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ESPORT: Electronic Sports Professionals Observations and Reflections on Training

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B) acquisition of data
C) analysis and interpretation of data
D) manuscript preparation
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Abstract

Esports and high-performance human-computer interaction are at the forefront of implementing new hardware and software technologies Despite that, there is a paucity of research on how championship-level esports professionals approach aspects of their preparation.

To begin addressing this gap, we conducted, transcribed, and analyzed interviews with top-level tournament players, coaches, and managers in the period 2015–2019. The interviews focused on mental, physical, and nutritional aspects of esports preparation. Initial processing included transcription and manual verification. Furthermore, where applicable, interview responses were rated and quantified by a panel of experts.

Physical training was most often mentioned as a relevant or consistent activity, while nutrition was indicated as relatively unimportant. Qualitative analysis indicated that consistency and resilience are key factors for upcoming esports competitors to focus on. Interviewees also emphasized balancing their gameplay time with other activities. Lastly, we identified important areas critical for a deeper understanding of the mental and physical demands of professional esports players.

Keywords: esports, professionals, training, recommendations

Introduction

Esports can be viewed as a subset of gaming that leverages simulated environments to define the competition space. There are numerous efforts in the research community to precisely define its place in the sports landscape. This includes efforts to more precisely define esports (Białecki et al., 2022; Freeman & Wohn, 2017; Fried, 2023). The largest esports tournaments routinely attract millions of concurrent viewers and award millions of dollars in prizes. Thus, esports is comparable in interest with popular conventional sports and is a largely global phenomenon, with tournaments held year-round on every continent ("Esports Charts – Esports Viewership, Popularity and Analytics – escharts.com," 2023; Pei, 2019). This strong growth has spawned not only a burgeoning esports industry, but also a wide range of interdisciplinary research, detailing the intersection of esports with law (Holden et al., 2017), health (Baena-Riera et al., 2023; Madden & Harteveld, 2021; Rudolf et al., 2020), and media studies (Hamilton et al., 2014; Kow & Young, 2013; Torres-Toukoumidis, 2022). In particular, much

of the esports-focused work fits well within the domain of human-computer interaction, given the mechanism by which many esports function (Watson et al., 2021). The prominent use of hardware and software in esports means that research in this area could be attributed to human-computer interaction (HCI) (Chiu et al., 2021).

There are no limits to the use of customized pointing devices in most if not all esports, including adaptive hardware (Tabacof et al., 2021). Players often modify their equipment, personalizing it to fit their requirements for comfortable play (see Figure 1 for an example of such customized hardware). Ergonomics and ease of use of hardware and software are known areas of consideration in esports; for example, there are multiple ways to position the mouse and keyboard, and different types of mouse grips. Other known issues in this space concern the latency in multiplayer competition and potential software inconsistencies (Sheldon et al., 2003).



Figure 1. Examples of equipment customized by professional esports players

Source: Mikołaj "Elazer" Ogonowski

Esports encompasses a large community, including players of all skill levels, fans, and commentators (or "casters"), and has provided intriguing directions for HCI (Kriglstein et al., 2021). This includes cognitive and mental health in esports (Madden & Harteveld, 2021; Türkay et al., 2020; Wu et al., 2021) and visualization systems for esports (Afonso et al., 2019; Feitosa et al., 2015; Kuan et al., 2017; Rijnders et al., 2022; Wallner et al., 2021; Xenopoulos et al., 2022). Additionally, computer games offer unique opportunities for cognitive research on neuroplasticity (Kowalczyk et al., 2018), and in their richness of stimuli can be compared to how biofeedback facilitates skill acquisition (Chen et al., 2021). Despite the large-scale community and growing interest that esports provides, there has been little work directed towards the long tail of the distribution of player skill – namely, highly skilled and professional esports players. These players provide a unique unit of study in that their skill often warrants distinct mental, cognitive, and physical demands. At the same time, sports science has repeatedly investigated the aforementioned characteristics for professionals in other sports (Lappi, 2018; Perrey, 2022; Walton et al., 2018), yet this seems to be limited for the esports domain, despite its cognitive nature. Furthermore, many esports are remarkably different from conventional sports, given their online nature and that they often mandate a sedentary style of play, thus making it challenging to extrapolate conclusions from conventional sports. Existing systematic reviews and meta analyses point towards the need for further research in esports (Bányai et al., 2019; Kelly & Leung, 2021). This includes research on physical activity in esports (Voisin et al., 2022). In this paper, we aim to bridge this gap by focusing on highly skilled esports players.

