



The role of the body in electronic sport: a scoping review

Supplementary Information

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Introduction

The body can be considered the central element for many sports or sports-related activities. From a historic perspective, physical exercise has commonly been used to form, shape, or discipline the body, with competitive sport following the credo of *citius, altius, fortius*. The differentiation of sport has led to the relevance of the body in sport and exercise becoming more multifaceted. While sport is usually connoted with coordinative or physical skills, the importance of topics like aesthetics and health has been rising, not only for sports but for society as a whole (Bette, 2017; Dimitriou, 2019; Rail & Harvey, 1995; Sabiston, Pila, Vani, & Thogersen-Ntoumani, 2019; Stichweh, 1990; Thiel, Seiberth, & Mayer, 2013). Thus, the relevance of the body is changing with the ongoing differentiation of sport. This is closely related to current changes in society since sport can be seen as a forerunner for societal changes (Armstrong & Giulianotti, 1998; Davenport, 2014). Especially digitalization is a driving force for societal change and therefore also for changes in sport (Miah, 2014; Ratten, 2019). Concerning sport, we see new movement practices involving virtual and physical practices, including exergames (Peng, Lin, & Crouse, 2011), motion-based video games (Ahir, Govani, Gajera, & Shah, 2020; Jenny, Manning, Keiper, & Olich, 2017), or electronic sport (esport), which

is presumably the most popular example. Two approaches to defining esport can be distinguished in literature: first, there are game-related definitions that mention the degree of organization, competitiveness, or professionalization in esport (Şentuna & Kanbur, 2016; Weiss & Schiele, 2013). Secondly, sport-related definitions refer to the relevance of physical and mental skills while using information technology to compete against each other (Hemphill, 2005; Wagner, 2006). However, none of the said definitions are mutually exclusive but instead complement each other. For this review, we describe esport as organized competitive video and computer gaming. Depending on the game played, two or more parties face each other under equal starting conditions, trying to outperform the opponent based on strategical, tactical, mental, and physical prowess. Various games from different genres can be considered esport if the competitions are held according to the abovementioned criteria (Riatti & Thiel, 2021).

Esport originated from the gaming industry but has become part of the sporting environment up to the point that nowadays, many nations accept it as a sport (Edgar, 2019; Schmidt, Heil, Fleischer, & Woll, 2019; Taylor, 2012). Meanwhile, it outperforms many traditional sports in terms of professionalization, spectatorships, prizemoney, or sponsoring, with the peak of popularity yet to be reached (Ballhaus, Vitale, Advani, & Akman, 2020; Schmidt, Schlör, & Woll, 2020b). Since the very first esport tournaments (actually, this terminology did not exist back then; Wagner, 2006), hegemonic esport games have changed often, with only a few of them maintaining their status as prominent titles, like *League of*

Legends (Riot Games, USA), *Defence of the Ancients (DOTA2)*, or the *Counter-Strike* franchise (both Valve Corporation, USA). Esport-related terminology has also changed over time. Until today, there has still been no consensus reached about a predominant terminology since its first mention in 1999 (Wagner, 2006). Common expressions are e-sport, esport, cybersport, both in singular or plural form, pro gaming, or professional gaming. Esport athletes at a top level are usually referred to as pro gamers (Taylor, 2012). The German Olympic Sports Confederation (DOSB) distinguishes between esport including games simulating traditional sports like football or basketball, and egaming which refers to shooter, action, or strategy games (Willimczik, 2019). However, it must be stated that the DOSB's suggestion is not acknowledged by the community, associations, or the industry (Fröhlich, 2018). It is comprehensible to argue that motion-based video games (like exergames) or virtual sports like golf simulations can also be mentioned in the context of esport since they are simulations of physical activity or sport with the use of electronic devices (Jenny et al., 2017). Still, these types of games play no major role in competitive computer gaming. The many terms describing esport show a similarity to the discourse about which activities can be described as sport: physical activity, exercise, training, or the term sport itself, which refers to competitions, can all be labeled sport, although referring to different activities (Caspersen, Powell, & Christenson, 1985; Thiel et al., 2013).

Despite the body-related demands of competing, such as physical prowess or hand-eye coordination, and even though esport is already recognized as a sport

Table 1 Search terms for literature search adjusted to fit the EBSCOHost database

Set	Search terms
#1	"electronic sport*" OR e-sport* OR esports* OR cybersport OR "professional gam*" OR "pro gam*" OR "competitive gam*" OR "elektronischer sport*" OR "sport electronic*" OR "deporte* electronic*" OR ciberdeporte* OR "sport electronique"
#2	body OR körper OR cuerpo OR corpo OR corps
#3	#1 AND #2

by various national umbrella sport governmental organizations, there is still an ongoing debate about the question of whether esports should be included in national and international sporting organizations (Thiel & John, 2020; Willimczik, 2019). Skeptics bring up a presumable lack of physicality and the fact that the players' movement is mediated through a digital environment. The corporeality in esports seems to be incompatible with what is hegemonically recognized as a sport. Some scholars argue that esports stands in contradiction to the values of traditional sports (Borggreve, 2021; Holt, 2016; Parry, 2019). In contrast, esports can be seen as a logical development of sport, fitting well into the modern digitalized, individualized, and disembodied world. It bears high educational, pedagogical, and social potential for various stakeholders of the existing sport system including clubs, associations, or educational institutions (Jonasson & Thiborg, 2010; Riatti & Thiel, 2021; Schmidt et al., 2019; Thiel & Gropper, 2017; Thiel & John, 2020).

In the debate about whether esports can be regarded as a sport in a traditional sense, many arguments refer to the domain of execution and application (Parry, 2019; Thiel & John, 2020). This indicates where the execution of an action takes place and where the effect of the action, the competitive performance, happens (Holt, 2016). While in traditional sports both domains overlap, in esports, the former takes place in real life while the latter is in the digital environment of the games. The mediation of the players' movement through digital avatars is unprecedented in traditional sports since the athletic corporeality representing the in-game action is located in a virtual reality. Hence, the body, the key element in many areas of traditional sport (Bette, 2017; Rail & Harvey, 1995; Sabiston et al.,

2019; Stichweh, 1990; Thiel et al., 2013), is presumably detached from the actual competition.

However, although the body might not be on display as in traditional sports, it does not mean that the body is absent or irrelevant in esports. It plays a role in both the digital and analogous world and is present in four different ways: 1) the executing player's physical appearance (height, weight, attractiveness, etc.); 2) the esports-specific athletic abilities of the player (hand and finger movements, neuromuscular coordination, etc.); 3) the interrelation between corporeality and the digital avatar (the embodiment of virtual actions by the executing player); and 4) the physical appearance of the avatar (style, clothes, height, weight, etc.). The first two types of the body's involvement in esports do not differ in principle from the role the body plays in traditional sports. The latter two represent a key distinction between esports and traditional sports, not only regarding the relation between player and avatar but also regarding the selection of the avatar's virtual physical characteristics.

To our knowledge, there is no systematic literature analysis that investigates the role of the body in esports considering these four facets. Therefore, this paper examines the question of which role the body plays in esports to contribute to a more differentiated discussion about the similarities and differences between esports and traditional sport. A scoping review approach has been chosen because it is regarded as a gold standard for reviewing research that is not yet characterized by empirical evidence or RCTs. It helps to 1) give an overview of existing literature on a very broad and unsystematic topic; 2) specifically depict characteristics of the role of the body in esports based on current literature; and 3) elaborate research gaps and desider-

ata that allow derivation of theoretical and practical implications as well as delivering a basis for future research about esports (Arksey & O'Malley, 2005; Peters et al., 2017; Tricco et al., 2018).

