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Toward a delineation of the differences between high engagement and problem gaming

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ABSTRACT

The boundary between highly engaged and problematic video gaming is often debated in the behavioral addictions field. The present study assessed whether quality of life, motivational and protective factors may differentiate high-frequency gamers (i.e., those who play 30 + hours per week) who did, and did not, meet the DSM-5 criteria for gaming disorder (GD). A total of 403 respondents completed an online survey including standard measures of GD, gaming motivation, quality of life (QOL), and protective factors for behavioral addiction (e.g., adequate sleep and healthy diet). Respondents with GD scored lower on all QOL measures and were more strongly motivated to use gaming to escape problems. Fewer protective factors were identified in GD cases, with an inability to balance gaming with sleep being the largest significant difference between the two groups. High-frequency gaming appears most likely to be problematic if it is used to escape real-world problems or prioritized over important everyday activities.

1. Introduction

More than 2.9 billion people play video games worldwide, with the global gaming industry's revenue estimated to have exceeded USD $175 billion in 2021. Although gaming has many recognized benefits as a form of entertainment; a skill- and strategy-based activity; and as a focal point for many online social activities, there is also increasing international recognition that high levels of gaming participation may lead to negative physical and psychosocial consequences (Griffiths et al., 2012; Chung et al., 2019). In recognition of the growing literature, internet gaming disorder (IGD) was included in the Diagnostic and Statistical Manual of Mental Disorders (DSM-5; American Psychiatric Association, 2013) as a condition warranting further study, and gaming disorder was officially recognized in 2019 in the International Classification of Diseases (ICD-11; World Health Organization, 2019). Recent meta-analyses estimate that between 1 and 3 % of the population may meet the criteria for gaming disorder (Kim et al., 2022; Stevens et al., 2020).

In problem gaming studies, it is often assumed that individuals tend to be more likely to experience harm as time spent gaming increases beyond specific time-based thresholds (King & Delfabbro, 2017; Triberti et al., 2018). Such harms may include interference with basic everyday activities (e.g., eating, sleeping, maintaining personal hygiene), social interaction (e.g., friends, family, relationships/marriage), or other important responsibilities (e.g., school, work, caring for children/pets) (King & Delfabbro, 2019). Assumptions about the relationship between gaming time and harm are based on sources such as the DSM-5, for example, which notes that individuals with GD typically devote "8–10 h or more per day" to gaming activities and "at least 30 h per week" (American Psychiatric Association, 2013, p. 796). To date, however, there has been relatively little support for a strong linear association between gaming time and problem gaming symptomatology, which has led to the argument that time spent gaming does not by itself explain problematic gaming (Király et al., 2015; Király et al., 2017; Demetrovics et al., 2016). Baggio et al. (2016), for example, reported that the correlation between gaming use over time and addiction symptoms was only moderate (r = 0.40).

Furthermore, given the rise of competitive online gaming (e.g. e-sports and streaming of videogames), which are inherently associated with intensive use and can have positive outcomes (e.g. prize money, fame, social opportunities), some forms of non-problematic intensive gaming may demonstrate some overlap with features of problem gaming, such as preoccupation and prioritisation of gaming activities (King & Delfabbro, 2019; Larrieu et al., 2022; Billieux et al., 2019; Kiraly et al., 2017; Charlton & Danforth, 2007). Many studies have recognized

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the 'highly engaged' gamer, i.e., an individual who plays games habitually and for long periods but with only small impacts on other aspects of life and may also report some net benefits to well-being from gaming.

The question arises: What personal characteristics or other variables might help to distinguish between highly engaged gaming and problematic use? Studies investigating the psychosocial correlates of problem gaming have provided insight into some of the motivational factors which tend to distinguish problematic gamers. Specifically, studies of the psychological factors associated with GD have identified the "escape" motive, the tendency to use gaming as a means of escape from other problems (e.g., anxiety, depression or other problems in life), as a major predictor of problem gaming (Ballabio et al., 2017; Yee, 2006; Xu et al., 2012; Billieux et al., 2013; Kardefelt-Winther, 2014; King & Delfabbro, 2019; Ko et al., 2009; Seay & Kraut, 2007; Andreassen et al., 2016). In addition, competition (Montag et al., 2019; Király et al., 2015; Ballabio et al., 2017), fantasy (Király et al., 2015; Zsila et al., 2018), and coping motives (Király et al., 2015; Zsila et al., 2018; Kuss et al., 2012) have demonstrated a significant positive association with IGD symptoms. Studies of social factors report that GD is associated with lower social competence (Liau et al., 2015; Lo et al., 2005), increased loneliness (Seay & Kraut, 2007; Lemmens et al., 2011; Yu et al., 2022), and poorer quality parent–child relationships (Schneider et al., 2017; Ballabio et al., 2017). Individuals reporting these risk factors may be motivated to participate in the virtual community associated with a game to compensate for lack of real-world social connections and support (Lemmens et al., 2011).