Despite growing academic interest in esports, esports curricula and high-performance human-computer interaction, there seems to be a lack of information regarding the needs and tendencies of esports athletes from first-hand sources. Accordingly, we apply both qualitative and quantitative analysis of interviews with esports professionals to investigate their approach in the three major categories of physical activity, mental factors in esports, and nutrition. Uniquely, we draw upon a curated dataset of a highly skilled subset of players representing the top end of esports players, many of whom have long standing fanbases or storied careers. These interviews were gathered by visiting major esports tournaments, such as Intel Extreme Masters Katowice.

The goal of our work is to highlight the perspective of professional esports players and staff on various aspects of the training process. We have formulated the following main research questions (RQ) to facilitate our investigation:

RQ 1: What is the players' attitude towards physical activity, nutrition, and mental aspects?

RQ 2: Do players have access to support staff who take care of physical activity, nutrition, and mental aspects?

RQ 3: What is the perceived path to becoming an esports player?

Related Work

Similar to our attempt here, a few other works have employed interview-based investigations. This includes research on coaching practices and issues; one such study focused on two main categories in a qualitative manner, namely general esports coaching information and challenges in League of Legends esports. The findings of this study emphasized different coaching philosophies, ideas of trust, synergy, micro play, macro play, and other psychological components that were perceived as key in a well-functioning team environment (Sabtan et al., 2022).

On the other hand, it is not only coaches who create the team environment. Some investigations have focused on the player-perceived determinants of success, mostly in the area of psychology, through thematic analysis (Poulus et al., 2022). Furthermore, other authors have attempted to quantify the amount of physical activity and in-game training. They found that the press exaggerate training time to be between 12 and 14 hours a day, while players indicate on average 5.28 hours per day (Kari & Karhulahti, 2016). Other researchers conducted 12 interviews with 11 professional Overwatch esports players, performing a thematic analysis on game-sense and mechanics. They concluded that critical aspects include knowledge of team-member and enemy positioning, and timing (Fanfarelli, 2018). There is also an article on the perceptions of effective training in esports, although it focused on League of Legends players. The authors split interview data into three themes: the state of training, training experiences, and motivational change. Their results indicated that training approaches and motivation can shift. Within the results, it was pointed out that players often perceive their training practices as sub-optimal.

Additionally, authors highlight the emotional and physical toll of this activity on players. This is due to the extensive hours of practice in a sedentary position ("grinding") aimed at improving ability (Abbott et al., 2023).

A Scoping Review on associations between esports participation and health habits uncovered that most of the players (65–88.7%) indicated regular exercise habits and highlighted the relative novelty of the esports research area (Monteiro Pereira et al., 2022). Additionally, though different from our attempt, there is an interview-based investigation into how esports athletes perceive performance-enhancing substances (Schubert et al., 2022).

Material and Methods

Interview Collection

We collected interviews with esports athletes, coaches, and managers ranging from semi-professional to professional. All of the interviews were collected in the form of audio-visual recordings in English (22 interviews) or in Polish (17 interviews); the total number of interviews split by the interviewee type is available in Table 1. Collection of the interviews took place during events such as: (1) ESL One Cologne 2015, (2) ESL One Frankfurt 2015, (3) IEM Katowice 2016, 2017, 2018, 2019 (4) ESL Polish Championships 2017, (5) WGL EU Season 2 Qualifier 2017, (6) MeetPoint 2018, (7) ESL One Katowice 2019.

All of the interviews were published online or recorded for further broadcast to cable television. The interviewees played or were professionally related to games such as League of Legends, StarCraft 2, Heroes of the Storm, Counter-Strike: Global Offensive, World of Tanks, Dota 2, and the business side of esports.

