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# Esports bettors versus traditional sports bettors: Differences in demographics, impulsivity, psychopathological symptoms, and gaming and gambling behavior

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ABSTRACT

*Background and aims:* Esports betting (i.e., betting on the outcome of professional competitive videogaming matches) has become a regular feature of most online gambling websites in recent years. The present study compared differences between esports bettors and traditional sports bettors, in addition to exploring factors that predict participation in esports betting.

*Methods:* Data regarding demographics, impulsivity, psychopathological symptoms, gaming, and gambling among 359 esports bettors (mean age = 37.98 years [SD = 13.64]; 86.9% male) and 326 sports bettors (mean age = 43.79 years [SD = 13.75]; 91.7% male) from the United Kingdom, Hungary, and Canada were collected through surveys via two gambling service providers (*Betway* and *Midnite*) and a gaming magazine.

*Results:* Compared to sports bettors, esports bettors were significantly younger, scored higher on gambling risk severity, and had more gaming disorder symptoms. Esports bettors were also more likely than sports bettors to report higher levels of stress, anxiety, and depression symptoms, and impulsivity, as well as be driven by coping, social, and financial motives to engage in betting. In an unadjusted binary regression model, being younger, being driven by coping, social, and financial motives, and reporting elevated levels of impulsivity, depression, anxiety, and stress symptoms were predictors of esports betting. Higher rates of problem gambling severity and gaming disorder symptoms were also predictors of esports betting.

*Conclusions:* The findings suggest that esports bettors are a distinct betting group, and vulnerable to multiple gaming/gambling-related harms and psychopathological harms.

## 1. Introduction

Esport has been defined as *"organized competitive digital gaming, played on a spectrum of professionalism"* [1, p. 20]. The same authors also noted that the two most associated qualities with esports in the extant literature are competition and organization, which potentially open the door for opportunities beyond just raw esports action like spectators and fans, commercial opportunities, associated winnings and championships etc. [1].

### 1.1. Esport as a sport activity

Early researchers in the field argued that esport should and could be considered as a sport depending on the definition or application [2,3], while other scholars have argued that esports do not belong in the sports conversations. For example, Parry [4] argued that esports are not adequately human, and that because of features such as lacking whole-body physicality (control and skills), they do not lead to the all-round development of an individual. The author also argued that esports are not structurally rigid like traditional sports because they are not

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governed or administered by stable institutions such as sporting bodies and committees and rather by videogame companies or possibly, even sponsors. However, more recently, esports were formally included in the *2022 Asian Games* in China as a medal event, and as a non-medal event in the *2018 Asian Games* [5]. Singapore hosted the first ever *Olympic Esports Week* (OEW) finals in June 2023, and the Kingdom of Saudi Arabia is due to host the inaugural *Olympic Esports Games* in 2027 [6,7].

While the Asian games featured traditionally popular esports titles such as *Riot Games' League of Legends,* and *Valve's DOTA 2,* the *Olympic Esports Series* took a different approach towards competitive videogaming and included virtual versions of popular Olympic sports such as archery (*Tic Tac Bow*) and cycling (*Zwift*), as well as including popular esports title, *Epic Games' Fortnite* for their shooting competition. This difference in approach between the two sets of events could be explained by the 9th International Olympic Committee (IOC) Summit where the IOC explicitly stated that they aimed to *"showcase the best of virtual sports at the OEW – hybrid physical and simulated sports"* [8]. The esports industry continues to grow with some of biggest titles such as *Valve's Counter Strike and DOTA 2* tournaments exceeding combined prize pools of over $20 million each in 2024, and titles such as *League of Legends World Championships* peaking at over 6.9 million concurrent viewers in 2024 [9].

In the extant literature, esports playing has been shown to attract highly competitive and social individuals. More specifically, professional and aspiring players display high levels of competitiveness and sociability in personality and in motivations to play [10,11]. However, videogaming and esports have traditionally been subject to criticism and stigma, and sometimes framed as 'problematic' [12]. Researchers have highlighted some possible risks and threats related to esports, their integrity, and esports consumers (esports players or spectators), such as doping and performance enhancement drugs (PEDs), gambling-like activities, addiction-related problems, and match-fixing. [13,14]. The gambling-like activities and associations have attracted growing interest from contemporary researchers, and some popularly discussed activities are skin betting and token wagering, esports betting, and loot box buying [14,15].

### 1.2. Esports betting

The competitive and organized structure of traditional sports, technological advancements, and globalization are some factors that have assisted in enabling the betting industries (i.e., sports wagering/betting) to sustain themselves as key stakeholders in both traditional sports [16] and esports [17]. Betting on esports has also become a regular feature of most online betting websites, both regulated and unregulated, where individuals can wager money, cryptocurrency, and even tradable in-game items from videogames (i.e., 'skins') [18]. These wagers can be placed on ongoing in-person or online events for some of the most popular (as well as niche) esports titles [19]. Those in this subset of betting activity are called esports bettors.

Researchers have shown some interest in understanding this group of esports bettors and existing literature suggests that esports bettors possess distinct characteristics compared to individuals who engage in other types of betting (e.g., sports betting) [20]. *Pinnacle* offered the first ever esports bet in early 2010, and the number of esports bettors has steadily increased [21]. However, they still remain relatively underexplored in academic research [20]. One of the more popular forms of comparison has been between esports bettors and sports bettors [22–24]. This might be due to the similarity in the nature of competitive videogaming with professional sports, with sports acting as a reliable anchor on which to base comparisons.

Demographically, some studies have observed differences in the ethnic compositions of their participants who bet on esports compared to those who bet on sports or engage in other traditional forms of gambling. Multiple studies have found that ethnic minorities in their respective nations are more likely to be esports bettors than sports bettors or other traditional gamblers [22,25–27]. Moreover, most studies have indicated that esports bettors are more likely to be (i) male than female [28–30], and (ii) younger compared to comparison groups such as sports bettors and non-gamblers [24,31,32].