The examination of quality of life variables in gaming studies is relatively limited (Borges, 2019). Some researchers have reported links between problem gaming and poor quality of life (Fazeli et al., 2020; Jeong et al., 2020; Lim et al., 2016; Larrieu et al., 2022). For example, in their study of engaged gamers who regularly played *World of Warcraft*, Lehenbauer-Baum and Fohringer (2015a) reported that the gamers who showed signs of problem gaming scored significantly lower on all four health domains of quality of life (physical and psychological health, social relationships, and environment) than those who did not show these signs. Measures of functional impact, such as quality of life, may therefore provide valuable insights into different profiles and levels of severity of problem gaming (Larrieu et al., 2022; Demetrovics et al., 2016).

Another emerging area in GD research has been the study of the influence of protective factors that reduce the likelihood of problem gaming. Such factors include gaming purposefully toward productive or adaptive outcomes, including recreation or enjoyment (Montag et al., 2019; Ramos-Diaz et al., 2018), skill development (Ballabio et al., 2017; Bányai et al., 2019; Montag et al., 2019; Wu et al., 2017), and to fulfil social motives (Cole & Griffiths, 2007; Yang & Liu, 2017). In the related field of gambling studies, some protective factors have been identified, including: being female (Scholes-Balog et al., 2014), greater parent supervision among adolescent gamblers (Dowling et al., 2017), as well as behavioral strategies that protect against excessive gambling expenditure (e.g., setting limits, tracking money spent, and limiting alcohol consumption; Currie et al., 2019). The extent to which some of these protective factors might also be applicable to predicting problem gaming risk warrants further examination.

2. The present study

The boundary between highly engaged and problematic video gaming is often debated in the behavioral addictions field. Problem gamers are thought to typically spend at least 30 h per week involved in gaming. However, many individuals may spend similar periods of time gaming without any associated (or with only minimal) negative effects and may in fact report net benefits (King & Delfabbro, 2019; Larrieu et al., 2022; Billieux et al., 2019; Kiraly et al., 2017; Charlton & Danforth, 2007). To advance our understanding of problem gaming, as well as the conditions under which highly frequent gaming may be non-problematic, the present study aimed to examine variables that may differentiate problematic usage from healthy gaming. The focus of this study was on individuals who would typically be considered at risk due to consistently high levels of gaming participation (i.e., playing games for at least 30 h per week). The present study considered three areas of potential difference between problem and non-problem high-frequency gamers: self-reported quality of life; motivations for gaming; and protective behaviors. Guided by the available literature, the following hypotheses were proposed:

H1: Non-problem gamers will score significantly higher on quality of life domains (i.e., physical health, psychological, social relationships, environment) than problem gamers.
H2: Non-problem gamers will report significantly higher social, skill development and recreation motives and significantly lower escape, competition, coping and fantasy motives than problem gamers.
H3: Non-problem gamers will report significantly more protective behaviors than problem gamers.

3. Method

3.1. Participants

A total of 403 participants ($M = 254$, $F = 149$) with an age range of 18–67 years ($M = 27.24$, $SD = 7.8$) participated in the study. The sample was recruited through the online recruitment platform *Prolific* (https://www.prolific.co/) from May to July 2021. To meet the inclusion criteria, participants had to play video games for at least 30 h per week, be at least 16 years of age and be fluent in English. Participants were generally residing in several major countries, the highest proportion being from Europe (59.8%). More than half of the sample were college educated (57.1%) generally within the 18–24 age group (45.4%) and reported their relationship status as single (47.4%).

3.2. Measures

3.2.1. Demographic information

General demographic information included: age, gender, relationship status, employment status, living status, highest level of education attained and nationality. Demographic information is summarised in Table 1. No significant associations were observed between problem gaming status and demographic characteristics.

3.2.2. Gaming characteristics questions

Seven questions captured each participant's gaming-related activities. These included: number of hours playing video games per week (30–40, 40–50, 50 +); future gaming aspirations; whether participants: received an income from gaming or streaming; had put their own money into gaming; and, whether respondents had engaged in various forms of professional or semi-professional gaming (e.g., esports/live streaming).