The interviews were originally recorded between 2015 and 2019 and span multiple game genres and esports titles. We used a total of 39 interviews. The total number of questions asked per type of interviewee is described in Table 1. Note that as esports evolved it became customary to name two distinct types of coaches. One called an in-game coach, who focus on aspects such as strategy, tactics, in-game exercises, and sparring (scrimmage) scheduling. The second is referred to as a performance coach, who focuses mainly on aspects outside of the game, such as nutrition, physical preparation, and high-level day-to-day scheduling.

Table 1. Interview count breakdown 2015-2019

Type	Number of Interviews	Number of total questions
Player	28	296
Coach (in-game)	2	20
Coach (performance)	1	11
Manager	7	63
Commentator	1	6
Total	39	396

Data Pre-Processing

The interviews were initially processed with OpenAI Whisper, which provides automatic video to text transcription (Radford et al., 2022). In the case of Polish recordings, transcription was performed with the automatic translation feature. Next, all transcriptions were manually verified by a bilingual native English and Polish speaker and split between questions and answers. Full interview transcriptions are available as a supplemental file.

Data Processing

Pre-processed interviews were placed in a spreadsheet format. Each of the categories for questions and answers was coded as a column. Aside from the main topics, interviewees also often provided additional information in a free-form manner – an attempt was also made to categorize these responses: (1) physical activity, (2) mental aspects, (3) science, (4) coaching, (5) in-game training, (6) nutrition, (7) social aspects.

Next, four out of the five authors acted as expert judges, separately grading the extracted abstract questions to alleviate possible biases towards contextual information. The judges were tasked with assigning a numerical value to each of the coupled question-answer contexts in an attempt to quantify responses to the most common interview questions. Possible values were binary (either 0 – No, 1 – Yes, and additionally 2 – No Information) or Likert

scale (1 – Strongly Disagree, 2 – Disagree, 3 – Neutral, 4 – Agree, 5 – Strongly Agree). The interview environment made it possible for the interviewer to ask multiple questions pertaining to the same topic. In the case when a similar question was asked after the initial question-answer context, such questions were judged separately and an average answer was calculated per interview.

Data Post-processing

After each of the referees provided their final grade sheet, further processing and numerical analyses were performed. Corresponding to the categories presented in Data Processing, coding of the analyzed interview questions is as follows: QA – physical activity, QM – mental aspects, QN – nutrition, QT – in-game training. Note that not all of the categories could be represented numerically for the quantitative analysis, and that the question text provided below is exemplary, as the wording sometimes varied during the actual interviews.

QA_0: (Likert) – Do you consider physical activity to be important for players?
QA_1: (binary) – Do you train physically?
QA_2: (binary) – Do you work with a fitness coach?
QM_0: (Likert) – Is psychology important for players?
QM_1: (binary) – Do you have a psychologist supporting you?
QN_0: (Likert) – Is nutrition important for players?
QN_1: (binary) – Do you have a nutritionist supporting you?
QN_2: (binary) – Do you have a meal plan?
QT_0: (binary) – Do you make changes to your training before a tournament?
QT_1: (estimated time in hours) – How much time do you spend training in-game before a tournament?
QS_0: (Likert) – How do you rate the atmosphere of the current tournament?

Statistical Methods and Qualitative Analyses

In the end, to verify whether interviewees differed in responses to questions that we had encoded with the Likert scale, we performed a descriptive analysis of the data and a statistical analysis using the Mann-Whitney U test with an alpha value of $\alpha <= 0.05$. Questions encoded in the binary format were only inspected descriptively. For the qualitative analysis, we collected multiple open statements from the interviewees and acted as experts to summarize the perceived importance of various aspects on the road to becoming a professional esports athlete.