Multiple studies have also reported a relationship exists between spectating esports matches or tournaments with betting on esports [26,31,33,34]. From the limited literature available on the motivations to engage in esports gambling (and betting), studies have reported that esports bettors tend to be motivated by financial, enhancement, competition, and coping motives to different degrees [28,29,35,36]. Some of these motives (such as competition and coping) have also been explored more generally among different types of videogaming and esports playing populations as motives to play videogames [11,37–39]. Moreover, Wardle et al. [40] suggested that this group could be especially vulnerable to potential gambling-related harms. This has been supported by results from a number of studies where esports bettors scored significantly higher on self-reported problematic gambling severity measures, compared to other groups such as sports bettors and other online gamblers [23,27,33,35,40,41].

Despite such findings, research in the field of esports-related gambling is still in its infancy. Due to the nature of esports, individuals who consume esports, and bet on it are often compared with groups of individuals who bet on traditional sports [23,24]. The limited existing literature has suggested that these groups might be quite different, and more research comparing esports bettors with other types of bettors would be helpful in delineating any differences between these groups, and to establish whether esports bettors are a standalone group [20].

The role of expertise or knowledge in sports betting has long been debated as either probable cognitive distortions or false beliefs [42,43], representing an illusion of control [44], or as a factor that can make a difference in making more accurate predictions or more successful bets on the outcomes of sports matches [45,46]. While this has not been formally explored among esports bettors, in interviews with esports bettors and skin bettors, Denoo et al. [28] noted that individuals who bet on esports with real money or skins believed *"being familiar with the video game, player or competition being wagered on"* [28, p. 11] was a motivation for engaging in esports betting or skin betting. The motive of profit maximization, and attributing the winnings made from esports betting as being due to their skill and knowledge were important factors in elevating self-esteem among esports bettors [28].

Personality traits and psychopathological comorbidities, such as impulsivity, self-esteem, anxiety, stress, and depression, are relatively underexplored among esports bettors. There has also been little attention paid to the motivations to gamble on esports, and reliable and robust measures to report these motivations have been encouraged [28,47]. Additionally, esports betting research has only been undertaken by a few researchers worldwide compared to other types of betting, and the study of newer populations with more diverse methodologies could be really beneficial in shaping research in this nascent field.

### 1.3. Aims and hypotheses of the present study

Building on the previously identified gaps, the present study was designed to further define individuals who bet on esports compared to traditional sports bettors. Considering that preliminary investigations have shown that most esports bettors also bet on traditional sports [20,23,26], the hypotheses were based on comparison of these two groups of bettors (i.e., sports bettors who had only bet on traditional sports in the year preceding data collection vs. esports bettors most of whom had also gambled on traditional sports in the year preceding data collection). More specifically, it was hypothesized that (i) esports bettors would be younger, male, more likely to perceive themselves as belonging to an ethnic minority, and more likely to still be in education, compared to sports bettors ($H_1$), (ii) esports bettors would exhibit higher

scores on scales for problem gambling severity, exhibit more gaming disorder symptoms on average compared to sports bettors, and would report to spectating esports more than sports bettors ($H_2$), and (iii) esports bettors would engage more frequently in playing the esports titles they bet on compared to sports bettors playing the sports they bet on, and would overestimate the role of 'gaming skill or knowledge' in betting, compared to sports bettors' perception of the role of 'sports skill or knowledge' in betting ($H_3$).

## 2. Methods

### 2.1. Participants, ethics, and data collection

The present study collected data from the United Kingdom ($n = 435$), Hungary ($n = 112$), and Canada ($n = 138$). Ethics research approval was granted from the University of Gibraltar Research Ethics Committee (117/2023/UniGib). Individuals were eligible for participation if they had engaged in either esports betting, sports betting, or both activities in the past 12 months. Data collection was conducted by contacting multiple gambling operators, requesting them to assist with the recruitment of participants. Two gambling operators, *Midnite Gaming* (licensed to operate in the UK and Ireland), and *Betway* (licensed to operate in many countries, including the UK, Ireland, and Canada) agreed to help the research team. Informed consent was obtained from all the participants. Participants from the United Kingdom and Canada completed a survey in the English language while Hungarian participants completed the survey in their native language.

*Midnite Gaming* included a banner on their website, inviting users of their platform to participate in the survey. *Betway* emailed their users a link to the survey. *GameStar*, a popular Hungarian gaming magazine and website, also helped by posting a Hungarian version of the survey on their website as an article, and then sharing it as a sponsored post on *Facebook*. Participation in the present study was incentivized with the possibility of entering into a prize draw to win *Amazon* vouchers of various amounts in the respective countries of the participants. Emails were collected from the individuals who wanted to participate in the draw and were only used for contacting the winners. Responses were instantly anonymized during the data cleanup process. A few responses were also collected from the website *Prolific* ($n = 19$) as part of a pilot study, where participants were compensated with a small amount of money.

A total of 808 individuals started the survey. However, data were not analyzed if individuals did not meet the inclusion criteria, failed to provide their consent to participate, or if they were not residing in one of the three target countries (because there were too few responses from other countries). To increase data quality and accuracy, data were also manually checked for any entries that looked suspicious or unnatural (e.g., straight-lining or random responding). After data cleaning, a total of 685 completed responses remained for further analysis and were divided into two groups. The first group comprised those who bet on esports in the 12 months (96.1% of whom had also gambled on traditional sports) preceding data collection (esports bettors; $n = 359$; 52.4%); the second group comprised those who had only bet on traditional sports in the year preceding data collection (sports bettors; $n = 326$; 47.6%). Although the term 'esports and sports bettors' would technically be more accurate, the present study refers to them simply as 'esports bettors' for brevity. The data were collected between March 2024 and July 2024.

### 2.2. Measures

#### 2.2.1. Socio-demographics

Participants were asked to respond to self-report questions regarding their gender, age, country of residence, ethnicity (whether they are an ethnic minority or not), education status (whether they were currently a student or not), and employment status (whether they were currently employed or not). Moreover, participants were also asked multiple choice questions regarding their thoughts on how they feel about their household income (e.g., coping on present income, living comfortably on present income), and on their life circumstances (e.g., *"My life circumstances are better than average"*). Responses for the household income and life circumstances were then coded from 0 to 5 with the lowest possible score of 0 reflecting a poor perception of their income or life circumstances, and 5 representing the best possible score reflecting a positive perception of their income or life circumstances.

