

EUROPEAN REPORT:

MENTAL HEALTH OUTCOMES IN ESPORTS PLAYERS

GG Project Consortium

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“The Good Game: Promoting mental health in esports” (GG)

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We would like to express our gratitude to all the esports players who participated in this study, as well as our external partners who aided in study recruitment. We thank the entire GG Consortium for their valuable contributions to the current study and report.



Executive summary

- The current report offers a summary of the key findings from a large international survey study, aimed at better understanding the mental health of esports players.
- The survey included measures on esports players' personal and esports-related demographics, well-being, depression, anxiety, and sleep disturbance. Additionally, a custom questionnaire was built to explore complex interactions between mental health and esports-related demands through advanced network analyses.
- A total of **1025 participants** from 64 different countries fully completed the survey. This included 632 (61.7%) participants currently residing within the EU.
- Participants' esports-level ranged from recreational (n = 288; 28.1%), to foundational (n = 292; 28.5%), pre-elite (n = 232; 22.6%), elite (n = 144; 14%), and mastery level (n = 69; 6.7%).
- In total, **36.4%** of esports players **experienced poor mental well-being**, whereas 63.6% reported good mental well-being.
- **45.3%** of players reported **moderate-to-severe symptoms of depression**.
- **33.6%** of respondents reported **moderate-to-severe symptoms of anxiety**.
- **70.7%** of the total sample reported indicators of **sleep disturbance**.
- Sleep, fatigue, and perceived lack of competence were frequently reported and strongly linked to depressive symptoms and impaired esports performance.
- Depressed mood acted as a central risk factor within the network analysis, with sleep issues, fatigue, and perceived lack of competence increasing the likelihood of worsening mental health.
- Over 40% of participants cited mental fatigue, anhedonia, poor sleep, and perceived skill level in esports as major hindrances to esports performance.



Aims of the GG survey

The rapid expansion of the esports industry has led to increased attention for the unique mental health challenges faced by esports players, yet research on this topic remains in its early stages (Kegelaers et al., 2024). Given the prevalence of stressors such as performance pressure, irregular sleep patterns, and lack of structured support systems, this study aims to provide empirical insights into the mental health experiences of esports players and identify key areas for intervention. To this end, an online survey was developed by the GG consortium (GG, 2024), targetting esports players of all levels of performance, concerning their well-being, mental ill-health, and esports specific stressors.

The aim of the GG survey was to:

- 1) Investigate esports players' well-being as well as the prevalence of symptoms of different mental health disorders (i.e., depression, anxiety, sleep disturbance).
- 2) Investigate the impact of **key esports-related demands**.
- 3) Investigate potential **complex reciprocal interactions** between different mental health outcomes and esports demands through advanced **network analysis**.
- 4) Create an evidence base for the development of a **multicomponent and multilevel online modular psychoeducational intervention**, targeting multiple areas to promote mental health (i.e., WP2 and WP3 of the GG project).

The results obtained through this survey will be elucidated in this European report.

More information on the GG project can be found here:

<https://goodgamewebsite.wordpress.com/>



Procedure and instruments

An online survey was administered to esports players through the networks of the five participating countries. This was done directly by the partners of the GG consortium and indirectly through the networks and social media accounts of the GG partners.

Before administering the survey, **ethical approval** was granted by the **Ethical Committee of Human Sciences of the Vrije Universiteit Brussel** (File number ECHW_529-WP1).

The online survey targeted esports players of all levels of play (i.e., recreational, foundational, pre-elite, elite, and mastery level players) and games or esports titles (e.g., League of Legends, Counter Strike, Rocket League, EA Sports FC).

The online survey was developed in Qualtrics and made available in eight languages (English, Dutch, French, German, Icelandic, Spanish, Catalan, and Swedish).

The online survey is available here:

https://vub.fra1.qualtrics.com/jfe/form/SV_0djIiRdeocTAWzQ

The survey was launched on the 7th of October 2024 and the final data set for this report was exported on the 18th of February 2025. After exportation, the data set was analysed in SPSS and R. All consortium members contributed to the data analysis reported in this work.



Survey structure

The content of the survey was divided into five sections:

1) Demographics

- i. Age, gender, current country of residence.

2) Esports involvement

- i. Years competing in esports, primary game of competition, description of level of performance, time per week spent on individual training, time per week spent on practicing in team, time per week spent on esports competition, access to esports support staff, financial income from esports.

3) Well-being and mental health

- i. The **World Health Organisation – Five Well-Being Index** (WHO-5) (World Health Organisation, 2024): 5-item scale that measures well-being over the last two weeks; 6-point Likert scale from 0 (*at no time*) to 6 (*all of the time*). Scores range from 0 to 30. Scores can be categorised as “low well-being” (total score ranges from 0 to 14) and “high well-being” (total score ranges from 15 to 30).
- ii. **Patient Health Questionnaire** (PHQ-9) (Kroenke et al., 2001): 9-item scale that measures the frequency of symptoms of depression; 4-point Likert scale ranging from 0 (*not at all*) to 3 (*nearly every day*); scores range from 0 to 27. Scores can be categorised according to the severity of reported symptoms as “no depression” (total score ranges from 0 to 4), “mild depression” (score ranges from 5 to 9), “moderate depression” (score ranges from 10 to 14), “moderately severe depression” (score ranges from 15 to 19), and “severe depression” (score ranges from 20 to 27).
- iii. **Generalised Anxiety Disorder Assessment** (GAD-7) (Spitzer et al., 2006): 7-item scale that measures the frequency of symptoms of anxiety; 4-point Likert scale ranging from 0 (*not at all*) to 3 (*nearly every day*); scores range from 0 to 21. Scores can be categorised according to the severity of reported symptoms as “no/minimal anxiety” (score ranges from 1 to 4), “mild anxiety” (score ranges from 5 to 9), “moderate anxiety” (score ranges from 10 to 14), and “severe anxiety” (score ranges from 15 to 21).
- iv. A single item on esports players’ mental health help-seeking behaviour.
- v. A single item on esports players’ formally received mental health diagnosis.
- vi. A single item on esports players’ self-assessment of neurodiversity.



4) Sleep disturbance

- i. **Pittsburgh Sleep Quality Index Questionnaire (PSQI)** (Buysse et al., 1989): 9-component scale that assesses sleep quality and sleep disturbances; 4-point Likert scale ranging from 0 (*no disturbance*) to 3 (*major disturbance*); scores range from 0 to 21. Overall scores can be categorised according to the presence and strength of sleep disturbances as “good sleep quality” (total scores ranges from 0 to 5) and “poor sleep quality” (total scores range from 6 to 21).

5) Network analyses on mental health and esports-specific demands

- i. GG custom questionnaire (GG, 2024): a novel, self-developed 17-item scale that allows for advanced network analyses. The scale measures core symptoms of both depression and anxiety, as well as different esports specific risk factors and protective resources; items are scored on a 10-point Likert scale ranging from 1 (*almost never*) to 10 (*constantly*); scores range from 17 to 170. Additionally, participants are asked if the item has hindered their ability to compete in esports at the level they are accustomed; dichotomous yes - no scale.



