Defining Elite in Esports A Scoping Review

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Defining Elite Esports Athletes: A Scoping Review

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Abstract

In this scoping review, we aimed to (1) provide clarity on terms used to describe elite esport samples, (2) identify the indicators used to describe elite esport samples, (3) collate rationales provided for defining esports samples as elite, and (4) draw conclusions on how to define elite esport samples. Electronic database and manual searches conducted for the final time in March 2024 yielded 7,802 records. Sixty-three studies published since 2012, with 1,768 e'athletes, satisfied the eligibility criteria and were included in the review. In total, 71% of the studies did not define "elite" when classifying their samples. In the remaining studies, elite esport samples were defined through four categories: (1) highest level of competition, (2) professional status, (3) in-game achievement, and (4) domain experience. Of the 63 studies, 29 classified their samples as elite through one category, and 34 included justifications incorporating two or more categories. We propose a 2-step working elite classification system for esports samples that considers a player's highest level of competition and success at that level. Furthermore, we propose a set of reporting guidelines for elite e'athletes, which encourages researchers to unpack: (1) the success of the e'athletes, and (2) the prominence of the esport.

Keywords: Computer gaming; high-performance; sport psychology; video games; expertise.

Highlights:

1. There was a significant incongruity in the terminology used to classify high-level esports samples and inconsistent justifications for why the sample was elite.
2. A 2-step elite classification system for esports samples that considers the player's highest level of competition and success at that level is proposed to help researchers classify their samples.
3. We propose a set of reporting guidelines for elite esport athletes, which advises researchers to unpack: (1) the success of the athletes, and (2) the prominence of the esports.

Defining Elite in Esports: A Scoping Review

The pinnacle of achievement and excellence in sport garners substantial scientific and practical interest from researchers and sporting professionals (Mann et al., 2007; Rees et al., 2016). The field endeavours to optimise performance, streamline talent systems, improve skill acquisition and coaching, and enhance performance psychology, all while acknowledging the immense skillfulness of athletes (e.g., Moran et al., 2019). At the core, investigations attempting to achieve the above goals have focused on the characteristics of expertise, such as perceptual-cognitive skills (e.g., Mann et al., 2007), movement coordination and control (e.g., Seifert et al., 2013), and psychological characteristics (e.g., Jones et al., 2002). Furthermore, studies have captured the development of expertise through several analyses of training and practice histories (Güllich & Emrich, 2014; Macnamara et al., 2016; Ward et al., 2007). Despite considerable progress in the understanding of expertise, inconsistencies in the classification of a sample's eliteness have sometimes plagued the interpretation and translation of information beyond the evidence body. Specifically, some researchers have grouped athletes based on skill level (e.g., Coutinho et al., 2016), while others use experience (e.g., Alves et al., 2013) or attainment level (e.g., Williams et al., 2011), meaning the terms *expert* and *elite* are adopted interchangeably. With this in mind, researchers have attempted to develop classification systems or taxonomies to promote more consistency among sample groupings in sport (Baker et al., 2015; McKay et al., 2022; Swann et al., 2015).

For instance, Swann et al. (2015) presented a model of expertise and eliteness based on three within-sport considerations (i.e., the athlete's highest standard of performance, success at the athlete's highest standard of performance, and experience at the athlete's highest level) and two between-sport considerations (i.e., the competitiveness of the sport in the athlete's country and global competitiveness of the athlete's sport). The model proposed that scores should be allocated for each of the five considerations, from which an overall score can be calculated to classify athletes as *semi-elite, competitive-elite, successful-elite* or *world-class elite* (and if the athletes do not meet the criteria for semi-elite, they are classified as sub-elite). In contrast, Baker et al. (2015) proposed a taxonomy based on skill level, incorporating training and competition levels. Within the taxonomy, there are several levels: naïve, novice, basic, intermediate,

advanced, expert and eminence. Finally, McKay et al. (2022) outlined a classification framework for defining the standard of athletes. Specifically, this population-based classification system grouped participants on a continuum: (Tier 0) *sedentary;* (Tier 1) *recreationally active;* (Tier 2) *trained/developmental;* (Tier 3) *highly trained/national level;* (Tier 4) *elite/international level;* and (Tier 5) *world-class.* While imperfect due to discrepancies in variables, scoring, and weightings, these classification systems are useful in directing researchers' attention to how they employ terminology (McAuley et al., 2022).

One emerging research area where expertise and eliteness are receiving more attention is esports (Pluss et al., 2019; Polman et al., 2018; Reitman, 2018; Sharpe et al., 2022; Smith et al., 2022). Although a formal consensus on the definition of esports has not been reached in the literature, Pedraza-Ramirez et al. (2020) recently defined esports as the competitive, individual- or team-based playing of video/computer games. Esports allows players to improve professionally and personally by competing against others online or in local tournaments. The games have ranking systems or official leagues that regulate competitions and are played on computers, gaming consoles, tablets, and phones. While similarities with traditional sports have been observed (e.g., Bickmann et al., 2020; Cretenoud et al., 2021; Jeong et al., 2022), numerous unique differences (e.g., Lam et al., 2022; Lee et al., 2021) have been identified consistently as the field progresses. For example, it appears that e'athletes (players who compete in esports for an in-game rank or in formal competitions; Bubna et al., 2023) share similarities with traditional sports with respect to those exhibiting greater executive control (Li et al., 2020), associated interplay between gaze behaviour and performance (Bickmann et al., 2020; Cretenoud et al., 2021; Jeong et al., 2022), exposure to everyday stress (Griffith & Sharpe, 2024), and capacity to cope with stressors (Leis et al., 2021; Poulus & Polman, 2022). However, differences to traditional sports appear to present themselves when discussing unique health risks and musculoskeletal problems (Lam et al., 2022), cognition (Campbell et al., 2018), the dynamics of an esport career (Meng-Lewis et al., 2022), and the influence of abnormal training times on sleep and mood (Lee et al., 2021), to name a few.

Regardless of considerable scientific progress in elite-level esports, there remains ambiguity concerning how elite e'athletes should be defined. That is, the esport field currently holds no systematic guidelines or classification system for defining and describing "eliteness" in players. This ambiguity is illustrated by the contrasting information used to classify performers as elite in studies to date. For example, some researchers have classified participants as elite if their in-game rank is above the 98.33 percentile (Gong et al., 2019), whereas others have defined e'athletes as elite if they simply entered a professional league (Benoit et al., 2020). Both examples have been highlighted as weak indicators of individual performance capability (e.g., Sharpe et al., 2022) and may not justify being classified as elite. If researchers are not defining their samples in a consistent manner, there are risks to the field. For instance, inconsistencies in how researchers classify or define their sample in esports could make it harder to replicate prior research and/or translate findings into real-world environments.

While classification models and taxonomies have been widely used in sports literature, it may not be appropriate to integrate them into the emerging and relatively unstructured domain of esports. Factors such as the popularity of an esport being related to geographic location, skewed funding sources for specific nations, and countries being at different esport developmental stages (e.g., Australia vs. South Korea) can substantially differentiate the skill gap of national-level players. For example, South Korea, the birthplace of esports, consistently demonstrates superior performance across all international events in numerous game titles, while Australia has had limited success on the international stage and rarely won titles beyond Defence of the Ancients 2 (DOTA 2). Popular esport titles may even increase in popularity before becoming a topic of the past in less than a few years. The rise (e.g., League of Legends (LoL) and fall (e.g., Heroes of the Storm) of numerous esports consequently makes it difficult to generalise the experiences of an esport athlete based on their success at the highest level or the competitiveness of their esport. Furthermore, researchers have not provided substantial information regarding the eliteness of their samples, the prominence of the esport within the researcher's geographic location, and references to the standard of play. As such, these challenges extend beyond the classification systems proposed by Swann et al. (2015) and

McKay et al. (2022), not only due to the rapidly changing popularity and development of esport titles, but also due to the competitive structure of esports being fundamentally different to traditional sports.

Against this backdop, the aim of this review was to address the absence of a systematic means to identify, describe, and classify how elite e'athletes samples have been defined in elite esport research. Whereas systematic reviews have a narrow focus (i.e., on a specific research question), scoping reviews are commonly utilised to offer a broad overview of potentially extensive and diverse literature related to a broad subject and are suitable for investigating emerging research areas (Sabiston et al., 2022). Scoping reviews typically adopt an exploratory approach, aiming to assess the breadth of an existing evidence base and categorise the material into themes of interest (Munn et al., 2018). Accordingly, our overarching scoping review question was: *how are elite performers defined in published esports research?* By addressing this research question, we sought to fulfil four objectives, which were to: (1) provide clarity on terms used to describe elite esport samples in published research; (2) clarify the indicators used to describe elite esport samples; (3) what rationales are provided by researchers for defining their samples as 'elite'?; and (4) draw conclusions on how to define elite esport samples through the development of a classification system and guidelines. We envisaged that this research could highlight the current state of elite esport research and provide researchers and practitioners with valuable guidance for classifying elite e'athletes.

Method

Review Protocol

The 5-step framework for scoping reviews (Arksey & O'Malley, 2005) and suggestions for enhancing elements of this framework (Levac et al., 2010) were used to address our research aim. Our review is reported in line with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) Extension for Scoping Reviews (PRISMA-ScR; Tricco et al., 2018; see Appendix 1). Before the screening began following our initial searches, we deposited the review protocol to the Open Science Framework repository (anonymised OSF link: https://osf.io/kqnps/?view_only=52d1f64da70143deab8740510b0dbddb).

Research Questions

In addressing our overarching research question, we developed four specific research questions: (1) what terms have been used to describe elite esport samples?; (2) what performance indicators are used when describing elite esport samples?; (3) what rationales (if any) are provided by researchers for defining their samples as 'elite'?; and (4) what conclusions can be drawn about how to define elite esport samples?

Identifying Relevant Studies

Our eligibility criteria were determined using the PCC mnemonic commonly used in scoping reviews (Khalil & Tricco, 2022), as we specified the Participants (competitive e'athletes; Bubna et al., 2023), Concept (elite) and Context (esports) that would be eligible for the review. Accordingly, to be included in the review, sources needed to: (1) be original empirical studies; (2) be peer-review journal articles published in the English language; and (3) include competitive esport participants described as 'elite', or a synonym of this (See Table 1). Studies that used synonyms of elite (often used colloquially to refer to accomplished athletes in non-professional settings; American Psychological Association Dictionary of Psychology (2nd Edition.), 2015) to classify their sample were included to negate any potential inconsistency with the use of the term elite and to allow for a more comprehensive assessment of the literature. Accordingly, we included samples if they used expert, skill (e.g., highly skilled, high skill), performance (e.g., high performers), experience, professional, or any other justification/terminology to group or distinguish the sample based on their level of proficiency. In line with Pedraza et al.'s (2020) definition of esports and similar to the definition of traditional sport (Kent, 2006), studies were only included if the participants took part in video/computer games that involved direct (i.e., performing directly against one another) or indirect competition (i.e., performing independent of other competitors, but performance is compared against one another in, for example, a game-wide ranking system or leader board).