#### 2.2.2. Gambling-related behaviors and beliefs

Participants were asked questions regarding their gambling behavior such as the time of day when they gambled, their frequency of gambling consumption in the past 30 days, and the earliest age they recall participating in that particular gambling activity (for esports betting, online sports betting, online gambling, and in-person gambling). Participants were also asked four questions regarding their perception on possessing skill or knowledge in an esport title or sport and if it helped them to make more successful bets on the activity. These questions comprised (i) *"In your opinion, to what extent does possessing good knowledge of a sport (e.g., about teams, players and competition) assist in making successful bets?"*; (ii) *"In your opinion, to what extend does possessing a high skill in a sport assist the same person in making successful bets?"*; (iii) *"In your opinion, to what extent does possessing good knowledge of an esport (e.g., about teams, players and competitions) assist in making successful bets?"*; and (iv) *"In your opinion, to what extent does possessing a high skill in an esport assist the same person in making successful bets?"*. These questions were rated on a five-point scale from 1 (*very low extent*) to 5 (*very high extent*).

#### 2.2.3. Problem gambling severity

Gambling disorder severity was assessed with the Problem Gambling Severity Index (PGSI) [48]. The PGSI is a standardized measure that assesses the severity of at-risk behavior in problem gambling and participants are asked questions regarding how they felt about their gambling behavior over the last 12 months on nine items (e.g., *"Have you bet more than you could really afford to lose?"*). Each item is scored on a 4-point scale from 0 (*never*) to 3 (*almost always*) and then summed to provide a score out of 27. The final scores indicate whether the individual is a non-problem gambler (score of 0), low-risk gambler (1–2), moderate-risk gambler (3–7) or problem gambler (8–27). Participants who completed the PGSI were also sent their scores at the end of the survey, along with a list of self-help and national resources localized to their country, if they felt like they needed to seek help for their gambling behavior. Cronbach's alpha for the PGSI in the present study was 0.91.

#### 2.2.4. Gambling motivations

Motives to gamble were assessed by using a modified version of the Gambling Motives Questionnaire (GMQ) [49]. The present study used a version known as the *GMQ-R-SF-14* [50] that assesses coping, social, and enhancement, and financial motives of individuals who participate in gambling, with 14 items asking participants to report their reasons for gambling over the past 12 months (e.g., *"I gamble because it's fun"*, *"I gamble because I need money"*). Items were scored on a 4-point scale from 1 (*almost never/never*) to 4 (*almost always*). The mean scores for each subscale were then used to interpret the strength of each gambling motive. Cronbach's alpha for the GMQ in the present study was 0.81.

#### 2.2.5. Gaming behavior and esports participation

Players were asked questions about their gaming behavior such as the frequency of their videogaming over the past 30 days. Participants were also asked questions regarding esports spectatorship such as how often they watched live and pre-recorded esports tournaments or matches, how often they played the esports titles or sports that they bet on, and how often they bet on them.

#### 2.2.6. Gaming disorder symptoms

Gaming disorder (GD) symptoms were assessed using the five-item version (IGDT-5) of the (ten-item) Internet Gaming Disorder Test [51,52] adapted by Horváth et al. [53]. The five items assess gaming disorder corresponding to the International Classification of Diseases (ICD-11) definition of the term 'gaming disorder' [54]. Items in the scale refer to videogaming in general, and not just online gaming, and ask participants about their videogaming, specifically over the past 12 months. The five items used comprised (i) *"Have you ever unsuccessfully tried to reduce the time spent on gaming?"*; (ii) *"Have you ever played games rather than meet your friends or participate in hobbies and pastimes that you used to enjoy before?"*; (iii) *"Have you played a lot despite negative consequences (for instance losing sleep, not being able to do well in school or work, having arguments with your family or friends, and/or neglecting important duties)?"*; (iv) *"Have you ever risked or lost a significant relationship because of gaming?"*; and (v) *"Have you ever jeopardized your school or work performance because of gaming?"*. These items are rated on a 3-point scale from 0 (*never*) to 2 (*often*). Therefore, mean scores on the IGDT-10 ranged from 0 to 2. Cronbach's alpha for the IGDT-10 in the present study was 0.76.

#### 2.2.7. Impulsivity

The Barratt Impulsivity Scale [55,56] was used to assess the personality trait of impulsivity. A shortened, 10-item version of the scale (originally 21 items) called the BIS-R-21-SF was used in the present study [57,58]. The scale assesses cognitive and behavioral impulsivity, and impatience/restlessness. The 10 items are scored on a 4-point scale from 1 (*Rarely never, never*) to 4 (*Almost always/always*) and the items assess how the participants think and react in different situations (e.g., *"I plan tasks carefully", "I am self-controlled"*). Four of the 10 items are reverse-scored. The scores are then summed, and the final score is between 10 and 40, with a higher score indicating greater impulsivity. Cronbach's alpha for the BIS in the present study was 0.77.

#### 2.2.8. Psychopathological symptoms

The Depression Anxiety Stress Scale (DASS-9) [59] was used to assess the general psychopathological symptoms of the participants. The nine items comprise subscales (i.e., depression, anxiety, and stress symptoms). Each participant is asked to indicate how much a given statement applied to them over the past week (e.g., *"I found it difficult to work up the initiative to do things"*). The items are scored on a 4-point scale from 0 (*did not apply to me at all*) to 4 (*applied to me very much or most of the time*). The combined mean score was used for the analyses due to its high internal consistency (Cronbach's alpha = 0.90) and the substantial intercorrelations among the three subscales ($r = 0.60, 0.65, 0.69$), which raised multicollinearity concerns.

#### 2.2.9. Statistical analysis

First, descriptive analysis was conducted comparing the two aforementioned groups in terms of their sociodemographic variables, personality traits, motivations, gambling behavior, and gaming behavior using independent-sample *t*-tests. Then, binary logistic regression models were constructed to identify potential predictors of esports bettor status compared to sports bettor status. Unadjusted associations were tested first, and then an adjusted model was constructed in three steps: first, sociodemographic variables and gambling motives were included as predictors, then personality and psychopathological variables were added in two further steps. Impulsivity, depression, anxiety, and stress symptoms and problem gambling symptoms were added first, then gaming disorder symptoms were added last to the model because this latter variable had a high number of missing values, which reduced the sample size of the overall regression model. All analyses were performed using IBM SPSS statistics version 28.