3.2.3. Internet gaming disorder scale

Gaming disorder symptoms were measured using the Internet Gaming Disorder Scale (IGD-scale) (Petry et al., 2014). The measure, validated by Sarda et al. (2016), was developed by an international team and contains nine items proposed to reflect the nine DSM-5 criteria for IGD (preoccupation, withdrawal, tolerance, reduce/stop, give up other activities, continue despite problems, deceive/cover-up, escape adverse moods, and risk/lose relationships/opportunities during a period of 12 months) (American Psychiatric Association, 2013). This measure was chosen in favour of ICD-11 measures because there is currently more available evidence on the psychometric properties of DSM-based tests (King et al., 2020a; King et al., 2020b). For the purpose of this study, screening for problem gaming according to either DSM or ICD conceptualisation was considered sufficient to address the primary research question. An example item measuring the criteria of withdrawal is: "Do

Table 1
Demographic Characteristics of the Sample.

Variable	Characteristic	Total		Problem Group		Non-Problem Group	
		n	%	n	%	n	%
Gender	Male	254	63.0	88	67.2	166	61.0
	Female	149	37.0	43	32.8	106	39.0
Age (years)	18–24	183	45.4	64	48.9	119	43.8
	25–30	113	28.0	43	32.8	70	25.7
	31–40	81	20.1	19	14.5	62	22.8
	41+	26	6.5	5	3.8	21	7.7
Region	United Kingdom	39	9.7	10	7.6	29	10.7
	Europe	202	50.1	59	45	143	52.6
	North America	82	20.4	25	19.1	57	21.0
	Oceania	16	4.0	5	3.8	11	4.0
	Other	64	15.8	32	24.4	32	11.7
Education	Secondary/High School	148	36.7	51	38.9	97	35.7
	Further (e.g. apprenticeship, TAFE)	21	5.2	7	5.3	14	5.1
	Higher (e.g. undergraduate, college)	157	39.0	48	36.6	109	40.1
	Postgraduate (e.g. masters, PhD)	73	18.1	24	18.4	49	18
	None of the above options	4	1.0	1	0.8	3	1.1
Employment	Employed full-time	164	40.7	51	39.0	113	41.5
	Employed part-time	67	16.6	18	13.7	49	18.0
	Casually employed	31	7.7	14	10.7	17	6.3
	Unemployed	140	34.8	48	36.6	92	33.8
	Retired	1	0.2	0	0.0	1	0.4
Relationship	Single	191	47.4	68	51.9	123	45.2
	In a relationship	146	36.2	46	35.1	100	36.8
	Divorced/separated	5	1.3	1	0.8	4	1.5
	Widowed	1	0.2	0	0.0	1	0.4
	Married	60	14.9	16	12.2	44	16.1
Living Circumstances	Living with a parent/guardian	192	47.6	66	50.4	126	46.3
	Living independently (renting, share house)	144	35.8	50	38.2	94	34.6
	Living independently (owner-occupier)	67	16.6	15	11.4	52	19.1

Note. N = 403 (n = 131 for the problem group; n = 272 for the non-problem group).

you feel restless, irritable, moody, angry, anxious, or sad when attempting to cut down or stop gaming, or when you are unable to play?" Each item was measured on a dichotomous scale (0 = No, 1 = Yes), with "yes" to five or more of the questions indicating problematic gaming status as per the DSM-5 guidelines. The internal reliability in the present study was acceptable (α = 0.70).

3.2.4. *Motives for online gaming Questionnaire*

Gaming motives were assessed using the *Motives for Online Gaming Questionnaire* (MOGQ; Demetrovics et al., 2011). The MOGQ is a 27-item self-report measure that assesses seven distinct motivational factors for engaging in gaming: social (4-items), escape (4-items), competition (4-items), coping (4-items), skill development (4-items), fantasy (4-items) and recreation (3-items). A sample item (from the social domain) is "I play online games because I can get to know new people". Items were answered on a five-point Likert scale ranging from 1 (*almost never/never*) to 5 (*almost always/always*). Total scores were summed for each motive, ranging from 4 to 20 (3–15 for recreation), with higher scores indicating higher tendencies towards the corresponding motive. All seven domains of the MOGQ exhibited acceptable internal reliability for the present sample: social (α = 0.81), escape (α = 0.87), competition (α = 0.84), coping (α = 0.74), skill development (α = 0.90), fantasy (α = 0.84), recreation (α = 0.78).