Methods

Esports literature has greatly increased over the past few years, but it is still considered a novel field of research. While the early publications were mainly focused on definitions and descriptions of esports, research is diversifying and becoming more interdisciplinary (Reitman, Anderson-Coto, Wu, Lee, & Steinkuehler, 2020; Riatti & Thiel, 2021). When trying to understand specific phenomena within the field of esports, such as the role of the body in this paper, it is helpful to elaborate on what has been investigated so far and identify open research paths in this field for future research. For this purpose, we chose to conduct a scoping review, as these are well suited for treating broad research questions and gaining an overview of the current state of research (Arksey & O'Malley, 2005; von Elm, Schreiber, & Haupt, 2019). We use the Preferred Reporting Items for Systematic Reviews and Meta-Analysis extension for scoping reviews (PRISMA-ScR) guidelines (Tricco et al., 2018). The PRISMA-ScR standard optimizes the methodological rigor when compared to the classic approach of scoping reviews, such as the one by Arksey and O'Malley (2005). It features a checklist of 20 essential and two optional reporting items which help to standardize scoping reviews. The outline of this scoping review was specified in a protocol in advance, including objectives, eligibility criteria, and method (<https://osf.io/h8rke>). Since this methodology can be followed iteratively, deviations from the protocol might occur (Arksey & O'Malley, 2005; Tricco et al., 2018; von Elm et al., 2019). Any divergences or modifications are noted in the following chapters.

Search strategy

The search strategy was developed and tested based on the heterogeneous termi-

nology of esports. It was matched to the term “body” and adapted for the relevant databases. **Table 1** exemplarily shows the search terms for the EBSCOHost database, including the use of search operators to increase methodological rigor (Kugley et al., 2017). The search terms were not only used for the title but in all pieces of information provided by the databases about potential publications. This was done because the word count for the title and abstract is limited and might not mention the relevant terminology, or because other synonyms for esports were used in these fields. Since literature in English, German, Italian, Spanish, and French was eligible for this review, we translated the search terms for each language. Still, the most common terms describing esports are unilingually accepted. Overall, this resulted in a heterogeneous search strategy that fits the scoping review approach, since it does not call for a deep dive into the topic but examines it on a broad level. For the same reason, no publication date limitation was set. The search was conducted on March 28, 2022. This review followed the proposed four steps for conducting the search (Arksey & O’Malley, 2005; Tricco et al., 2018): 1) searching electronic databases (EBSCOHost, PubMed, Web of Science, and SagePub); 2) checking reference lists of eligible works; 3) additional research on GoogleScholar and hand-searching key journals to prevent omitting relevant papers and grey literature; 4) checking existing networks, relevant organizations, and conferences for publications.

Selection process and data extraction

As described in the protocol (<https://osf.io/h8rke>), this scoping review follows specific criteria regarding the inclusion and exclusion of studies: 1) all types of empirical research studies, including qualitative, quantitative, and mixed-method research studies, both experimental and observational, were eligible; 2) all types of publications were considered, such as books, book sections, theses, journal papers, conference and workshop proceedings, grey literature,

and such like; 3) there were no restrictions regarding the publication date; 4) research in English, French, German, Spanish, and Italian was eligible, regardless of its geographical origin; 5) full-text availability was mandatory. Literature was excluded if it 1) was non-empirical, like reviews, editorials, comments, essays, abstracts, or conference submissions; 2) did not discuss esports in terms our framework sets out; or 3) did not discuss corporeality regarding the four different ways in which it can be observed in esports (player’s physical appearance, player’s skills and abilities, interrelation between corporeality and digital avatar, and avatar’s physical appearance).

Articles were first scanned by title, then by abstract, and lastly by full text. If the title or abstract demonstrated that the publication did not refer to our topic as intended based on our inclusion and exclusion criteria, it was excluded from the sample. During the full-text search, we checked whether the studies were empirical and whether their findings were relevant to our research question. If an article had an overarchingly different topic, but still offered findings for our research question, the relevant findings were nonetheless extracted. This selection process is illustrated in the flow diagram (**Fig. 1**). Since the PRISMA-ScR guidelines recommend conducting the sifting process with more than one reviewer, we conducted the search with two reviewers independently. This helps to increase the methodological precision of the scoping review (Tricco et al., 2018; von Elm et al., 2019). Any disagreement between the reviewers was settled via constructive debating.

The study selection was an iterative process, so we used the knowledge gained throughout the search to adapt and redefine the inclusion and exclusion criteria and the search strategy, for example by including Boolean operators. Further, the data extraction tool was slightly altered throughout the process compared to what we defined in the protocol. This is also in line with the iterative nature of a scoping review (Tricco et al., 2018). Eventually, the following data were extracted and assigned: Author, year, origin, language, aim, methodology, sample

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Abstract

The popularity of competitive computer and videogaming, also known as electronic sport (esport), has been rising rapidly during the past decades. Because of many parallels with traditional sports, like competitiveness, skill requirements, degree of professionalization, or the way it is portrayed in the media, esports has been adopted as part of the sport canon in many countries. Still, critics argue that playing computer games lacks the physicality commonly seen in traditional sports. A significant part of the competition is mediated through digital platforms and the spotlight shifts from the players’ appearance and actions to their digital avatars. This paper takes on this issue by exploring existing evidence about the role of the body in esports via a scoping review approach. According to the findings of 47 studies, the body’s role in esports is akin to that in traditional sport, including specific motoric requirements or biometric responses. Beyond that, the body can be seen as a link between the digital and physical worlds. Players embody digital avatars in the form of esports-specific movements, transfer of norms and ideals, and identification with the in-game characters. Future research can use this review as a basis for scientific approaches to individual phenomena regarding corporeality in esports and intercorporeality.

Keywords

Esport · Sociology · Gaming · Digitalization · Corporeality · Physicality

characteristics, and relevant findings for the scoping review.

Results

The initial search yielded 4644 records. After removing duplicates, scanning titles and abstracts, and checking the full texts, 30 publications were deemed eligible. 13 additional records were added via cross-referencing and four records were added through other sources. In