## 3. Results

### 3.1. Demographic, personality, psychopathological, gambling-related and gaming-related variables

Demographic, personality, psychopathological, gambling-related, and gaming-related variables are presented separately and compared for the two groups, esports bettors and sports bettors, in Table 1. Demographically, the two groups showed significant differences regarding age, being in education, being employed, country, first instance of betting on sports, and ethnicity variables. More specifically, compared to sports bettors, esports bettors were younger with a mean age of 37.98 years (compared to 43.79 years), more likely to be in education and in paid employment, engaged in sports betting at a younger age, and more likely to report as belonging to an ethnic minority.

It was also found that esports bettors were also more likely to be living in Hungary and Canada, compared to sports bettors, who were more likely to be living in the United Kingdom. There were no significant gender differences among the two groups. There were also no observed significant differences among the groups with how they felt about their financial situation with both groups feeling positively on average about their situations. There were also no notable differences in what time the two groups participated in their betting activities.

Esports bettors reported significantly higher levels of impulsivity and psychopathological symptoms than sports bettors but the effect size was weak. Esports bettors reported significantly higher scores on the coping, social and financial gambling motives compared to sports bettors. There were no significant differences in the enhancement motives between the two groups. Esports bettors also scored significantly higher for gambling disorder symptoms with a moderate effect size.

Gaming-related variables showed statistically significant differences regarding esports/sporting knowledge, esports tournaments/streams live and pre-recorded spectatorship, playing the esport title(s) or sport(s) that they bet on, and gaming disorder symptom variables. More specifically, in the past year, esports bettors reported watching more esports tournaments/matches live and prerecorded streams compared to sports bettors, and playing the esports title they bet on in a higher proportion compared to sports bettors playing the sport they bet on. Esports bettors also reported significantly higher mean gaming disorder symptom scores compared to sports bettors with a moderate effect size.

Esports bettors did not overestimate the role of possessing high knowledge or skill in a particular esport title for making more informed betting decisions compared to the impact of possessing high knowledge or skill in a particular sport. In fact, there was a significant difference in the esports/sporting knowledge variable (with a moderate effect size), with sports bettors being significantly more likely to believe that possessing high knowledge in a sport leads to better betting decisions compared to esports bettors' perception of possessing the same high knowledge for a particular esports title.

#### 3.1.1. Prediction of esports betting using sociodemographic, gambling motivational, personality, and psychopathological variables

Following the comparison of the two groups, a series of binary logistic regressions were conducted to see if esports betting could be predicted using sociodemographic variables, gambling motives, impulsivity, and psychopathology. The unadjusted associations provided several significant results. Younger age, being a resident in Hungary and Canada, coping, social and financial motives, impulsivity, depression, anxiety, and stress symptoms, problem gambling, and gaming disorder symptoms were associated with greater likelihood of being an esports bettor compared to being a sports bettor. It should also be noted that the unadjusted associations refer to crude bivariate logistic regression models estimating baseline effect sizes prior to any multivariate adjustment.

**Table 1**
Comparisons of esports bettors and sports bettors: Demographic, personality, psychopathological, gambling-related and gaming-related variables.

| | Esports bettors $N = 342–359$. | Sports bettors $N = 323–326$. | $\chi^2/t$ | df | Cramer's V/Cohen's *d* |
|---|---|---|---|---|---|
| | N (%)/Mean (SD) | N (%)/Mean (SD) | | | |
| *Demographic characteristics* | | | | | |
| Gender (male) | 312 (86.91) | 299 (91.7) | 2.70 | 1 | 0.06 |
| Age | 37.98 (13.64) | 43.79 (13.75) | −5.542*** | 683 | 0.42 |
| In education | 65 (18.16) | 23 (7.1) | 18.757*** | 1 | 0.17 |
| Working | 302 (84.36) | 252 (77.30) | 5.520* | 1 | 0.09 |
| Age of esports betting onset (year) | 31 (13.87) | N/A | N/A | N/A | N/A |
| Age of sports betting onset (year) | 28.59 (11.86) | 31.72 (13.40) | −3.180** | 642.7 | 0.25 |
| Age of in-person gambling onset (year) | 21.69 (7.69)[1] | 21.98 (7.48)[2] | −0.410 | 461 | 0.04 |
| Household income | 4.15 (0.90) | 4.20 (0.85) | −0.79 | 666 | 0.06 |
| Life circumstances | 4.21 (1.14) | 4.31 (1.05) | −1.26 | 682 | 0.10 |
| *Gambling time of day* | | | | | |
| Day and afternoon time (8 am-8 pm) | 166 (46.37) | 153 (46.93) | 0.90 | 2 | 0.04 |
| Nighttime (8 pm-8 am) | 71 (19.83) | 56 (17.18) | | | |
| No specific time | 121 (33.80) | 117 (35.89) | | | |
| *Country* | | | | | |
| United Kingdom | 192 (44.14) | 243 (55.86) | 32.78*** | 2 | 0.22 |
| Hungary | 76 (67.86) | 36 (32.14) | | | |
| Canada | 91 (65.94) | 47 (34.06) | | | |
| Ethnic minorities | 45 (12.57) | 22 (6.75) | 6.544* | 1 | 0.10 |
| *Personality variable* | | | | | |
| Impulsivity | 1.95 (0.47) | 1.86 (0.45) | 2.680** | 674 | 0.21 |
| *Psychopathological variable* | | | | | |
| Depression, anxiety, and stress symptoms | 0.51 (0.59) | 0.42 (0.48) | 2.107* | 660.1 | 0.16 |
| *Gambling-related variables* | | | | | |
| Enhancement motive | 2.44 (0.80) | 2.43 (0.69) | 0.205 | 673.3 | 0.02 |
| Coping motive | 1.45 (0.59) | 1.25 (0.40) | 5.445*** | 620.4 | 0.41 |
| Social motive | 1.77 (0.69) | 1.59 (0.63) | 3.584*** | 673 | 0.28 |
| Financial motive | 2.16 (0.80) | 1.99 (0.70) | 2.966** | 671.5 | 0.23 |
| Problem gambling symptoms | 3.53 (4.42) | 2.03 (3.06) | 5.187*** | 639.3 | 0.39 |
| *Gaming-related variables* | | | | | |
| Esports/sporting knowledge[3] | 3.51 (1.16) | 3.93 (0.85) | −5.75*** | 647.4 | 0.41 |
| Esports/sporting skill[4] | 3.37 (1.16) | 3.35 (1.03) | 0.238 | 676.4 | 0.02 |
| Esports tournaments/streams live spectatorship | 182 (51.12) | 70 (21.47) | 64.22*** | 1 | 0.31 |
| Esports tournaments/streams pre-recorded spectatorship | 123 (34.55) | 44 (13.50) | 40.793*** | 1 | 0.25 |
| Playing esports/sports they bet on | 138 (38.66) | 112 (34.36) | 1.358 | 1 | 0.05 |
| Playing the esport/sports they bet on in the last year. | 128 (92.75)[5] | 92 (82.14)[6] | 6.592** | 1 | 0.16 |
| Gaming disorder symptoms | 2.25 (2.23)[7] | 1.37 (1.65)[8] | 4.475*** | 384.8 | 0.44 |

