (Huggins, 2018). The misuse of insider information refers to the use of insider information to gain advantage in the betting market giving athletes the opportunity to anonymously bet against themselves (Huggins, 2018; Derevensky et al., 2019). In America, betting on other factors within the game, not on the winning or losing of it, created increased gambling temptations for athletes who were persuaded into manipulating games, but would be more comfortable if it did not affect the final results (Huggins, 2018).

Although problem gambling has been found to be more common in male athletes (Rhind et al., 2014; Hakansson et al., 2018), more studies focusing on female athletes are needed in order to understand the factors that contribute to gambling problems from a female perspective to develop appropriate harm measures, policies and interventions (Hakansson & Widinghoff, 2019; McCarthy et al., 2019). The limited research on female gamblers has shown significant gender differences in gambling experiences (McCarthy et al., 2019) when it comes to gambling motivations (Legge, 1996; Lesieur & Blume, 1991), the age they start gambling, how fast they develop dependence and seek help (Echeburua et al., 2011; Haw & Holdsworth, 2016; LaPlante et al. 2006) and issues experienced before developing gambling problems (Haw & Holdsworth, 2016; Specker et al. 1996). Males start gambling at an earlier age than females, but females rapidly develop dependence and seek help quicker than men (Echeburua et al., 2011; Haw & Holdsworth, 2016; LaPlante et al. 2006). Females tend to experience mood or anxiety disorders before experiencing gambling problems whereas men start experiencing other disorders after they have experienced gambling problems. They also gamble to escape from personal pressures, boredom and depression, whilst men would engage in gambling activities for social purposes (Legge, 1996; Lesieur & Blume, 199; Specker et al. 1996).

Hakansson et al. (2023) carried out a systematic review on problem gambling among elite athletes and found that there is limited research on female athletes when compared to male athletes. The review only included papers that measured problem gambling through a verified measure and therefore, studies based on a qualitative research design did not meet the inclusion criteria. Two studies by Lim et al. (2017) and Moriconi & de Cima (2020) were not included. There has been a significant increase in females gambling in the general population in the UK (Gambling Commission, 2023) and research is needed to determine whether the link between sport-related settings and gambling affects female athletes and to what extent. Sports-related factors were found to influence male athletes to gamble but there is not enough evidence to conclude if it is also the case for female athletes. In the UK, around 3,109 females reported a gambling problem in 2019, which is an increase of 35% from 2014/15 (Gamcare, 2019). Between 2020 and 2021, GambleAware (2022) also reported an increase in problem gambling among females from 1.5% to 2%. However, this increase might partly be due to more openness in self-reporting to access support rather than an actual increase in instances of problem gambling.

Historically, professional, and elite sport has been seen as a male preserve and females were considered outsiders (Pfister, 2010). Nevertheless, within the last decade there has been a substantial growth of female's elite-level sport in terms of things like sponsorship, popularity, audience and media coverage (Bowes & Culvin, 2021; Thomson et al., 2023). For example, the Union of European Football Associations (UEFA) launched a business case for women's football (soccer) in 2022 to showcase the potential growth after record-breaking UEFA Women's Euro 2022 and UEFA Women's Champions League attendances. The commercial value of women's football is set to reach €686 million (UEFA, 2022). However, the increasing professionalisation of women's sport came with significant pressures. Although female athletes are considered to be professional, it can be argued that the label is aspirational and not always sustained by professional working conditions, creating barriers and tensions in their personal and professional lives (Marshall et al., 2022). Elite female athletes have to settle on lower wages due to existing gender pay

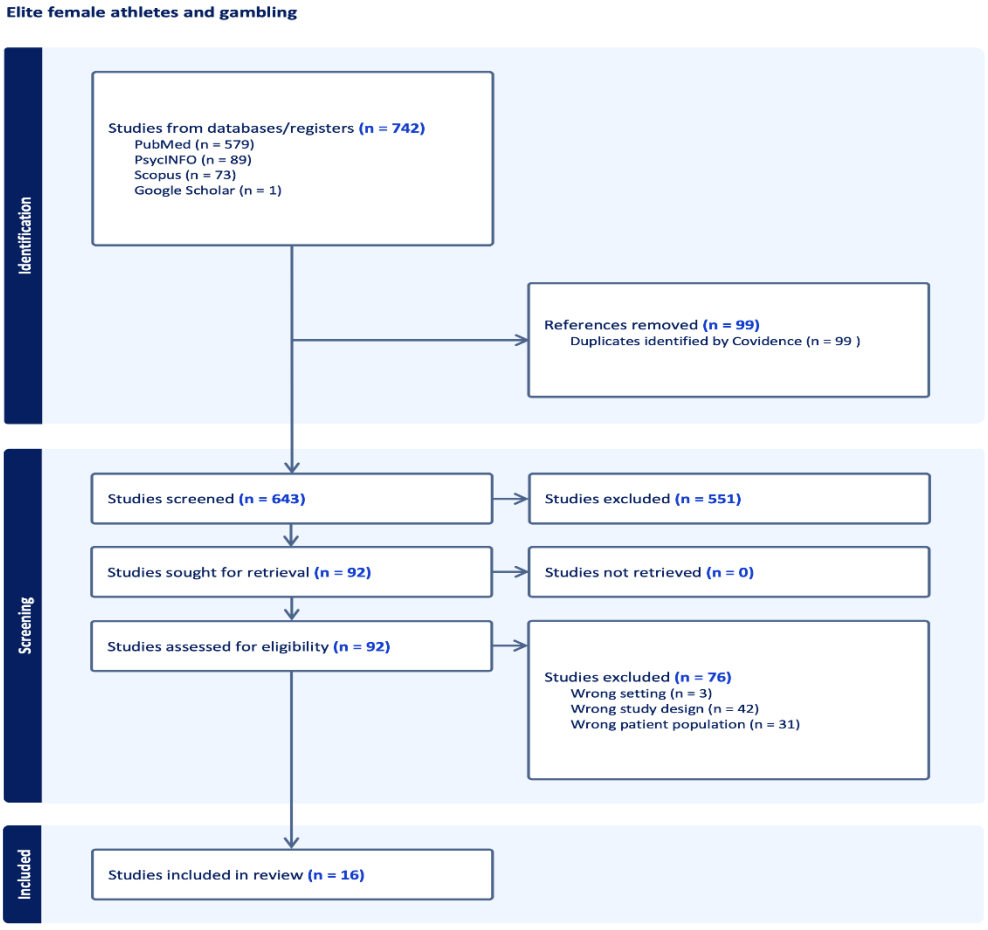
gaps, short-term contracts and no parental leave (Bowes et al., 2021) meaning they often face financial difficulties (Clarkson et al., 2022)