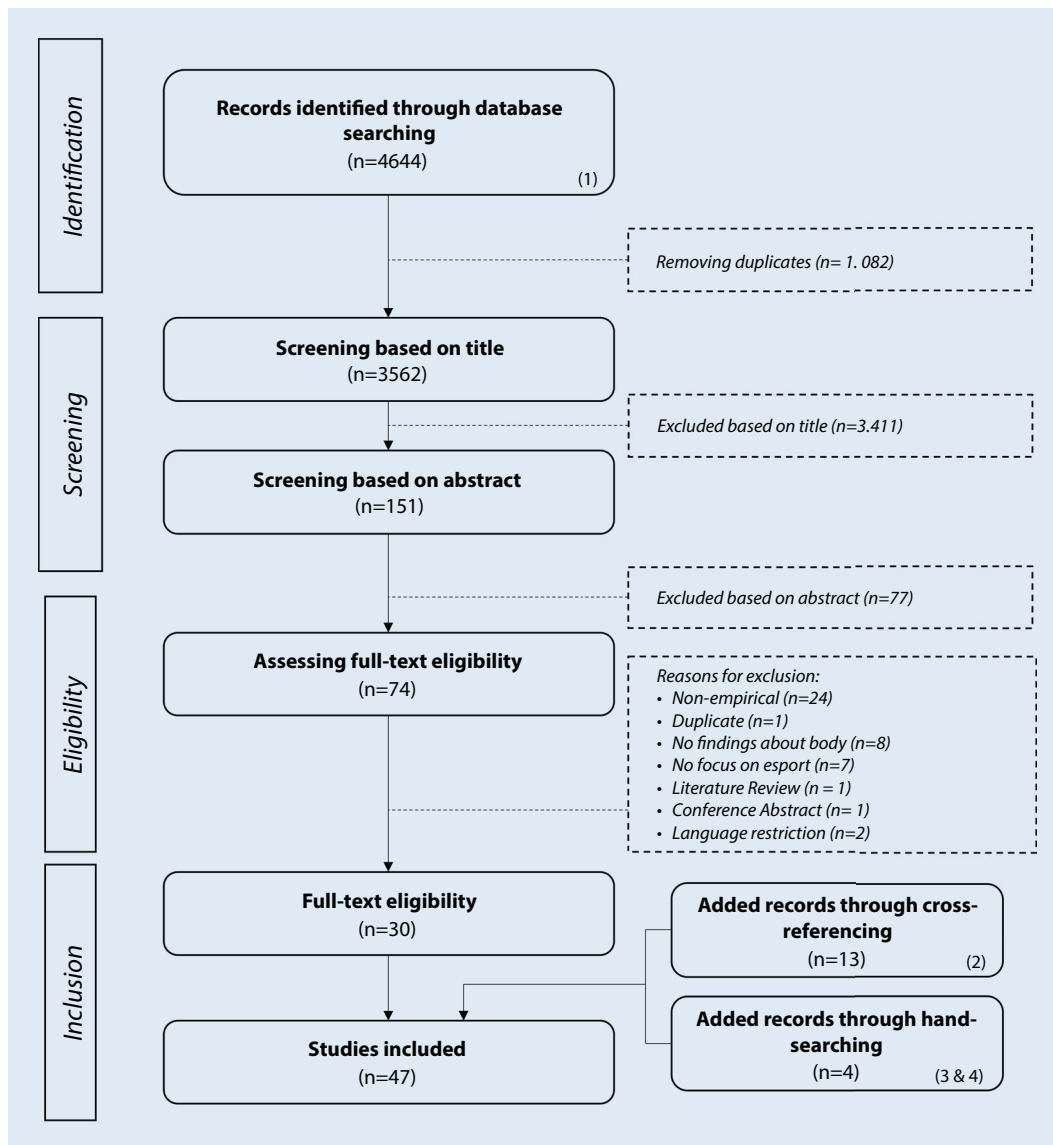


Fig. 1 ◀ Flow diagram adapted from the PRISMA-ScR guidelines (Tricco et al., 2018)

the end, 47 publications were included in this scoping review (◻ Fig. 1).

The earliest publication is from 2007, with more than three quarters published from 2018 onwards ($n = 37$, 78.72%) and most studies ($n = 16$, 34.05%) published in 2020. Although studies in five languages were eligible, eventually, only articles in English ($n = 43$, 91.49%) and German ($n = 4$, 8.51%) were found to be suitable. Still, literature from 16 different countries was identified for the review. Most articles are from the USA ($n = 15$, 31.91%) and Germany ($n = 6$, 12.44%). Cumulatively, nine research pieces are from Nordic countries including Denmark ($n = 4$, 8.51%), Sweden ($n = 2$, 4.26%), Finland ($n = 2$, 4.26%), and

Norway ($n = 1$, 2.13%). Eight different methodological approaches were found, with most studies applying one method ($n = 34$, 72.34%), 12 research pieces using two (25.53%), and one using three (2.13%). Respective data were collected mainly by quantitative surveys ($n = 19$, 40.43%), qualitative interviews ($n = 12$, 25.53%), and biometrical analysis ($n = 10$, 21.28%). Five mixed-methods analyses combined qualitative interviews with observations. Biometrical analyses were used twice with observations and once with a quantitative survey. Quantitative surveys were matched twice with experimental trials and once with observation. One article combines qualitative interviews and secondary data analysis. One

publication used three methods, namely qualitative interviews, observations, and secondary data analysis.

◻ Table 2 shows information about the population of the included studies. The sample sizes of the research pieces using a quantitative survey as the main method range from 34 (Roncone, Kornspan, Hayden, & Fay, 2020) to 15,392 (Ratan, Fordham, Leith, & Williams, 2019). Qualitative interview studies include seven (Poulus, Coulter, Trotter, & Polman, 2021; Smith, Birch, & Bright, 2019) to 34 subjects (Pargman & Svensson, 2019; Rambusch, Jakobsen, & Pargman, 2007). Both qualitative interview studies with 34 subjects are based on the same sample. One article

Table 2 Description of studies' samples, including size, population, age, and gender

Study	Sample size	Population ^a	Age	Gender (F)
Rambusch et al. (2007)	34	Pro gamers	19–25	n. a.
Taylor, Jenson, and de Castell (2009)	n. a.	n. a.	n. a.	n. a.
Witkowski (2012)	19	Pro gamers	n. a.	0.00%
Kari and Karhulahti (2016)	115	Esport players	20.8 ± 4.4	2.61%
Anderson (2017)	n. a.	n. a.	n. a.	n. a.
Ford (2017)	n. a.	Esport players	n. a.	n. a.
Hamari and Sjöblom (2017)	888	Esport fans	22.75	7.09%
Schaeperkoetter et al. (2017)	33	Esport players	n. a.	3.03%
Ruvalcaba, Shulze, Kim, Berzenski, and Otten (2018)	179	Esport players	n. a.	(1) 66.30% (2) 44.83%
Schmidt, Kowal, and Woll (2018)	346	Esport players (68) Control group (278)	18–46	0.00%
Diankun, Weiyi, Tiejun, Yuening, and Dezhong (2019)	60	Pro gamers (26) Esport players (34)	(1) 25.35 ± 2.39 (2) 24.59 ± 2.13	0.00%
Myers (2019)	393	Esport players	18–30	4.50%
Pargman and Svensson (2019)	34	Pro gamers	19–25	n. a.
DiFrancisco-Donoghue, Balentine, Schmidt, and Zwibel (2019)	65	Esport players (collegiate)	18–22	n. a.
Ratan et al. (2019)	15,392	Esport players (League of Legends)	18+	4.00%
Smith et al. (2019)	7	Esport players (CS:GO)	20.57 ± 2.07	0.00%
Thomas, Rothschild, Earnest, and Blaisdell (2019)	9	Pro gamers (League of Legends)	20.8 ± 2	0.00%
Bayrakdar, Yildiz, and Bayraktar (2020)	137	Esport players	19.92 ± 2.21	0.00%
Choi, Slaker, and Ahmad (2020)	n. a.	n. a.	n. a.	n. a.
DiFrancisco-Donoghue, Werner, Douris, and Zwibel (2020)	24	Esport player (13) Control group (11)	(1) 20.2 ± 1.7 (2) 19.2 ± 1.3	0.00%
Egliston (2020a)	24	Esport players (DOTA2)	n. a.	n. a.
Egliston (2020b)	24	Esport players (DOTA2)	n. a.	n. a.
Hao et al. (2020)	475	Esport players	18–22	100%
Lindberg et al. (2020)	188	Esport players	17.1 ± 2.3	2.10%
Rudolf et al. (2020)	1066	Esport players	22.9 ± 5.9	8.1%
Sainz, Collado-Mateo, and Coso (2020)	15	Pro gamers	22 ± 3	n. a.
De Las Heras, Li, Rodrigues, Nepveu, and Roig, (2020)	18	Pro gamers (League of Legends)	22 ± 3.0	11.11%
Nagorsky and Wiemeyer (2020)	1835	Esport players	13–47 (20.9 ± 4.5)	4.00%
Sousa et al. (2020)	17	Esport players (Overwatch & League of Legends)	20.1 ± 1.8	0.00%
Trotter, Coulter, Davis, Poulus, and Polman (2020)	1772	Esport players	n. a.	9.40%
Ronccone et al. (2020)	34	Esport players (collegiate)	18–23 (20.02 ± 1.46)	0.00%
Glass and McGregor (2020)	9	Esport players (Overwatch)	n. a.	22.22%
Schmidt, Gnam, Kopf, Rathgeber, and Woll (2020a)	23	Esport players	23	17.39%
Buzzelli and Draper (2021)	120	Esport players (collegiate)	n. a.	8.3%
Ekdahl (2021)	10	Esport coaches (League of Legends)	n. a.	0.00%