International Data Collection

- **Who?** An online survey was administered to esports players of all performance levels, through the networks of all project partners.
- **When?** Data was collected between October 2024 and February 2025.
 - Distribution of survey responses over time is illustrated in Figure 1.
- **How?** Participants received an online link via email or through a QR code distributed at esports events, social media channels run by the partners, video dissemination on Youtube, and Twitch streams. An estimated 755,000 individuals (at least) viewed the advertisements for the survey.
- **Communication highlights:**
 - Social media:
 - X post by Ismael Pedraza (member of consortium): 140,500 views
(<https://x.com/IsmaPedraza/status/1877348444228001977>)
 - X post by Eefje “Sjokz” Depoortere (External): 50,000 views
(<https://x.com/sjokz/status/1877399113618108925>)
 - Youtube:
 - Youtube short by Extra History channel (External): 366,000 views
(<https://www.youtube.com/shorts/exMLdSEJumc>)
 - Youtube short by Extra Credits channel (External): 150,000 views
(https://www.youtube.com/shorts/chFX_Fz6xXw)
 - Youtube video by Extra Credits channel (External): 12,000 views
(<https://www.youtube.com/watch?v=iyvkIBA7pNE>)
- **Survey link:** https://vub.fra1.qualtrics.com/jfe/form/SV_0djJiRdeocTAWzQ

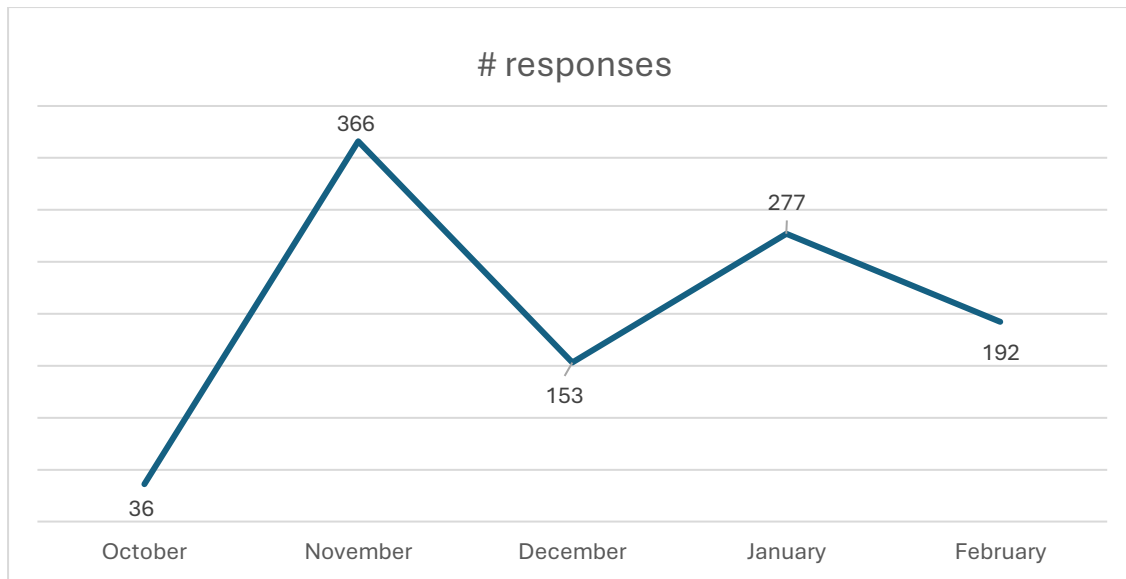


Figure 1. Distribution of the complete responses ($N = 1025$) collected between October 2024 and February 2025

Participants

- In total, **1025 participants** completed the questionnaire in full.
- Attesting to the international nature of the online survey distribution, esports players **from all over the world** completed the questionnaire (see Figure 2); the **majority** of responses came **from countries within the EU** ($n = 632$; 61.7%, see Figure 3) with Spain collecting the most responses ($n = 217$; 21.2% of total sample), followed by Germany ($n = 204$; 19.9% of total sample).

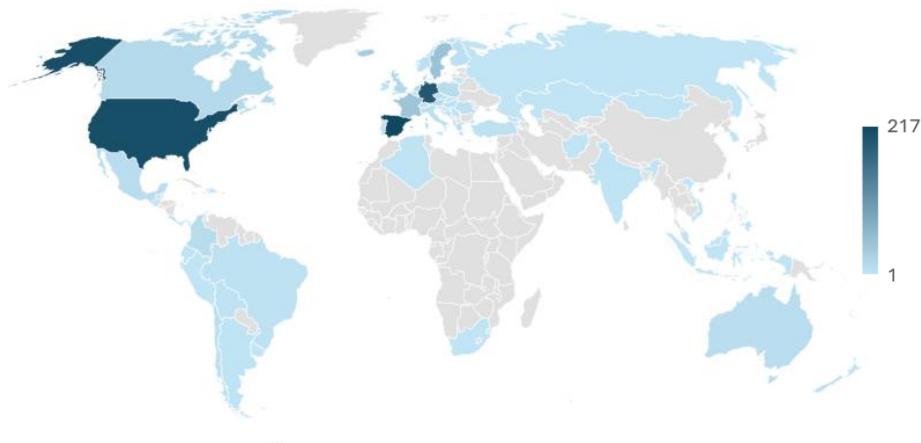


Figure 2. World map of completed survey responses ($N = 1025$)

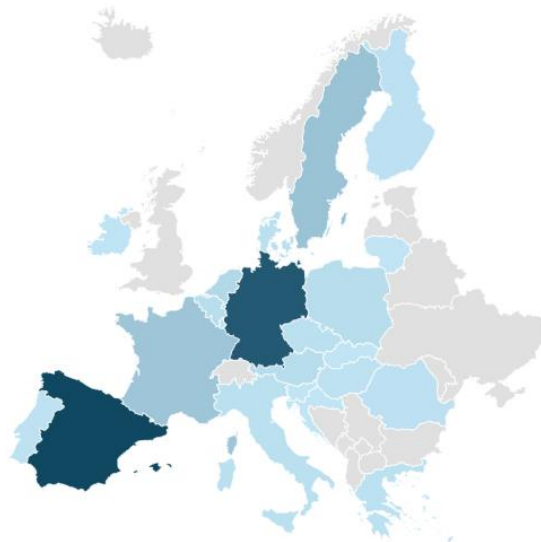


Figure 3. Responses from EU countries ($n = 632$)