Despite both male and female athletes being at higher risk of developing a gambling problem, there is a paucity of research on the factors that contribute to gambling problems from the perspective of female athletes. Taken together, the research question this systematic review aims to answer is: what is known about gambling amongst elite athletes, male and female, and what methodologies have been used to investigate this research topic? Therefore, the studies conducted on gambling among elite athletes will be reported, with a focus on the methodologies used.

METHOD

This review followed the standards of Preferred Reporting Items for Systematic Reviews and Meta-analysis (PRISMA). Covidence, online software used for managing and streamlining systematic reviews, was used to screen, review and extract the papers identified in the searches. The PRISMA diagram (fig. 1) was automatically produced by Covidence.

Fig. 1 PRISMA flowchart of the search and selection process. Search words used: 'gambling athlete' and 'gambling sport actor'



Eligibility criteria

Certain inclusion criteria were set to guide the search and selection of papers for this systematic review. Firstly, in keeping with the approach adopted by previous systematic reviews in this area, only papers covering gambling among elite athletes published in peer-reviewed journals or book chapters were considered for inclusion. For this systematic review, elite athletes, often referred to as 'elite sports actors' (Constandst et al., 2022), were considered to be elite if they represented national teams, played in top leagues or at a corresponding level (Swan et al., 2015). A number of papers with student-athletes or college athletes within the National Collegiate Athletics Association (NCAA) were identified in the search, but they did not meet the inclusion criteria (e.g. Ellenbogen et al., 2008; Derevensky et al., 2019). As identified by Swann et al. (2015), university-standard athletes do not meet the standard for elite athletes based on the competitive level criteria. Some NCAA Division I athletes from universities in the US perform at a high level and could be argued to be elite, but it is difficult to make this distinction. When taking into consideration cultural differences, in other countries like China, Italy or Canada, university level sports are not as competitive as in the US and therefore, university level alone does not meet the criteria for elite level (Swann et al., 2015). Additionally, Nelson et al. (2023) carried out a scoping review looking at the association between gambling and athletic participation and included studies with NCAA college athletes. A distinction was made between NCAA college athletes and elite athletes. A limitation of the study was that a large group of studies included in the scoping review had data from the same series of NCAA reports and some studies had overlapping samples. Although studies with college-athletes were reviewed taking into consideration their competitive level, none of the papers met the inclusion criteria for this review.

Secondly, the literature search was limited in terms of language as only papers in English and Romanian were considered. The principal author's first language is Romanian and therefore, the author was able to comprehend and interpret any studies in this language. In addition, only empirical studies based on a quantitative and/or qualitative methodology were considered eligible for inclusion. No restrictions were applied with respect to year of publication.

Information sources and search strategy

The research strategy employed for this paper was in accordance with guidelines for conducting systematic literature reviews (Liberati et al., 2009). The search was carried out by the principal author between the 1st and 20th of June 2023 and the searchers were uploaded to Covidence. PubMed, PsycINFO and Scopus were selected as the databases for the search to ensure a broad range of results; these are the main databases used for gambling-related systematic reviews (Ghinassi & Casale, 2022; Hakansson et al., 2023). The combination of keywords used were 'gambling athlete' and 'gambling sport actor' as athlete and sport actors are the common terms used in previous literature. The identified review papers were searched for potential further papers and only one paper was missed out from the initial search. A further control search was carried out on Google Scholar on the 20th of June 2023 and the paper that was not identified in the initial search was then identified and added in the review.

Selection of papers and data collection processes

Fig 1 shows the results from the literature search. A total of 742 studies were imported for screening from which 99 were automatically removed by Covidence as they were duplicates. The remaining 643 studies were then screened based on title and abstract and 551 were removed as they were not relevant to the review. A total of 92 papers were assessed for eligibility after reading the full-text versions and most of them (n=76) failed to meet the inclusion criteria due to having the wrong setting (n=3), wrong study design (n=42) or wrong population (n=31). Some studies were excluded because they had samples of college athletes, and they did not meet the criteria for elite athletes and some were systematic reviews and only empirical studies were considered for inclusion. Only 16 relevant papers were therefore included in the analysis. All papers were in English. Data

extracted included the full references of articles, setting, number of participants, gender, sports distribution, competitive level, research design & time horizons, data collection method/instruments, main focus of research and main research findings.