Table 2 (Continued)

Study	Sample size	Population ^a	Age	Gender (F)
Ekdahl and Ravn (2021)	12	Esport coaches (League of Legends & CS:GO)	n. a.	0.00%
Giakoni-Ramírez, Duclos-Bastías, and Yáñez-Sepúlveda (2021)	53	Pro gamers	21.01 ± 0.39	n. a.
Hussain et al. (2021)	9	Esport players	19–29	100%
Poulus et al. (2021)	7	Pro gamers	24 ± 4.2	0.00%
Schelfhout, Bowers, and Hao (2021)	n. a.	n. a.	n. a.	n. a.
Silva, Correia, and Silva (2021)	7	Esport players	24–34	85.71%
Tjonndal (2021)	n. a.	n. a.	n. a.	n. a.
Paramitha, Hasan, Iلسya, Anggraeni, and Ramadhan (2021)	50	Esport players	21.5 ± 1.01	0.00%
Haupt, Wolf, and Heidenreich (2021)	1	Esport players	32	0.00%
Giakoni-Ramírez, Merellano-Navarro, and Duclos-Bastías (2022)	260	Pro gamers	18–30 (21.30 ± 2.26)	0.00%
Rudolf et al. (2022)	1038	Esport players	23.0 ± 5.4	8.8%
Yu, Brison, and Bennett (2022)	479	Esport fans	18–39	n. a.

^aIf the skill level is not mentioned or includes various skill levels, it is described as *esport*

applies a qualitative survey yielding data from 393 participants (Myers, 2019). The studies' population includes all skill levels of competitive gaming, ranging from world-class professionals to collegiate players, to amateur and casual players. Some papers focus only on specific esport titles, namely *League of Legends*, *Counter-Strike: Global Offensive* (CS:GO), *DOTA2*, *Overwatch* (Activision Blizzard, USA), or *Fortnite* (Epic Games, USA). On average, the age of the participants is in the early and mid-twenties, with an overall range from 13 to 47. 14 articles include no information regarding the ratio of the participants' genders, or this cannot be reported due to the studies' designs. Only four research pieces have more female participants than males. Three of them focus on the experiences of women in esport, with two deliberately including only female esport players. 14 papers have significantly more male participants (2.1 to 22.22%) and the samples of 15 studies consist entirely of males. Only a few studies mention information about the cultural background, ethnicity, or nationality of the subjects, for example when it was relevant to the research question (Hao et al., 2020; Hussain, Yu, Cunningham, & Bennett, 2021).

Concerning the different forms of how the body is displayed in esport, 27 stud-

ies can be classified under the topic "appearance and attributes of the player's body" (1), 34 under the theme "esport-specific physical performance requirements" (2), 11 under the subject "interweaving between physicality and digitality" (3), and three fall under the area "appearance of players' avatars" (4). In the following subsection, each topic is treated individually, giving the possibility to further elaborate on the distinctive findings. 22 articles can be assigned to one of the four categories, another 22 to two topics, and three studies to three topics. Therefore, some works are reported multiple times in the following section. ■ **Table 3** summarizes all included publications according to the respective subject areas they fall under.

(1) Body appearance and attributes

Overall, 27 studies fall under this topic. All findings are related to what is known about the physical attributes and appearance of the players' bodies. The general physical activity of esport players is reported as above average, for example according to WHO recommendations (DiFrancisco-Donoghue et al., 2020; Kari & Karhulahti, 2016; Paramitha et al., 2021; Roncone et al., 2020; Rudolf et al., 2020; Rudolf et al., 2022). Buzzelli and Draper (2021) mention that for com-

petitive gamers, body perception is less important than social benefits through esport. According to Tjonndal (2021), there is a public perception of competitive gamers being obese, unhealthy, and not physically active. One research piece investigates the competitive gamers' self-perceived fitness level, revealing that 21% claim to have a very low to low fitness level, 46% intermediate, and 33% consider themselves as having good or very good fitness (Nagorsky & Wiemeyer, 2020). Regarding a self-reported health status, few claim to have very poor (0.2%) or poor health (4.8%), while 38.2% report a very good and 18.2% report an excellent health condition (Rudolf et al., 2020).

Several analyses determined the body-mass-index to describe the body of esport players. While some simply surveyed the BMI (Lindberg et al., 2020; Schmidt et al., 2020a), others used it to depict an image of physical health among esport players. However, the findings are mixed: a few studies imply that the average BMI of esport players is above average (Thomas et al., 2019), with trends toward obesity (Rudolf et al., 2020; Schmidt et al., 2018; Trotter et al., 2020). Trotter et al. (2020) compared data from respondents from 65 different countries and found no significant difference between the origin of the players. The same findings

Table 3 Subject areas treated across all studies

	Subject area	n	(%)	Studies
(1)	Physical bodily appearance and attributes	27	57.45	Anderson (2017); Bayrakdar et al. (2020); Buzzelli and Draper (2021); Choi et al. (2020); DiFrancisco-Donoghue et al. (2020); Giakoni-Ramírez et al. (2021); Giakoni-Ramírez et al. (2022); Hamari and Sjöblom (2017); Hussain et al. (2021); Kari and Karhulahti (2016); Lindberg et al. (2020); Nagorsky and Wiemeyer (2020); Paramitha et al. (2021); Rambusch et al. (2007); Roncone et al. (2020); Rudolf et al. (2020); Rudolf et al. (2022); Ruvalcaba et al. (2018); Schelfhout et al. (2021); Schmidt et al. (2020a); Schmidt et al. (2018); Smith et al. (2019); Taylor et al. (2009); Thomas et al. (2019); Tjonndal (2021); Trotter et al. (2020); Yu et al. (2022)
(2)	Conditional and coordinative requirements of sport-specific movement	34	72.34	Bayrakdar et al. (2020); Buzzelli and Draper (2021); de Las Heras et al. (2020); Diankun et al. (2019); DiFrancisco-Donoghue et al. (2019); DiFrancisco-Donoghue et al. (2020); Egliston (2020a); Egliston (2020b); Ford (2017); Giakoni-Ramírez et al. (2021); Giakoni-Ramírez et al. (2022); Glass and McGregor (2020); Haupt et al. (2021); Kari and Karhulahti (2016); Lindberg et al. (2020); Nagorsky and Wiemeyer (2020); Paramitha et al. (2021); Pargman and Svensson (2019); Poulus et al. (2021); Rambusch et al. (2007); Rudolf et al. (2020); Rudolf et al. (2022); Sainz et al. (2020); Schaeperkoetter et al. (2017); Schmidt et al. (2020a); Schmidt et al. (2018); Silva et al. (2021); Smith et al. (2019); Sousa et al. (2020); Taylor et al. (2009); Thomas et al. (2019); Tjonndal (2021); Trotter et al. (2020); Witkowski (2012)
(3)	Interweaving between body and digitality	11	23.40	Egliston (2020a); Egliston (2020b); Ekdahl (2021); Ekdahl and Ravn (2021); Ford (2017); Hao et al. (2020); Hussain et al. (2021); Myers (2019); Poulus et al. (2021); Rambusch et al. (2007); Witkowski (2012)
(4)	Digital bodily appearance and attributes	3	6.38	Ford (2017); Hussain et al. (2021); Ratan et al. (2019)