Participant characteristics

- The participants predominantly identified as **male** ($n = 845$; **82.4%**), followed by **female** ($n = 139$; **13.6%**), and **non-binary** ($n = 29$; **2.8%**) (see Figure 4).
- Ages ranged from 18 to 91 years old, with a **mean age** of **27.7** y.o. ($SD = 7.37$) (see Figure 4).
- The esports **performance level** of the participants varied (see Figure 5); most players played at a **foundational level** ($n = 292$; **28.5%**), followed by **recreational level** ($n = 288$; **28.1%**), **pre-elite level** ($n = 232$; **22.6%**), **elite level** ($n = 144$; **14%**), and **mastery level** ($n = 69$; **6.7%**).
- *League of Legends* ($n = 316$; 30.8%) was the most frequently played game amongst participants, followed by *DOTA2* ($n = 80$; 7.8%), *Counter-Strike* ($n = 75$; 7.3%), and *Overwatch* ($n = 61$; 6%).
- The number of **years of experience** in esports ranged from 0 to 32 years, with a **mean of 7** years of experience ($SD = 6.03$). On average, participants committed 14.9 hours per week to individual training ($SD = 22.73$), 9.6 hours per week to team training ($SD = 18.49$), and 7.8 hours per week on esports competitions ($SD = 14.40$), which translates to a **total average playing time of 32.4 hours per week** ($SD = 47.85$).
- Most players did not have access to a support staff ($n = 654$; 63.8%), followed by players who have an online coach ($n = 217$; 21.2%), players who are part of an esports organisation which offers multidisciplinary support ($n = 88$; 8.6%), and players who only have an in-person coach ($n = 66$; 6.4%).
- Most players did not receive any money playing esports ($n = 632$; 61.7%), followed by players who occasionally received some income or prize money ($n = 250$; 24.4%), players who have a full-time contract to play esports ($n = 68$; 6.6%), players who have a part-time contract to play esports but also have other forms of income ($n = 48$; 4.7%), and players who have a part-time contract and don't have another income ($n = 27$; 2.6%).

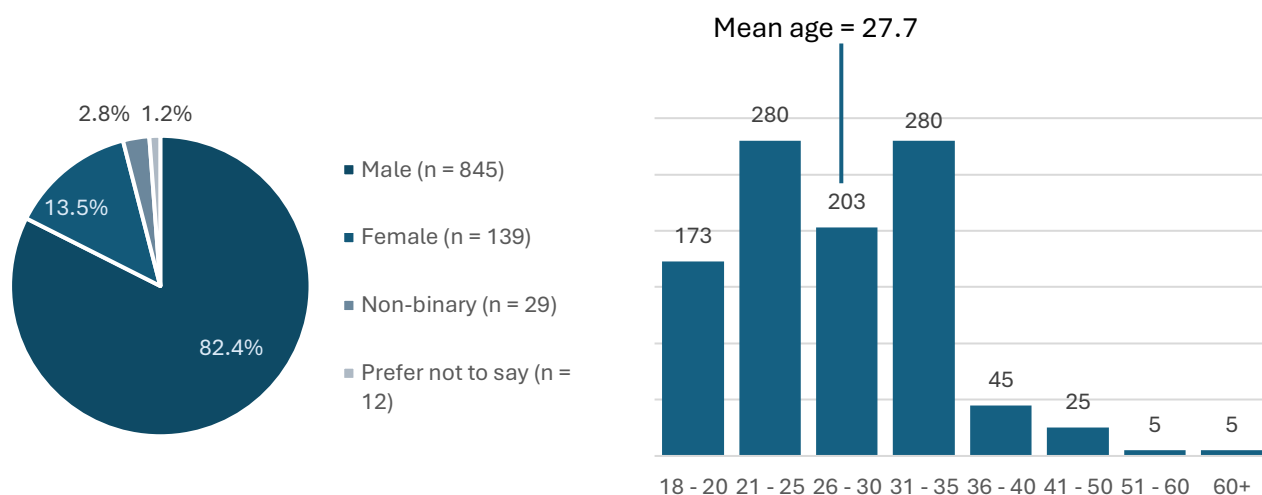


Figure 4. Gender and age distributions of full sample

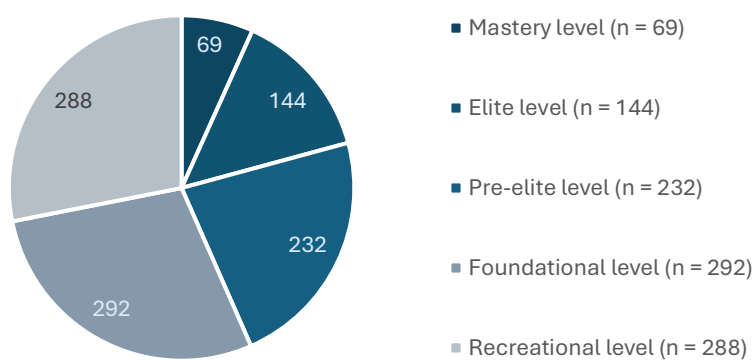


Figure 5. Distribution of performance levels



Main results

In line with the Dual Continuum of Mental Health framework (Keyes, 2002), we explored indicators of esports players' **well-being**, as well as symptoms of common mental disorders. For this project, we focussed on **symptoms of depression and anxiety** because these reflect the most prevalent mental health issues in the population as a whole. Additionally, we focused on the prevalence of **sleep disturbance**, as esports is commonly associated with a number of challenges which may specifically affect sleep quality, including unconventional practice and competition times, late-night screen exposure, sedentary lifestyles, and excessive training hours (Kegelaers et al., 2024). These mental health outcomes were assessed using validated self-report scales. Additionally, single self-report items were included to assess esports players' mental health help-seeking behaviour, formal diagnosis, and neurodiversity. Finally, a custom survey was developed to assess the complex interactions between esports players' mental health and experienced demands through advance network analysis. This custom questionnaire included items on the core symptoms of depression (i.e., depressed mood, anhedonia) and anxiety (i.e., anxious mood, excessive worrying). Additionally, key demands experienced within the esports environment were included, specifically sleep quality and duration, physical and mental fatigue, esports-related stress, preoccupation with gaming, emotion regulation, and experienced social support from inside and outside the esports environment. Finally, drawing on self-determination theory (Ryan & Deci, 2000), basic needs thwarting was also included.

The following sections offer a detailed overview of the mental health findings within the current study.

Well-being

THE WORLD HEALTH ORGANISATION-FIVE WELLBEING INDEX (WHO-5)

Well-being was measured using the WHO-5. This self-report instrument, measuring general mental well-being, was developed by the World Health Organisation (2024).

- The scale consists of five statements relating to the past two weeks.
- Each statement is rated on a 6-point scale (0 - At no time; 5 - All of the time)
- The total score ranges from 0 – 25, with zero representing the worst well-being and 25 representing the best well-being
- A score of 13 has been suggested as a cut-off indicating poor mental well-being

KEY FINDINGS

- The **mean well-being score** was **13.89** ($SD = 5.03$), with scores ranging from 0 to 25 (see Figure 6).
- **36.4%** of the population scored under the proposed cut-off of 13 out of 25, and can thus be described as having **poor well-being**.
- **63.6%** of the population scored above the cut-off, and can thus be described as having **good well-being**.
- Figure 7 shows the distribution of responses on the individual items of the WHO-5.
- The highest average scores were reported for Item 1 ('I felt cheerful and in good spirits') with a mean of 3.00 ($SD = 1.15$), followed by Item 5 ('My daily life has been filled with things that interest me') with a mean of 2.94 ($SD = 1.32$).
- The lowest scores on the WHO-5 were reported for Item 4 ('I woke up fresh and rested') with a mean of 2.35 ($SD = 1.44$).