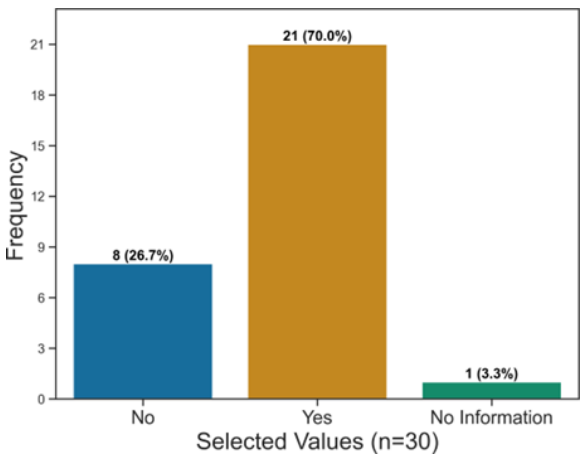
Results

Quantitative Analysis

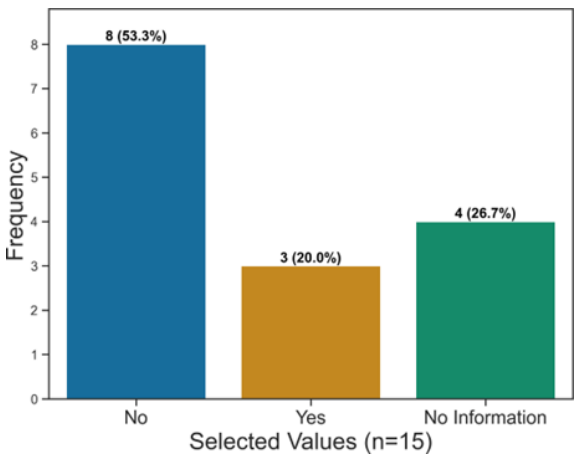
Physical Activity

Aggregated referee responses are visualized in Figure 2. Descriptive analysis indicates that when asked about their approach towards physical activity (Figure 2c), the majority of interviewees stated that they Agree or Strongly Agree that it can positively influence their gameplay. Additionally, most of the players (Figure 2a) indicated that they train physically. On the other hand (Figure 2b), when asked about external support from a professional fitness coach, they typically indicated not having such support at the time.

a.



b.



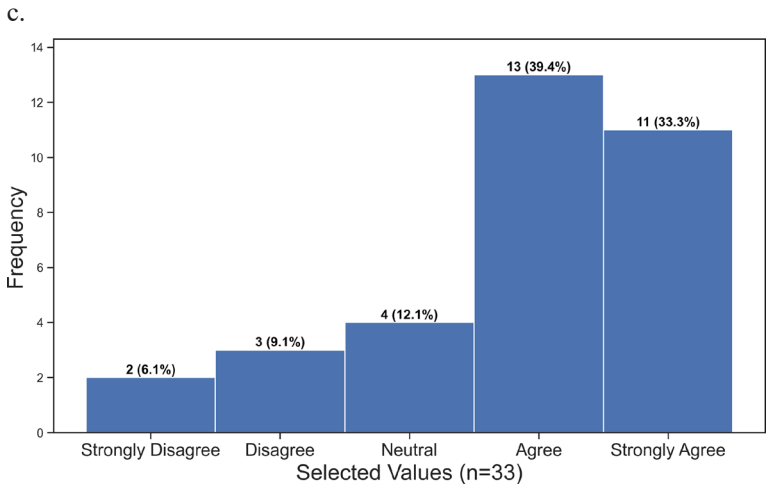


Figure 2. Choice frequency for coded questions related to physical activity – a. "Do you train physically?", b. "Do you work with a fitness coach?" and c. "Do you consider physical activity to be important for players?"

Mental Aspects

When asked about mental aspects, the majority of the interviewees agreed that it can be important for success in esports (Figure 3b). On the other hand, when asked if they have access to a professional psychological support, most players responded negatively (Figure 3a).