*Note:* For categorical variables, Pearson's chi-square ($\chi^2$) was reported after running crosstabs; and *t*-tests equality of means were run and *t*-values reported for numeric variables.*$p < .05$; **$p < .01$; ***$p < .001$. |ES|: Absolute value of effect sizes (comparing means: Cohen's *d*; comparing proportions: Cramer's V). [1]n = 232; [2]n = 231; [3]Esports/sporting knowledge, and [4]Esports/sporting skill variables were created with two different variables for the two groups. For knowledge, esports bettors' perceptions on the impact of knowledge of a specific esport title in making more successful bets was compared with sports bettors' perceptions on the impact of knowledge of a specific sport in making more successful bets on that sport. The same approach was also followed for esports/sporting skill, where the perceptions of participants on the impact of possessing high skill of a specific esport title or sport in making more successful bets was compared. [5]n = 138, [6]n = 112; [7]n = 218; [8]n = 170.

However, in the adjusted model, most of these predictors lost their significance. When introducing only sociodemographic variables and gambling motives, female gender, younger age, being a resident in Hungary and Canada and coping motive were significant predictors. When impulsivity, depression, anxiety, and stress symptoms and problem gambling symptoms were also introduced in the model, none of these had a significant association with esports betting status, but the previously listed variables remained significant. When gaming disorder symptoms were added to the final model, only younger age, being a resident in Hungary and Canada, and gaming disorder symptoms remained significant predictors of esports betting. However, it should be noted that despite losing significance, the effect size for female gender further increased in the third adjusted model (OR = 2.40 [0.96–5.98]) compared to the earlier models. This may be due to the large decrease in sample size between second and third adjusted models (i.e., from $N = 664$ to $N = 384$).

### 3.1.2. Hypotheses testing

Findings (Table 1) indicated that $H_1$ was partially supported with varying levels of significance. Compared to traditional sports bettors, esports bettors were significantly younger, significantly more likely to report belonging to an ethnic minority and significantly more likely to be in education. However, while an overwhelmingly majority of the total sample was male (89.20%), there were no significant gender differences between the two groups. However, as shown in Table 2 in the binary logistic regression models, being female was a predictor of esports betting when adding gambling motives, personality, and psychopathological variables to the regression models. Findings (Table 1) indicated that $H_2$ was supported because (compared to traditional sports bettors) esports bettors reported significantly higher scores on the PGSI, significantly higher scores on the IGDT-10, and spectated live or pre-recorded esports streams or tournaments significantly more.

Findings (Table 1) indicated that $H_3$ was supported in part but rejected in others. More specifically, over the past 12 months, esports bettors reported playing the esports titles they wagered on significantly more often than sports bettors engaged in the sports they bet on. However, the effect size was weak. The opposite was observed among both groups' perception of the role of gaming knowledge or sporting knowledge in making more successful bets. Sports bettors were significantly more likely than esports bettors to believe that having good knowledge of a sport increases the likelihood of making successful bets on that sport, whereas esports bettors were less likely to view knowledge of an esports title as similarly beneficial for betting success. There were no significant differences among both groups' perception of the role of

**Table 2**
Binary logistic regression models: The association between sociodemographic, psychological, gaming and gambling-related variables among esports bettors vs. sports bettors.