INSERT TABLE 1 ABOUT HERE

Study Selection

The search string was developed based on meetings between the research team, initial scoping searches, and advice from an academic librarian. Searches of four electronic databases were conducted (first and second author) on two occasions, with the first search carried out on July 7th, 2022 and the final search performed on March 1st, 2024. Two searches were conducted to capture new esports research published throughout the review process. The databases searched were APA PsycINFO; Computers and Applied Sciences Complete; Scopus; and SPORTDiscus with Full Text. In line with the PCC criteria (Khalil & Tricco, 2022), we included search terms that captured the Participants (e'athletes), Concept (elite) and Context (esports) that would be eligible for the review. Accordingly, our search string contained one block for e'athletes and esports and one block for elite (see Table 1), with the searches limited to records published in the English language in peer-reviewed journals, where possible (see Appendix 2 for full electronic database searches for each database). Additional records were also identified through manual searching by screening the reference lists and forward citations (Google Scholar) of included literature and existing reviews. All records identified through these search processes were exported to EndNote (first author). Duplicates were removed through the automatic de-duplication feature and manual searching. The first and second author screened all records at the title and abstract stages in Rayann. After arriving at their decisions on each record, the two authors met to discuss the outcomes of this process and resolve discrepancies. The full texts of the remaining records were then checked for eligibility by the first and second authors independently. After completing this process, both authors met to discuss their decisions, engaged in dialogue to resolve discrepancies (i.e., by explaining the rationale for their decision and discussing whether the article should be included based on the eligibility criteria), and reach agreement on the reasons for excluding articles at the full-text stage. In circumstances where the first and second author could not agree on a decision, the third author was asked to offer a decision. Using guidelines for interpreting kappa values (McHugh, 2012), the level of agreement between the first and second authors was moderate at the title and abstract stage ($\kappa = .70$) and strong at the full text stage ($\kappa = .86$).

Data Extraction

Based on the information needed to address our research questions and information extracted in previous research (Swann et al., 2015), we developed a data charting table to enable us to extract relevant data (see Appendix 3). The data charting table included information on: authors; publication year; publication type; study design; study context (e.g., location); sample characteristics (e.g., age, gender); game type; game title; in-game rank; status (i.e., professional or amateur); and any information relating to the eliteness (or any term that is used to justify high proficiency) of their samples. The first and second authors independently extracted data for approximately half of the included studies and then checked data extracted by the other author to verify accuracy. All disagreements were resolved through discussion between the first and second authors, and the rest of the named authors (Tricco et al., 2018).

Collating Results

The 3-step process recommended for collating, summarising, and reporting results of scoping reviews (Levac et al., 2010) was employed, with this process led by the first and second author. First, a content analysis was undertaken to summarise data pertaining to our research questions (i.e., terms and justifications used to describe elite esport samples). Second, we reported findings that addressed our research questions. Specifically, we grouped the terms (RQ1), collated the indicators (RQ2), and recorded the rationales provided for elite esports samples (RQ3). We then organised data in relation to each of these research questions into inductively developed categories and calculated frequencies for the terms, indicators, and rationales across the included studies. Finally, we considered the overall meaning of the results in relation to our research questions and developed a working elite classification system and reporting guidelines for elite e'athletes (RQ4; see below).

Developing a Working Classification System and Guidelines

Guided by previous research (Swann et al., 2015) and informed by findings from our scoping review, we developed a working classification system for elite e'athletes to fit the unique requirements of esports. To achieve this, we also drew on insights from established frameworks (see McKay et al., 2022; McAuley et al., 2022, for discussion) to provide a foundational structure for the system's development, while addressing the extensive heterogeneity within the esports domain. Given that attempts to directly

apply existing models (e.g., Swann et al., 2015) in the esports context are fraught with difficulties, our team, which included experts in elite esports encompassing researchers and practitioners, developed the working classification system and associated guidelines to directly address some of these challenges and to provide context-specific guidance on defining elite in esports. In devising the classification system, we deliberately used the term 'working' to emphasise its provisional nature and highlight that it is our intention that it serves as a stepping stone for future research and that can be refined and progressed to develop a more stable framework. The reporting guidelines underscore the pivotal information that future esports researchers must provide about collecting and reporting demographic and contextual information. Adherence to these guidelines will support the further development of our working classification system and allow researchers to synthesise esports findings more meaningfully in future.

Results

Study Selection

Our electronic database searches yielded 7,802 records, with a further five records identified through manual searching. After duplicate removal and our 2-stage screening process, 63 studies were included (see Figure 1). The primary reasons for excluding records at the full-text stage were that the game reported was not an esport (k = 271). In total, 82 studies did not state the esport that their participants competed in and were excluded from the review.

Contextual Information

The 63 studies included 1,768 e'athletes players matching our eligibility criteria, comprising 1,309 males (74.00%), 48 females (2.75%), and 411 (23.25%) participants for whom gender was not reported. Forty-seven independent samples were included, with one study (Cui et al., 2021) reporting two independent samples. Overall, 47 studies focused on e'athletes from a single game and 16 reported participants from multiple games. Thirty-five studies solely recruited elite (or any terms referring specifically to top-level) e'athletes, whereas 28 studies reported samples that included both non-elite and elite e'athletes. For the purpose of our review, we did not include ineligible participants (e.g., non-elite, novice participants). The majority of studies (89.00%) were published from 2018 onwards (k = 56),

illustrating the significant growth in research on elite e'athletes in the last six years (see Appendix 4). The 63 studies were published in 44 different journals, with the *International Journal of Gaming Computer-Meditated* Simulations (k = 7) and the *International Journal of Environmental Research and Public Health* (k = 4) being the most prominent publishers of esport research featuring elite players (see Appendix 5). The most frequently reported esport samples were from LoL (k = 28) and CS:GO (k = 16 see Appendix 3). Studies focused on LOL and CS:GO was published over a 9-year period (2016-2024), indicating that the esport was relatively stable in terms of prominence. Less frequently reported esport samples included Fortnite (k = 1) and Paladins (k = 1).

INSERT FIGURE 1 ABOUT HERE

When considering the definition of elite in esports, one should consider: (1) the specific esport; (2) how big the pool of participants is within the sport (i.e., is it an esport with millions of participants or one that has a very small/niche following); (3) how widely played the esport is (e.g., is it played worldwide or only in particular countries?); and (4) how enduring the esport is (e.g., has it maintained popularity for a number of years or only a number of months?).

Main Synthesis: Terms, Indicators, and Rationales for Elite Esports

The terms and indicators used for classifying esport samples as 'elite' within the included studies are detailed in Table 2. Of the 63 studies included, 18 (28.57%) provided an explicit definition (or rationale) to classify their sample as elite (or any synonyms of elite; see Table 3). The 45 studies (71.43%) that did not explicitly define why their sample was elite also provided minimal justification for labelling their sample as elite (see Table 2).

INSERT TABLE 2 ABOUT HERE.

INSERT TABLE 3 ABOUT HERE.

The most common indicators used by researchers to classify their sample as elite were the highest level of competition (k =43) or professional status (k = 45), followed by in-game achievement (k = 27) and domain experience (k = 15; see Table 4). Many studies reported information that fitted into several of these categories. One study (Marzouki et al., 2017) developed a questionnaire to measure and classify

participants' eliteness, but no scale development information was provided. In the following sections, we present a synthesis of the definitions of elite e'athlete and the justifications reported in terms of four categories.

INSERT TABLE 4 ABOUT HERE.

Highest Level of Competition

Four sub-categories were formed around the level of competition elite, e'athlete were performing at. Of the 43 studies that used the level of competition to classify their elite esports samples, most reported their samples were playing in *international competitions* (k = 19/43). With respect to international competitions, the level of detail provided varied. For example, Poulus et al. (2021b) used Swann et al.'s (2015) elite classification matrix to justify defining their sample as ranging from successful-elite (being successful at the highest level) to competitive-elite (competing regularly at the highest level), but did not offer information on the competitions that performers competed in. In contrast, Benoit et al. (2020) provided information on the specific international league (The Overwatch League) and the team the esport athletes were recruited from (Houston Outlaws). Participation in a country or region's *national competition* was also used to justify elite samples (k = 14/43). In this category, the reviewed studies represented a range of different nations or regions, including Korea (Han et al., 2012; Kang et al., 2020), the United Kingdom (Smith et al., 2019), and Europe (Mendoza et al., 2021). Finally, the remaining sub-categories were *national second-tier leagues or below* (k = 6/43) and *unspecified competitions or leagues* (k = 4/43). For instance, Poulus et al. (2021a) stated their sample was elite due to their participation in an Australian second-tier competition, and Lee et al. (2021) reported that participants were "competing in First Person Shooter games within a professional league" (p. 3).

Professional Status

Three sub-categories for elite e'athlete were developed based on their professional status. *Playing for a professional organisation* was the most frequently cited sub-theme (k = 38/45), although the nature and level of detail provided varied. For example, Lam et al. (2022) reported that their sample consisted of elite mobile esport athletes who were starting players from 10 professional teams. In contrast, Mateo-

Orcajada et al. (2022) reported that their sample consisted of "the five players of the starting team of UCAM esports club" (p. 2). Five studies (k = 5/43) used *income or level of involvement in esports* to justify their sample as being elite, with participants competing on a full-time basis (Hong & Connelly, 2022; Pluss et al., 2022) or having esports competition as their primary source of income (Leis et al., 2021). *Membership with a professional esports body or association* was cited less frequently (k = 2/43).

In-Game Achievement

For in-game achievement, *in-game rank* was the most frequently cited sub-theme (k = 16/27). These studies used the game's in-built competitive ranking system, and all studies used the specific in-game rank as a cut-off to define their sample as elite. One study reported that any in-game rank was sufficient to be defined as an expert (Delmas et al., 2022), whereas the other 15 studies used a certain in-game rank to separate the elite from sub-elite esport athletes. For instance, Castaneda et al. (2016) classified DOTA2 players with a Match Making Ranking (MMR) higher than 4,000 as experts. *Achievement of a certain percentage of in-game rank* featured in seven studies (k = 7/27), although different percentages were used across studies. For example, Mendoza et al. (2021) reported their e'athletes were above the 85th percentile in LoL, whereas Li et al. (2020) used a more stringent criterion, reporting their LoL players as being in the top 0.2% of players. Kim et al. (2018) used a *win ratio* of >70% as part of justifying their sample as elite. Some studies also used *'competence' measure*s (k = 3/27) to support elite classifications, with different approaches used to determine competence. Cretenoud et al.'s (2021) participants played CS:GO mini-games on Playmaster.gg to measure players' ability to flick, hold, peek, shoot, spray, and track expertise. For participants with no official record, licences, or career experience, Kim et al. (2018) required participants to play a competitive match against an expert player to determine their in-game expertise. Finally, Marzouki et al. (2017) developed a novel off-game questionnaire to test World of WarCraft players' expertise.

Domain Experience

Domain experience comprised two sub-categories: *experience* (k = 8/15) and *training* (k = 7/15). *Experience* included studies that reported an esport athletes length of time playing their esport (i.e., "more

than 6 years, and had more than 5 years of experience in professional or semi-professional teams"; Mendoza et al., 2021, p. 3) or the number of hours e'athletes had recorded playing their esport (i.e., Delmas et al., 2022; Lange et al., 2022). Studies that mentioned a sample's *training* referred to how many hours they played and/or trained each week (e.g., "Expert is defined as those who have played StarCraft more than three times a week for six months"; Jeong et al., 2022, p. 2) or how long a player had been training at a certain level (e.g., "5 h per week specifically playing CS:GO and maintained a current competitive rank between Gold Nova Master and Global Elite were assigned to the High Skill Gamer (HSG) Expertise group"; Toth et al., 2021, p.121).