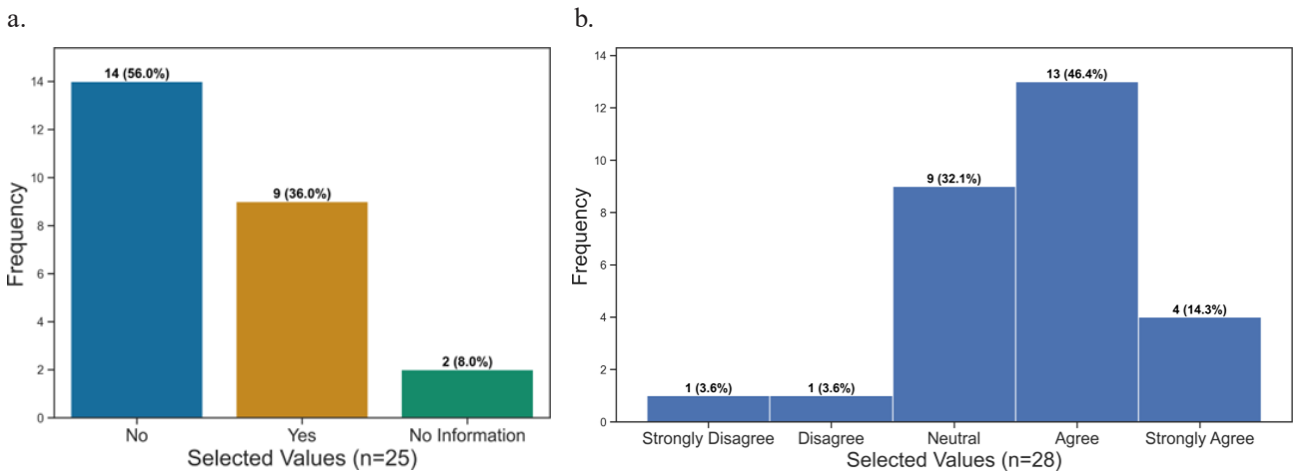


Figure 3. Choice frequency for coded questions related to mental aspects of esports: a. "Do you have a psychologist supporting you?"; b. "Is psychology important for players?"

Nutrition

While discussing nutrition and its possible influence on esports performance, players indicated that they either Agree or Strongly Agree with the premise of nutrition being important for their performance (Figure 4c). Despite these statements, most of the players indicated that they do not follow any meal plan and do not consult with a professional nutritionist, as can be seen in Figure 4a and Figure 4b.