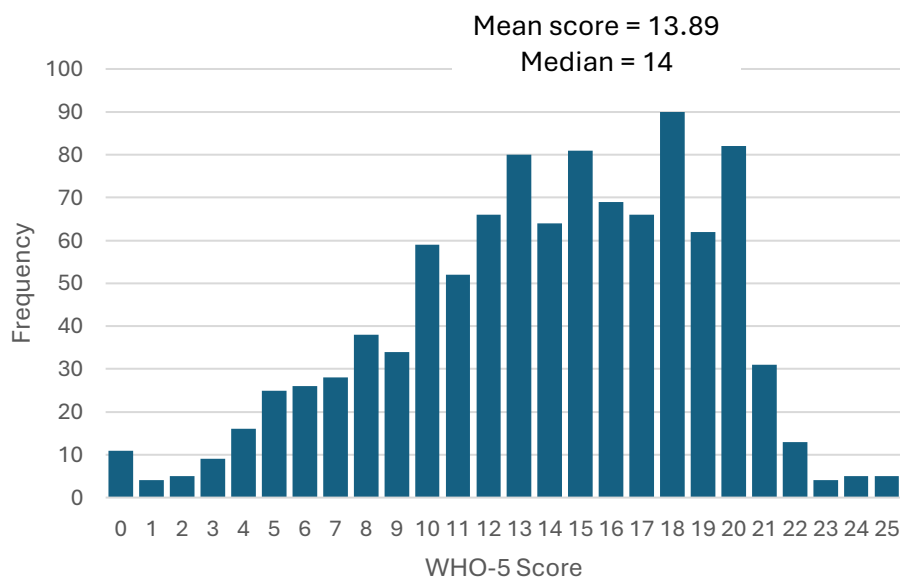


Figure 6. Total scores on the WHO-5



Mental ill-health

PATIENT-HEALTH QUESTIONNAIRE (PHQ-9) (Kroenke et al., 2001)

Symptoms of depression were assessed using the PHQ-9. This self-assessment instrument measures symptoms of depression, based on the Diagnostic and Statistical Manual of Mental Disorders (DSM).

- The scale consists of 9 items measuring different depressive symptoms over the last two weeks
- Each item is scored on a 4-point scale (0 - not at all; 3 - nearly every day)
- Total score ranges from 0 to 27, with higher scores reflecting the presence of more severe symptoms of depression.
- The following cut-off scores were adopted to categorise depression severity: 0–4 reflects minimal or no depression, 5–9 suggests mild depression, 10–14 represents moderate depression, 15–19 indicates moderately severe depression, and 20–27 reflects severe depression. A score of 10 or higher is considered the threshold for clinically significant moderate-to-severe depression, warranting potential intervention.
- Item 9 ('thoughts that you would be better off dead or of hurting yourself in some ways') also acts as an emergency screening item to determine the degree of suicidal ideation.

GENERALIZED ANXIETY DISORDER QUESTIONNAIRE (GAD-7) (Spitzer et al., 2006)

Symptoms of anxiety were assessed using the GAD-7. This self-assessment instrument measures symptoms of generalized anxiety disorders, based on the Diagnostic and Statistical Manual of Mental Disorders (DSM).

- The scale consists of 7 items measuring different anxiety symptoms over the last two weeks.
- Each item is scored on a 4-point scale (0 - not at all; 3 - nearly every day).
- Total score ranges from 0 to 21, with higher scores reflecting the presence of more severe symptoms of anxiety.
- The following cut-off scores were adopted to categorise anxiety severity: 0–4 indicates minimal anxiety, 5–9 suggests mild anxiety, 10–14 represents moderate anxiety, and 15–21 signifies severe anxiety. A score of 10 is considered the threshold for clinically significant moderate-to-severe anxiety, warranting potential intervention.

KEY FINDINGS

- The mean depression score based on the PHQ-9 was 9.74 ($SD = 6.48$), with a minimum score of 0 and a maximum score of 27.
- 267 participants (**26%**) reported **no symptoms of depression**, 294 participants (**28.7%**) reported **mild symptoms**, 235 participants (**22.9%**) reported **moderate symptoms**, 133 participants (**12.9%**) reported **moderately severe symptoms**, and 96 participants (**9.4%**) reported **severe symptoms** (see Figure 7).
- The lowest scores on individual items were reported for Item 9 ('Thoughts that you would be better off dead or of hurting yourself in some ways') with a mean of 0.67 ($SD = 0.98$), followed by Item 8 ('Moving or speaking slowly or fast') with a mean of 0.69 ($SD = 0.97$).
- The highest scores were reported for Item 3 ('Trouble falling asleep or staying asleep or sleeping too much') with a mean of 1.42 ($SD = 1.05$), followed by Item 4 ('Feeling tired or having little energy') with a mean of 1.4 ($SD = 1.02$).
- While Item 9 had the lowest mean score across all items, **38%** of participants reported having **suicidal or self-harming thoughts** on several days or more over the past 2 weeks (see Figure 8).
- The mean anxiety score based on the GAD-7 was 7.39 ($SD = 5.52$), with a minimum score of 0 and a maximum score of 21.
- 399 participants (**38.9%**) reported **minimal symptoms of anxiety**, 282 participants (**27.5%**) reported **mild symptoms** of anxiety, 203 participants (**19.8%**) reported **moderate symptoms** of anxiety, and 141 participants (**13.8%**) reported **severe symptoms** of anxiety (see Figure 9).
- The lowest scores on individual items were reported for Item 5 ('Being so restless that it is hard to sit still') with a mean of 0.79 ($SD = 0.98$), followed by Item 7 ('Feeling afraid, as if something awful might happen') with a mean of 0.87 ($SD = 1.00$).
- The highest scores were reported for Item 3 ('Worrying too much about different things') with a mean of 1.22 ($SD = 1.01$), followed by Item 1 ('Feeling nervous, anxious, or on edge') with a mean of 1.19 ($SD = 0.97$).

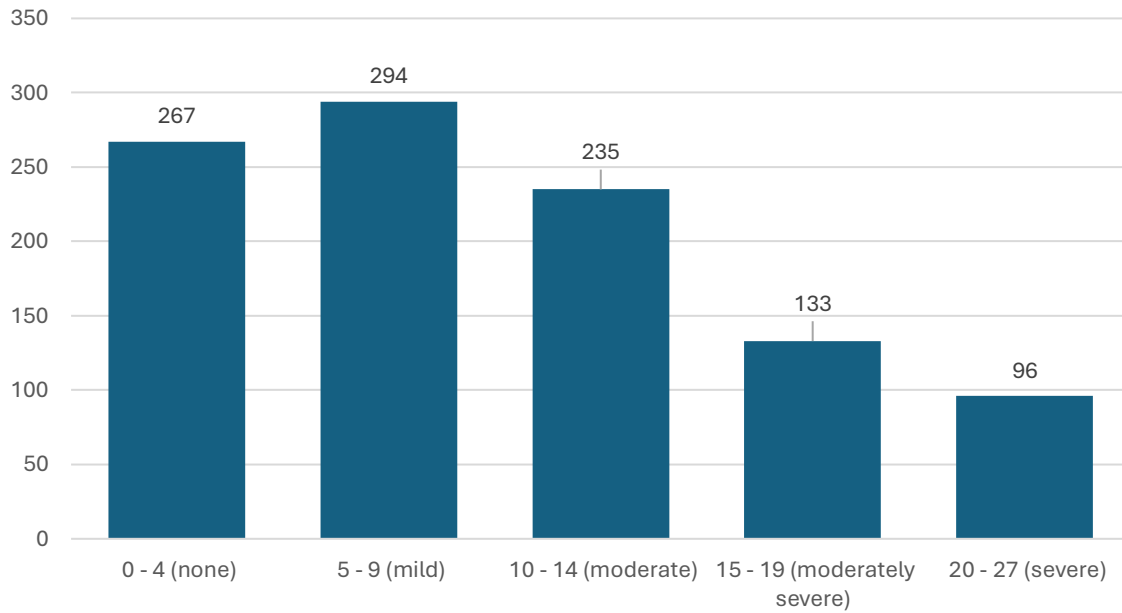


Figure 8. Prevalence of depressive symptoms (PHQ-9)