Single and Multiple Category Use

Of the 63 studies, 29 (46.0%) classified their samples as elite through the use of one category, and 34 (54.0%) studies provided elite-classification justifications that incorporated two or more categories (see Table 5). Single-category classifications were reported across *highest level of competition* (k = 10, 19.9%), *professional status* (k = 11, 17.5%) , and *in-game achievement* (k = 8, 12.7%). No studies used *domain experience* only to classify their sample as elite. Ten combinations of two or more categories were employed, with the combination of *highest level of competition* and *professional status* being used most frequently (k = 17, 27.0%). For example, Giakoni-Ramírez et al. (2021) justified their sample as being professional e'athletes who "were competing on a regular basis in the Gamergy esports event in Madrid (Spain) organised by the Liga de Videojuegos Profesional (LVP) in 2018 … (and) being a professional gamer with a current contract" (p. 1083). The combinations of *highest level of competition, professional status* and *domain experience* (k = 4, 6.35%) and *in-game achievement* and *domain experience'* (k = 3, 4.76%) were reported more than twice, with the seven other combinations reported only once or twice (see Table 5).

INSERT TABLE 5 ABOUT HERE.

Discussion

The purpose of this scoping review was to systematically identify, describe, and classify how elite e'athlete samples have been defined in elite esport research. There were substantial heterogeneity in the

terms used to describe elite samples (RQ1). Various eliteness indicators, including the athlete's highest level of competition, professional status, in-game achievement, and domain experience, were used by researchers to describe elite samples (RQ2). Furthermore, the majority of studies did not provide a clear rationale for defining their samples as elite (RQ3). Arguably, these findings reflect the rapidly evolving nature of the research field and the limited available guidance for researchers when classifying and describing their samples. Finally, to support the classification of elite samples and to guide researchers, we next propose a preliminary classification system based on a player's highest level of competition, along with their success and experience at this level. Furthermore, we offer reporting guidelines to standardise the demographic and contextual information that researchers report, which will allow for further refinements to our classification system in the future (RQ4).

In our scoping review, we have highlighted significant incongruity in the terminology used to classify high-level samples in esports. In some instances, the term, elite, was confused with other conceptually related but unique terms included within the same studies (e.g. Jeong et al. 2022). To compound the issue, there were also inconsistent justifications for why the sample was elite. Some studies used single indicators (e.g. Lam et al., 2022a; Poulus et al., 2022; Watanobe et al., 2021), with the highest level of competition being the most common. Others combined several indicators to provide a more nuanced justification (e.g. Mendoza et al. 2021). The lack of a unified approach presents a problem for the field, making it difficult for researchers to synthesise existing literature to draw meaningful, cross-study conclusions (e.g., via systematic reviews). Consequently, these disparate approaches to defining elite esport players could leave coaches and practitioners relying on the findings of individual studies. Such an approach is problematic, however, as evidence from individual studies might only be relevant to the specific sample and not generalisable (i.e., in the statistical probabilistic sense – see Smith, (2018) to others. More so, study design limitations can have a more considerable impact on the findings of individual studies, which may heighten the risk of bias.

With these issues in mind, the field could benefit from a classification system that helps researchers when defining elite samples in esports, similar to what is offered in traditional sporting

domains (see Swann et al., 2015 and McKay et al., 2022). While it is acknowledged that there are limitations to classification systems (McAuley et al., 2022), they allow researchers to be more cognizant of the variables they use to define their sample as elite. In proposing a working elite esports classification system, we conceptualise elite e'athlete as *individuals who compete at the highest level for their esport*. While the aforementioned definition of eliteness allows for a straightforward classification, we acknowledge that there are relative differences between esports, thus making it challenging to compare samples. For example, athletes competing at the highest level of prominent esports like LoL, DOTA2 or CS:GO, represent a lower percentage of the total talent pool than other, less widely-played esports like Apex Legends and Rainbow Six: Seige. In other words, reaching the top in some esports is more difficult than others due to the larger scale of their playing numbers and the intensity of competition.

Elite Classification System

The working elite classification system uses a 2-step approach with three indicators (Figure 2) to allow researchers to judge the elite status of their samples. We developed it using a combination of the findings from the current scoping review and literature in elite traditional sports. We incorporated knowledge from elite traditional sports due to the inconsistency of reporting in current descriptions of elite e'athlete. Step 1 assesses the highest competition standard that the esports sample competes at and delineates between elite and non-elite players. As per our definition of eliteness, Step 1 holds the most weight in the decision-making process. Step 2 is where researchers consider other contextual factors when judging the eliteness of the sample, by evaluating a player's success and years of experience at their highest competition standard. We note that we have based our elite classification system on a continuum until there is sufficient consistency in descriptions of esports samples to establish levels of eliteness (similar to the approach that Swann et al., 2015 adopted).

INSERT FIGURE 2 ABOUT HERE

Competition Standard (Step 1)

The studies in the current scoping review provided enough information to delineate the eliteness of four competition standards: regional; second-tier national standard; top-tier national competition, and

international competitions. Regional competitions refer to high school, university, and community competitions that are often geographically based. Second-tier national competitions (or below) include competitions that are not the premier national competition for the esports title, consisting of academy or division 2 competitions (e.g. the League of Legends Champions Korea Academy Series). Esports samples from regional and second-tier national competitions (or below) are considered non-elite. For clarity, there will be many levels of non-elite athletes, and we do not mean to suggest that second-tier national competitors and regional are equally proficient. Due to the variance in competition standards between nations and between esports, the working elite classification system does not differentiate eliteness levels or non-eliteness based on competition level. At present, Step 1, competition standard, categorises samples as elite or non-elite, with all e'athlete competing in a top-tier national standard being considered elite. Similarly, with non-elite samples, we are not suggesting that all elite samples are equally proficient and that future elite esports classification systems will offer categories of eliteness (like Swann et al., 2015). To support future classification systems to develop categories for elite and non-elite esports samples, authors must clearly report their sample characteristics (see guidelines below)

Success and Experience (Step 2)

Through Step 1, esports samples can be classified as elite, and through Step 2, the degree of eliteness of an esports sample can be specified more precisely. Due to the variance in the indicators used to classify elite e'athletes in the current literature, Step 2 is informed by traditional sports elite classification systems (McKay et al., 2022; Swann et al., 2015). Similar to Swann et al.'s (2015) model for classifying elite sports athletes, we suggest that when classifying the eliteness of an esport sample, researchers should consider the success and experience at their highest level of competition. Unlike Step 1 and the results of Swann et al.'s (2015) review, our review findings demonstrate insufficient agreement in the current literature to delineate between categories of success and experience in esport. As such, we propose that decisions about the sample's success and experience should be justified along a continuum. Whilst years of experience at the highest level appears to be more straightforward to appraise, success can vary between esports and regions. Success for some researchers might mean winning their national

competition, placing in the top-3, or even qualifying for the final series in their national competition, which in some cases could mean placing in the top-6. Considering the current state of esports literature and the rapidly evolving nature of the field, it is difficult to provide clear definitions and delineations between distinct levels of success and experience.

Overall, we suggest that this classification system allows more consistency in the classification of elite athletes in esports. However, we emphasise that the classification system is only a proposed starting point. It is not intended to be comprehensive, all-encompassing, and fixed, as this was not possible given the available scientific evidence and the pace of development within the esports field. Therefore, we expect this working classification system to be updated and progressed as the elite esports evidence body becomes more mature and robust. To aid with the development of a more robust platform of evidence to inform further modifications of the classification system as the field expands, we propose a set of reporting guidelines.

Reporting Guidelines

The following reporting guidelines can aid with the collection and reporting of demographic and contextual information about elite e'athlete in future research. The guidelines are based on a series of questions about the success and achievements of the athlete(s), and the prominence and competitiveness of the esport(s). We also suggested that these reporting guidelines can assist reviewers and editors to maximise the transparency, rigour, and consistency of sample descriptions in esports research. Table 6 provides a summary of the considerations and the associated questions. To determine the *success and achievements of the athlete(s)*, we suggest that the following three questions should be answered:

1) What is the player's highest competition standard within their esports?
2) How long has the player participated at their highest competition standard?
3) How much success has the player achieved at their highest competition standard?

Responses to these questions should already be reported to justify the use of the term elite as part of the above classification system; however, they are reiterated to enhance consistency. We propose four

questions to contextualise the success and achievement of the athlete(s) in the *prominence and competitiveness of the esport(s)*. These include:

4) How big is the pool of participants in the esport?
5) How widely played is the esport?
6) How long has the esport been played competitively?
7) How big are the prize pool and audience for the esport?

The size of the participant pool (or talent pool) indicates if there is sufficient competition for the standard of play to be considered elite. Active player information contrasts esports with large, active player pools (e.g., CS: GO) and those that are less popular (e.g., R6). Similarly, the reach of an esport title across nations shows the scale at which an esport is played and the diversity of the talent pool. Furthermore, by asking how long the esport has been played competitively, this can enable differentiation between 'legacy' esports (i.e., those played competitively for over a decade, such as LoL) and newer esports (e.g., Valorant). The length of time an esport has been played competitively also indicates how long the esport competitive structure has had to develop and how long players have been able to develop game-specific expertise. Finally, prize pools and audience numbers can indicate how developed an esports' structure competition is and the standard of competition within that esport.

To assist researchers in utilising the proposed elite reporting guidelines in their studies, a hypothetical example is included.

Participants were 36 elite LoL players competing in split 1 of the 2023 League of Legends EMEA (Europe, the Middle East and Africa) Championship (LEC). LoL is widely played at both the amateur and professional levels, with over 150 million registered players and roughly 117 million active players each month (Response to Question 5). Specifically, split 1 of the LEC included 10 teams (50 starting players) who competed for a share of €80,000 (Response to Question 7). At the time of writing, there are nine professional leagues (first-tier, including the LEC, showing that EMEA is a prominent region for LoL) and 27 lower-tier leagues (second/third tier; Response to Question 4). League of Legends has been played competitively since 2011, and

the LEC began in 2013 and currently attracts an average of 270,000 concurrent viewers weekly (2022 Esports Charts; Response to Question 6). The 36 players in the current sample consisted of 20 males and 16 females (M = 22.9, SD = 2.1, R – 18-28 years). Of our 36 players, 26 players' highest level of competition was the LEC, these players have competed at this level for between 2 months (debut season) and four years (M = 2.5, SD = 0.8; Response to Question 3). 10 players had previously competed at one of the two major international LoL tournaments (MSI or Worlds; Response to Question 1). Of the 10 players who had competed at MSI or Worlds, all 10 had previously won the LEC, but none had won MSI or Worlds (Response to Question 2).

Using the elite classification system, all 36 players in the current sample can be considered elite as, at minimum, they compete in a top-tier national competition (LEC). The 10 players who have experienced success in the LEC and competed at an international competition (MSI or Worlds) could be considered more elite than the rest of the sample.

It should be noted that certain guidelines (i.e., *How widely played is the sport?, How long has the esport been played competitively?*) might be outlined in the introduction or other areas of an article and do not need to be repeated in the Participants section of the Methods. Adopting our reporting guidelines will ensure sufficient consistency for researchers to compare samples and synthesise evidence. It will also minimise the potential impact of researchers misclassifying samples (while the classification system is still developing) as studies will include enough details for retrospective classifications in the future. Finally, we remind researchers that whilst we encourage adherence to these reporting guidelines when describing elite esports samples, these guidelines should not supersede protecting the anonymity of research participants or adhering to ethical approval requirements.