were reported by Bayrakdar et al. (2020) as they investigated the BMI of esports players from the USA, Turkey, and South Korea. Other studies found that esports players commonly have an average BMI (Paramitha et al., 2021; Rudolf et al., 2022) but slightly higher body fat percentage (DiFrancisco-Donoghue et al., 2020), and two studies unveiled the finding that the BMI of esports players is similar to the BMI of average or healthy traditional sport athletes (Giakoni-Ramírez et al., 2021; Giakoni-Ramírez et al., 2022). Among the test subjects, higher BMI indicates longer sedentary behavior (Rudolf et al., 2020; Rudolf et al., 2022), lower physical activity (Bayrakdar et al., 2020; Trotter et al., 2020), and lower perceived general health (Rudolf et al., 2022; Trotter et al., 2020). DiFrancisco-Donoghue et al. (2020) stated that except for the BMI, all other statistics in their study indicated lower general physical health of esports players, including increased sedentary behavior, lower physical activity, lower lean body mass, lower bone mineral content, and higher body fat percentage. Lower physical activity through increased esports play time was also mentioned by Bayrakdar et al. (2020). The work by Schmidt et al. (2018) reports no difference between

gamers and the control group regarding health-relevant parameters.

Nutrition among esports players is discussed in three papers. One study asserts that diet may be important for pro gamers to maintain a sportive appearance (Rambusch et al., 2007). This is partially supported by looking at the general fruit and vegetable consumption among gamers, which reveals that although only 11% fulfill recommendations by the German Nutrition Society, professional gamers and former professional gamers follow a healthier diet than other competitive gamers. However, the latter differences are not significant (Rudolf et al., 2020). Trotter et al. (2020) reported that alcohol consumption and smoking behavior among esports players is lower than average compared to global data.

Sleep habits were investigated by six studies. Smith et al. (2019) argue that it is important for esports players to keep track of their sleep for performance purposes. Two articles imply that competitive gamers do not suffer bad sleeping behavior (DiFrancisco-Donoghue et al., 2020; Paramitha et al., 2021), while three studies identified problematic sleeping behavior among esports players, presumably because of long periods of sitting in front of the screen (Buzzelli & Draper, 2021; Rudolf et al., 2020; Rudolf et al.,

2022). Contrarily, Rudolf et al. (2020) found evidence that current professional players have significantly better sleeping behavior than former professionals.

As for the physique of players, one article found that pro gamers gesture, taunt, and communicate via body language during offline tournaments like traditional athletes (Schelfhout et al., 2021). In addition, there are mixed results regarding the connection between the players' bodily appearance and the spectators' motivation for esports consumption (Anderson, 2017; Hamari & Sjöblom, 2017; Yu et al., 2022). While Hamari and Sjöblom (2017) found no evidence that the professional players' aesthetics and body appearance are motivational drivers for spectating esports tournaments or leagues, Yu et al. (2022) argue that for female spectators, physical attractiveness is a motive for watching esports. The depiction of emotional outbursts and physical aggressiveness of professional players is well-perceived by esports fans and is seen as a motivating factor for consumption (Hamari & Sjöblom, 2017). According to Anderson (2017), the looks of professional gamers are important for their external image. On streaming platforms like *twitch.tv*, the players' appearance can be monitored through profile pictures, live streams, or videos. Corporeal aspects like

physical attractiveness help to draw attention, viewership, and ultimately profit. Two analyses show that there is a trend toward female pro gamers using their bodily appearance in a sexualized way to increase attention and audience (Anderson, 2017; Taylor et al., 2009). Ruvalcaba et al. (2018) examined different experiences between women and men in competitive gaming and observe an objectification of women on streaming platforms. For female streamers, the body is often the main object of feedback in form of discrimination, insults, inappropriate comments, or compliments (Anderson, 2017; Ruvalcaba et al., 2018). Still, staging the body while live streaming generally helps to interact with the audience by implying a corporeal presence which eventually helps to promote a broadcast (Anderson, 2017; Ruvalcaba et al., 2018). Anderson (2017) concludes that the inclusion of the body in the broadcast is a crucial element for streamers and pro gamers. Another aspect of the marketing value can be observed when looking at the advertisement of esports events which show pro gamers in sport-like aesthetics depicting the sportive competitive appearance of esports for marketing purpose (Taylor et al., 2009). Rambusch et al. (2007) imply that pro gamers are aware that athletic or healthy looks, or being in shape, are important for potential sponsorship deals, as the sponsors want their ambassadors to represent a certain positive image. However, pro gamers do not pursue athleticism or physical activity primarily for their looks, but because a healthy physique is perceived as beneficial to better performance (Kari & Karhulahti, 2016; Rambusch et al., 2007; Roncone et al., 2020; Rudolf et al., 2020; Trotter et al., 2020).

The perspective of considering the body as representative of the gender shows that esports is a terrain influenced by hegemonic masculinity. This increases the entry barrier for female players (Hussain et al., 2021; Ruvalcaba et al., 2018; Schelfhout et al., 2021; Taylor et al., 2009). Further, female gamers are more likely to be judged by fans and journalists according to their feminine appearance instead of their skill (Choi et al., 2020; Schelfhout et al., 2021). The

female body is more likely attributed to femininity than to esports-relevant performance (Choi et al., 2020).

(2) Esport-specific physical requirements

A total of 34 studies treat the specific physical requirements and skillset for competitive gaming. Generally speaking, reduced physical activity because of sedentary behavior is a common trait of competitive gaming (Bayrakdar et al., 2020; DiFrancisco-Donoghue et al., 2019; DiFrancisco-Donoghue et al., 2020; Giakoni-Ramírez et al., 2021; Giakoni-Ramírez et al., 2022; Lindberg et al., 2020; Rudolf et al., 2020; Rudolf et al., 2022; Trotter et al., 2020). Common clinical pictures in competitive gaming are hand, wrist, neck, and back pain, and eye fatigue (DiFrancisco-Donoghue et al., 2019) or musculoskeletal pain (Lindberg et al., 2020), especially from overstrain. Additionally, there is a connection between increased esports activity and decreased lean body mass, bone mineral content, and increased body fat (DiFrancisco-Donoghue et al., 2020). While Giakoni-Ramírez et al. (2021) observed no connection between time spent playing esports and BMI, Bayrakdar et al. (2020) conclude that decreased physical activity through increased esports activity leads to a higher BMI.