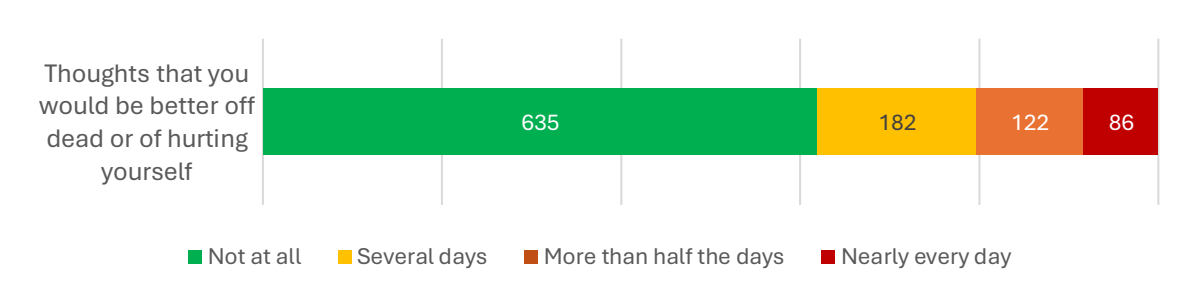


Figure 9. Distribution of responses on Item 9 of PHQ-9

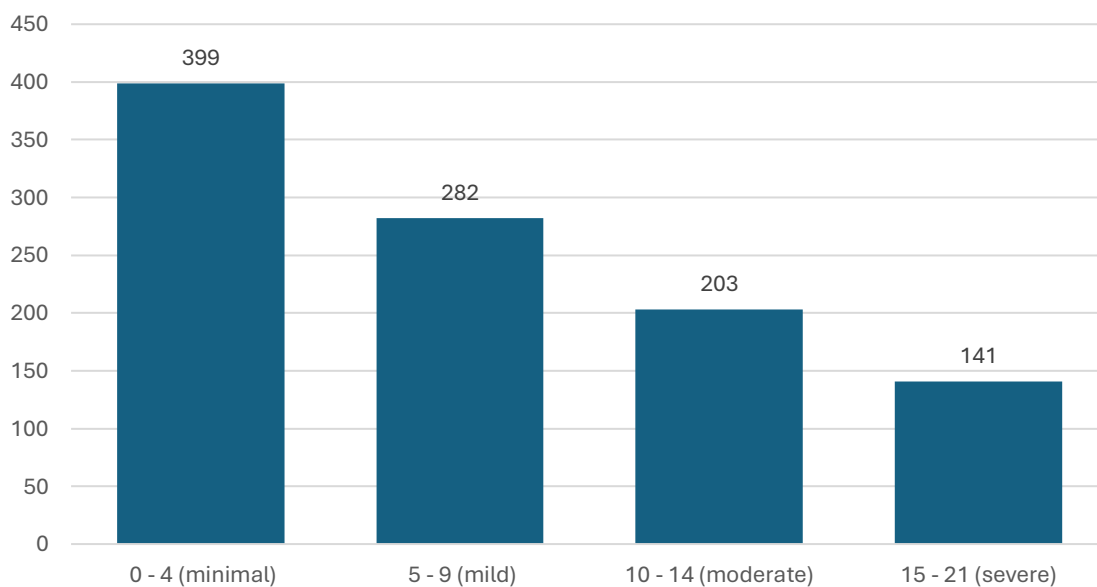


Figure 10. Prevalence of anxiety symptoms (GAD-7)



SELF-REPORT ITEMS

In addition to the validated self-report scales, single self-report items were included to assess whether esports players' had received a formal mental health diagnosis, neurodiversity, and help-seeking behaviour.

KEY FINDINGS

- Regarding diagnosis, 257 participants (**25.1%**) indicated to had received **received a prior formal diagnosis of a mental health condition**. 740 participants (72.2%) indicated that they never received a formal diagnosis, and 28 participants (2.7%) preferred not to say.
- Regarding neurodiversity, 372 participants (**36.3%**) indicated that they would describe themselves as **neurodivergent**. 632 participants (61.7%) indicated that they would not describe themselves that way, and 21 participants (2%) preferred not to say.
- Regarding help-seeking behaviour, 151 participants (**14.7%**) were **receiving professional mental health help** (i.e., psychologist, psychiatrist), and 313 participants (**30.5%**) reported that they had **received professional help in the past**. 544 participants (53.1%) reported to that they had never received professional mental health help, and 17 participants (1.7%) preferred not to say.
- The results of mental health diagnosis, neurodiversity, and help-seeking behaviour are displayed in Figure 10.

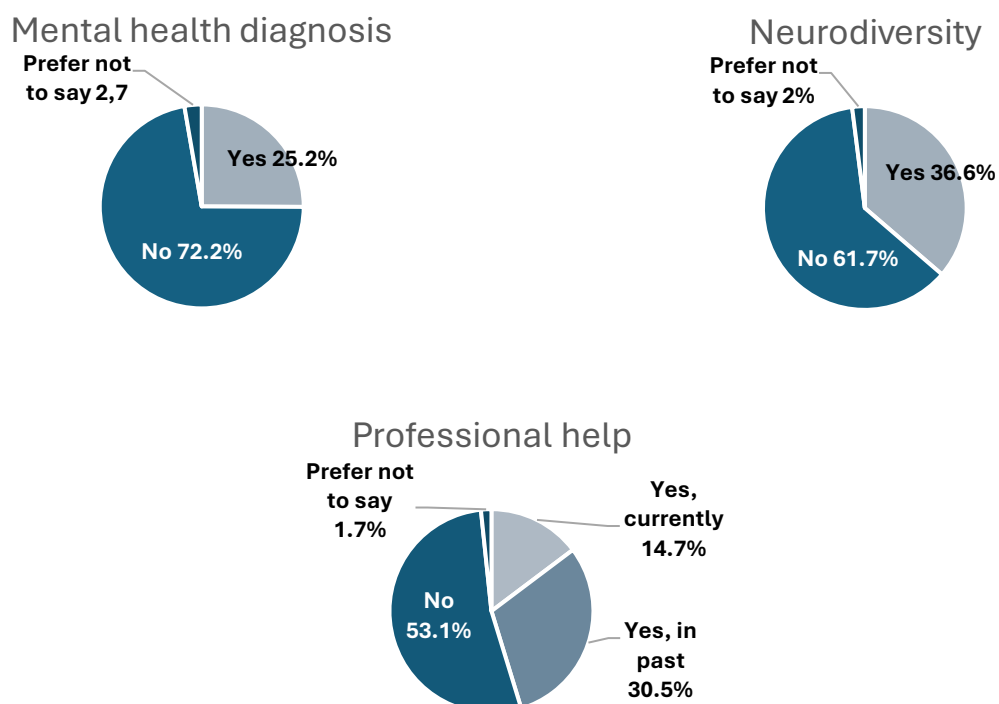


Figure 10. Esports players' reported formal mental health diagnosis, neurodiversity, and help-seeking behaviours



Sleep disturbance

PITTSBURGH SLEEP QUALITY INDEX QUESTIONNAIRE (PSQI) (Buysse et al., 1989)

The Pittsburgh Sleep Quality Index (PSQI) was used to assess sleep disturbance. This widely used self-report questionnaire assesses various aspects sleep quality over a one-month time interval.