INSERT TABLE 6 ABOUT HERE

Strengths and Limitations

This scoping review has several strengths. First, the scoping review's quality was strengthened by following established guidance for scoping reviews (Arksey & O'Malley, 2005; Levac et al., 2010; Tricco et al., 2018). Second, a broad group of search terms were used to capture studies across various

disciplines (i.e., sports psychology, exercise and movement science, and cognitive psychology) that report high-performing esport samples. Despite these strengths, this review is not without limitations. One potential limitation is that only studies published in the English language were included. This could potentially result in publication and language bias, although it is worth noting that unpublished and non-English papers can have a limited impact on the overall conclusions of a review (Schmucker et al., 2017). To maintain methodological rigour, strict exclusion criteria were employed, resulting in the exclusion of numerous papers due to a failure to specify which game(s) were studied (k = 82). Some of these omitted studies reported potentially elite samples, which could have contributed to the review. For example, Lee et al. (2021) reported a sample of 17 participants from the professional first-person shooter (this term describes a group of games) leagues in South Korea, Australia, and the United States. Without knowing which video game these samples were drawn from, however, it is not possible to determine if this video game is an esport. Lastly, the working elite classification system and reporting guidelines proposed are grounded in data from studies included in this scoping review. Given the rapid development of the esports industry, significant changes in how esports are played (i.e., advances in mobile, virtual, and augmented reality gaming), and the likely continued growth in the global visibility of esports in the future, refinements to the proposed classification system and guidelines will likely be necessary as the field continues to evolve. Nevertheless, we suggest that the data-driven classification system and guidelines proposed in the current study represent an important starting point.

Recommendations for Future Research

Researchers are encouraged to use the working elite classification system to classify their esports samples and utilise the guidelines for elite esports when reporting on elite esports samples. Adherence to these reporting guidelines can help peer reviewers and editors evaluate the validity of samples deemed elite and can assist future researchers in comparing findings across elite esports samples. The proposed elite classification system should be considered a starting point to be refined once the esports industry matures within the sporting landscape. Initially, we encourage future researchers to build on our classification system through other methods, such as a Delphi study, which would allow researchers to

gather expert opinions (e.g., esports researchers and practitioners) and move towards consensus for an elite esports classification system. In the future, a refined elite classification system, analogous to Swann et al.'s (2015) classification system for elite traditional sports samples, could enable the categorisation of elite esports samples into classifications such as semi-elite, competitive-elite, successful elite, and world-class elite. We suggest that a classification system like this could be reached more quickly and robustly if researchers, reviewers, and editors in the field embrace the reporting guidelines for elite esports samples that we have proposed. Finally, future research should develop a system that classifies non-elite and sub-elite esports samples.

Conclusion

Research exploring high-performing esports samples has grown substantially in the last five years. This scoping review identified substantial heterogeneity in the terms and indicators used to describe elite esports samples. Only a small number of studies provided a clear definition of elite to justify their samples as elite. Furthermore, both single-category (i.e., in-game achievement) and multiple-category (i.e., highest level of competition and professional status) elite justifications were used to define samples as elite. Based on this clear lack of clarity when defining elite esport samples, an initial elite esports classification system and a series of flexible and informative esport reporting guidelines have been offered. These guidelines consist of two overarching considerations, comprising seven sub-considerations, that authors and reviewers can employ to enhance the quality of future elite esports research.

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Table 1

Blocks with Search Terms used in all Databases.

Block #	PCC criteria addressed	Search terms
1	Participant, Context	esport* OR "e-sport*" OR "e-athlet*" OR eathlet* OR "competitive gaming" OR cybersport* OR "cyber-sport*" OR "battle arena" OR "first-person shoot*" OR "first person shoot*" OR "real-time strategy" OR "real time strategy" OR "multiplayer online battle arena" OR MOBA OR "video gam*" OR "electronic sport*" OR multiplayer OR "computer gam*"
2	Concept	(elite* OR expert* OR experience* OR professional*) OR ((high* OR medium OR low*) n5 performance) OR ((high* OR medium OR low*) n5 skill*)
Notes: PCC = Participant, Concept, Context		

Table 2

Justification Provided for Elite Esports Athlete Classification Within Included Studies

#	Author(s) (Year)	Esports played	Competition information	Terms	Elite classification justification with the study
1	Angelo et al. (2022)	LoL	Finals of CBLoL (Brazilian Championship of LoL)	Professional	CBLOL professional teams (p.4).
2	Benoit et al. (2020)	OW	The Overwatch League	Professional, elite, expert, performance	"These participants are considered elite video gamers, because they have achieved the necessary performance level to enter a professional league. They reported daily FPS video game usage in the last 6 months and were ranked as Grandmaster or Top 500/Pro in the game" (p.4).
3	Bickmann et al. (2020)	FiFA 19	Professional players took part in the Virtual Bundesliga (VBL).	Professional, higher skilled	"All professional players took part in the Virtual Bundesliga (VBL)" (p.2).
4	Bihari & Pattanaik (2023)	CS:GO, DOTA2, HS, PUBG, CoD (NS), CoC, CR, FIFA, Tekken.	Not reported	Professional	"the gamer should be an active sponsored competitive player affiliated with an organisation. If inactive, they should only have retired from pro-gaming for up to five years at the start of data collection" (p.1939).
5	Castaneda et al. (2016)	DOTA 2	DOTA 2 ranked in-game play	Expert, professional, skill	"Advanced players fell into the range of an MMR of 3001-4000. Experts were players with an MMR higher than 4000" (p.7).
6	Castro& (2020)	Brawl Stars	2019 ESL Masters Spain Brawl Star.	Professional	"The chosen team for this research is QLASH Team Pro, 2019 champion of the ESL Masters Spain Brawl Star" (p.250). "The team competes on an international level and travels to tournaments all around the world, as to Paris, Poland or South Korea, they do not live exclusively from electronic sports and their income is minimal. They could barely be considered in the category of amateur or semi-professional players" (p.251).
7	Cretenoud et al. (2021)	CS:GO	CS:GO Ranked in-game play	Expert, skill	Expertise was measured through in-game rank and through six CS:GO mini-games, which were developed by Logitech (Lausanne, Switzerland) in collaboration with the University of Limerick (Ireland) and are publicly available on playmaster.gg. We extracted six gaming skills: flicking, holding, peeking, shooting, spraying, and tracking (pp.3-4).
8	Cui et al. (2021)	LoL, PUBG	Experiment 1: LoL ranked in-game play. Experiment 2: PUBG ranked in-game play	Experience, experts	Experiment 1: The experts had at least 2 years of LOL gaming experience and were LOL masters based on their Expertise Gaming Ranking provided by the LOL gaming software (the top 7% of players) Experiment 2: The experts had at least 2 years of PUBG gaming experience and were PUBG masters based on their Expertise Gaming Ranking provided by the PUBG gaming software (the top 7% of players) (p.6).
9	Delmas et al. (2022)	LoL	LoL ranked in-game play	Expert	The expert group was composed of individuals who have completed 10 'placement matches', they are given a rank for the season (i.e., around a year), which represents their level of expertise. Participants in this group all had spent at least 100 hours playing the game (i.e., the average time required to be ranked in the game), and all had to have a rank at the given season or the past one (p.7).
10	Ding et al. (2018)	LoL	LSPL (LOL secondary professional league)	Expert, professional	Participants were from two Chinese LSPL (LOL secondary professional league) teams (p.684).
11	Donovan et al. (2022)	Valroant, PUBG, R6	Not reported	Professional	NOT AVAIL

12	Ekdahl & Osler (2023)	LoL	Not reported	Expert, professional	"The subset of data we analyse here is based on ten semi-structured interviews with ten Danish esports professionals". All players achieved an in-game rank within the top 6.6%. (p.12)
13	Fanfarelli (2018)	OW	2017 Overwatch League	Skill, professional, expert	Expert-level Overwatch Players (p.6)
14	Giakoni-Ramírez et al. (2021)	LoL, CS:GO, Call of Duty (NS), Hearthstone, FIFA (ns), CR, Fortnite, and RL	Gamergy esports event in Madrid (Spain) organised by the Liga de Videojuegos Professional (LVP) in 2018	Professional	Players were competing on a regular basis in the Gamergy esports event in Madrid (Spain) organised by the Liga de Video juegos Professional (LVP) in 2018, and were a professional gamer with a current contract (p.1083).
15	Giakoni-Ramírez et al. (2022)	LoL, Counter Strike (NS), Hearthstone, Call of Duty (NS), FIFA (ns), CR ,RL	Not reported	Professional	"… participants had to be a member of a professional esports team" (p.4).
16	Gomes et al. (2021)	LoL	Not reported	Elite	"The e-athletes lived in the Gaming House and adhered to the same routine in both the training and competition conditions" (p.1003).
17	Gong et al. (2019)	LoL	LoL ranked in-game play	Top-ranking, experience	A top-ranking, expert player is ranked above the 98.33 percentile. A player's ranking data are assigned by the LOL software (p.2).
18	Han et al. (2012)	StarCraft (NS)	Not reported	Expert, professional	"Pro-gamers on the 000 StarCraft pro-game team who are the members of the Korea eSports Association (KeSPA) were recruited" (p.509).
19	Himmelstein et al. (2017)	LoL	LoL Tournaments	High-level, competitive, professional	"A competitive player was defined as a player who had competed in a minimum of two tournaments within the past 12 months. Player rank was also a factor… Only those who had achieved the rank of Platinum 5 (lowest of the platinum sub-levels) or higher were eligible for the study" (p.6).
20	Hong & Connelly (2022)	Street Fighter (NS), Tekken (NS), and Pro Evolution Soccer [PES]), LoL, DOTA2	All players have competed at international competitions and two won the world championships in their games.	Professional, high-performance	"It was also observed that the semi-professional and amateur players defined themselves based on their ranking and tier/league they played for. Since each game has different tiers and league systems, this posed a challenge to define. However, for the present study, professional players are defined as players who play esports full-time in a top tier/league in their game and who are affiliated to professional teams" (p.4).
21	Jeong et al. (2024)	Valorant, OW, Escape from Tarkov, Apex	Not reported	High-skill	"…participants were divided into two groups (in the top 10 %: high-skilled and lower than the top 20 %: low-skilled) according to the official rank of each FPS game they played" (p.2).
22	Jeong et al. (2022)	StarCraft I	Starcraft I ranked in-game play	High-skill, expert,	"Expert player is defined as players who have played StarCraft more than three times a week for at least six months, or who are in the top 10% of the official StarCraft ranking" (pp.2-3).
23	Kang et al. (2020)	OW, PUBG, LoL, StarCraft II	Professional teams in the Korean Esports Association (KeSPA).	Professional, elite	On one team, seven players attended 85% of the games during the pro-gaming season and 20 players attended less than 30% of the games. 28 players on another team, five players attended 82% of the games during the pro-gaming season and 23 players attended less than 40% of the games (p.3).
24	Kari & Karhulahti (2016)	CS:GO, StarCraft II, DOTA 2, LoL, HoTS	Not reported	Elite, professional, high-level	Playing as part of a professional esport team (p.54.)
25	Kim et al. (2018)	StarCraft I	StarCraft I ranked in-game play	Professional	Win ratio ≥ 70% for expert, 50% < win ratio < 70% for medium, and win ratio ≤ 50% for novice players. License or Professional gamer experience: If the player has a license, it meant that he was a semi-professional player. Also, some players have experience as trainees on professional teams sponsored by