| | Unadjusted associations with esports betting status among sports bettors | | First adjusted model to predict esports betting status among sports bettors[2] | | Second adjusted model to predict esports betting status among sports bettors[3] | | Third adjusted model to predict esports betting status among sports bettors[4] | |
|---|---|---|---|---|---|---|---|---|
| | OR [95% CI] | *p* | OR [95% CI] | *p* | OR [95% CI] | *p* | OR [95% CI] | *p* |
| *Sociodemographic variables* | | | | | | | | |
| Female gender (ref.: male gender) | 1.53 [0.92–2.53] | 0.102 | 1.77 [1.03–3.05] | 0.040 | 1.78 [1.03–3.09] | 0.040 | 2.40 [0.96–5.98] | 0.061 |
| Age | 0.97 [0.96–0.98] | <0.001 | 0.98 [0.97–0.99] | <0.001 | 0.98 [0.97–0.99] | <0.001 | 0.97 [0.95–0.99] | 0.007 |
| Country of residence (ref. Hungary) | | | | | | | | |
| United Kingdom | 0.37 [0.24–0.58] | <0.001 | 0.42 [0.27–0.67] | <0.001 | 0.42 [0.27–0.67] | <0.001 | 0.34 [0.19–0.62] | <0.001 |
| Canada | 0.92 [0.54–1.56] | 0.749 | 0.95 [0.55–1.65] | 0.852 | 0.95 [0.54–1.65] | 0.850 | 0.57 [0.29–1.14] | 0.112 |
| *Gambling motives* | | | | | | | | |
| Enhancement motive | 1.02 [0.83–1.25] | 0.838 | 0.92 [0.72–1.17] | 0.502 | 0.93 [0.73–1.19] | 0.518 | 1.05 [0.76–1.45] | 0.785 |
| Coping motive | 2.35 [1.69–3.26] | <0.001 | 1.94 [1.32–2.85] | <0.001 | 1.90 [1.18–3.01] | 0.008 | 1.67 [0.90–3.11] | 0.103 |
| Social motive | 1.52 [1.21–1.92] | <0.001 | 1.10 [0.82–1.48] | 0.514 | 1.11 [0.83–1.50] | 0.481 | 0.97 [0.66–1.44] | 0.881 |
| Financial motive | 1.36 [1.11–1.66] | 0.003 | 1.10 [0.88–1.39] | 0.397 | 1.13 [0.89–1.44] | 0.318 | 1.20 [0.87–1.66] | 0.264 |
| *Personality and psychopathological variables* | | | | | | | | |
| Impulsivity | 1.57 [1.13–2.19] | 0.008 | – | – | 1.04 [0.68–1.62] | 0.846 | 0.87 [0.50–1.52] | 0.620 |
| Depression, anxiety, and stress symptoms | 1.35 [1.02–1.80] | 0.038 | – | – | 0.69 [0.46–1.03] | 0.071 | 0.67 [0.40–1.10] | 0.111 |
| Problem gambling symptoms | 1.12 [1.07–1.17] | <0.001 | – | – | 1.03 [0.97–1.10] | 0.296 | 1.03 [0.95–1.11] | 0.498 |
| Gaming disorder symptoms | 1.26 [1.13–1.41] | <0.001 | – | – | – | – | 1.17 [1.02–1.34] | 0.022 |

*Notes.* OR [95% CI]: Odds ratio with the 95% confidence interval. Ref.: reference category in the specific variable. Variables significantly ($p < .050$) associated with esports betting status among sports bettors are highlighted in grey. Unadjusted associations were tested through separate binary logistic regressions where the outcome variable was the esports betting status among sports bettors (1 = sports betting, 2 = esports betting and sports betting at the same time), the reference category is sports betting. Sample size is 388 in the case of gaming disorder symptoms, and it ranges between 664 and 685 in the case of the other predictor variables.
2 Binary logistic regression model where the outcome variable was the esports betting status among sports bettors (1 = sports betting, 2 = esports betting and sports betting at the same time), the reference category is sports betting. Predictor variables were the variables listed in the left column, and they were all introduced in the model at the same time. ($N = 670$; 97.7%). The model was statistically significant, $\chi^2(8) = 77.73$, $p < .001$, indicating that the predictors improved the model fit. The Nagelkerke $R^2$ indicated that the model explained approximately 14.6% of the variance in the dependent variable.
3 Binary logistic regression model where the outcome variable was the esports betting status among sports bettors (1 = sports betting, 2 = esports betting and sports betting at the same time), the reference category is sports betting. Predictor variables were the variables listed in the left column, and they were all introduced in the model at the same time. ($N = 664$; 96.8%). The model was statistically significant, $\chi^2(11) = 78.72$, $p < .001$, indicating that the predictors improved the model fit. The Nagelkerke $R^2$ indicated that the model explained approximately 14.9% of the variance in the dependent variable.
4 Binary logistic regression model where the outcome variable was the esports betting status among sports bettors (1 = sports betting, 2 = esports betting and sports betting at the same time), the reference category is sports betting. Predictor variables were the variables listed in the left column, and they were all introduced in the model at the same time. ($N = 384$; 56%). The model was statistically significant, $\chi^2(12) = 53.72$, $p < .001$, indicating that the predictors improved the model fit. The Nagelkerke $R^2$ indicated that the model explained approximately 17.5% of the variance in the dependent variable.

gaming skill or sporting skill in making more successful bets.

## 4. Discussion

As hypothesized, multiple statistically significant differences among the two groups of bettors were observed. Individuals who participated in esports betting were significantly younger, more likely to be in full-time or part-time education than not, and they were also more likely to be in full-time or part-time employment than not working. Esports bettors also reported they started betting on sports at a younger age and were more likely to report belonging to an ethnic minority compared to individuals who were sports bettors.

There were no significant gender differences in the two groups of bettors, but like the sports betting and esports betting literature in general [20,60,61], the present study's sample was predominantly male (89.12%; $n = 598$). However, when interpreting the regression models, the findings for two adjusted models (when adding sociodemographic variables and gambling motives; and when adding impulsivity, depression, anxiety, and stress symptoms to the model) suggested that being a female bettor was a predictor for being an esports bettor. Previous findings in the existing literature have shown that females comprise a larger proportion of esports bettors compared to sports bettors in studies comparing these two groups [22,23].

Esports bettors being significantly younger had a moderate effect size compared to sports bettors, and being younger was also a significant predictor for esports betting in all the regression models. This is also consistent with previous research [24,31,32] and there could be a few possible reasons for this. The esports landscape features unregulated esports and skin betting websites [19] that might appeal to younger audiences. In interviews with skin bettors, Denoo et al. [28] noted that skin bettors recalled using unregulated skin gambling and esports betting websites when they were minors because it was an easy way to gamble without any hard identity checks or restrictions.

It could also be that esports betting in general is marketed to a different audience compared to sports betting or traditional gambling. Studying esports gambling advertisements on the social media platform *X* (formally *Twitter*), Rossi et al. [62] reported that approximately 17% of these advertisements were *"of particular appeal"* to children (compared to just 3% of traditional gambling advertisements) including using animations or cartoons, advertisements being associated with youth culture, etc. They also found that children (aged under 16 years) comprised 28% of engagements (*replies* and *retweets*) with esports gambling advertisements compared to just 5% for the traditional gambling advertisements. Moreover, while young people aged 16–23 years comprised 66% of engagements for esports gambling advertisements, and 63% of all engagements for traditional gambling advertisements, when the authors examined users aged 24 years and above, their share of engagements with traditional gambling advertisements held steady at 32% of all traditional gambling engagements examined but their engagements with esports gambling advertisements dropped to just 6% of the total esports gambling advertisements examined.