RESULTS

Studies' characteristics

Table 1 shows all the data extracted from the 16 studies which met the inclusion criteria. One of the 16 extracted papers was a book chapter (Rhind et al., 2014) and the rest were published in peer-reviewed scientific journals in English. Although there was no limit set to the year of publication, this ranged from 2014 to 2023. Five studies were conducted in Sweden, two in Australia, two in UK/Great Britain, one in Denmark and Sweden, one in France but assessing participants from seven European countries (Spain, France, Greece, Ireland, Italy, Sweden, UK) and one each in Belgium, Ireland, Germany, Portugal and Norway. In terms of time horizons, all studies adopted a cross-sectional design, 12 of them were based on a quantitative research design and only four of them were based on a qualitative research design. They covered 7,668 elite athletes with sample sizes ranging from 11 to 1,438 participants. Two studies by Rhind et al. (2014) and Constandt et al. (2022) had samples formed of both elite and non-elite athletes. However, given that there was *some* representation of professional athletes in these studies, the papers fall within the scope of this review. Rhind et al. (2014) concluded that problem gambling was not associated with the competitive level but the participation in corruptive practices increased with competition level as athletes competing at an elite level were more likely to be approached for insider information. Constandt et al. (2022) did not observe statistically significant differences in gambling behaviours according to the level of play, but because the sub-sample of professional athletes recruited for the study was relatively small, no meaningful conclusions can be drawn.

Publication	Setting, number of individuals, gender, and sports distribution	Competitive level	Research design, time horizons	Data collection method/instruments	Main focus of the research	Main research findings
Rhind et al. (2014)	UK, athletes (N =1,049), 53.1% males and 46.9% females, large number of team (football/soccer, cricket, netball) and individual (athletes, swimming, tennis) sports	Various levels, from international/national (5%) to county (32%) or club (63%) competitive level	Cross-sectional, quantitative research design	Survey, self-report questionnaire Problem Gambling Severity Index - PGSI	The extent of gambling and associated corruption amongst UK athletes	Gambling is higher amongst athletes than in general population both for males and females. Higher problem gambling levels in team sports. The prevalence of corruptive practices appears to increase along with competitive level.
Grall-Bronnec et al. (2016)	Spain, France, Greece, Ireland, Italy, Sweden, UK athletes (N =1,236), several team sports such as football/soccer, rugby, cricket and handball, mostly males, 98.3%	Professional athletes	Cross-sectional, quantitative research design	Survey, paper questionnaire Lie/Bet The urgency, premeditation, perseverance, and sensation seeking (UPPS)-Short Form questionnaire. Gambling related cognitions questionnaire	Prevalence and associated factors of gambling amongst professional athletes in Europe	Professional athletes are particularly exposed to both gambling and problem gambling. Betting on one's own team, betting online, gambling regularly, and having a high positive urgency score were associated with gambling problems, current or past, among professional athletes.
Lim et al. (2017)	Great Britain, athletes (N=11), 100% males, football/soccer	Professional, semi-professional and retired footballers	Cross-sectional, qualitative research design	Qualitative in-depth, semi-structured interviews lasting 45 to 60 minutes.	Exploring the experiences of professional	Athletes would start gambling socially but then would become

				They covered things like how their professional career influenced their gambling activities, the development and experience of gambling problems and how gambling problems affected their professional career.	footballers who have developed problems with their gambling behaviour.	problematic and done in isolation. The factors contributing to this were related to structural aspects of professional football as an occupation (e.g., high salaries, spare time, gambling as a shared leisure pursuit) and the competitive and emotional challenges of the game (e.g., loss of form, injury or contract release and their effects upon mood).
Håkansson et al. (2018)	Sweden, athletes (N =352), 95% current athletes (N=333) and 5% retired athletes (N=17) 40% males and 60% females, several individual and team sports such as cross-country skiing, martial arts, handball and canoeing.	Elite athletes, national team level and conduct college/university (and corresponding) studies	Cross-sectional, quantitative research design	Online survey NODS-CLiP (diagnostic screen for gambling disorder) Gaming addiction scale adolescents- GASA Short version - alcohol use disorder identification test-AUDIT-C	The prevalence and correlates of problem gambling and gaming in national team-level athletes.	There were high rates of problem gambling, however with large gender differences. There was comparable prevalence in team sports and in other sports.

Jensen et al. (2019)	Denmark and Sweden, football/soccer players (N =323), 100% males	Elite football players	Cross-sectional, quantitative research design	Online and paper survey Brief Biosocial Gambling Screen - BBGS The Sport Anxiety Scale-2 (SAS-2) The Centre for Epidemiologic Studies Depression Scale (CES-D)		Problem gambling is higher amongst athletes than in general population. There was an association with depression and sport anxiety, but not with age.
Håkansson et al. (2020)	Sweden athletes (N=327), football/soccer, handball and ice-hockey, 62% males and 38% females	Elite athletes	Cross-sectional, quantitative research design	Web survey Vignettes about things like changes throughout COVID-19 and worries about future. Patient health questionnaire-9 - PHQ-9 Generalised anxiety disorder assessment- GAD-7	Perceived psychological influence from COVID-19 and symptoms of depression, anxiety and changes in alcohol drinking, gambling behaviour and problem gambling during the COVID-19 lockdown amongst elite athletes.	Elite athletes suffered with COVID-19 related distress which led to other mental health symptoms. Gambling increase during the pandemic was rare, but related to gambling problems, which were common in male athletes.
Moriconi & de Cima (2020)	Portugal, institutional actors (N=12) and sports actors (N=34), team sports such as football/soccer, futsal, basketball and handball, males only	Elite players/athletes, referees, managers, and retired players, referees, people with high position within sporting organisations	Cross-sectional, qualitative research design	A qualitative multimethod approach (Schmidt 2006) including (a) ethnographic methods, (b) contextualisation and document analysis; and (c) semi-structured interviews with key informants (lasting 60 to 120 minutes)	Betting patterns among sports actors in Portugal and perceptions and incentives that lead them to bet in their own sports, competitions, and games.	Sports betting is also believed to be culturally rooted in the sports industry in Portugal with athletes engaging in it on a recreational level and even betting on their own sports.