					companies. Being a trainee meant that the player was a very skilful player. We group both the licensed players and professional trainees into the expert player category. Test Game: If the player has no official record, license, or career experience, a special match was arranged against an expert player. During the match, the expert player, most members of the medium, and expert groups played over 500 games on BattleNet (p.13,579)
26	Kim et al. (2022)	StarCraft (NS)	Not reported	Expert, professional	"The professional gamers were from a professional team and members of the Korea e-Sports Association at the time of data collection. They had been playing esports in a professional team for between 3 and 10 years" (p.2).
27	Lam et al. (2022a)	Onmyoji Arena	Top-tier 2021 Shanghai Onmyoji Arena Pro League (OPL) tournament.	Top-tier, professional	Starting lineup players from ten professional teams of a top-tier MOBA tournament (Onmyoji Arena Pro League, OPL) (p.3).
28	Lam et al. (2022b)	Onmyoji Arena	Top-tier 2021 Shanghai Onmyoji Arena Pro League (OPL) tournament.	Elite, professional	Participating in a top-tier Onmyoji Arena Pro League (p.3).
29	Lange et al. (2022)	CS:GO	Competing in professional CS:GO competitions	Professional	"…pro players (or athletes), hardcore amateur, and casual amateur. The classes are characterised in terms of hours spent in the game: >10,000, 1,000-10,000, <1,000, respectively. Pro player is the player with a work contract signed with a professional team. eSports is his/her occupation including regular training sessions, professional lifestyle, and communication among the players, team captain, analyst, and manager" (p.483).
30	Lee et al. (2021)	OW, CS:GO, Paladins	Not reported	Professional, elite	"Participants were eligible for inclusion if they competed as part of a professional team within an official esports league" (p.3).
31	Leis et al. (2021)	LoL	Professional competitions in the second German division or higher.	Professional	Competitors in the second German division or higher and competing is main source of income. Ranked as challenger, grandmaster, or master (p.6).
32	Li et al. (2020)	LoL	LoL ranked in-game play	Expert, top-ranking	Top LoL players were ranked higher than the Diamond tier (i.e., Master, GrandMaster and Challenger tiers). Fewer than 0.2% of the LOL players have a chance to reach beyond the Diamond tier (Fig. 1); therefore, we called them "top-ranking LOL players" or "top players." (pp.4-5).
33	Marzouki et al. (2017)	WoW	Organised WoW Guild play	Expert, skill	We built a questionnaire testing players' knowledge about WoW and acquired skills through completed raids, highest rated battlegrounds, Skill Points, etc. The questionnaire accessed three dimensions: 1. Temporal characteristics related to the game (duration of frequency of use: monthly, weekly, daily, etc.); 2. general knowledge of the game (crafts, seasonal events, equipment's strength, etc.); and the knowledge related to the player's activity (Valor Points, items' level, guild, raid level, etc.). Once correctly completed, the questionnaire leads to a maximum score of 64 points. The following inclusion criteria were used: experts must have an overall score above 45, whereas novices must have an overall score below 34. (p.6).
34	Mateo-Orcajada et al. (2023)	LoL	2019/2020 SuperLiga Orange	Professional, elite	One team from the 2019/2020 SuperLiga Orange season (p.30156-7)
35	Mateo-Orcajada et al. (2022)	LoL	Spring Split of the 2019/2020 season of SuperLiga Orange (SLO) League of Legends.	Professional	The professional LOL team of UCAM esports club. (p.2)
36	Mendoza et al. (2021)	LoL	Professional or semi-professional teams in official LOL national and international leagues (i.e.,	Expert, professional	Expert gamers competed in official esports tournaments. The minimum level of expert players at the time of the study was the Platinum ranking. Because all experts were competitive players, participating in tournaments with established teams, they play and train between 15 and 40 h weekly. Expert gamers had

			Superliga Orange, Spain; Iberian Cup, Spain; and European Championship).		been playing MOBA games for more than 6 years, and had more than 5 years of experience in professional or semi-professional teams in official LOL national and international leagues (i.e., Superliga Orange, Spain; Iberian Cup, Spain; and European Championship). (pp.2-3).
37	Meng-Lewis et al. (2020)	LoL	League of Legends Pro League (LPL) China and a racing simulation game.	Professional	Professional esports clubs in China (p.1).
38	Monteiro Pereira et al. (2023)	FIFA	National eFootball League (e.g. FPF Digital Challenge, FPF Portuguese Cup, etc.).	Elite	"We recruited elite and world-class (adapting [Mckay et al. 2022]) FIFA esports players i.e. esports players that have at least one call to be part of the Portuguese eFootball national team and with competition-relevant tricks and performance achievements or being in the top three at a major international event such as the World Championship, respectively), the Portuguese national team coaches, and the coordinators of the Portuguese Football Federation (FPF) eFootball department for this study" (p.3)
39	Pereira et al. (2022)	LoL	CBLOL	Professional	"The sample was composed of 138 Brazilian LOL players, from amateur championships, university championship, challenger circuit and CBLOL" (p.27).
40	Piatysotska et al. (2023)	CS:GO	Not reported	Elite	"Elite players of semi-professional CS:GO teams." (p.20)
41	Piatysotska et al. (2023)	CS:GO, DOTA2	Not reported	Elite	"Elite players of semi-professional teams in the disciplines of Counter-Strike: Global Offensive (CS:GO) and DOTA 2." (p.629)
42	Piatysotska et al. (2024)	CS:GO, DOTA2	Not reported	Elite	"Elite players from semiprofessional teams in Counter-Strike: Global Offensive (CS:GO) and DOTA 2" (p.105)
43	Pluss et al. (2020)	CS:GO	Not reported	Professional	The professional group involved players that competed on a full-time basis and represented a team at an international level (i.e. major tournaments and world championships) of competition. The semi-professional group involved players that compete on a full-time basis and represented a team at a national level (i.e. domestic or regional leagues) of competition. (p.135).
44	Pluss et al. (2022)	LoL, HoTS, OW, PUBG	Not reported	Professional, expert	"The professional group involved players that competed on a full-time basis and represented a team at an international level (i.e. major tournaments and world championships) of competition" (p.2).
45	Pluss et al. (2021)	CS:GO	CS:GO PGL Major Krakow 2017.	Professional	Professional esports players competing in the major esports tournament: CS:GO PGL Major Krakow 2017. The professional esports players compete on a full-time basis and represent a professional esports team at the highest level of competition. (p.70)
46	Poulus et al. (2023)	LoL	2022 League of Legends Circuit Oceania (LCO) season	Elite	"Participants were competing in split two (the second half of the season) of the 2022 League of Legends Circuit Oceania (LCO) season. The LCO is the highest-level professional LoL competition in the oceanic region." (p.3)
47	Poulus et al. (2021)	LoL	The tier 2 competition in the oceanic region (in 2020), the Oceanic Challenger Series (OCS).	Elite, professional	Participants were all involved in the regular Oceanic Challenger Series (OCS) season and the season playoffs. All player's teams made the semi-finals (Top four). (p.3).
48	Poulus et al. (2022)	LoL , CS:GO, R6, OW.	Not reported	Elite, professional	"Using Swann et al.'s (2015) categorisation system, one athlete was classified as successful elite (athletes who have experienced some (infrequent) success at the highest level) and another classified as world class elite (athletes who have sustained success (repeated wins over a prolonged period) at the highest level). The remaining five athletes were classified as competitive elite (athletes who regularly compete at the highest level)." (p.744).

49	Reitman (2018)	LoL	University of California Irvine's scholarship League of Legends team competitive competition.	Elite, professional, expert	The team's environment is one of elite gamers, many of whom have been or will be professional esports athletes. two team members are former professional League players, one signed with a professional team during the observed season, and two others have explicitly stated their goal to become professional players. (p.29).
50	Rey Perez & Rubio (2023)	LoL	Various professional Brazilian leagues	Professional	A series of previous professional achievements in various Brazilian Championship are outlined in Table 1 (p.829-830).
51	Schubert et al. (2022)	FIFA	bevestor Virtual Bundesliga (VBL) Club Championship	Professional	"selected professional esports players of clubs taking part in the "bevestor Virtual Bundesliga (VBL) Club Championship". The VBL is overseen by the German Football League (DFL). To date, the VBL is the only professional football league competition directly integrated into the FIFA video game title, which is by far the best-selling sports video game worldwide." (p.3).
52	Sharpe et al. (2023)	CS:GO	ESL Premiership Spring 2022 tournament	Elite	The national competitor (NC) group consisted of 33 active ESL Premiership competitors 212 preparing for the ESL Premiership Spring 2022 tournament. This group comprised five full teams and their associated backup members.
53	Smith et al. (2019)	CS:GO	ESL Premiership CSGO Spring finals	Elite, high-level	Participants were recruited from four teams that competed in the ESL Premiership CSGO Spring finals in the UK. (p.25).
54	Song et al. (2013)	StarCraft I and StarCraft II	Professional StarCraft I and StarCraft II competitions	Professional	NOT AVAIL
55	Swettenham & Whitehead, (2022)	LoL	The team in the current case study was a professional esports team within the UK League Championship (UKLC).	Professional	"The team in the current case study was a professional esports team within the UK League Championship (UKLC)." (p.5).
56	Thomas et al. (2019)	LoL	Not reported	Elite, professional	Elite LoL players belonging to the same professional team. (p.2).
57	Toth et al. (2019)	CS:GO	CS:GO Ranked in-game play	Elite skill, high ranked	"…the Elite Skill group consisted of gamers between the Master Guardian Elite to The Global Elite rankings." (p.4).
58	Toth et al. (2021)	CS:GO	CS:GO ranked in-game play	High skill	"… those who reported spending more than 5 h per week specifically playing CS:GO and maintained a current competitive rank between Gold Nova Master and Global Elite were assigned to the High Skill Gamer (HSG) Expertise group." (p.3).
59	Trotter et al. (2023)	CS:GO	ESL CS:GO Premiership	Expert	"The ESL premiership is the highest national division of CS:GO in the United Kingdom and Republic of Ireland. The NC participants had in-game ranks which ranged from Supreme Master First Class to Global Elite. These participants represented the top 3.39% of players (96%). However, all but one of the NC participants were in the top 0.75% of all CS:GO players."
60	Valls-Serrano et al. (2022)	LoL	Professional League in Spain	Expert	"Experts were recruited from the UCAM esports club primary and secondary team that plays in the professional league in Spain. Expert players should also meet three demanding criteria. The first was (a) having been classified equal to or higher than Diamond I tier in the LOL ELO ranking system (distributed by tiers from iron to challenger). Players ranked beyond Diamond I are placed in a superior percentile than 99.69. This cut-off point placed these players above 2 standard deviations with respect to the mean in a sample of more than one million players. The second was being (b) a professional player from a primary or secondary professional LOL league." (p.3-4).
61	Wang et al. (2024)	FIFA	China's National FIFA League	Professional	"Professional players in the experiment came from three different professional FIFA eSports clubs, which accounts for 84% of the FIFA eSports national team in China. Their training time is not less than 8 h a day and two of them have been selected to the Asian Games 2023" (p.2)

62	Watanabe et al. (2021)	Street Fighter V Arcade Edition	CAPCOM Pro Tour 2019 rankings	Professional, highly skilled, expert	"CAPCOM Pro Tour 2019 rankings were in the top 128 out of one million global competitors." (p.2).
63	Woods et al. (2016)	StarCraft II	Participated in the second season of the StarCraft II 2014 World Championship Series	Elite, world-class, professional	"Our sample included elite StarCraft 2 video game players who participated in the second season of the 2014 World Championship Series" (p.46).
Notes: Abbreviations used as follows: NS = Not specified, LoL = League of Legends, HoTS = Heroes of the Storm, OW = Overwatch, CS:GO = Counter-Strike: Global Offensive, PUBG = PlayerUnknown's Battlegrounds, DOTA 2 = Defense of the Ancients 2, CL = Clash Royale, SCI = Starcraft 1, SCII = Starcraft 2, WoW = World of Warcraft, RL = Rocket League, R6 = Rainbow Six: Seige. CoD = Call of Duty, CoC = Clash of Clans, HS = Hearthstone.					