In the present study, there was a significantly higher proportion of esports bettors from Canada and Hungary, compared to the United Kingdom. This was also the case in all the regression models, where being a resident of Hungary or Canada was a significant predictor of being an esports bettor. These results may be explained by the fact that the UK is the biggest sports betting market in Europe [63] and one of the biggest markets in the world [64], and it might be more common to

engage in sports betting as a social or normalized activity in the UK than in Canada or Hungary. Also, the Hungarian sample was exclusively recruited via the assistance of *GameStar*, a Hungarian videogame magazine and website, which would naturally mean that the participants would be gamers from a gaming community. The association between gaming behavior and esports-related gambling has also been well documented [34,65].

Esports bettors reported higher mean impulsivity, depression, stress, and anxiety symptom scores than sports bettors. These factors were also significant predictors for esports betting in the unadjusted regression model. Impulsivity, depression, stress, and anxiety symptoms have been associated with both problem gambling [66–69] and gaming disorder [70–72]. Studies examining anxiety, stress, and depression symptoms among esports players have shown that a significant proportion of them show some levels of stress, anxiety, and depression symptoms [73–75]. However, there are few studies that have examined psychopathological variables among different groups of sports bettors that have included esports bettors. In the present study, the two groups differed significantly, with moderate effect sizes for both gambling disorder risk severity and gaming disorder symptoms. Esports bettors scored significantly higher than sports bettors on both measures. Gambling and gaming disorder symptoms were also significant predictors of esports betting in the unadjusted regression model.

When gambling motives, problem gambling, gaming disorder symptoms, psychopathological variables, and impulsivity were all added to the adjusted regression model, gaming disorder symptoms remained the only significant predictor of esports betting status. It could be that esports betting might attract individuals who struggle with impulse control, and that individuals suffering from gaming disorder might be at elevated risk of developing other behavioral addictions such as problem gambling. One possible reason that is commonly posited for why individuals with gaming disorder score higher on depression, anxiety, and stress is that they might be using gaming as an escape [76] from these aforementioned mood states or as a coping strategy to deal with stressors in life [77].

In the present study, esports bettors were also significantly more likely to report coping as a motivation to gamble than sports bettors with a moderate effect size, and it was also a significant factor for predicting esports betting in the unadjusted regression model. The coping motive also remained as the only significant motive predictor for esports betting in two out of three adjusted models (when adding sociodemographic and gambling motives variables, and when adding impulsivity, depression, anxiety, and stress symptoms to the model). However, esports bettors reporting significantly higher problem gambling risk severity symptoms could also be due to the fact that most participants in the esports betting group also bet on traditional sports. From the data available, it is not possible to say whether those betting on esports were doing so because they were at higher risk of developing gambling disorder, and therefore engaging in more than one form of gambling, or if esports betting is inherently a riskier form of gambling compared to sports betting. It was noted that esports bettors in the present study reported having started gambling on sports at a significantly younger age than the traditional sports bettors.

In the extant literature, multiple studies have reported positive relationships between watching esports and esports betting, as well as watching esports being a significant predictor of gambling on esports [26,32,35]. Self-reported viewership among samples of esports bettors of esports matches/events was as high as over 90% in previous studies [31,33]. In the present study, esports bettors reported watching esports tournaments, matches, or live-streams significantly more than sports bettors, with a small to moderate effect size. Just under half of the esports bettors watched esports tournaments or streams live (compared to 21.5% of sports bettors), while approximately one-third of esports bettors watched prerecorded tournaments or streams (compared to 13.5% of sports bettors).

As noted earlier in the paper, the role of expertise or knowledge in esports betting and how it might affect the outcome of bets has not been examined in previous studies in the academic literature. Consequently, the present study explored whether esports bettors and sports bettors perceived the role of esports knowledge and esports skill, or sporting knowledge and sporting skill, to be factors in making more successful bets, and if there would be any differences in their perceptions. It was hypothesized that esports bettors would overestimate the role of skill and knowledge compared to sports bettors. However, the results indicated that sports bettors gave high importance to the role of knowledge in sports significantly more than esports bettors, with a moderate effect size. There were no significant differences in the role of skill in their respective betting activities, with both types of bettor exhibiting the same mean score.

Data were also collected regarding their involvement in playing the esports title(s) they bet on, or the sport(s) they bet on. These could be in the form of organized competition, semi-professionally or casually. It was hypothesized that due to the accessible nature of videogames and esports titles and being able to play them from the comfort of home recreationally, individuals betting on esports would report playing more videogame titles that they bet on than sports bettors would report for playing the sports they bet on. The results indicated that over the past 12 months, esports bettors were more likely to play the esports title(s) they bet on compared to sports bettors playing the sport(s) they bet on. This difference (while significant) only had a very small effect size.

The present study also explored whether there were any differences between the time of day when the two types of bettor engaged in their respective betting activities. Rossi et al. [62] found that esports gambling betting accounts on social networking website *Twitter* (now *X*) were twice as likely to advertise by sending tweets between late nights and early mornings (10 pm-6 am), when individuals could be more vulnerable than during the day, to engage in gambling [62,78–80]. This could be a cause for concern, as it may suggest that esports gambling advertisers are engaging in unhealthy business practices that harm their users. However, the present study did not find any significant differences in the two groups with respect to time of day when they engaged in gambling behavior.

While comparisons of gambling motives between individuals who engage in esports betting and sports betting have not been conducted previously, there have been studies that have explored esports betting motivations. Denoo et al. [28] reported that esports bettors were motivated by profit and making money through their betting behaviors. Similarly, Bibert et al. [36] also reported that monetary gain was the primary external motivational factor among esports bettors, followed by amotivation (i.e., gambling without a purpose or reason), socialization, and social recognition. In the present study, esports bettors were significantly more likely to report being driven by financial motives than sports bettors and were also significantly more likely to gamble for coping and social motives, compared to traditional sports bettors. The financial motivations did not appear to be driven by their financial status because there were no significant differences in how individuals perceived their household income or their life financial circumstances between the two groups. In addition to being more likely to be driven by financial motives to gamble, esports bettors in the present study also had significantly greater problem gambling severity. This may be because most esports bettors also bet on traditional sports as well as esports, whereas sports bettors bet exclusively on traditional sports. Similar variables, such as gambling frequency and levels of problem gambling severity, have both been shown to be positively associated with financial motives for gambling in existing literature [81].