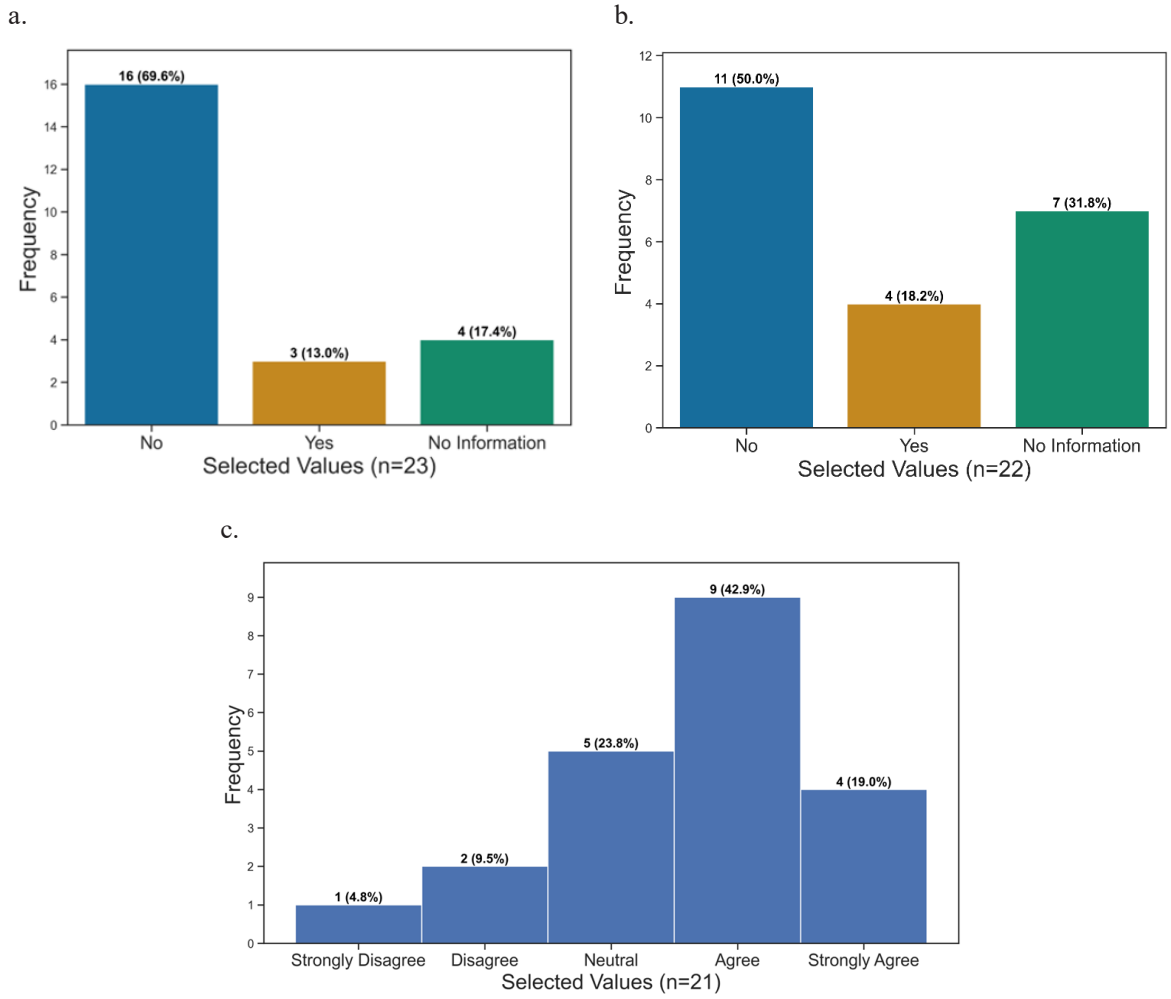


Figure 4. Choice frequency for coded questions related to nutrition: a. "Do you have a nutritionist supporting you?"; b. "Do you have a meal plan?"; c. "Is nutrition important for players?"

Response Comparison

To compare the perceived responses between different coded question categories, we conducted a Mann-Whitney U test for all of the Likert scale questions. The results of the test are presented in Table 2.

Based on the results, we can conclude that the interviewed professionals indicate having a similar (positive) attitude across all three aspects: mental, physical, and nutrition.

Table 2. Results of Mann-Whitney U test for Likert scale coded questions

Question	QA_0		QM_0		QN_0	
	u-stat	p-value	u-stat	p-value	u-stat	p-value
QA_0	-		-		-	
QM_0	379.0	0.207	-		-	
QN_0	292.5	0.318	297.5	0.948	-	

Note: QA_0: (Likert) – Do you consider physical activity to be important for players?; QM_0: (Likert) – Is psychology important for players?; QN_0: (Likert) – Is nutrition important for players?

In-Game Training

When asked about in-game training characteristics, interviewees indicated that they do change how they train when in preparation for a tournament – Figure 5. The majority of the respondents indicated an average training time of between 7 and 9 hours being most prevalent.

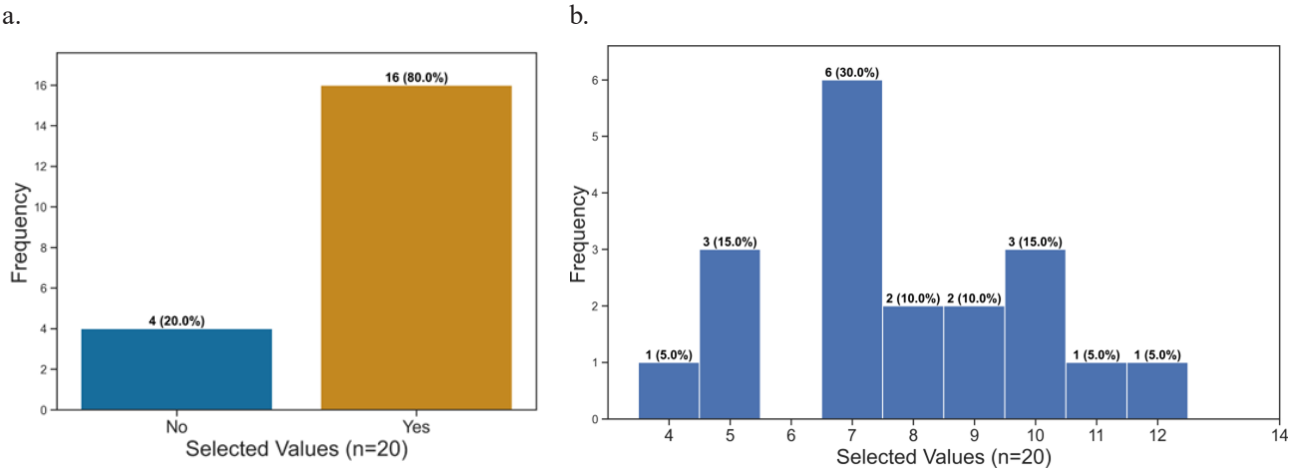


Figure 5. Choice frequency for all questions related to in-game training: a. "Do you make changes to your training before a tournament?"; b. "How much time do you spend training in game before tournament?"