3.2.5. *Quality of life Questionnaire*

To examine differences between problem and non-problem gamers in respect to quality of life, the abbreviated *World Health Organisation Quality of Life Questionnaire* (WHOQOL-BREF) was used (World Health Organization, 2012). The WHOQOL-BREF is a 26-item self-report measure that assesses 4 distinct facets relating to quality of life: physical health (7-items), psychological (6-items), social relationships (3-items), and environment (8-items). A sample item (from the psychological domain) is "how much do you enjoy life?" Items were answered on a five-point Likert scale ranging from 1 to 5 with higher scores indicating higher identification with the corresponding question. However, three questions are negatively framed and subsequently reversed for analysis. Mean scores for each domain are calculated and multiplied by 4 as per the WHOQOL-BREF scoring instructions. This score is then ranged from 4 to 20, with higher scores indicative of higher individual perception of quality of life for that particular domain. The WHOQOL-BREF is a leading quality of life measure, demonstrating good psychometric qualities (Skevington et al., 2004). All four WHOQOL-BREF domains had good internal consistency in the present study: physical (α = 0.76), psychological (α = 0.81), social (α = 0.77), and environment (α = 0.81).

3.2.6. *Protective factors questions*

Eight questions were included to capture behaviors that might serve as protective factors against problem gaming or gaming-related harm (see Carey et al., 2021; Hing et al., 2016). These included whether (Yes/No) respondents reported: setting limits on time and money devoted to gaming; engaged in other leisure activities; engaged in sport or exercise; balanced gaming with sleep needs; ate healthy foods; and/or actively maintained their personal hygiene and living conditions.

3.2.7. *Design and procedure*

The study used a cross-sectional online survey methodology. For the purpose of this study, high-frequency gaming was defined as playing video games for at least 30 h per week. The 30-hour cut-off was chosen to match the DSM-5 which states that gamers with IGD typically devote 30 h per week to the activity. Participation involved completion of an

online survey using their own device (phone, computer, tablet etc). The survey, advertised on *Prolific*, provided potential participants with a brief description of the study aims, risks and eligibility before consenting to participate in the 15-minute survey. Ethical approval was granted by the University of Adelaide Human Research Ethics Subcommittee (ID: 21/19).

3.2.8. Analytical approach

A priori power analysis using the statistical software *G*Power* (Version 3.1.9.4) indicated the following sample sizes were required to achieve a power level of 0.80 when adopting a significance criterion of $\alpha = 0.05$ and detecting medium effect sizes: $N = 51$ for an independent samples *t*-test; $N = 32$ for a 2x2 chi-square test of association; $N = 39$ for a 3x2 chi-square test of association; and $N = 66$ for a binary logistic regression model. Therefore, the study had sufficient statistical power for all planned statistical analyses.

Results were analysed using Statistical Package for the Social Sciences (SPSS; version 27.0). All tests were two-sided, with an alpha level of $p < .05$ adopted to indicate statistical significance. Problem gaming was determined by scores on the IGD scale. Independent samples t-tests were conducted to examine mean group differences. Supplementary analysis was run using a series of 3x2 and 2x2 chi-square tests to investigate whether significant group associations existed for the protective factors or gaming characteristics questions. A three-stage hierarchical logistic regression was conducted. Gender was added in step one, total protective factors were added in step two, and the escape, coping and fantasy motives were added in step three.

4. Results

4.1. Data screening and quality control

Participants' responses were screened for missing data and invalid responses. Of the 411 complete responses, 8 responses were removed due to missing values of more than 5 % (4 questions) of the survey. For 52 participants (13.15 %) who had missing values of less than 5 % of the survey, scores were inserted using mean interpolation and included in the final sample. Therefore, the final data set consisted of 403 participants.

4.2. Demographic comparisons

There were no age-related differences affecting outcome variables. However, males ($M = 3.75$, $SD = 2.19$) scored significantly higher on the IGD scale than females ($M = 3.03$, $SD = 2.33$). Males also scored significantly higher on the physical domain of the WHOQOL-BREF than females. Alternatively, females scored significantly higher on the social domain of the WHOQOL-BREF than males. Lastly, males scored significantly higher on most MOGQ motives (social, competition, coping, skill development, fantasy, recreation), than females.

4.3. Descriptive statistics

Table 2 summarises the main gaming descriptive statistics of the sample. Participants mostly played video games between 30 and 40 h per week (87.1 %), had plans to continue gaming as a leisure activity only at less than 30 h per week (69.7 %), did not engage in competitive gaming/esports (68 %) or live streaming (74.4 %), and did not receive an income from competitive gaming/esports (88.1 %) or live streaming (96 %). There were 131 participants (32.5 %) who classified as problem gamers based on the IGD scale and 272 participants (67.5 %) who were classified as the non-problem group. This high rate of problem gaming reflected the selective sampling of individuals who played 30 + hours of gaming per week.