Performance indicators for esports can be physical fitness, excellence, hard work, endurance, and pursuit of athleticism (Rambusch et al., 2007), or a balanced body, specific precise movement skills, human-machine interplay, and body posture (Witkowski, 2012). Ford (2017) compares playing competitive fighting games to playing a musical instrument and highlights the importance of rhythm, mechanical, and expressive potential. Players must be capable of executing and incorporating perfectly timed fine motoric motion sequences. Several publications show that bodily requirements in form of motoric skillset and physicality differ significantly from esports title to esports title (Egliston, 2020a; Egliston, 2020b; Ford, 2017; Nagorsky & Wiemeyer, 2020; Sousa et al., 2020).

The motoric skills for each game must be learned and incorporated to execute optimal gameplay. Two studies investigating *DOTA2* gameplay conclude that amateurs copy pro gamers based on the theoretical knowledge they gain by watching professional games. They observe pro gamers while doing specific movements and try to imitate them, for example a technique called “manta dodging,” which needs to be perfectly timed to avoid an incoming attack. However, many pro gamer moves need excellent timing and hand-eye coordination, which amateur players lack. This skill gap is described as “bodily tension” regarding fine motor and sensorimotor skills, timing, coordination, and regulation of affective states, implying that non-professionals fail to copy the gameplay of professionals. Even within a single game, the physical requirements can differ between different playstyles, positions, or characters used in the match. Both works argue that watching games works as mnemotechnic but fails to train physical skills (Egliston, 2020a; Egliston, 2020b). One study recommends extracting data for performance diagnostics directly from the input devices—keyboard, mouse, controller—where the physical and performance-related action takes place (Silva et al., 2021).

Four qualitative interview studies, two of which use similar data, show that pro gamers see themselves as sportspersons or athletes despite the reduced physical requirements (Pargman & Svensson, 2019; Rambusch et al., 2007; Schaeperkoetter et al., 2017; Taylor et al., 2009). Pargman and Svensson (2019) extend this by arguing that physicality is an essential part of sportification, which describes the process of an activity, a game, or a play becoming a distinctive sport. However, the sole distinction based on physical demand for a practice is not enough to distinguish between sport or non-sport, and esports shows various other traits of sportification. Still, in their quantitative, survey Buzzelli and Draper (2021) found that collegiate esports players don't see athleticism, in terms of physical fitness, as a relevant attribute for esports. According to Tjonndal (2021), there is a public discourse about

the corporeal aspects of esports indicating that the body plays no performative role and esports leads to the opposite of athleticism. Haupt et al. (2021) investigated cardiovascular activity and energy expenditure during competitive gaming and concluded that esports is no substitute for physical exercise. It also shows that blood glucose is slightly raised during competitive play. Other findings show short-term effects on the body, stating that physiological arousal during play raises the cortisol level significantly (Schmidt et al., 2020a), increases heart rate and respiratory rate (Glass & McGregor, 2020; Haupt et al., 2021), or increases heart rate and systolic blood pressure—indicators for a response to an aerobic strain without physical exertion (Sousa et al., 2020). Long-term effects are depicted in one research piece which reveals a change in the brain's plasticity leading to improved local functional connectivity density and default mode network (Diankun et al., 2019). Three articles imply a positive connection between physical fitness and performance level of esports players (Kari & Karhulahti, 2016; Paramitha et al., 2021; Roncone et al., 2020), and de Las Heras et al. (2020) show how short intense cardiovascular exercise before competing can have a positive effect, for example on in-game accuracy. Further, specific breathing patterns can help regulate the performance level under a stress situation (Poulus et al., 2021; Smith et al., 2019).

Two studies investigated the effect of caffeine intake on performance in esports, with mixed results. Thomas et al. (2019) found no significant short-term physical (and mental) skill improvement through caffeine consumption in the form of energy drinks among professional *League of Legends* players. Sainz et al. (2020) reported an improvement in accuracy and reaction time among *Fortnite* and *Counter-Strike: Global Offensive* players using a generic first-person shooter simulation.

(3) Interweaving between the physical and digital worlds

A total of 11 studies yielded findings about interweaving between the physical body and the digital world in the context of competitive gaming. Peripherals like keyboards and mice can be understood as extensions of the body for a sportive purpose and make the players feel connected to the digital world and the avatars (Ekdahl, 2021; Ekdahl & Ravn, 2021; Poulus et al., 2021; Rambusch et al., 2007; Witkowski, 2012). The players are not actively conscious of using a mouse, keyboard, or controller when playing a game as long as they are in a flow state (Poulus et al., 2021). Any haptic or physical disturbance, however, leads to discomfort in the body, device, and digital realms, and can result in performance issues for the players (Ekdahl, 2021; Rambusch et al., 2007). Ford (2017) argues that players see the digital characters as musical instruments which allow them to express their skill and individual style. Especially pro gamers can anticipate and reduce the timespan between physical input and in-game reaction (an essential ability in competitive gaming), because they can “feel the digital avatars and their actions and steer the maneuvers more efficiently” (Egliston, 2020a; Egliston, 2020b).

Ekdahl and Ravn (2021) explicitly investigated inter-corporeality in esports. Their study shows how the human body extends into virtuality in the form of common bodily expressions executed through digital avatars. The way players move and behave in-game via their avatars is like the way athletes behave in traditional sports. This means that intentions, expressions, or skills are embodied through the virtual bodies controlled by the players. The players don't feel a gap between virtuality and reality and refer to the character's movements as if they were their own: “If I take one step forward, my opponent will take a step back” (Ekdahl & Ravn, 2021, p. 309). The digital characters portray the intentions of the players in the form of body language like athletes do in traditional sports. Therefore, not only do players train these movement practices but they

must also learn how to read the digital movements to outperform the opponent. In competitive gaming, reading the virtual body language is more important than reading the real body language. Myers (2019) shows that body language and physical gestures are mimicked in competitive gaming settings. He describes how the digital avatar is used in games to show virtual and physical dominance over the opponent. In this sense, physical body language is willfully mediated through digital avatars, for example in the form of taunting and expressing dominance (Myers, 2019), or unintentionally, when executing strategic or tactical maneuvers like feinting (Ekdahl & Ravn, 2021).

Hao et al. (2020) observed the practice of gender swapping among Chinese female gamers to avoid gender-based resentments. This implies that women and girls tend to represent a different gender in-game and they try to break the physical-digital connection to be less exposed to discriminatory behavior. This eventually leads to self-efficacy and higher motivation to participate. Hussain et al. (2021) find comparable results when investigating the motives and lived experiences of Muslim women for competitive gaming. They conclude that esports is used as a vehicle of liberation and self-expression. Hence, esports is considered a means to escape common societal norms and values, especially the culturally imposed role of the body including obligatory dress codes for women.

(4) Digital avatar

Three studies (the lowest number in the sample) discuss findings regarding the appearance and attributes of the digital body. Hussain et al. (2021) found evidence that digital bodies can be used to carry normative sociocultural ideals and values, like gender, ethnicity, or skin color. Thus, players may individualize their digital appearance to represent desirable norms and express themselves freely beyond any sociocultural standards. Considering the gender of the digital avatars, Ratan et al. (2019) observed that female players tend to choose female characters, while men show no

preference regarding the physical appearance of their avatars. Ford (2017) found that the virtual appearance of digital avatars plays no role in competitions but instead, the characters' mechanics and in-game skills are central matters.