Purcell et al. (2020)	Australia, athletes (N =749), 54.1% females and 45.9% males, 37 sports (64.2% individual and 38.8% team),	Elite athletes (registered in high-performance system database for Olympic, Paralympic or Commonwealth game sports)	Cross-sectional, quantitative research design	Online survey PGSI General Health Questionnaire-GHQ-28 Kessler 10- K-10 Rosenberg Self-Esteem Scale - RSE Male Depression Risk Scale-MDRS Eating Disorders Examination Questionnaire- EDE-Q Alcohol Use Disorders Test-AUDIT Satisfaction with Life Scale-SWLS	The prevalence and correlates of mental health symptoms amongst elite athletes, comparing rates against published community norms	There are increased rates of general psychological distress amongst elite athletes when compared to the general population but significantly lower problematic alcohol consumption and gambling behaviour.
Vinberg et al. (2020)	Sweden, athletes (N =1,438), 65% males and 35% females, team sports: ice hockey, football/soccer and basketball	Highest divisions, elite athletes	Cross-sectional, quantitative research design	Survey, web-based questionnaire PGSI	The prevalence of gambling and 'at risk for gambling problems and the association between at risk for gambling problems and demographic factors as well as attitudes towards and experiences of	2% of female athletes and 13% of male athletes were classified as being at risk for gambling problems. Problem higher in male athletes higher than in the general population. There were no obvious differences

					gambling among elite athletes and coaches within the elite sport environment.	between types of sport.
Jones & Noel (2021)	Germany, athletes (N= 201), 83% males and 17% females, no sports mentioned	Intermediate or higher levels of expertise in a given sport	Cross-sectional, quantitative research design	Online survey Items developed by the researchers. Adopted Diagnostic and Statistical Manual of Mental Disorders V - DSM - V	The influence of sports betting-specific cognitive distortions/erroneous beliefs and emotional involvement with sports on betting behaviour and problems alike.	The results highlighted athletes' emotional involvement and erroneous beliefs as potential targets for future intervention and prevention efforts.
Kilic et al. (2021)	Australia, athletes (N=281), 53% males and 47% females, football/soccer	Professional footballers, first division	Cross-sectional, quantitative research design	Online survey Athlete Psychological Strain Questionnaire- APSQ - K-10 GAD-7 Patient Health Questionnaire 9 Athlete Sleep Screening Questionnaire Alcohol Use Disorders Identification Test Consumption Cutting Down, Annoyance by Criticism, Guilty Feeling and Eye-openers Adapted to Include Drugs	The prevalence of mental health symptoms (MHS) among Australian professional footballers compared with former players and whether MHS were associated with recent injury and psychological resilience.	Mental health symptoms are prevalent among active and former professional footballers. Higher level of psychological resilience is associated with decreased reporting of MHS. Severe injury is associated with problem gambling and sleep disturbance.

				Brief Eating Disorder in Athletes Questionnaire Diagnostic Screen for Gambling Disorders for Control, Lying and Preoccupation- NORC		
Peensgard et al. (2021)	Norway, athletes (N =378), 58% males and 42% females, a range of different sports, team and individual	Olympic/Paralympic athletes and other elite/ semi-elite athletes	Cross-sectional, quantitative research design	Online survey Canadian Problem Gambling Index- CPGI Hopkins Symptoms Check List – 10 – HSCL – 10 The Bergen Insomnia Scale- BIS The Eating Disorder Examination Questionnaire Short - EDE-QS	The mental health status of elite-level athletes during a specific COVID-19 period, how COVID-19 related consequences being associated with mental health problems and reported satisfaction with life and the differences in risk factors for mental health between Olympic and Paralympic athletes, compared with elite and semi-elite athletes.	Gambling problems were higher in males than in females, and lower in athletes reporting positive consequences of the COVID-19 situation.
Vinberg et al. (2021)	Sweden, 100% males, 61% athletes (N=19), team sports	Elite athletes, coaches and managers, first divisions	Cross-sectional, qualitative research design	Semi-structured interviews lasting 30 to 120 minutes.	Factors within the sport the athletes/ coaches/ managers	Gambling was found to be normalised

	(football/soccer, basketball, ice-hockey)			The questions were: Please tell us what comes up in your mind when you hear of gambling and sports? How would you describe your own gambling? How would you describe other people's gambling; others in the team and / or in other teams you have been in? What do you think are the main reasons why others in your team or in your previous teams (in which you have been playing) gambles? Please, describe how you think the sport club views gambling?	experience contribute to whether they themselves and others, gamble or do not gamble, as well as examining how they perceive the sports clubs' view and relationship to gambling.	within male elite sports. Too little' or 'too much' money, high salaries or the pursuit of money, were considered to be risk factors for gambling for athletes, coaches and the management team
Constandt et al. (2022)	Belgium, people involved in sports clubs (N =817), 77.8% athletes (N=636), large number of sports including football/soccer, tennis, volleyball and basketball, 64.6% males and 35.1% females	All levels, 19.1% semi/professional (N=156), 62.8% amateur/recreational (N=513), 16.6% no competition (N=136)	Cross-sectional, quantitative research design	Online survey PGSI Open-ended questions	To determine the prevalence of problem gambling and predictors of problem gambling in sports clubs' actors, normalization of gambling in sports clubs	Being male, being aged 26–35 years old and being involved in football are factors that might be linked with higher levels of problem gambling in sports. Sports betting was also found to be normalized in sports clubs given its prevalence, and its frequently organized