Table 3 presents a comparison of the problem and non-problem groups on the main outcome measures. The problem group scored significantly lower on all four domains of the WHOQOL-BREF than the non-problem group. Therefore, Hypothesis 1 was supported.

In terms of motivation scores, the problem group scored significantly higher on social, escape, competition, coping, skill development and fantasy scores than non-problem gamers. Therefore, Hypothesis 2 received partial support only, as the non-problem group did not score higher than problem gamers on any of the gaming motive subscales.

4.4. Protective behaviors

The third aim of the study was to investigate whether the two groups differed with respect to protective behaviors. An independent-samples *t*-test indicated the non-problem group ($M = 6.07$, $SD = 1.66$) reported significantly more protective behaviors than the problem group ($M = 5.47$, $SD = 1.82$). The size of this effect was small, $d = 0.35$.

Additional Chi-square tests examined group difference for each of

Table 2
Gaming-related characteristics and Chi-Square results of the sample.

Variable	Response category	Total		Problem Group		Non-Problem Group		Pearson Chi-square χ 2	Phi ϕ	Cramer's V
		n	%	n	%	n	%			
Weekly gaming (hours)	30–40	351	87.1	119	90.9	232	85.3	5.60		0.12
	40–50	41	10.2	7	5.3	34	12.5			
	50+	11	2.7	5	3.8	6	2.2			
Gaming aspirations	Continue 30 + hours per week	101	25.1	41	31.3	60	22.1	5.77		0.12
	Pursue as career	21	5.2	9	6.9	12	4.4			
	Leisure only at <30 h per week	281	69.7	81	61.8	200	73.5			
Engage in Esports	Yes	129	32	55	42	74	27.2	8.87**	0.15	
	No	274	68	76	58	198	72.8			
Received income from gaming	Yes	48	11.9	20	15.3	28	10.3	2.08	0.07	
	No	355	88.1	111	84.7	244	89.7			
Put real money into gaming	Yes	262	65	97	74	165	60.7	6.96**	0.13	
	No	141	35	34	26	107	39.3			
Engage in live streaming	Yes	103	25.6	44	33.6	59	21.7	6.58*	0.13	
	No	300	74.4	87	66.4	213	78.3			
Received income from streaming	Yes	16	4	6	4.6	10	3.7	0.19	0.02	
	No	387	96	125	95.4	262	96.3			

Note. N = 403 (n = 131 for the problem group, n = 272 for the non-problem group). Cramer's V and Phi statistics are for problem gamers compared to non-problem gamers. *p <.05. **p <.01.

Table 3
Summary of Descriptive Statistics for all Psychometric Measures.

	Problem group (n = 131)		Non-problem group (n = 272)			
	M	SD	M	SD	*t*-test	Cohen's d
IGD scale	6.16	1.21	2.19	1.35	29.7**	2.11
MOGQ						
Social	11.05	4.10	9.46	3.82	3.82**	0.41
Escape	13.33	4.23	10.26	4.34	6.71**	0.71
Competition	13.02	4.31	10.85	4.14	4.88**	0.52
Coping	13.18	3.41	11.26	3.44	5.26**	0.56
Skill Devt	12.79	4.51	11.20	4.24	3.45**	0.37
Fantasy	12.01	4.52	9.55	4.16	5.40**	0.58
Recreation	12.63	2.56	12.13	2.74	1.78	0.13
WHOQOL-BREF						
Physical	14.00	2.59	15.28	2.47	4.76**	0.51
Psychological	12.50	2.38	13.21	2.19	2.96**	0.31
Social	12.00	4.08	14.02	3.68	4.99**	0.53
Environment	14.02	2.66	14.97	2.50	3.51**	0.37

Note. N = 403. IGD scale = Internet Gaming Disorder Scale. MOGQ = Motives of Online Gaming Questionnaire. WHOQOL-BREF = World Health Organisation Quality of Life Questionnaire Abbreviated. ** p <.01.

the eight protective behaviors. This analysis showed a statistically significant, weak negative association between balancing gaming with sleep needs and problem gaming status, $\chi^2(1) = 19.88$, $p = <0.001$, f = -0.22; a statistically significant, weak negative association between maintaining personal hygiene and problem gaming status, $\chi^2(1) = 4.30$, $p = .038$, f = -0.10; and a statistically significant, weak negative association between maintaining sanitary living conditions and problem gaming status, $\chi^2(1) = 4.22$, $p = .040$, f = -0.10. Table 4 summarises these results and shows that problem gamers were less likely to balance gaming with sleep needs, maintain personal hygiene and maintain sanitary living conditions than non-problem gamers.