Tournament Atmosphere

When asked about the tournament atmosphere (n=18), i.e. "How do you rate the atmosphere of the current tournament?", the majority of players indicated that they strongly agree with the statement of the atmosphere being positive (n=8), followed by "agree" (n=6), and finally neutral declarations (n=4).

Qualitative Analysis

As discussed in the Data Post-Processing section, not all questions could be represented numerically; even so, key information was provided in their context.

Recommendations for Aspiring Players

When asked about their recommendations for younger players who would like to try to become professional, Interviewee 16 stated:

> *"Like I said before, just practice, practice, practice, that's all it really comes down to and just having a good mindset. Those are the two main things I'd definitely say, yeah."*

In this statement, the player underlined the idea of practice and having the right mindset.

Interviewee 17 stated:

> *"I'd say I was doing the basics. I was not doing more than I could have done. I was just working enough to graduate, not to do more. So I'd say it's up to everyone, each person to study as much as they want or so. Maybe some people are not going to school* [in order] *to play. I was doing that sometimes but that's not what you should do obviously. It's up to everyone to work as much as you want and then to try to play outside the school hours."*

This emphasized that aspiring players should play as much as possible outside of other responsibilities. This is in line with what Interviewee 20 stated:

> *"You know what, it depends on who is at home (the environment). When parents are always going to put pressure on formal education, and they won't let their son (child) fulfill themselves in e-gaming (gaming, esports), it will be a very difficult path, but you have to go through it and be persistent, persistent, persistent. Do not give up. After two or three years, if you want to become a professional player, sooner or later you can make it, but it is very hard."*

This underlined the importance of environmental factors as well as being persistent as key indicators that play a role in esports success.

Similarly, Interviewee 29 stated:

> *"It's just keep working, you should just finish school, you can play when you get home and with your team in the evening, it's more like the social life you sacrifice*

because you have work, you have school, some things you just have to do if you don't succeed and that's just the fact and just keep trying and go forward but don't go all in if you know what I mean ..."

This additionally mentions not sacrificing everything for the sake of an esports career.

On top of that, Interviewee 31 stated:

"I feel like you have to really work hard. I think there's a lot of people in the space that are really, really good at video games, but to get to a professional level, I think the biggest thing is stopping people is themselves, and you can be really good, but to become a professional is you need to be able to take criticisms, be able to send maybe your match demo to somebody and be like, hey, where did I mess up, and be willing to listen to that. You're not like, oh, this guy's an idiot, he doesn't understand, or whatever, you have to be able to take criticisms from your peers, from the fans, from your teammates, and I think that's kind of the difference between a professional and a really good player is how serious they're willing to take themselves and how much time they're willing to put into it. So in terms of tools, I think there is definitely tools out there that can help players grow, but in my personal opinion, your biggest enemy is yourself."

Putting emphasis on the psychological and communication factors playing a role in the success in esports. Furthermore, Interviewee 39 stated:

"There is no secret if you're good, you're gonna get seen and and you need you know a bit of luck. Plus being very good. So It is just a matter of, yeah, making things happen just show yourself as much as possible. And if you're very good, you're gonna get seen and you're gonna climb up the ladder in a way and and yeah work hard."

All of the interviewees providing recommendations for aspiring esports players indicated hard work, persistence, or environmental factors coupled with luck as key indicators for success in esports.

Tools and Esports Science

When asked about the availability of tools, and the current state of educational and scientifically applicable information, Interviewee 12 stated:

"Difficult question. I've never looked for any advice (tutorials) on how to train in esports. I've watched some videos, as Piotr said, from Virtus.pro, how they prepare, how they train. Of course, it's about the Counter-Strike team, but the influence of science... Personally, I've not taken any scientific advice from articles, bachelor, or some master thesis on this topic."