						and discussed character.
Kvillemo et al. (2022)	Sweden, athletes (N=20), 100% males, football/soccer	Elite football players	Cross-sectional, qualitative research design	Semi-structured interviews lasting 38 minutes on average. Questions about mental health problems, health risk behaviours among football teams, peer-relations, relations to coaches, and attitudes toward health risk behaviours, along with proposals for effective interventions.	The perception of mental health problems and health risk behaviours among Swedish male elite soccer players and their attitudes toward possible prevention strategies.	Elite players' large income, excessive free time, and need for excitement were identified as risk factors for problematic gambling, and experiences of stress and mental health problems were linked to performance pressure, social media, and injuries during different periods of their career.
Turk et al. (2023)	Ireland, athletes (N=608), 76% males (N=460) and 24% females (N=148), gaelic football/soccer and hurling	Elite athletes, first 4 divisions	Cross-sectional, quantitative research design	Survey, web-based questionnaire PGSI Gambling culture assessed through age at first bet, following gambling companies online, gambling	Gambling patterns in elite level Irish GAA athletes and the factors associated with higher risk gambling in this group	There is a harmful gambling culture amongst elite Irish athletes. Male gender, lower educational

				with teammates, knowledge re GAA gambling regulations and attitude to sponsorship		status, free online gambling use, gambling with teammates and first bet at less than age 18 were associated with moderate/high risk gambling.

Methodological review

The 12 quantitative studies employed the survey method for the research strategy using online/web-based or paper questionnaires to collect data. They utilised a range of validated measures to identify aspects including problem gambling levels, anxiety, depression and eating disorder levels. The data was analysed using a range of statistical methods, mainly a type of regression analysis technique. The quantitative paper by Constandt et al. (2022) used open-ended questions to explore the perceptions on the present and desired socio-cultural environment regarding gambling in the participants' clubs, and then asked whether athletes felt pressured from their teammates to participate in sports betting and whether participating in sports betting is important to cement belonging in their team or club. The quantitative data from the study was analysed using descriptive statistics and ordinal regression. Vinberg et al. (2020) also conducted ordinal regression analysis on the data looking at different factors associated with 'at risk for gambling problems'. The researchers used statements such as 'gambling is important to my teammates', 'we often talk about gambling during training' and 'our coaches have a positive attitude towards gambling' to determine whether a culture in which gambling is normalised is associated with being 'at risk for gambling problems'.

Turk et al. (2023) assessed gambling culture in sports clubs in Ireland by looking at the age of first bet, following gambling companies online, gambling with teammates, knowledge regarding the Gaelic Athletic Association (GAA) gambling regulations, attitude to sponsorships and whom they would turn to for assistance with gambling issues. They conducted univariate analysis and multivariate logistic regression analysis. Hakansson et al. (2020) looked at psychological distress and problem gambling in elite athletes during COVID-19 restrictions and measured things like problem gambling, anxiety and depression levels and used a range of different statistical methods including univariate analysis, linear-by-linear chi-squared and logistic regression. Peensgard et al. (2021) checked the potential association between the participants' experiences with COVID-19 and the risk of different mental health conditions including problem gambling using multivariate binary logistic regression analysis.

Killic et al. (2021) looked at the prevalence of mental health symptoms amongst Australian professional football (soccer) players and performed logistic regression analyses to explain the potential association of independent variables, namely injuries and psychological resilience with the dependent variable, mental health symptoms including gambling. Rhind et al. (2014) explored gambling participation, problem gambling levels and participation in corruptive practices related to gambling and analysed the data using descriptive statistics, bivariate correlations and chi-square tests. Grall-Bronnec et al. (2016) explored gambling prevalence amongst European professional athletes and associated factors and performed a number of analyses including exploratory univariate analysis and multivariate analysis. Hakansson et al. (2018) tested variables for association with problem gambling amongst elite athletes using binary logistic regression. Purcell et al. (2020) explored rates and correlates of mental health symptoms in elite athletes and have used a number of statistical analysis techniques including multi-predictor logistic regression. Jensen et al. (2019) conducted descriptive statistics, correlations and linear regression analysis on data regarding gambling participation, anxiety and depression levels. Lastly, Jones and Noel (2021) firstly used principal components analysis (PCA) to identify patterns of covariation, potentially due to proposed hidden factors, erroneous beliefs and athletes' emotional involvement, and then regression analysis to test the association between these factors with betting behaviour and associated problems.

The qualitative study by Moriconi and de Cima (2020) followed a multi-method approach to data generation: (a) ethnographic methods, (b) contextualisation and document analysis; and (c) semi-structured interviews. The other three qualitative studies used semi-structured interviews to collect data, two using content analysis to analyse the data (Kwillemo et al., 2023; Vinberg et al., 2021) and one using interpretive-thematic analysis (Lim et al., 2017). Lim et al. (2017) asked interviewees to speak about their football career, their experiences with gambling, how their professional career in football influenced their gambling activities and development and experience of gambling problems, helping to

determine the existence of a gambling culture within British football clubs. The semi-structured interview guide used by Vinberg et al. (2021) covered the following questions: 'Please tell us what comes up in your mind when you hear of gambling and sports? How would you describe your own gambling? How would you describe other people's gambling; others in the team and / or in other teams you have been in? What do you think are the main reasons why others in your team or in your previous teams (in which you have been playing) gambles? Please, describe how you think the sport club views gambling?'. Kwillemo et al. (2023) used open-ended questions, suggestions of probing statements and follow up questions to explore things such as personal experiences, mental health issues, health risk behaviours, peer-relations and social situation/background information; the exact statements/questions used were not presented. Moriconi and de Cima (2020) used ethnographic methods and contextualisation and document analysis to become familiar with the world of sports betting, understanding current opportunity structures for deviant behaviours and therefore having the knowledge of tendencies, narratives and normative frameworks needed to create the interview guides. However, the questions used in the interviews were not presented.