- The scale consists of 19 items which are grouped into 7 components that represent subjective sleep quality, sleep latency, sleep duration, habitual sleep efficiency, sleep disturbances, use of sleep medication, and daytime dysfunction.
- A score is calculated for each of the 7 components of the PSQI using a 4-point scale (0 - not during the last month; 3 - more than 3 times a week).
- A single total score is then calculated to assess the presence of overall sleep disturbance.
- The total score ranges from 0 – 21, with higher scores reflecting more severe sleep disturbances.
- A cut-off score of 6 or higher is commonly considered to indicate clinically relevant levels of sleep disturbance.

KEY FINDINGS

- The mean score on the PSQI was 7.66 ($SD = 3.49$), with a minimum score of 1 and a maximum score of 20.
- In our population, **70.7%** of the participants scored over the threshold indicating **potential sleep disturbance** (i.e., a score of 6 or higher), whereas only **29.3%** of esports players reported experiencing **good sleep quality** (i.e., a score of 5 or lower).
- The distribution of scores on the PSQI are displayed in Figure 11.

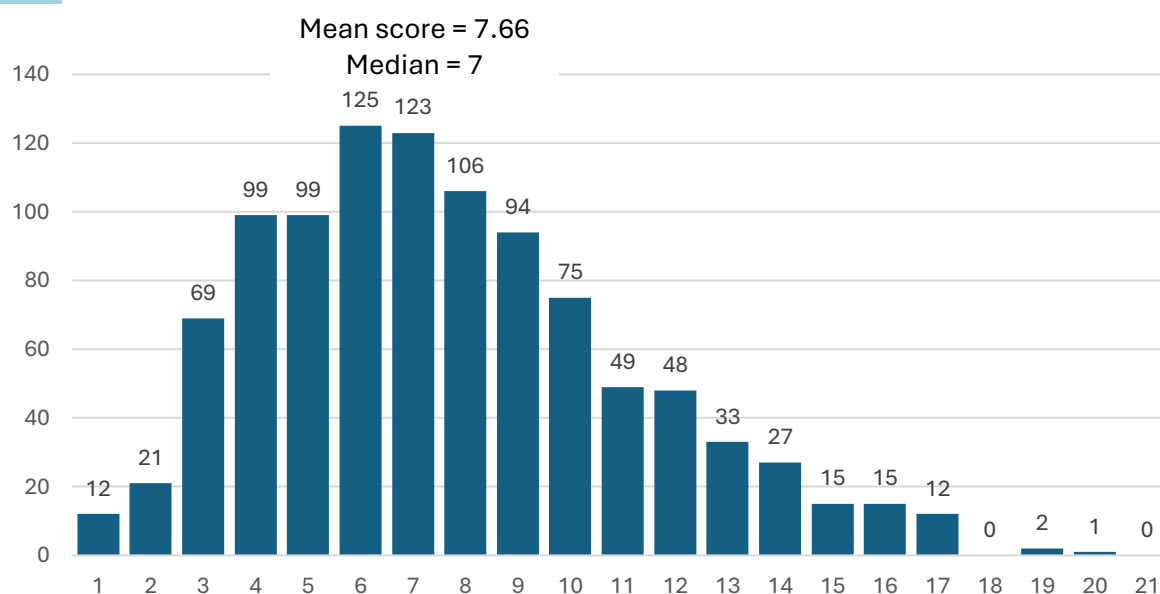


Figure 11. Distribution of scores on the PSQI



Associations between mental health outcomes and demographic factors

To establish statistical associations between different mental health outcomes, a correlation analysis was conducted between the variables well-being, depression, anxiety, sleep disturbance, age, and total time spent playing esports per week. Additionally, group differences within our total sample were explored. Specifically, we compared average scores on the different mental health outcomes between esports players of differing performance levels, as well as between male and female esports players. As non-binary participants constituted only a very small group, they were excluded from this comparison).

KEY FINDINGS

- Results from the correlation analysis are displayed in Table 1
- **Weak negative relationships** were observed **between well-being** scores and **depression** scores ($r = -0.28, p < .01$), **anxiety** scores ($r = -0.26, p < .01$), and **sleep disturbance** scores ($r = -0.23, p < .01$).
- A **strong positive relationship** was observed **between anxiety** and **depression** scores ($r = .83, p < .01$).
- **Moderate positive relationships** were found **between sleep disturbance** and **depression** scores ($r = .47, p < .01$), as well **anxiety** scores ($r = .40, p < .01$).
- **Weak positive relationships** were found between **age** and **well-being** ($r = 0.19, p < .01$), **depression** ($r = 0.14, p < .01$), **anxiety** ($r = 0.15, p < .01$), and **sleep disturbance** ($r = 0.11, p < .01$).
- No significant relationships were found between total time spent on esports and any of the mental health outcomes. This finding seems in contrast with the common idea that the culture of ‘grinding’ might be associated with mental health in esports.
- Group differences for mental health outcomes are illustrated in Table 2.
- **Female** esports players reported **higher symptoms of depression, anxiety, and sleep disturbance compared to male** players.
- Esports players of a **higher performance level** (elite, mastery) reported **higher well-being** than players of a lower performance level, but at the same time also reported **higher symptoms of depression, anxiety, and sleep disturbance**.

- Overall, the findings provide clear support for the Dual Continuum model of mental health; namely that well-being and mental ill-health reflect two related but essentially distinct dimensions of a complete state of mental health (Iasiello et al., 2020).