## 5. Limitations

The present study has a number of limitations. Firstly, despite using multiple methods to recruit participants, the sample size was still modest. Additionally, the sampling methods were inconsistent across countries, with some participants recruited through email via gambling

operators, and others recruited via banners on a gambling website, or through a website article or *Facebook* post by the gaming magazine. While the survey took only 7–10 min to complete, continuous efforts to locate communities of esports bettors were difficult. Secondly, while the present study aimed to differentiate between esports and sports bettors, there were very few participants who exclusively bet on esports to have a standalone group for analytic purposes. Therefore, the esports betting group mostly comprised individuals who bet on both esports and traditional sports. Future research would be greatly aided by researchers being able to get access to a standalone sample of 'pure' esports bettors. Thirdly, all the data were self-report, which are susceptible to well-known biases (e.g., social desirability, memory recall), Although the participants were guaranteed anonymity and confidentiality, some participants provided their email addresses (for the prize draws), which may have made individuals feel like their anonymity was compromised. Finally, the study was also cross-sectional in nature so causality between the study variables could not be determined.

## 6. Conclusions and future directions

The present study's results enhance the existing literature by comparing individuals who bet on esports with those who bet on traditional sports. Compared to traditional sports bettors, esports bettors were shown to be significantly younger in age, more likely to report belonging to an ethnic minority in their country of residence, score significantly higher on problem gambling severity risk self-assessments, and more likely to report watching esports. The study also adds to the very limited literature on motivations to engage in betting related to esports, and explored impulsivity, stress, anxiety, and depression symptoms. Those who bet on esports reported significantly higher scores on these aforementioned psychopathological variables, and also reported significantly higher scores on financial, social, and coping motivations for engaging in their gambling behavior, compared to sports bettors.

Moreover, individuals who bet on esports were also more likely to report being in education and employment, while also beginning to gamble on sports at a younger age, and reporting a significantly higher prevalence of gaming disorder symptoms compared to sports bettors. Individuals who only bet on sports were significantly more likely to denote importance to the role of possessing knowledge of a sport in making successful bets on it, compared to esports bettors' perception of possessing knowledge of a particular esports title in making successful bets on it. These results suggest that further research is needed to explore the relationships and possible associations between gaming behavior, esports spectatorship, and esports-related betting. Replication of the present study by conducting studies in other countries is needed for cross-cultural comparisons of betting behavior on esports to better understand their sociodemographic and psychological profiles because existing research has been limited to a few Western nations, and very little is known about esports bettors from other parts of the world [20].

While some studies have explored the role of sporting knowledge in making accurate predictions in traditional sports betting [45,46], it would be interesting for researchers to explore the factors of gaming knowledge and expertise in specific esports titles and how these factors may influence successful betting among esports bettors. Future longitudinal studies in the field could examine whether esports betting acts as a gateway towards other future betting and gambling activities, or why women and individuals belonging to an ethnic minority in their country might be more inclined to bet on esports rather than just sports. The esports industry is also encouraged to help develop support measures for esports bettors, and preventive measures to minimize potential harms to these consumers using part of the industry profits that often rely on aggressive esports-betting sponsorships [82].

The present study's findings indicate that compared to standalone sports bettors, individuals who also bet on esports appear to be more susceptible to gambling and videogaming-related harm, more vulnerable to elevated levels of impulsivity, experience higher levels of depression, anxiety, and stress symptoms, and are more likely to engage in gambling as a coping strategy. The study serves as the starting point for self-report evidence on multiple variables among esports bettors. The findings regarding the perception of skill and knowledge on esports betting outcomes by attempting to assess this belief quantitatively are novel and encourage a deeper discussion into the topic. Although there are a few studies comparing samples of esports and sports bettors, the present study is the first to directly compare gambling motivations among these two groups, as well as being the first to examine direct cross-cultural differences among esports bettors within the same study. Additionally, questions regarding gambling during a particular time of day, and asking esports bettors (and sports bettors) if they actively played the esports or sports they bet on had also not been examined previously.

The results also provide novel insight regarding the esports betting population, showing that esports betting usually occurs as part of a broader gambling repertoire rather than in isolation. This indicates that the observed differences are due to variations in gambling involvement patterns rather than a clear division between distinct betting groups. The study also offers empirical evidence for the incremental validity of gaming disorder symptoms as a predictor of esports betting involvement. Importantly, gaming disorder symptoms remained significantly associated with involvement even after controlling for established risk factors such as gambling motives, impulsivity, and general psychopathology. Esports betting may be more closely related to domain-specific gaming traits than to wider, non-specific psychological characteristics. The study also explored personality traits and psychological variables such as impulsivity, depression, anxiety, and stress symptoms among esports bettors at the time of participation, and how these variables are reported differently among different gambler or groups, and how these variables interact with one another in regression models to predict esports betting status.

Keeping these differences in mind, individuals who bet on esports rather than just sports should also be included and represented in existing awareness campaigns and safer gambling advertisements. Increased representation of esports bettors in such harm-reduction and awareness programs could lead to this population feeling more confident in discussing their struggles with esports-related gambling, and individuals suffering from esports-related gambling harm might feel encouraged to seek help.

## CRediT authorship contribution statement

**Harshdeep S. Mangat:** Writing – original draft, Visualization, Project administration, Methodology, Investigation, Formal analysis, Data curation, Conceptualization. **Orsolya Király:** Writing – original draft, Validation, Methodology, Formal analysis. **Róbert Urbán:** Writing – original draft, Validation, Formal analysis, Data curation. **Shu M. Yu:** Writing – review & editing, Validation, Formal analysis. **Mark D. Griffiths:** Writing – review & editing, Supervision, Conceptualization. **Borbála Paksi:** Writing – review & editing. **Katalin Felvinczi:** Writing – review & editing. **Zsolt Demetrovics:** Writing – review & editing, Supervision, Funding acquisition, Conceptualization. **Andrea Czakó:** Writing – review & editing, Supervision, Project administration, Conceptualization.

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Authors RU, BP and KF have nothing to declare for this study.

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