Moving onto sampling and recruitment techniques, not every study explained in detail the techniques used. The four qualitative studies had samples between 11 and 34 participants and recruited using different methods. Moriconi and de Cima (2020) interviewed 34 people working within the sports industry (players/ athletes, referees, managers and retired players and referees) across different sports. One of the authors accompanied a national men's futsal team to collect data through ethnography and established personal contacts with participants to conduct the interviews. Vinberg et al. (2021) interviewed 31 individuals and in terms of the recruitment strategy, had direct contact with managers and coaches at some sports clubs, contacted individuals via sports unions and used the snowball sampling method for athletes. Lim et al. (2017) interviewed 11 British footballers, and they were recruited by virtue of their treatment for a gambling disorder at the Sporting Chance clinic. Kwillemo et al. (2023) interviewed 20 athletes and used purposive sampling to recruit them. Additionally, elite junior and junior players received an email being asked whether they would want to participate in the study. Their contact information was obtained from The Swedish Professional Soccer Leagues who reached out to teams and asked them to select players to participate.

The 12 quantitative studies had samples between 201 and 1,438 but little detail was given about the sampling and recruitment methods used. A number of authors have been in touch with the relevant sporting organisations to get access to possible participants. Constandt et al. (2023) contacted as many official sports federations as possible to participate and the federations administered the surveys to sports clubs and members via mailing lists and social media channels. Additionally, the survey was also distributed via newsletters and social media channels of the authors' university and via emailing local sports officials. Turk et al. (2023) invited all Gaelic Players Association (GPA) and Women's Gaelic Players Association (WGPA) members to complete the survey and 608 players completed it. Peensgard et al. (2021) distributed the survey to Olympic and Paralympic-level athletes and to athletes who were members of The Norwegian Athlete Association (NISO) and collected data from 378 people. Purcell et al. (2020) invited all athletes contracted by the Australian Institute of Sport via a national sporting organisation to complete the survey and 749 individuals participated. Hakansson et al. (2020) have been in touch with the players' unions to distribute the survey to players who agreed to participate; 327 players completed it.

In the study by Rhind et al. (2014), 1,049 individuals were surveyed after being approached and recruited both directly at sporting venues and through coaches/managers. Grall-Bronnec et al. (2016) collected data from 1,236 individuals after the survey was distributed by EU athletes to professional teams from different sports across a number of European countries. Hakansson et al. (2018) distributed the survey electronically to 584 individuals who applied for a student scholarship for university studies and had a history of playing sport at elite and national level; 352 participated in the study. Jensen et al. (2019) sent invitation emails directly to clubs explaining the aim of the study and the participation

procedure and 323 took part in the study. Vinberg et al. (2020) also contacted each club via email and/or phone and once the initial contact was made, the web link was sent to relevant people at each selected club who then distributed the link to athletes and coaches via email or through a Facebook group. 1,438 individuals completed the survey. Killic et al. (2021) collected data from 281 individuals and stated that the study was done through anonymous recruitment and Jones and Noel (2021) recruited 201 athletes or former athletes from the general population of North Rhine Westphalia, but no details were given about the sampling or recruitment methods.

When looking at the analytical strategies employed in the quantitative studies, most studies used some form of regression which allowed them to control for the effect of one or more variables and potentially improve the reliability of results (Hakansson et al., 2018; Jones et al., 2019; Hakansson et al., 2020; Purcell et al., 2020; Pensgaard et al., 2021; Vinberg et al., 2020; Jones & Noel, 2021; Killic et al., 2021; Constandt et al., 2022; Turk et al., 2023). Grall-Bonnec et al. (2016) performed a range of explorative univariate and multivariate analyses, and Rhind et al. (2014) analysed the data using descriptive statistics, bivariate correlations and chi-square tests.

In terms of gender, five studies included male athletes exclusively, one included male athletes almost exclusively (98%) and in four studies the sample of male athletes was significantly higher than the sample of female athletes. Six studies had gender balanced samples, and they were all based on a quantitative research design. No interviews were carried out with elite female athletes. Most studies included different sports, both team sports and individual sports. Four papers only included football/soccer players and eight included football/soccer, alongside other sports; one included different sports, but not football/soccer and three did not mention the exact sports. Problem gambling levels were measured in most studies using validated measures such as the PGSI and CPGI and DSM-V. Using these types of measurements automatically guides the direction of investigation towards a more medical/ psychological/ pathological perspective on gambling studies among athletes. As mentioned previously (e.g. Vinberg et al., 2020), a gambling culture within clubs has been identified as a factor associated with increased levels of gambling participation for athletes, coaches and managers. Conversely, the importance of understanding the cultural aspects is often neglected in research approaches and therefore there is a lack of qualitative research focused on gambling culture in sports clubs.

Due to the significant difference in the number of qualitative and quantitative studies in this review, it is difficult to compare the results in depth. The comparable findings are in line except for the effect income has on athletes' gambling behaviour. The findings regarding income and gambling participation were different when employing quantitative and qualitative methods. Three qualitative studies (Lim et al., 2017; Vinberg et al., 2021; Kwillemo et al., 2023) found that income is a risk factor for athletes to engage in problematic gambling behaviour while a quantitative study (Vinberg et al., 2020) found no association. Lim et al. (2017) stated that the semi-structured interviews allowed the players to discuss their gambling experiences in their own words and then the interviewer was able explore issues raised in more detail. The three qualitative studies were carried out with male athletes only which highlights the importance of carrying out qualitative studies with female athletes too, to better understand their experiences and any risk factors for problem gambling.