4.5. Predictors of IGD status

Given that gender was related to both the predictor variables as well as the outcome variable, it was important to confirm whether the relationships were maintained after controlling for other variables. A three-stage hierarchical logistic regression was conducted and reported in Table 5. Results from Model 1 indicated that gender did not contribute significantly to the regression model, $\chi^2(1) = 1.45$, $p = .229$. The model explained 1 % (Nagelkerke R^2) of the variance in problem gaming and correctly classified 67.5 % of cases. Sensitivity was 0 % and specificity was 100 %. Introducing the total protective factors variable in Model 2 contributed significantly to the regression model, $\chi^2(1) = 11.12$, $p <.05$, and explained an additional 3 % (Nagelkerke R^2) of the variance in problem gaming status. Furthermore, 68.2 % of cases were correctly classified, sensitivity was 6.9 % and specificity was 97.8 %. Of the two predictor variables, only total protective factors were still statistically significant. Lastly, introducing the three risky motivations (escape, coping, fantasy) in Model 3 also contributed significantly to the regression model, $\chi^2(3) = 51.91$, $p <.001$, and explained an additional 13 % (Nagelkerke R^2) of the variance in problem gaming status. Furthermore, 68.2 % of cases were correctly classified, sensitivity was 27.5 % and specificity was 87.9 %. Of the 5 predictor variables, only total protective factors and MOGQ escape were still statistically significant. Gamers who were motivated to play for escape reasons had 1.11 times higher odds of being in the problem gamer group. Higher total protective factors were associated with 15 % reduced odds of being in the problem gamer group.

5. Discussion

The present study investigated potential differences between highly frequent gamers who met, and did not meet, screening criteria for gaming disorder. Consistent with past research (Fazeli et al., 2020; Jeong et al., 2020; Lim et al., 2016; Lehenbauer-Baum and Fohringer, 2015a), problem gamers scored significantly worse than non-problem gamers on all four areas of quality of life (physical health, psychological, social relationships, environment). Although some caution is needed in comparing the QOL figures to normative data because the sample was international (but primarily European), comparisons of each group's mean QOL scores to those reported in two major studies are presented (Hawthorne et al., 2006; Lehenbauer-Baum et al., 2015). These comparisons sought to determine the practical significance of the present study's WHOQOL-BREF scores and group differences. First, with reference to Lehenbauer-Baum et al. (2015) study of highly engaged and 'addicted' gamers, each group in the present study scored similarly or lower on all of the WHOQOL-BREF subscales than its comparison counterpart (i.e., Physical: 76.4 vs 81.6 (Engaged) and 70 vs 74.9 (Problem); Psychological: 66 vs 73 (Engaged) and 62.5 vs 64.3 (Problem); Social: 70 vs 70.3 (Engaged) and 60 vs 62.2 (Problem); Environmental: 75 vs 79 (Engaged) and 70.1 vs 75.7 (Problem).

With reference to Hawthorne et al.'s (2006) WHOQOL-BREF scores in relation to general health status (which was scored along a continuum of "Poor", "Fair", "Good", "Very Good" and "Excellent"), the non-problem gamer group's four subscale scores corresponded with the

Table 4
Protective Factors Characteristics and Chi-Square Results of the Sample.

Variable	Characteristic	Total		Problem Group		Non-Problem Group		Pearson Chi-square χ2	Phi ϕ
		n	%	n	%	n	%		
Limits on gaming time	Yes	164	40.7	49	37.4	115	42.3	0.87	−0.05
	No	239	59.3	82	62.6	157	57.7		
Limits on money devoted to gaming	Yes	287	71.2	88	67.2	199	73.2	1.55	−0.06
	No	116	28.8	43	32.8	73	26.8		
Engage in other activities/ hobbies	Yes	357	88.6	113	86.3	244	89.7	1.04	−0.05
	No	46	11.4	18	13.7	28	10.3		
Engage in sport/ exercise	Yes	269	66.7	85	64.9	184	67.6	0.30	−0.03
	No	134	33.3	46	35.1	88	32.4		
Balance gaming with sleep needs	Yes	302	74.9	80	61.1	222	81.6	19.88**	−0.22
	No	101	25.1	51	38.9	50	18.4		
Eat healthy foods	Yes	262	65	77	58.8	185	68	3.32	−0.09
	No	141	35	54	41.2	87	32		
Maintain Personal hygiene	Yes	360	89.3	111	84.7	249	91.5	4.30*	−0.10
	No	43	10.7	20	15.3	23	8.5		
Maintain sanitary Living conditions	Yes	365	90.6	113	86.3	252	92.6	4.22*	−0.10
	No	38	9.4	18	13.7	20	7.4		

Note. N = 403 (n = 131 for the problem group, n = 272 for the non-problem group). Phi statistic is for problem gamers compared to non-problem gamers.
*p <.05. **p <.01.