Table 1. Correlations between mental health outcomes, age, and total hours of esports engagement

	Well-being	Depression	Anxiety	Sleep dis.	Age
Well-being	-				
Depression	-.28*	-			
Anxiety	-.26*	.83*	-		
Sleep dis.	-.23*	.47*	.40*	-	
Age	.19*	.14*	.15*	.11*	-
Total hours of esports	-.03	.02	.04	.05	.01

* $p < .001$

Table 2. Group comparisons

	Well-being		Depression		Anxiety		Sleep disturbance	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Total	13.89	5.03	9.74	6.48	7.39	5.52	7.66	3.49
Gender								
Male	13.83	4.99	9.19	6.39	6.98	5.48	7.46	3.51
Female	14.00	5.22	12.33	6.25	9.29	5.29	8.58	3.30
Performance level								
Recreational	13.22	4.93	7.98	5.94	5.96	4.96	7.12	3.24
Foundational	13.28	4.81	8.85	5.99	6.53	5.29	7.55	3.22
Pre-elite	13.62	5.26	10.28	6.43	7.74	5.41	7.69	3.53
Elite	15.71	4.78	13.42	6.18	10.61	5.34	8.82	3.88
Mastery	16.35	4.59	11.33	7.75	9.12	6.14	7.94	4.14



Network analyses

Finally, the GG custom questionnaire was a novel scale that was tailored specifically to allow for advanced network analyses. Network analyses are advanced statistical methods that allow for the exploration of complex and reciprocal interactions between a range of different constructs. For the GG project we calculated two networks: (a) a **symptom frequency network** (exploring how prevalent certain symptoms or demands were) and (b) a **hindrance network** (exploring the extent to which certain symptoms or demands were perceived to impact players' performance).

- The scale consisted of 17 items, covering the core symptoms of depression and anxiety, as well as a range of esports-related demands. Whenever possible, items were adapted from established self-report scales. The included items covered the following constructs:
 - **Lack of interest** or pleasure in things (Anhedonia) – derived from the PHQ-9
 - **Depressed mood** (Depression) – derived from the PHQ-9
 - **Feeling anxious**, nervous, or on edge (Anxiety) – derived from the GAD-7
 - **Inability to stop worrying** (Worry) – derived from the GAD-7
 - Perceived **esports-related stress** (Stress)
 - **Preoccupation with gaming** (GamingObsession)
 - Perceived **sleep duration** (PercSleepQuantity)
 - Perceived **sleep quality** (PercSleepQuality)
 - Perceived **physical fatigue** (PhysFatigue)
 - Perceived **mental fatigue** (MenFatigue)
 - Symptoms of **musculoskeletal pain** (SomaticSymptoms)
 - Lack of perceived **social support within the esports environment** (InsuffSupportEsport)
 - Lack of perceived **social support within the personal environment** (InsuffSupportPersonal)
 - **Emotional regulation difficulties** (DiffEmotionCtrl)
 - **Autonomy** basic need thwarting (LackAutonomy)
 - **Competence** basic need thwarting (PercLackSkill)
 - **Relatedness** basic need thwarting (LackConnection)
- To analyse the symptom frequency network, each item was scored on a 10-point scale in terms of how often participants experienced this factor over the past month (from 1 - *almost never*; 10 - *constantly*).



- Additionally, to analyse the hindrance network, participants were asked for each item whether this factor hindered their ability to compete in esports at the level they are accustomed; scored on a dichotomous yes - no scale.

KEY FINDINGS

- The mean total score on the custom GG survey was 77.81 ($SD = 31.86$), with a minimum score of 17 and a maximum score of 166.

Symptom frequency network

- The symptom frequency network is presented in Figure 12.
- On average, participants reported having experienced a lack of sleep, reduced sleep quality, increased mental fatigue, and competence thwarting more often than not (mean scores >5) over the past month.
- The **strongest associations** were observed from **depressed mood to physical fatigue through mental fatigue**, from **depressed mood to anhedonia**, and from **sleep quantity to sleep quality**.
- **Depressed mood** acted as a **parent node** in the network, suggesting that when participants experience sleep and/or fatigue problems or a perceived lack of competence, they are more likely to report depressive symptoms rather than the other way around.
- Participants who reported frequent **gaming preoccupation** were also likely to have experienced **esports-related stress**, were more likely to experience **emotion regulation difficulties**, and reported **more frequent symptoms of depression and anxiety**.
- Regarding the frequency at which depressive symptomatology is reported and its position within the psychopathological intensity network, **intervening on depressive symptoms** might be a sensible target, as it may influence the frequency of occurrence of both esports-related symptoms and sleep-related symptoms further downstream.



Figure 12. Bayesian Directed Acyclic Graph of the GG custom questionnaire: symptom frequencies network. Larger and darker nodes represent higher symptom frequencies corresponding to the mean node values (between brackets). Arrows indicated “directional dependencies” in which the presence of a given node (i.e., a “descendant”) more strongly implies the presence of another node (i.e., the “parent”) than vice versa. Arrow thickness indicate the strength of the relationship expressed in BIC scores.



KEY FINDINGS

Hindrance network

- The hindrance network is presented in Figure 13.
- **Mental fatigue, anhedonia, competence thwarting, and impaired sleep quality** were reported as a **hindrance to performing in esports** at the expected level in more than 40% of the sample.
- The **strongest associations** were observed **between sleep quantity and quality**. That is, individuals who reported that poor sleep quality impacted their esports performance were most likely to also report that insufficient sleep duration impacted their performance.
- **Anhedonia, esports-related stress, and autonomy thwarting** impacted esports performance as separate **parent nodes** in the hindrance network. This implies that debilitating anxiety, competence thwarting, lack of support, pain, and preoccupation with gaming directionally depend on these parent symptoms further upstream.