Discussion

The present scoping review identified the existing literature to better understand the role of the body in esports. It illustrates key findings, explores research gaps, and therefore offers a foundation for future research in this direction. The amount of literature that can be processed in exploring the research question has increased exponentially over the past years and is diversifying regarding origin and topic. This trend has been mentioned by other scholars, but compared to the literature about traditional sports, research dealing with aspects of the body in esports is still in its infancy (Reitman et al., 2020; Riatti & Thiel, 2021; Schmidt et al., 2020b). Our analysis reveals four forms of how the body may be present in esports: 1) the players' physical appearance; 2) the conditional and coordinative skill required to play; 3) the interweaving between the real body and the digital world; and 4) the digital appearance of the in-game characters. The review shows that the way the body is considered in esports and competitive gaming does not differ much from traditional sports. Hence, in esports, topics like physical health, motoric skillset, or bodily appearance are considered relevant for both the player in the analog world and the connection between the player and the digital avatar. However, comparably few publications look beyond the physical aspects of the body and treat the interplay with the digital world, although this is a key trait of esports and a strong distinction between traditional and esports. Observing esports in a sport scientific scope needs to address this intersection, because we see that the physical input does not stop at the domain of execution—here the computer or console—but the players also sense feedback from their digital characters which needs to be incorporated into playing practice.

Inter-corporeality

Considering the connection between the body and virtuality, our findings reveal that esports is characterized by an experiential immersion of the player in virtual reality. However, while the sense of being immersed in a virtual realm is rather a stylistic element to increase gaming experience in non-competitive computer games, in esports it is a side effect that players need to adapt to (Cranmer, Han, van Gisbergen, & Jung, 2021; Sawan et al., 2020). In this sense, the player's body has not only the purpose of giving input but becomes an integral part of competitive gaming both experientially and practically. One of our most important findings is that peripherals (mouse, keyboard, etc.) are understood as extensions of the body while competing. It appears to be like the way equipment is perceived in traditional sports. Players embody the mouse, keyboard, and the in-game character, and perceive controlling them as natural movements. This also means that players prefer characters, playstyles, or avatar setups which they feel most comfortable playing. Therefore, the capabilities of a digital avatar become part of the optimal gaming setup and form an interplay between input devices and players. The slightest divergence from this setup results in a disturbance of this sensorimotor connection and a loss of performance. This can be compared, for example, to racket sport. The athletes do not sense their racket as an exogenous object when competing, but rather understand it as an extension of their body to play the ball. Hence, the physical traits of the rackets are experienced as integral bodily traits when anticipating, adjusting, and adapting to game situations; even more, players sense incorrect racket positions as a physical discomfort (Biggio, Bisio, Avanzino, Ruggeri, & Bove, 2017).

This scoping review also reveals that the motoric skills for esports significantly differ among genres, games, and even within a game. It can be expected that there are sensorimotor or fine motor skill transfers within certain genres, so that shooter players are more likely to adapt to other shooters than to strategic games

and vice versa. Further, the discrepancy between the motoric skills of professionals and non-professionals depicts that understanding theoretical, tactical, and strategic skills does not suffice to play at a top level but that the game must be embodied in the sense indicated above. This underlines that esports-specific motion needs to be internalized and it could imply that genetic disposition is as important as it is in traditional sports, for example when pursuing a professional career.

Aesthetics and appearance

Our findings show that physical aesthetics play an important role in the competitive gaming cosmos. The image of the body in competitive gaming is strongly influenced by clichés evolving around the physis of gamers (Taylor, 2012; Tjonndal, 2021). However, our findings suggest that this aspect needs to be investigated in a more differentiated manner. For example, according to numerous studies investigating the body composition of players, the image of the players being obese and unhealthy is not proven right. This aspect refers not only to athletic performance in esports. In fact, especially professional gamers understand that maintaining physical health and fitness is not only beneficial to their performance but also helps in marketing themselves. Although the play action takes place in a virtual world, people behind the screens are the focus of attention and are judged by their appearance. Female gamers face objectification and are not seldomly reduced to their outer appearance, which can be seen as a side effect of the hegemonic masculinity in competitive gaming (Taylor et al., 2009). However, female gamers tend to use femininity to stage themselves when appearing publicly, for example in streams. The integration of the body helps to create a connection with the spectators and is considered beneficial for increasing the audience (Anderson, 2017).

Some traditional perceptions of athleticism (like being fit, muscular, in shape, etc.) cannot be attained by playing esports. However, this must not be regarded as a counterargument against the sportive-

ness of esports. Many other sports based on fine motoric prowess are commonly accepted within the sport canon, like darts or shooting sport. Furthermore, esports is characterized by in-game gestures which can be interpreted in the same way as if they occurred in the real world. Body language, including taunting, feinting, and gestures, are used in the virtual and physical realms of esports competitions, which means that players transfer common bodily norms in the game. Additionally, our findings therefore help to explain the practice of cosmetic modifications for in-game characters. Players can buy “skins” to change the looks of and individualize their digital avatars. This is an important source of income for the publishers and developers of the games and a well-perceived feature within the communities (Macey & Hamari, 2019). Individuality is promoted through playstyle or cosmetic alteration of in-game characters, which is also observable in traditional sports. Cristiano Ronaldo’s signature goal celebration, Eric Cantona’s distinctive way of popping up the collar of his jersey, and Serena Williams’ eccentric tennis outfits are prominent examples of how professional athletes stage themselves. Pro gamers can do so as well in the real world and have the possibility to extend characteristic traits into the digital world which support their marketing strategies. Still, while the physical and digital appearance is relevant for players, it is unlikely that they will sacrifice in-game functionality or performance for looks (Ford, 2017; Ratan et al., 2019).

Physical health

The BMI is used as a metric to assess players’ health in many papers that investigate the physiological health aspect of esports. A crucial finding is that studies show that there is no significant difference between the body composition of esports players compared to common average non-gamers. Rather, the use of the BMI in research hints at the fact that among researchers, there is a cliché regarding the perception of the bodily appearance of gamers, as they are considered lazy and overweight (Tjonndal, 2021). Overall, the articles analyzed in

our review reveal that it is difficult to determine the specific bodily appearance of gamers. What can be attested is the fact that esports is no substitute for physical exercise. Knowing this and understanding the importance of being healthy to perform well in esports competitions shows that it is necessary to maintain physical fitness when competing. Therefore, it is recommended to include fitness training as compensation for the sedentary nature of esports. The data imply that professionals are especially aware of this fact and behave accordingly, not only regarding physical activity but also regarding sleep behavior and diet. Therefore, professionals adopt behaviors that are common to traditional sports. Another similarity between research on esports and studies on traditional sport relates to physical injuries relevant to competition. A central finding is that injuries in esports mainly stem from overstressing and posture issues, occurring, for example, because of the sedentary nature, which is why more professional medical supervision is called for in esports (Pereira, Brito, Figueiredo, & Verhagen, 2019; Yin et al., 2020). Regarding inter-corporeality, it can be expected that pain plays a different role in esports than in traditional sports. Since the domains of execution and application (Holt, 2016) exist in different realms, the in-game action has no direct impact on the player’s health. For example, being eliminated in a match has no consequences on the player’s physical state. However, health problems due to sedentary behavior or reduced physical activity are a problem in esports (DiFrancisco-Donoghue et al., 2019; Trotter et al., 2020; Yin et al., 2020). Still, since it is not a contact sport, the injury risk is lower than in many other sports. In traditional sport, “playing hurt” is perceived to be normal or even glorified. It is a sign of effort or compassion to compete despite being injured or after taking a rough hit (Nixon, 1994; Roderick, Waddington, & Parker, 2000). For example, Bastian Schweinsteiger was described as a hero during the World Cup final 2014, which saw him bleeding and taking hits, though he kept playing. The differing domains of execution and application can be a reason this marginalization of pain might

not occur in esports. Players’ injuries are not visible and physical fouls do not exist. From an external perception, there is less space for the glorification of “playing hurt.”