Table 3
Studies That Provided an Explicit Definition of Their Elite Sample's Proficiency

#	Author(s) (Year)	Esport(s) played	Explicit sample classification justification
2	Benoit et al. (2020)	OW	“These participants are considered elite video gamers, because they have achieved the necessary performance level to enter a professional league. They reported daily FPS video game usage in the last 6 months and were ranked as Grandmaster or Top 500/Pro in the game” (p.4).
5	Castaneda et al. (2016)	DOTA 2	“Advanced players fell into the range of an MMR of 3001-4000. Experts were players with an MMR higher than 4000” (p.7).
8	Cui et al. (2021)	LoL, PUBG	Experiment 1 - The experts had at least 2 years of LOL gaming experience and were LOL masters based on their Expertise Gaming Ranking provided by the LOL gaming software (the top 7% of players). Experiment 2 -The experts had at least 2 years of PUBG gaming experience and were PUBG masters based on their Expertise Gaming Ranking provided by the PUBG gaming software (the top 7% of players) (p.6).
14	Giakoni-Ramírez et al. (2021)	LoL, CS:GO, Call of Duty (NS), Hearthstone, FIFA (ns), CR, Fortnite, and RL	The selection of players was carried out by consecutive non-probabilistic sampling, selecting all possible subjects to whom we had access who met the inclusion criteria, these being ... and 4) being a professional gamer with a current contract (p.1083).
17	Gong et al. (2019)	LoL	A top-ranking, expert player is ranked above the 98.33 percentile. A player's ranking data are assigned by the LOL software based on the player's experience and expertise compared against the average level across all players worldwide (p.2).
20	Hong & Connelly (2022)	Street Fighter (NS), Tekken (NS), and Pro Evolution Soccer, LoL, DOTA2	“…for the present study, professional players are defined as players who play esports full-time in a top tier/league in their game and who are affiliated to professional teams” (p.4).
22	Jeong et al. (2022)	StarCraft I	“Expert is defined as those who have played StarCraft more than three times a week for at least six months, or who are in the top 10% of the official StarCraft ranking” (pp.2-3).
26	Kim et al. (2018)	StarCraft I	We used the following expertise decision criteria: win ratio ≥ 70% for expert, 50% < win ratio < 70% for medium, and win ratio ≤ 50% for novice players. License or Professional gamer experience: If the player has a license, it meant that he was a semi-professional player. Also, some players have experience as trainees on professional teams sponsored by companies. Being a trainee meant that the player was a very skillful player. We group both the licensed players and professional trainees into the expert player category. Test Game: If the player has no official record, license, or career experience, a special match was arranged against an expert player (a member of our research team). During the match, the expert player most members of the medium and expert groups played over 500 games on BattleNet (p.13,579).
29	Lange et al. (2022)	CS:GO	“In this research, we divided the players into three classes: Pro players (or athletes), hardcore amateur, and casual amateur. The classes are characterised in terms of hours spent in the game: >10,000, 1,000-10,000, <1,000, respectively... Pro player is the player with a work contract signed with a professional team. eSports is his/her occupation including regular training sessions, professional lifestyle, and communication among the players, team captain, analyst, and manager” (p.483).
32	Li et al. (2020)	LoL	“We first recruited ... LOL expert players ranked higher than the Diamond tier (i.e., Master, GrandMaster and Challenger tiers) to participate in the present experiments. Fewer than 0.2% of the LOL players Fewer than 0.2% of the LOL players have a chance to reach beyond the Diamond tier; therefore, we called them "top-ranking LOL players" or "top players”” (pp.4-5).
36	Mendoza et al. (2021)	LoL	“The other group consisted of expert gamers who competed in official esports tournaments. The minimum level of expert players at the time of the study was the Platinum ranking (internal game ranking), which places them in the 85th percentile of all users. Because all experts were competitive players, participating in tournaments with established teams, they play and train between 15 and 40 h weekly (mean = 25 ± 3). Expert gamers had been playing MOBA games for more than 6 years, and had more than 5 years of experience in professional or semi-professional teams in official LOL national and international leagues (i.e., Superliga Orange, Spain; Iberian Cup, Spain; and European Championship) (pp.2-3).
38	Monteiro Pereira et al. (2023)	FIFA	We recruited elite and world-class (adapting [Mckay et al. 2022]) FIFA esports players.(p.3)
44	Pluss et al. (2020)	LoL, HoTS, OW, PUBG	The professional group consisted of players that compete on a full-time basis (a minimum of 38 hours of scheduled training per week) and represent a professional esports team at the highest level of competition (p.135).
45	Pluss et al. (2021)	CS:GO	Professional esports players compete on a full-time basis and represent a professional esports team at the highest level of competition in a first-person shooter video game (Counter-Strike: Global Offensive) (p.70).
46	Poulus et al. (2023)	LoL	Participants were competing in split two (the second half of the season) of the 2022 League of Legends Circuit Oceania (LCO) season. The LCO is the highest-level professional LoL competition in the oceanic region. (p.3)

48	Poulus et al. (2022)	LoL, CS:GO, R6, OW.	"Using Swann et al. (2015) categorisation system, one athlete was classified as successful elite (athletes who have experienced some (infrequent) success at the highest level), and another classified as world-class elite (athletes who have sustained success (repeated wins over a prolonged period) at the highest level). The remaining five athletes were classified as competitive elite (athletes who regularly compete at the highest level)." (p.744).
57	Toth et al. (2019)	CS:GO	"…the Elite Skill group consisted of gamers between the Master Guardian Elite to The Global Elite rankings." (p.4).
58	Toth et al. (2021)	CS:GO	"…those who reported spending more than 5h per week specifically playing CS:GO and maintained a current competitive rank between Gold Nova Master and Global Elite were assigned to the High Skill Gamer (HSG) Expertise group. " (p.3).
Notes: Abbreviations used as follows: NS = Not specified, LoL = League of Legends, HoTS = Heroes of the Storm, OW = Overwatch, CS:GO = Counter-Strike: Global Offensive, PUBG = PlayerUnknown's Battlegrounds, DOTA 2 = Defense of the Ancients 2, CL = Clash Royale, SCI = Starcraft 1, SCII = Starcraft 2, WoW = World of Warcraft, RL = Rocket League, R6 = Rainbow Six: Seige. CoD = Call of Duty, CoC = Clash of Clans, HS = Hearthstone.			

Table 4

Definitions Provided for the Classification of Elite Esport Samples, With the Number (K) and Percentage (%) of Included Studies Reporting Each.

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	*k*	%
1. Highest level of competition	1	1	1			1				1				1				1	1	1			1				1	1	1	1	1			1	1	1	1	2	2				2	1	1	1	1	2	1		1	1	1	1	2				1	1	1	1	1	43	33.08
International competition	1	1	1			1								1						1			1				1	1	1						1	1		1					1		1			1					1									1	1	19	14.62
National competition																		1																1			1	1	1				1			1		1			1	1			1				1	1	1			14	10.77
National second-tier league or below										1																					1								1								1		1						1									6	4.62
Unspecified competitions/ leagues																			1											1														1										1										4	3.08
2. Professional status	1			1		1				1	1	1	1	1	1	1		2		2			1	1	2	1		1	1		1			1	1	1	1			1	1	1	2	2	2			1	1	1	1	1	1			1			1	1	1			45	34.62
Income level from or involvement in esports																				1											1												1	1	1																			5	3.85
Playing for a professional organisation	1			1		1				1	1	1	1	1	1	1		1		1			1	1	1	1		1	1					1	1	1	1			1	1	1	1	1	1			1	1	1	1	1	1			1			1	1	1			38	29.23
Membership with professional esports body																		1							1																																							2	1.54
3. In-game achievement		1			2		2	2	2			1					1		1		1	2				2					1	2	1			2																					1	1	1	1				27	20.77
In-game rank		1			1		1	1	1			1							1		1	1									1	1				1																					1	1	1	1				16	12.31
Achievement of a certain percentage of in-game rank					1			1	1								1					1										1				1																												7	5.38
Win ratio																										1																																						1	0.77
'Competence' measure							1																			1							1																															3	2.31
4. Domain experience		1						1														1			1	1			2							2			1					1								1						1		1	1			15	11.54
Experience								1																	1	1			1							1			1													1								1				8	6.15
Training		1																				1							1							1								1														1			1			7	5.38
Cross-category total																																																																	
1	X	X	X			X				X				X				X	X	X			X				X	X	X	X	X			X	X	X	X	X	X				X	X	X	X	X	X	X		X	X	X	X	X				X	X	X	X	X		
2	X			X		X				X	X	X	X	X	X	X		X		X			X	X	X	X		X	X		X			X	X	X	X			X	X	X	X	X	X			X	X	X	X	X	X			X			X	X	X				
3		X			X		X	X	X			X					X		X		X	X				X					X	X	X			X			X																		X	X	X	X					
4		X						X														X			X	X			X							X								X								X						X		X	X				

Table 5
Single and Multi-Category Elite Classification Frequencies

Single-Category Classifications (*k* = 29)	*k*	%
1. Highest level of competition	10	15.87
2. Professional status	11	17.46
3. In-game achievement	8	12.70
4. Domain experience	0	0.00
Multi-Category Classification (*k* = 34)	*k*	%
Highest level of competition + Professional status	17	26.98
Highest level of competition + Professional status + Domain Experience	4	6.35
In-game achievement + Domain Experience	3	4.76
Highest level of competition + Professional status + In-game achievement	2	3.17
Highest level of competition, Professional status + In-game achievement + Domain Experience	2	3.17
Highest level of competition + In-game achievement	2	3.17
Highest level of competition + In-game achievement + Domain Experience	1	1.59
Professional status + In-game achievement + Domain Experience	1	1.59
Professional status + Domain Experience	1	1.59
Professional status + In-game achievement	1	1.59

Table 6

Proposed Criterion and Questions for Defining Elite in Esports

Criterion	Questions
Success and achievements of the athlete/s	1) What is the player's highest participation standard within their esport? 2) How long has the player participated at their highest competition standard? 3) How much success has the player achieved at their highest competition standard?
Prominence and competitiveness of the esport/s	4) How big is the pool of participants in the esport? 5) How widely played is the esport? 6) How long has the esport been played competitively? 7) How big are the prize pool and audience for the esport?