Table 5
Hierarchical Logistic Regression Analysis for Variables Predicting Problem Gaming in the Current Sample.

Predictor Variables	B	SE	Wald χ 2	df	p	OR	95 % CI OR		Cox & Snell R^2	Nagelkerke R^2	Chi-Square
							LL	UL			
Step 1											
Model 1									0.00	0.01	1.45
Constant	−0.37	0.32	1.32	1	0.25	0.69					
Gender	−0.27	0.22	1.43	1	0.23	0.77	0.49	1.19			
Step 2											
Model 2									0.03	0.04	11.12
Constant	0.62	0.45	1.88	1	0.17	1.86					
Gender	−0.18	0.23	0.64	1	0.42	0.83	0.53	1.30			
Total Protective Factors	−0.19	0.06	9.52	1	0.00**	0.83	0.73	0.93			
Step 3											
Model 3									0.12	0.17	51.91
Constant	−2.04	0.68	8.90	1	0.00**	0.13					
Gender	−0.07	0.25	0.07	1	0.79	0.94	0.58	1.52			
Total Protective Factors	−0.16	0.07	5.93	1	0.02*	0.85	0.75	0.97			
MOGQ Escape	0.10	0.04	7.51	1	0.01**	1.11	1.03	1.19			
MOGQ Coping	0.06	0.04	1.99	1	0.16	1.06	0.98	1.16			
MOGQ Fantasy	0.04	0.03	1.19	1	0.28	1.04	0.97	1.11			

Note. Condition is for problem gamers compared to non-problem gamers. Bolded values reach statistical significance. B = unstandardised beta coefficients. SE = standard error of the coefficients. df = degrees of freedom. p = probability. OR = odds ratio. CI = confidence interval; LL = lower limit; UL = upper limit.
*p <.05. **p <.01.

"Good" category. In comparison, the problem gamers' WHOQOL-BREF scores corresponded with "Good" in the Physical domain, "Fair" in the Psychological and Environmental domains, and "Poor" in the Social domain. Thus, the largest practical difference in QOL between the two gamer groups was in the Social domain. Overall, these findings contribute to the limited data on the quality of life of problem gamers, which is particularly under-examined outside of East Asian studies.

An important finding in this study was the problem group scored significantly higher on most gaming motivation measures as compared to the non-problem group. These findings were unexpected as they were somewhat inconsistent with previous studies. Specifically, that social (Cole & Griffiths, 2007; Yang & Liu, 2017) and skill development (Ballabio et al., 2017; Bányai et al., 2019; Montag et al., 2019; Wu et al., 2017) motives have been found to be negatively associated with IGD. Alternatively, and consistent with our predictions, non-problem gamers recorded significantly lower on escape, competition, coping and fantasy motives than problem gamers, which was consistent with other studies (Ballabio et al., 2017; Yee, 2006; Montag et al., 2019; Király et al., 2015; Ballabio et al., 2017; Zsila et al., 2018). Overall these findings suggest problem gamers may tend to score higher on motivational measures because they generally attribute greater psychological investment in the activity (Delfabbro, 2012), even in comparison to individuals with a similarly high time investment in the activity. This may be explained by problem gamers' need to attribute more importance or need satisfaction from gaming to justify the personal costs and burdens associated with their gaming.

The present study supported the notion that non-problem gamers engage in significantly more protective behaviors than problem gamers. However, it is important to note that whilst the difference is statistically significant, it only equates to a difference of about one protective behavior (on average) and the effect size was small. Furthermore, neither problem gamers (5.47 out of 8), or non-problem gamers (6.07 out of 8) reported a low amount of protective behaviors. The largest observed difference related to balancing gaming with sleep needs. This finding was consistent with previous studies which have found that sleep is one of the first areas of functioning to be negatively affected by problem gaming (King et al., 2010; Lam, 2014). Moreover, this finding underlines the importance of interventions for problem gaming targeting night-time routines to combat the negative effects of problem gaming which may be compounded by sleep deprivation. Problem gamers also scored worse on measures of personal hygiene and sanitary living conditions, which is consistent with their QOL score on Environment falling in the lower 'fair' category. This finding aligns with previous studies which highlight the importance of assessing and addressing basic skills and adaptive functioning in interventions for problem gaming (Jeong et al., 2020; Lim et al., 2016; Larrieu et al., 2022).