FINDINGS

Prevalence of problem gambling among athletes

Studies measuring the levels of problem gambling have shown higher problem gambling rates among athletes than the general population for both genders. For example, 8.7% of male athletes in Norway experienced gambling problems (Pensgaard et al., 2021), considerably higher than the rate for the whole population, 1.4% (University of Bergen, 2020). In the UK, it was concluded that gambling and problem gambling is more common amongst athletes than the general population (Rhind et al., 2014) for both male and female athletes. In Sweden and Denmark, 16.1% of elite footballers were classed as at-risk gamblers, significantly higher than the rate for general population (8.2%), the general

population in Sweden, 2% (Grall-Bronnec et al., 2016) and in Denmark, 2.5% (Jensen et al., 2019).

Most studies indicated significantly higher problem gambling rates for male athletes when compared to female athletes (e.g. Constandt et al., 2022; Hakansson et al., 2018; Hakansson et al., 2020; Pensgaard et al., 2021; Rhind et al., 2014; Turk et al., 2023; Vinberg et al., 2020). Constandt et al. (2022) found the problem gambling rate amongst sports actors to be 0.8%, for both males and females, and specified that being a male is a variable positively related to higher degrees of problem gambling. In Sweden, Hakansson et al. (2018) found that the problem gambling rate for male athletes was 14% and 1% for female athletes and the more recent study by Hakansson et al. (2020) has shown the moderate risk and problem gambling rate to be 10% for male athletes and 0% for female athletes. Another study with athletes in Sweden by Vinberg et al. (2020) found that moderate-risk and problem rates were present in 13.1% of male athletes and in 1.7% of female athletes. In Norway, Pensgaard et al. (2021) stated that 8.7% of male athletes and 1.4% of female athletes experience gambling problems. In the UK, Rhind et al. (2014) reported the problem gambling rate for male athletes as 9.2% and for female athletes as 1.1% and in Ireland, 8% of male athletes met the criteria for problem gambling while none of the female athletes did (Turk et al., 2023).

Although the problem gambling rates are lower amongst female athletes, there is a proportion of female athletes who do experience harm. Additionally, taking into consideration the increase in females gambling in the general population (Gambling Commission, 2023), there is need for more research focused on female athletes and gambling. In New Zealand and Canada, rates of males and females gambling are very similar (du Preez, 2021; Williams et al., 2021). It is important to understand whether sports related factors would push female athletes towards gambling in order to develop effective policies and interventions for them.

Variations between sports

Studies that included different types of sports allowed comparison. In Sweden, Hakansson et al. (2018) did not identify any significant differences between individual sport athletes and team sport athletes and Vinberg et al. (2020) compared gambling behaviour between ice hockey, football (soccer) and basketball players and did not find any obvious differences between the type of sport. However, the study by Rhind et al. (2014) in the UK found that the problem gambling rate is more common in team sports, with 80% of those with a gambling problem being involved in team sports (Rhind et al., 2014). Constandt et al. (2022) also observed that respondents involved in football (soccer) in Belgium were more likely to score higher on the problem gambling scale. Hakansson et al. (2023) discussed how some sports, especially team sports, receive more attention from the gambling industry and that can influence the gambling cultures and betting practices. In England, the most high-profile sports are team sports; football (soccer), rugby and cricket, attracting attention from the gambling community and therefore athletes involved in those sports might be exposed to gambling-related interactions through marketing and media (Rhind et al., 2014).

As mentioned in the introduction, there are environmental and cultural factors in sports associated with gambling amongst athletes and those were explored in some of the studies included in the review. Vinberg et al. (2020) and Vinberg et al. (2021) found that in Sweden, a sports environment, where athletes regularly talk about gambling and a culture in which betting is normalised, has been associated with being ‘at risk for gambling problems’, highlighting the risk of normalising gambling at the community level in sports clubs. Lim et al. (2017) noticed that influence from older teammates is a factor contributing to both, starting and continuing gambling and problem gambling for British football players. A gambling culture in sport starts communally but it leads to gambling participation happening in isolation, being exacerbated by a culture which stigmatises disclosure (Lim et al., 2017). A ‘macho culture’ was identified in Australia as male elite footballers do not feel comfortable to share any mental health struggles and admit they have problems; opening up about gambling problems to coaches could lead to negative

consequences for training and advancement for players (Kwillemo et al., 2023). Turk et al. (2023) observed that amongst Irish elite athletes, gambling with teammates was a factor associated with a player's moderate to high-risk gambling. In Belgium, sports betting is considered to be 'part of the game' with athletes and coaches often talking about it amongst themselves in a positive way (Constandt et al., 2022). Sports betting is also believed to be culturally rooted in the sports industry in Portugal with athletes engaging in it on a recreational level and even betting on their own sports (Moriconi & de Cima, 2020). There is need for more research to assess gambling participation and problem gambling rates in different sports to determine whether possible differences exist due to things like individual characteristics of athletes, attitudes, cultures and regulation.

Gambling and mental health

The papers by Kilic et al. (2021), Kwillemo et al. (2023) and Purcell et al. (2020) mainly focused on athletes' mental health, exploring the relationship between gambling problems and mental health problems and Hakansson et al. (2020) focused on mental health during COVID-19 pandemic for elite athletes. Gambling related findings were not broken down and presented by gender in those papers. During the pandemic, Hakansson et al. (2020) found that elite athletes struggled with their mental health, having concerns over their own sports future and those who suffered with gambling problems reported increased gambling participation throughout that period. Elite athletes are known to be at a high risk of developing mental health problems due to sports-related stressors such as injuries (Reardon et al., 2019), constant pressure to perform, extensive travelling and spending time away from home and family (Kuettel & Larsen, 2020; Poucher et al., 2021). Elite athletes perceive the lack of successful performance as a threat, evoking a fear that they might be seen as weak and being kicked out from the team (Vinberg et al., 2021). This fear in turn could lead to them engaging in health risk behaviours such as gambling as they could try to capture the thrill and euphoria associated with success on the field as well trying to relieve negative feelings (Lim et al., 2017). Kwillemo et al. (2023) uncovered that indeed, elite players' disposable income, excessive free time and the need for excitement are risk factors for problem gambling for male elite athletes in Sweden and Kilic et al. (2021) found that severe injury is associated with problem gambling and sleep disturbance for male elite footballers in Australia.