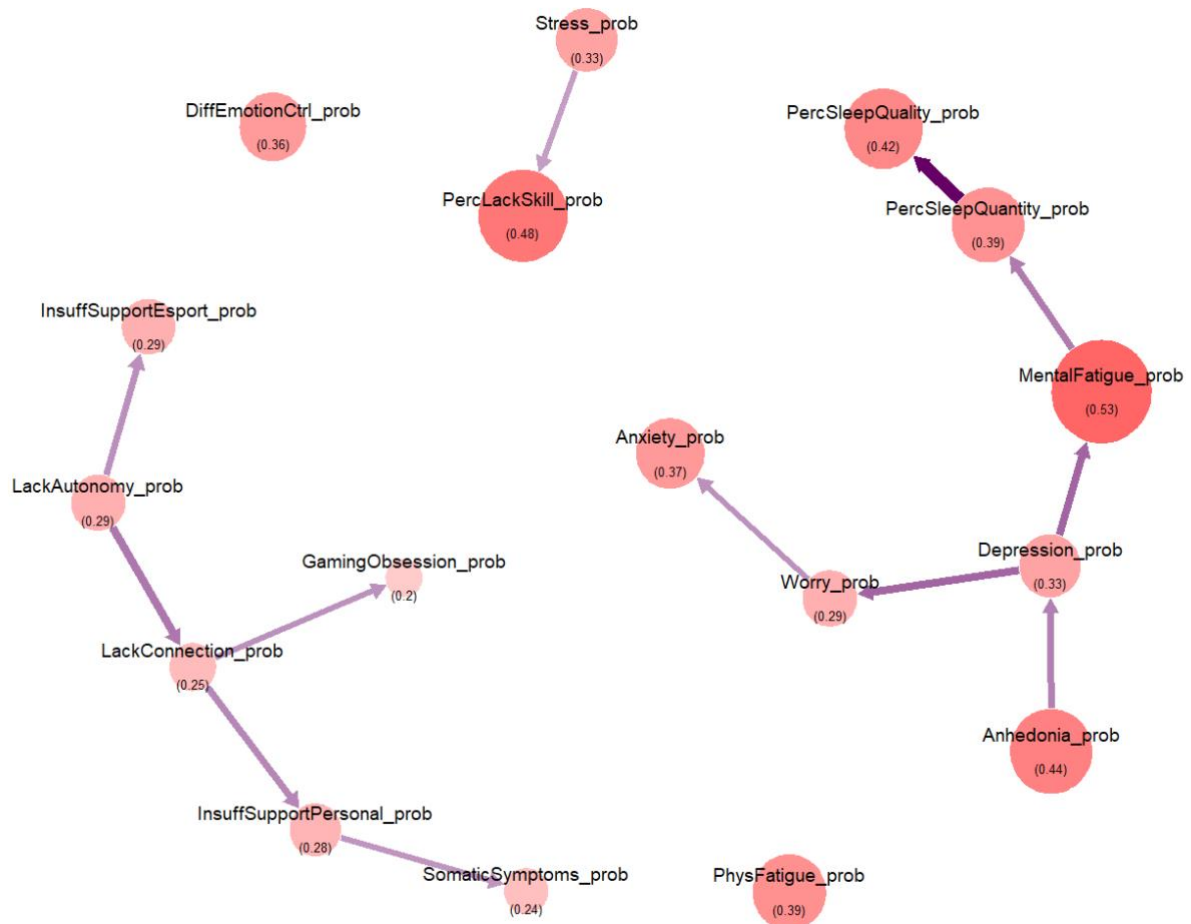


Figure 13. Bayesian Directed Acyclic Graph of the GG custom questionnaire: hindrance network. Larger and darker nodes represent prevalences (as in the proportion of participants that indicate that the symptom hinder their ability to perform at the accustomed level) corresponding to the mean node values (between brackets). Arrows indicated “directional dependencies” in which the presence of a given node (i.e., a “descendant”) more strongly implies the presence of another node (i.e., the “parent”) than vice versa. Arrow thickness indicate the strength of the relationship expressed in BIC scores.

Recommendations for future research and practice

Work Package 1 of the GG project provides an important next step for research and applied practice aimed at understanding and promoting esports' players mental health. To the best of our knowledge, **this study** offers the **largest and most comprehensive dataset** to date on **esports players' mental health**, including participants from a range of different games and performance levels. Drawing on the findings of this large international survey, several key implications and recommendations for future research and applied practice can be derived.

RECOMMENDATIONS FOR FUTURE RESEARCH

- Future **longitudinal research** could build upon this study by exploring developmental factors and temporal variations in esports players' mental health over time (e.g., across different parts of the competitive season or across players' competitive career).
- Future **qualitative research** may complement this quantitative study by providing detailed insights into the **lived experiences** of esports **players experiencing mental health problems**. Particular attention could also be directed here towards the lived experiences of **underrepresented populations** within the esports landscape, including female or non-binary esports players.
- Future research would also benefit from adopting a **culturally sensitive perspective**. Esports has gained global popularity. However, little is known concerning the mental health of esports players from different cultures or parts of the world. Moreover, culturally sensitive research should consider players experiencing a cultural transition, moving from one part of the world to another in order to pursue their esports career.
- Future research should also further consider the **role of the broader esports environment** on players' mental health. This includes the impact of key individuals (e.g., esports coaches), organisational factors (e.g., team structure, available organisational support), as well as broader cultural factors (e.g., culture of 'grinding', toxicity).
- Finally, high-quality **intervention studies** with sufficiently large populations are also urgently needed. In particular Randomised Control Trials (RCTs) should serve as the gold standard to develop and test new mental health interventions tailored specifically at esports players.



RECOMMENDATIONS FOR APPLIED PRACTICE

- Drawing on the findings from the current study, it is clear **both elite-level and grassroots esports organisations** hold a **key responsibility to support their players** in order to promote well-being and prevent the onset of symptoms of mental disorders.
- Given the centrality of depressive symptoms (and to a lesser extent anxiety symptoms) within the symptom frequency network, interventions could aim to target these symptoms directly. In particular, **mental health literacy interventions** have been proposed as effective and low-threshold interventions to improve people's knowledge and awareness around symptoms of common mental disorders (Jorm, 2012).
- Additionally, given the prevalence of issues surrounding sleep disturbance and fatigue, **sleep interventions** may equally hold potential to improve esports players' mental health.
- Given the role of emotional regulation difficulties in explaining the presence of several other esports-related demands within the symptom frequency framework, tailored **emotion regulation training** may equally be considered for esports players.
- Although preventive interventions form important avenues for future work, the high number of esports players currently experiencing clinically relevant symptoms of mental ill-health stresses the importance of effective detection and access to treatment for these individuals. As such, effective detection strategies as well **established referral pathways to professional mental health care experts** with context-specific knowledge and understanding of the esports landscape are needed.



References

- Buysse, D. J., Reynolds, C. F., Monk, T. H., Berman, S. R., & Kupfer, D. J. (1989). The Pittsburgh sleep quality index: A new instrument for psychiatric practice and research. *Psychiatry Research*, 28(2), 193–213. [https://doi.org/10.1016/0165-1781\(89\)90047-4](https://doi.org/10.1016/0165-1781(89)90047-4)
- GG (2024). *Promoting Mental Health in Esports*. <https://goodgamewebsite.wordpress.com/>
- Iasiello, M., van Agteren, J., & Cochrane, E. M. (2020). Mental health and/or mental illness: A scoping review of the evidence and implications of the dual-continua model of mental health. *Evidence Base*, 2020(1), 1–45. <https://doi.org/10.21307/eb-2020-001>
- Jorm, A. F. (2012). Mental health literacy: Empowering the community to take action for better mental health. *American Psychologist*, 67(3), 231–243. <https://doi.org/10.1037/a0025957>
- Kegelaers, J., Trotter, M. G., Watson, M., Pedraza-Ramirez, I., Bonilla, I., Wylleman, P., Mairesse, O., & Van Heel, M. (2024). Promoting mental health in esports. *Frontiers in Psychology*, 15, 1342220. <https://doi.org/10.3389/fpsyg.2024.1342220>
- Keyes, C. L. M. (2002). The mental health continuum: From languishing to flourishing in life. *Journal of Health and Social Behavior*, 43(2), 207–222. <https://doi.org/10.2307/3090197>
- Kroenke K, Spitzer RL, Williams JB. (2001). The PHQ-9: validity of a brief depression severity measure. *Journal of General Internal Medicine*, 16(9), 606–613. doi: 10.1046/j.1525-1497.2001.016009606.x. PMID: 11556941; PMCID: PMC1495268.
- Ryan, R. ., & Deci, E. . (2000). Self-Determination Theory and the Facilitation of Intrinsic Motivation, Social Development, and Well-Being. *American Psychologist*, 55(1), 68–78.
- Spitzer RL, Kroenke K, Williams JB, Löwe B. (2006). A brief measure for assessing generalized anxiety disorder: the GAD-7. *Archives of Internal Medicine*, 166(10), 1092–1097. doi: 10.1001/archinte.166.10.1092. PMID: 16717171.
- World Health Organization (2024). *The World Health Organization-Five Well-Being Index (WHO-5)*. Geneva: World Health Organization; 2024. License: CC-BY-NC-SA 3.0 IGO