Even though the importance of nutrition in sport is well elaborated (Kerksick et al., 2018), literature regarding esports-specific diet is still scarce. While some research pieces investigate the relevance of caffeine or energy drinks on performance, others imply the relevance of dieting to maintain fitness or for a healthy body appearance. A reason for the lack of studies in this field could be the low physical exertion of competitive gaming (Ribeiro, Viana, Borges, & Teixeira, 2021).

To sum up, it can be said that although esports is commonly referred to as a disembodied sport, lacking physicality and therefore struggling to fit into existing ideas about sport (Borggrefe, 2021; Holt, 2016; Parry, 2019; Willimczik, 2019), this scoping review shows that the body plays an important part in esports, both in the analog and the virtual world. This finding complements the arguments of scholars who underscore the importance of the corporeal ambiguity of esports (Cranmer et al., 2021; Ekdahl & Ravn, 2019; Thiel & John, 2020; van Hilvoorde & Pot, 2016).

Practical and theoretical implications

The following implications are derived from our findings: 1) despite esports being often labeled disembodied, the body is the subject of research from many different perspectives in esports literature, ranging from the analysis of the players’ physical attributes to the physioidigital interplay between player and avatar. 2) Our review shows that the body in esports functions as an intersection between the real and digital worlds. The connection between body and game is, in contrast to the opinion of some esports-critical researchers, not a one-way direction. In-game mechanics also affect the players’ motor execution and neurophysiological processing of the gameplay. Considering this linkage, we can assume a difference between esports and casual computer games. While in casual games,

experiencing the virtual worlds is seen as a relevant part of the gaming experience (Cranmer et al., 2021), effective dealing with immersion has to be considered a performative trait in competitive gamers, which players need to pay attention to. 3) Esport is no substitute for physical activity; therefore, players should consider including physical exercises in their esport training program. Nowadays it is already common for professionals to have athletic coaches and supervision from physicians. However, amateurs and young athletes need guidance in this field. Governing bodies like associations or clubs may create the conditions for players to learn about how to maintain an equilibrium between practicing esport and counteracting the risks of the sedentary nature of the game. If sporting clubs were to introduce esport departments in which players could benefit from a supporting environment comparable to traditional competitive sports at a higher level, the possible downsides could be reduced (Riatti & Thiel, 2021). For example, the DGI in Denmark, a national umbrella organization for sporting associations, supports clubs that want to include esports within their portfolio. Their support ranges from helping with IT solutions to developing training concepts (DGI, n.d.). 4) Clubs could also benefit from esport departments because they could appeal to people who do not see themselves fitting in at traditional sporting clubs. Since the entry barrier for competitive gaming is lower than for many traditional sports, this could be a future strategy for the recruitment of new members (DGI, n.d.; Hayday & Collison, 2020; Hewitt, 2014). 5) When considering the low physical exertion of competitive gaming, nutrition might become more important to maintain physical fitness and health. This could also be a pillar of training control in esport (Ribeiro et al., 2021).

Research desiderata

Our review confirms that the esport research landscape is still in its infancy (Reitman et al., 2020; Riatti & Thiel, 2021). According to our analyses, several knowledge gaps and research desiderata exist

regarding the role of the body in esport. 1) Although the area of research is growing and diversifying, research predominantly deals with the physical attributes of the body necessary for high performance. In contrast, literature regarding the physical-digital interplay or about embodiment and digital corporeal phenomena in esport is scarce. More research is necessary because the relationship between the analog and the virtual is essential and unique for esport, but difficult to interpret based on the current state of research (Cranmer et al., 2021). Possible research questions comprise, for example, positive and negative effects deriving from the duality of the body or changes in the general perception of the analog body in virtual worlds. It would also be interesting to analyze in detail how competitive players identify themselves with their digital avatars and as how important common normative values regarding the body are seen by them. For example, little is known about the reciprocal effects which might influence body image, ideals, or beauty standards in both worlds. Longitudinal studies are particularly relevant in this context. A possible question that is interesting from a longitudinal point of view is whether the popularity of esport and the physical and digital roles of the body can have an impact on the body ideals within the community, sport, or society. 2) Considering the different motoric requirements for different esport disciplines, it would be interesting to see if there are specific phenotypes or physical preconditions which are beneficial for different games or genres. Eventually, this would also open questions about talent recruitment and promotion. 3) Moreover, it would be worth examining whether and how far it is possible to transfer skills from one game genre to another. 4) An additional open question refers to the structuring and planning of training in esport. To date, there is not much evidence regarding whether training must differ from genre to genre, and just as little is known about how much physical activity is necessary for top performance. 5) Although research about pain and injuries in esport has been treated in this scoping review, competing under pain was not a topic of

the selected publications. It may be interesting to investigate whether “playing hurt” can also be observed in esport.

Limitations

The first limitation stems from the sample demographics of the included works. The fact that the studies do not paint a representative picture for countries of origin, age, gender, etc. makes comparisons difficult, since the role of the body can differ significantly because of cultural origins. Particularly the fact that the participants in the experiments of the processed publications mainly consist of males in their early twenties is problematic, because there is a significant number of professional female e-athletes (Hedlund, 2021), and the findings of the existing studies are more likely to be valid for males than for non-males. Secondly, we included all types of publications regardless of their quality, which is characteristic for conducting scoping reviews but can also be interpreted as an issue (Arksey & O'Malley, 2005; Tricco et al., 2018). In addition, there is only one longitudinal analysis included, which makes it difficult to extract profound long-term findings. Thirdly, we cannot rule out that several relevant papers were excluded because of language restrictions, despite searching in five languages. We assume that the sample's quality could improve if research pieces from more countries, for example from the Far East, where esport is particularly popular (Taylor, 2012), were included. Fourthly, although we conducted the searching process with two reviewers working simultaneously on the sample, only one reviewer checked the full-text eligibility. Methodological rigor could have been increased by including more reviewers in this step.

Conclusion

This scoping review explores literature that helps to understand the role of the body in esport and competitive gaming. The body is a crucial subject area in sport research (Rail & Harvey, 1995; Sabiston et al., 2019; Thiel, John, & Frahsa, 2019), and it is necessary to study this topic when researching esport. This review

shows that corporeality can be observed on the physical but also the digital side of esports. Contrary to established assumptions (Holt, 2016; Parry, 2019), esports should not be considered a disembodied sport or activity. Since the popularity and relevance of esports are continuously growing and esports is on the way to becoming mainstream (Jonasson & Thiborg, 2010; Riatti & Thiel, 2021; Schmidt et al., 2020b), the sociology of sport and body should pay more attention to esports in the future. Hence, the body is not only worth studying for the player's physical health or competition-related motor skills, but also for addressing body-related issues that may not be immediately apparent when engaging with esports. This ranges from the analysis of discriminatory and toxic behavior towards the players' bodies, to the question of the "social reality" of "physical" interactions in the virtual space.

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Declarations

Conflict of interest. P. Riatti and A. Thiel declare that they have no competing interests.

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