On the other hand, Purcell et al. (2020) found that in Australia, there are increased rates of general psychological distress among elite athletes when compared with the general population, but significantly lower problematic alcohol consumption and gambling behaviour. The limited research on female gamblers shows that mood or anxiety disorders can predict problem gambling for females but not for males as females who experience negative emotions resort to gambling to relieve those emotions (Blanco et al., 2006; Desai & Potenza, 2008). Research is needed to understand the relationship between gambling problems and mental health problems in elite female athletes, identifying whether those sports related factors that can lead to mental health problems do contribute to gambling participation and problem gambling for them.

Income and gambling participation

Lim et al. (2017) found an association between high salaries and increased gambling and problematic gambling for male British footballers (soccer players) and Rhind et al. (2014) found that male and female athletes in the UK who admitted to have taken money to underperform for gambling purposes reported higher levels of disposable income when compared to those who did not take money to underperform. In Sweden, 'too little' or 'too much' money, high salaries, disposable income or the pursuit of money, were considered to be risk factors for gambling for athletes, coaches and the management team. This was identified in the interviews conducted by Vinberg et al., (2021) and Kwillemo et al., (2023). On the other hand, an earlier quantitative study by Vinberg et al. (2020), using a survey to collect data, found no association between being at risk for gambling problems and employment aspects, such as full-time pay or no pay at all. Future work should determine whether the fact that elite female athletes have lower income pushes them

towards gambling to make money or it makes them want to stay away from it as they do not have the same disposable income as elite male athletes.

Sports betting

Most studies included in this review did not investigate and present the gambling activities athletes were engaging in; only some papers mentioned sports betting. Jones and Noel (2021) focused on athletes' sports betting behaviour and discovered that there is a strong association between betting problems and emotional involvement with sports, and between distorted cognitions/beliefs and increased betting activities. Previous research found that betting behaviour can indeed be driven by sports-specific knowledge, feeling competent in predicting outcomes and that in-play betting or prop bets specifically can be more harmful than other forms of gambling for athletes as it gives them more control over the outcome of events (Derevensky et al., 2019). Turk et al. (2023) has shown that betting on horse/dog racing is the most common method of gambling for elite athletes in Ireland and in Belgium, Constandt et al. (2022) stated that sports betting is a normalised activity in sports clubs in terms of prevalence and its frequently organised and discussed character. Considerably more work is needed to understand the gambling activities athletes engage in and to further explore the extent the normalisation of sports betting affects athletes.

LIMITATIONS

This systematic review has synthesised the current knowledge on athletes and gambling and the research methodologies used. Although this systematic review provides a meaningful contribution to the understanding of gambling amongst elite athletes, it does have limitations. Firstly, only papers in English and Romanian were considered, meaning possible significant contributions published in other languages were not included. Secondly, all studies were from Australia or some European countries which calls into question the generalizability of results for athletes in places such as the US, with most papers in the US exploring gambling amongst college, rather than elite athletes (Derevensky et al., 2019). Another limitation is represented by the fact that two of the papers identified (Rhind et al 2014; Constandt et al., 2022) had samples of both, elite and non-elite athletes. Although no significant differences were observed in gambling participation between the different levels of play, Constandt et al. (2022) could not conclude whether this lack of a significant difference was related to the limited number of participants playing at a professional level. The findings are also limited by the low number of papers identified and included in this study, emphasising the need for more research in the area. The samples used in most papers were unbalanced, had a low representation of female athletes and were mostly based on a quantitative research design.

CONCLUSION

This systematic review confirms what is known about elite athletes and gambling with a focus on methodologies used. This review has found that although male athletes are more likely to develop gambling problems than female athletes, considerably more work is needed to determine whether sports related factors contribute to gambling problems for female athletes. A gambling culture at sports clubs was identified as a key factor influencing male athletes in different countries to gamble but it cannot be concluded whether this is also the case for female athletes. This review also identified a lack of qualitative studies as most research papers used the survey method to collect data and those based on a qualitative research design have featured male athletes exclusively. Several papers identified in this review outlined how participants were mainly recruited through contacts with sporting organisations which reflects the importance of having the support from organisations such as clubs or players unions, in order to generate representative samples of elite athletes. In summary, this present systematic review calls for qualitative studies focused on gambling amongst both male and female athletes, and for sporting organisations to support researchers to conduct meaningful research to design policies and interventions to reduce gambling harms amongst athletes.

Statement of Competing Interests
The authors do not declare any competing interests.

Relative Contribution
All authors had full access to all materials in the study. AMG conducted the analysis and interpretation of the data. The study concept and design were done by all authors as well as the manuscript write-up and study supervision. All authors approved of the final version.

Ethics Approval
N/A.

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Declarations
A version of this paper was presented at a research conference: European Conference on Gambling Studies and Policy Issues (EASG) 2024: https://www.easg.org/easgconference2024/home.

Research Promotion
This systematic review aimed to identify what is known about elite athletes and gambling worldwide with a focus on female athletes and on what methodologies have been used to investigate this research topic. This is significant because despite both male and female athletes being at a higher risk of developing a gambling problem, there is a paucity of research on the factors that contribute to gambling problems from the perspective of female athletes. Additionally, there is a significant lack of qualitative research on gambling amongst elite athletes, both males and females.

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