Figure 1

PRISMA 2020 Flow Diagram

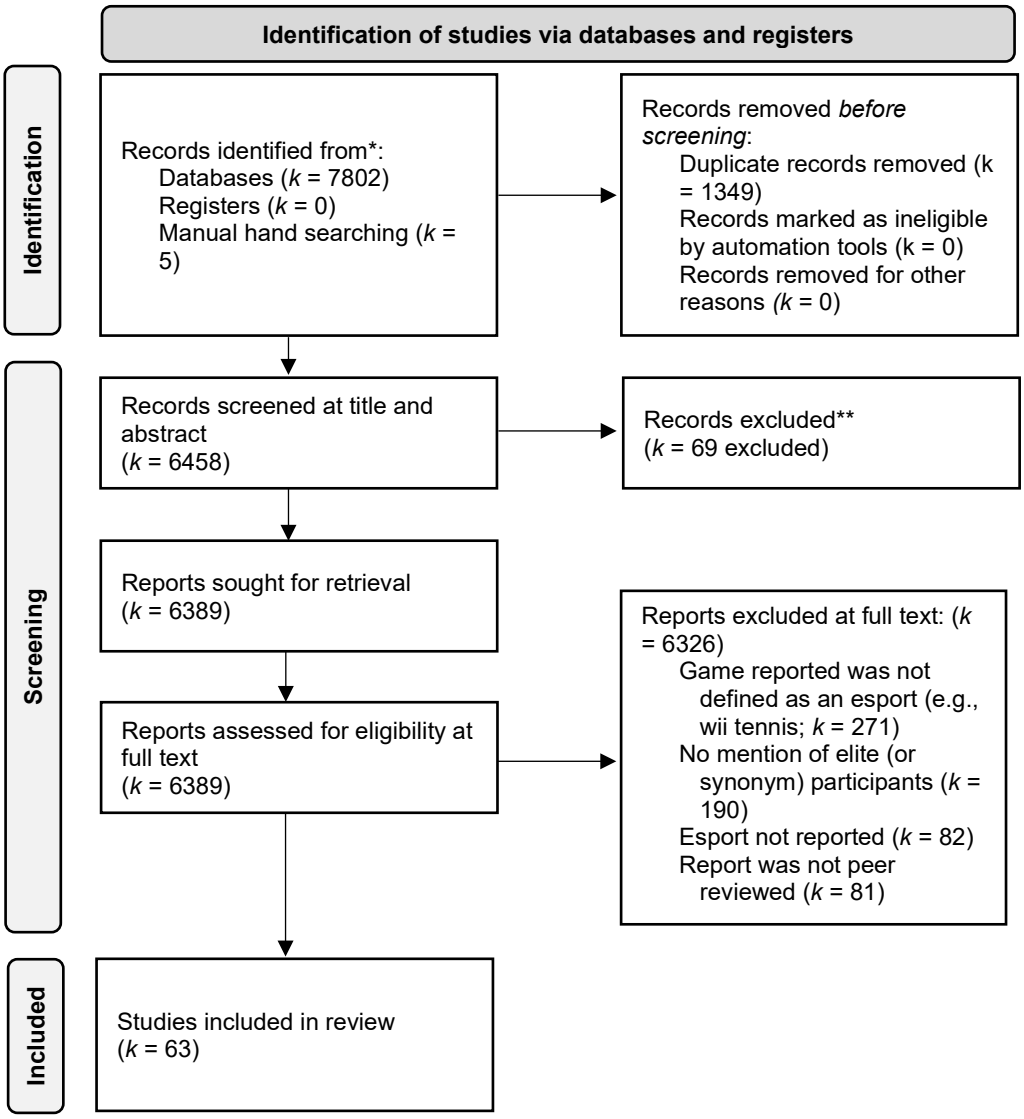
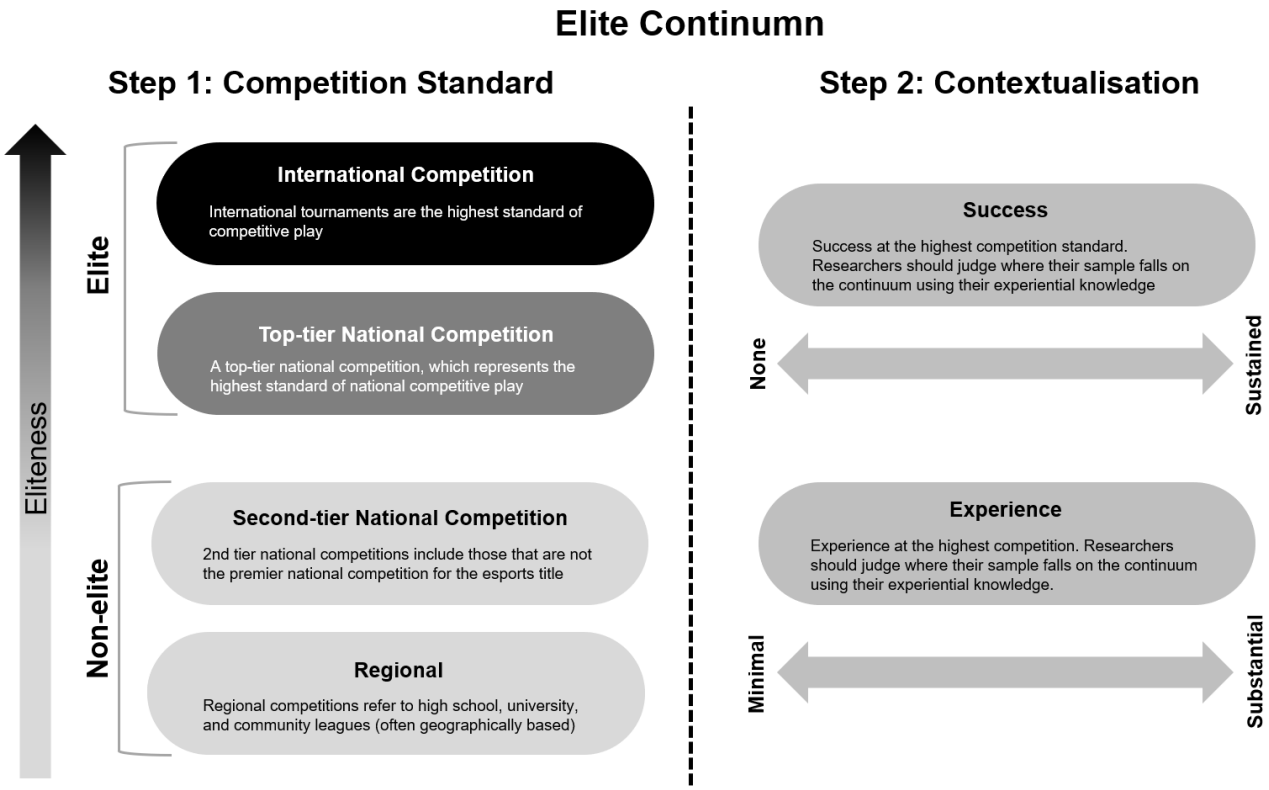


Figure 2

Elite Classification System Proposed for Esport Research



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			
Title	1	Identify the report as a scoping review.	1
ABSTRACT			
Structured summary	2	Provide a structured summary that includes (as applicable): background, objectives, eligibility criteria, sources of evidence, charting methods, results, and conclusions that relate to the review questions and objectives.	2
INTRODUCTION			
Rationale	3	Describe the rationale for the review in the context of what is already known. Explain why the review questions/objectives lend themselves to a scoping review approach.	3-5
Objectives	4	Provide an explicit statement of the questions and objectives being addressed with reference to their key elements (e.g., population or participants, concepts, and context) or other relevant key elements used to conceptualize the review questions and/or objectives.	5
METHODS			
Protocol and registration	5	Indicate whether a review protocol exists; state if and where it can be accessed (e.g., a Web address); and if available, provide registration information, including the registration number.	6
Eligibility criteria	6	Specify characteristics of the sources of evidence used as eligibility criteria (e.g., years considered, language, and publication status), and provide a rationale.	6-7
Information sources*	7	Describe all information sources in the search (e.g., databases with dates of coverage and contact with authors to identify additional sources), as well as the date the most recent search was executed.	7
Search	8	Present the full electronic search strategy for at least 1 database, including any limits used, such that it could be repeated.	7
Selection of sources of evidence†	9	State the process for selecting sources of evidence (i.e., screening and eligibility) included in the scoping review.	7-8
Data charting process‡	10	Describe the methods of charting data from the included sources of evidence (e.g., calibrated forms or forms that have been tested by the team before their use, and whether data charting was done independently or in duplicate) and any processes for obtaining and confirming data from investigators.	8
Data items	11	List and define all variables for which data were sought and any assumptions and simplifications made.	8
Critical appraisal of individual sources of evidence§	12	If done, provide a rationale for conducting a critical appraisal of included sources of evidence; describe the methods used and how this information was used in any data synthesis (if appropriate).	N/A

SECTION	ITEM	PRISMA-ScR CHECKLIST ITEM	REPORTED ON PAGE #
Synthesis of results	13	Describe the methods of handling and summarizing the data that were charted.	8
RESULTS			
Selection of sources of evidence	14	Give numbers of sources of evidence screened, assessed for eligibility, and included in the review, with reasons for exclusions at each stage, ideally using a flow diagram.	8-9; Figure 1
Characteristics of sources of evidence	15	For each source of evidence, present characteristics for which data were charted and provide the citations.	Table 3-4
Critical appraisal within sources of evidence	16	If done, present data on critical appraisal of included sources of evidence (see item 12).	N/A
Results of individual sources of evidence	17	For each included source of evidence, present the relevant data that were charted that relate to the review questions and objectives.	Table 3-4
Synthesis of results	18	Summarize and/or present the charting results as they relate to the review questions and objectives.	10-13
DISCUSSION			
Summary of evidence	19	Summarize the main results (including an overview of concepts, themes, and types of evidence available), link to the review questions and objectives, and consider the relevance to key groups.	13-19
Limitations	20	Discuss the limitations of the scoping review process.	19
Conclusions	21	Provide a general interpretation of the results with respect to the review questions and objectives, as well as potential implications and/or next steps.	20-21
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.	NA

JBI = Joanna Briggs Institute; PRISMA-ScR = Preferred Reporting Items for Systematic reviews and Meta-Analyses extension for Scoping Reviews.
* Where *sources of evidence* (see second footnote) are compiled from, such as bibliographic databases, social media platforms, and Web sites.
† A more inclusive/heterogeneous term used to account for the different types of evidence or data sources (e.g., quantitative and/or qualitative research, expert opinion, and policy documents) that may be eligible in a scoping review as opposed to only studies. This is not to be confused with *information sources* (see first footnote).
‡ The frameworks by Arksey and O'Malley (6) and Levac and colleagues (7) and the JBI guidance (4, 5) refer to the process of data extraction in a scoping review as data charting.
§ The process of systematically examining research evidence to assess its validity, results, and relevance before using it to inform a decision. This term is used for items 12 and 19 instead of "risk of bias" (which is more applicable to systematic reviews of interventions) to include and acknowledge the various sources of evidence that may be used in a scoping review (e.g., quantitative and/or qualitative research, expert opinion, and policy document).

From: Tricco AC, Lillie E, Zarin W, O'Brien KK, Colquhoun H, Levac D, et al. PRISMA Extension for Scoping Reviews (PRISMAScR): Checklist and Explanation. Ann Intern Med. 2018;169:467–473. doi: 10.7326/M18-0850.