And later provided more context with:

"Yes, for sure there are some statistics about how an average player from top teams spend[s] *their time in training. Maybe even on how they eat, or if they do something besides that. So surely some statistics could show that something out there works and helps in these preparations (training). But, as I said, I've never looked for any statistics, I've never supported myself in this way, or looked for any advice."*

At the same time indicating that the statistics are important in discovering weaknesses in gameplay:

"Yes, we do. We take care of statistics, mainly percentage of wins of teams from different leagues, from different maps, and on different sides of the map. But I don't think it changes... If we are weak in the map, we train it or we think that we don't want to play this map and we always ban it. But specific preparation outside of the game and on a specific map, we don't do that. There is no such thing that we have to focus more on the days when we play with these opponents. There isn't anything like that."

On the other hand, when a performance coach (Interviewee 15) of one of the teams was asked about the availability of the tools, these were his statements:

"I mean, mainly there are websites that collect the data and statistics, there are some software tools that are paid, and unfortunately, they cost a lot. We try to use them. I think that there is no dedicated tool, you just got to know what you want to verify, what works and what doesn't. Additionally, the tools for physical training are mostly available online. If it is tools for stretching, the balls for massaging the muscles? And in the game, well, it's a computer. I do not see any other essential tools."

Limitations

It should be noted that the interviews were conducted in a short form, in a fast-paced tournament environment. Therefore, there was no way of conducting a full in-depth analysis with existing sociological methodologies. Moreover, as mentioned in the Interview Collection section, the data was collected between 2015 and 2019, and in the everchanging esports landscape they represent only

a very limited sample of top tournament players, coaches, and managers. Despite that, we think that our work offers a unique snapshot of the state of top-level esports at the time of data gathering.

Additionally, as opinions may change over time, we cannot verify if the interviewees still hold the same stances on the investigated topics, and if they self-censored some of their responses to appear positive in the media.

Discussion

Despite some of the players indicating that physical activity is not relevant in esports, there are results that contradict such anecdotal experience. Breaking up prolonged sitting with a six-minute walk has shown to improve the executive functioning of players (DiFrancisco-Donoghue et al., 2021). Further, the widespread consensus on physical activity is that it is a positive stimulus for human cognitive performance (Brown et al., 2021; Mandolesi et al., 2018). Yet it is unclear what the optimal training load and intensity are to facilitate positive effects on in-game performance. This includes potential scheduling issues. For example, intense physical training immediately prior to high levels of mental activity may even be detrimental to performance.

Spitzer et al. (Spitzer et al., 2022) suggest a theoretical approach for the possibility of knowledge transfer by AI systems. Learning in new environments may include acquiring "tacit" knowledge, which is hard to express by available language but could be captured in data. On the other hand, as the esports research field progresses, this knowledge should be documented, verified, and applied to future esports players and conventional sports.

Future Research

We recommend further research into the broad area of esports to answer the following questions: (1) What should be the load and intensity of physical activity training to significantly boost the performance of esports players? (2) How should esports training be structured so that it can accommodate physical activity in a non-invasive way? (3) What should be the methodical structure of training and practice in esports to maximize human performance? (4) What are the currently available training tools to manage training load and intensity? (5) Is it possible to effectively use online and offline AI systems in esports training?

Conclusions

Given our results from the quantitative analyses, we have concluded that most of the players and esports staff were aware of the potential positive effects of physical activity, focus on mental aspects, and nutrition (**RQ 1**). Additionally, a higher percentage of interviewees indicated that they strongly agree with physical activity being important than for nutrition or mental aspects. Despite the high profile of the interviewees, it is clear they had limited access to support staff to help them take care of these aspects (**RQ 2**). On the other hand, 36% of the respondents indicated that they have access to a psychologist, compared to 20% for fitness coaches and 13% for nutritionists. Juxtaposing these claims with 70% of interviewees stating that they train physically and only 18.2% follow a specific meal plan, we conclude that physical activity and psychological aspects are of key importance to players (at least on the declarative level).

Based on the player recommendations (**RQ 3**), we conclude that the best way for aspiring players to reach their goals in esports is to be persistent, hard-working, and to not sacrifice other areas of life where possible. This points towards a holistic view of esports represented by the top-level athletes. Additionally, respondents indicated that they use statistical software to track gameplay weaknesses and look for various educational materials on how to play better.

Competing interests

The authors declare no conflict of interest.

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