Multivariate analysis identified that the motive to escape from reality was the only predictor of problem gaming status. This finding was consistent with past studies (e.g. Ballabio et al., 2017; Yee, 2006; Xu et al., 2012; Billieux et al., 2013; Kardefelt-Winther, 2014), and supports the notion of escape as an important process in problem gaming (Giardina et al., in press). Converging evidence indicates that time spent engaged in gaming is not sufficient on its own to understanding the risks of gaming; rather, it is necessary to examine the psychological function of the gaming activity. As Giardina et al. (in press) argue, the act of playing games may be a process of 'escaping into' or immersing oneself in the virtual world of a game, wherein the player may satisfy basic needs of identity expression, socialising and creativity. This is distinct from playing to 'escape from' reality, whereby the player is primarily concerned with avoidance of the real world and/or dissociating from uncomfortable feelings or distress. Further studies may consider the interplay of escape tendencies arising in problem gaming among individuals with anxious profiles.

The findings presented in this study have several implications. Although there has been increasing public concern that high-frequency gaming may increase risk of addiction (Demetrovics et al., 2016), gaming time alone may not be the most important factor contributing to problematic outcomes amongst highly engaged users. Similarly, guidelines that refer simply to limiting gaming time may be overlooking more important variables that influence the risk related to involvement in the activity. It may be useful, for example, for parents to monitor the reasons for engagement in gaming, including whether it is being used to escape from difficult real-world situations and whether engagement occurs at times that displace important adaptive routines, including sleep and socialising. In other words, while greater time commitments might increase the risk of gaming interfering with other activities, it can also be scheduled and timed as to reduce this impact. Such issues would be complementary to additional considerations of absolute time spent in the activity.

Future research should examine the course of problem gaming in relation to changes in QOL. Broadly, many problem gaming studies lack measures of functional impairment and/or QOL and would benefit from including these alongside other screening tools. Future high-frequency

gaming studies should consider examining the potential contribution of comorbid issues, such as depression, anxiety, poor self-concept and/or trauma, to assist in understanding the conceptualisation of problem gaming issues as a primary vs secondary problem. Another area for further research is potential differences in the actual in-game play between problem and non-problem high-frequency gamers. For example, do these players differ with respect to their preferences for game genre and patterns of game play? Are there any skill-related or progression-related differences that might be identifiable using telemetry-based measures?

The present study is one of few studies to investigate differences in highly frequent gamers using validated measures of quality of life or functional impairment (King et al., 2020a, 2020b). However, there are limitations in the present study that warrant acknowledgement. First, although our sample had sufficient power to detect effects, participants were primarily targeted on the basis of highly frequent gaming and therefore may not be representative on other demographic variables. As a survey-based study, participants' responses may be affected by response biases common to this methodology. Another important issue is the lack of causality in these results, e.g., whether poor quality of life influenced problem gaming status or whether problem gaming status influenced poor quality of life. Similarly, the scope of this study did not allow for the incorporation of a "non-players" group. Therefore, we do not know whether non-players would have scored even higher on quality of life than individuals playing less than 30 h per week. Finally, the influence of different game genres and features was not assessed.

6. Conclusion

The present study contributes to a growing body of evidence indicating that problem gaming is associated with poorer quality of life and gaming to escape, and provides new insights into the role of protective behaviors in relation to problematic gaming. This work is particularly relevant given the rising popularity of gaming-based careers, such as esports athletes and entertainment streamers, which typically involve habitual or continuous engagement in gaming. Greater understanding of healthy long-term engagement in gaming is important to informing guidelines for these activities, including their promotion and implementation in schools. Further research that examines the factors associated with adaptive gaming habits in the context of high frequency gaming is important for informing clinical and public health agendas. Greater understanding of high frequency, adaptive gaming may also help to dispel some misconceptions of gaming as a leisure activity and reduce public stigma associated with gaming.

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8. Contributors

Author A reviewed the literature, collected the data, conducted the statistical analysis, and prepared the first draft of the manuscript. All authors contributed to the design of the study and have approved the final manuscript.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Appendix A. Supplementary material

Supplementary data to this article can be found online at https://doi.org/10.1016/j.abrep.2022.100462.

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