Appendix 2

Search Terms Used in Each Electronic Database.

Block #	SPORTDiscus	APA PsycINFO	Computers & Applied Sciences Complete	Scopus
S1	TI (esport* OR "e-sport*" OR "e-athlet*" OR eathlet* OR "competitive gaming" OR cybersport* OR "cyber-sport*" OR "battle arena" OR "first-person shoot*" OR "first person shoot*" OR "real-time strategy" OR "real time strategy" OR "multiplayer online battle arena" OR MOBA OR "video gam*" OR "electronic sport*" OR multiplayer OR "computer gam*") PCC criteria addressed: Participant, Context	TI (esport* OR "e-sport*" OR "e-athlet*" OR eathlet* OR "competitive gaming" OR cybersport* OR "cyber-sport*" OR "battle arena" OR "first-person shoot*" OR "first person shoot*" OR "real-time strategy" OR "real time strategy" OR "multiplayer online battle arena" OR MOBA OR "video gam*" OR "electronic sport*" OR multiplayer OR "computer gam*") PCC criteria addressed: Participant, Context	TI (esport* OR "e-sport*" OR "e-athlet*" OR eathlet* OR "competitive gaming" OR cybersport* OR "cyber-sport*" OR "battle arena" OR "first-person shoot*" OR "first person shoot*" OR "real-time strategy" OR "real time strategy" OR "multiplayer online battle arena" OR MOBA OR "video gam*" OR "electronic sport*" OR multiplayer OR "computer gam*") PCC criteria addressed: Participant, Context	TITLE (esport* OR "e-sport*" OR "e-athlet*" OR eathlet* OR "competitive gaming" OR cybersport* OR "cyber-sport*" OR "battle arena" OR "first-person shoot*" OR "first person shoot*" OR "real-time strategy" OR "real time strategy" OR "multiplayer online battle arena" OR "video gam*" OR "electronic sport*" OR multiplayer OR "computer gam*") PCC criteria addressed: Participant, Context
S2	AB (esport* OR "e-sport*" OR "e-athlet*" OR eathlet* OR "competitive gaming" OR cybersport* OR "cyber-sport*" OR "battle arena" OR "first-person shoot*" OR "first person shoot*" OR "real-time strategy" OR "real time strategy" OR "multiplayer online battle arena" OR MOBA OR "video gam*" OR "electronic sport*" OR multiplayer OR "computer gam*")	AB (esport* OR "e-sport*" OR "e-athlet*" OR eathlet* OR "competitive gaming" OR cybersport* OR "cyber-sport*" OR "battle arena" OR "first-person shoot*" OR "first person shoot*" OR "real-time strategy" OR "real time strategy" OR "multiplayer online battle arena" OR MOBA OR "video gam*" OR "electronic sport*" OR multiplayer OR "computer gam*")	AB (esport* OR "e-sport*" OR "e-athlet*" OR eathlet* OR "competitive gaming" OR cybersport* OR "cyber-sport*" OR "battle arena" OR "first-person shoot*" OR "first person shoot*" OR "real-time strategy" OR "real time strategy" OR "multiplayer online battle arena" OR MOBA OR "video gam*" OR "electronic sport*" OR multiplayer OR "computer gam*")	ABS (esport* OR "e-sport*" OR "e-athlet*" OR eathlet* OR "competitive gaming" OR cybersport* OR "cyber-sport*" OR "battle arena" OR "first-person shoot*" OR "first person shoot*" OR "real-time strategy" OR "real time strategy" OR "multiplayer online battle arena" OR "video gam*" OR "electronic sport*" OR multiplayer OR "computer gam*")

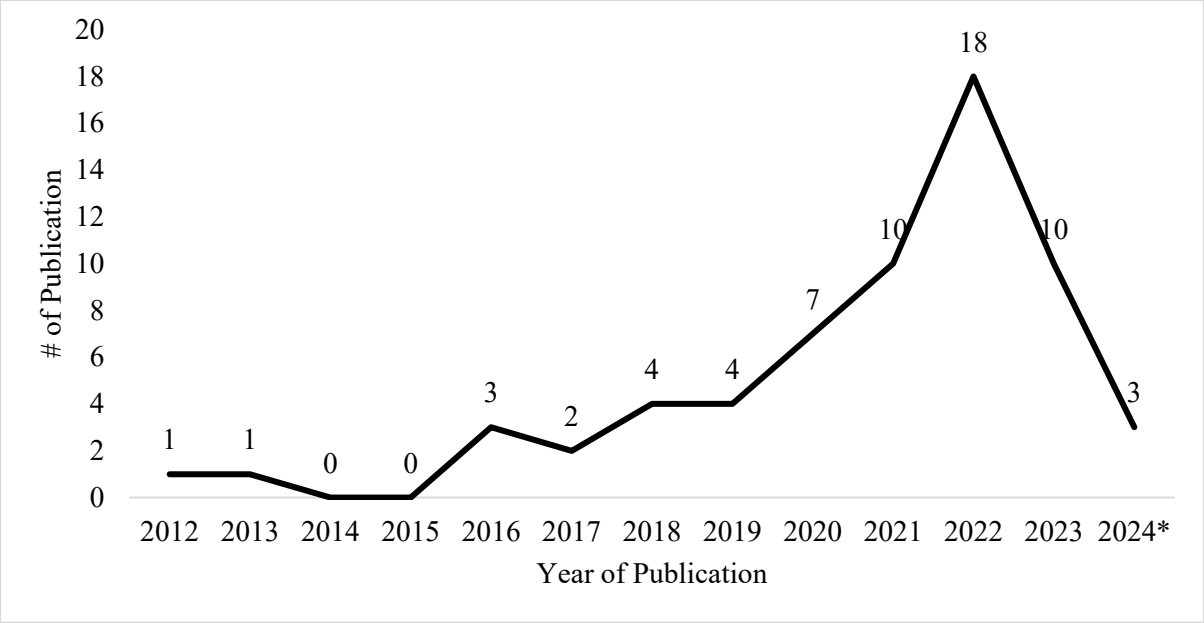
	PCC criteria addressed: Participant, Context	PCC criteria addressed: Participant, Context	PCC criteria addressed: Participant, Context	PCC criteria addressed: Participant, Context
S3	DE "ESPORTS" OR DE "VIDEO game competitions" OR DE "ESPORTS" OR DE "ELECTRONIC games" OR DE "MULTIPLAYER games" OR DE "VIDEO games" PCC criterion addressed: Context	DE "Computer Games" OR DE "Digital Gaming" PCC criterion addressed: Context	ZU "esports" or ZU "video game competitions" or ZU "multiplayer games" or ZU "electronic games" or ZU "cyber sport p/l" PCC criterion addressed: Context	S1 OR S2
S4	S1 OR S2 OR S3	S1 OR S2 OR S3	S1 OR S2 OR S3	TITLE (elite* OR expert* OR professional* OR ((high* OR medium OR low*) W/5 performance) OR ((high* OR medium OR low*) W/5 skill*)) PCC criterion addressed: Concept
S5	TX ((elite* OR expert* OR experience* OR professional*) OR ((high* OR medium OR low*) n5 performance) OR ((high* OR medium OR low*) N5 skill*)) PCC criterion addressed: Concept	TX ((elite* OR expert* OR experience* OR professional*) OR ((high* OR medium OR low*) n5 performance) OR ((high* OR medium OR low*) N5 skill*)) PCC criterion addressed: Concept	TX ((elite* OR expert* OR experience* OR professional*) OR ((high* OR medium OR low*) n5 performance) OR ((high* OR medium OR low*) N5 skill*)) PCC criterion addressed: Concept	ABS (elite* OR expert* OR professional* OR ((high* OR medium OR low*) W/5 performance) OR ((high* OR medium OR low*) W/5 skill*)) PCC criterion addressed: Concept
S6	S4 AND S5	S4 AND S5	S4 AND S5	S4 OR S5
S7	Limit to the English language and Scholarly Peer-Reviewed Journal Articles, where possible.	Limit to the English language and Scholarly Peer-Reviewed Journal Articles, where possible.	Limit to the English language and Scholarly Peer-Reviewed Journal Articles, where possible.	S3 AND S6

				Limit to the English language and Articles.
Records retrieved	977 Titles	3375 Titles	1674 Titles	1776 Titles
Notes: PCC = Participant, Concept, Context				

Appendix 3 Charting Table is attached as an excel document.

Appendix 4

Publication Trend for Studies with Elite Esport Samples Included in the Review



*As of March 1st, 2024.

Appendix 5

Journal of Publication for the Included Studies

Journal name	Articles (*k*)	Proportion of total articles (%)
Sports Journals	**14**	**29.79**
Case Studies in Sport and Exercise Psychology	1	2.13
Psychology of Sport and Exercise	2	4.26
Journal of Sport Sciences	1	2.13
MDPI - Sports	1	2.13
Sport Management Review	1	2.13
Sport, Exercise, and Performance Psychology	1	2.13
Sports Medicine - Open	1	2.13
The Journal of Sport and Exercise Science	1	2.13
Sport in Society	1	2.13
Sports Medicine - Open	1	2.13
Sport, Exercise, and Performance Psychology	1	2.13
Journal of Physical Education and Sport	1	2.13
Slobozhanskyi Herald of Science and Sport	1	2.13
Computer Journals	**11**	**23.40**
International Journal of Gaming and Computer-Mediated Simulations (IJGCMS)	7	14.89
Computers in Human Behaviour	3	6.38
International Journal of Human-Computer Interaction	1	2.13
Other Journals	**38**	**80.85**
International Journal of Environmental Research and Public Health	4	8.51
International Journal of Esports Research	3	6.38
Frontiers in Human Neuroscience	3	6.38
PeerJ	2	4.26
Frontiers in Psychology	2	4.26
Retos: nuevas tendencias en educación física, deporte y recreación	2	4.26
Acta Psychologica	1	2.13
Applied Ergonomics	1	2.13
Chronobiology International	1	2.13
Heliyon	1	2.13
IEEE Access	1	2.13
IEEE Sensors	1	2.13
International Journal of Morphology	1	2.13
Journal of Expertise	1	2.13
Journal of Vision	1	2.13
Journal Psychiatric Research	1	2.13
MDPI - Biology	1	2.13
MDPI - Sustainability	1	2.13
Nerual Plasticity	1	2.13
PLOS ONE	1	2.13
Psychiatry Investigation	1	2.13
Avaliação Psicológica	1	2.13
Performance Enhancement and Health	1	2.13
Philosophy & Technology	1	2.13
Multimedia Tools & Applications	1	2.13
Displays	1	2.13
Neuroscience Letters	1	2.13
Physical Education Theory and Methodology	1	1.00
Total	63	100.0

Appendix 6.
Esports title abbreviation table

Abbreviation	Esport title
LoL	League of Legends
OW	Overwatch
DOTA2	Defense of the Ancients 2
HoTS	Heroes of the Storm
CS:GO	Counter-Strike: Global Offensive
PUBG	PlayerUnknown's Battlegrounds
CL	Clash Royale
SCI	Starcraft 1
SCII	Starcraft 2
WoW	World of Warcraft
RL	Rocket League
R6	Rainbow Six: Seige
CoC	Clash of Clans
CoD	Call of Duty
HS	Hearthstone