1828
AKADÉMIAI KIADÓ

Journal of Behavioral Addictions

15 (2026) 2, 735–745

DOI:
10.1556/2006.2026.00022

FULL-LENGTH REPORT

Check for updates

The role of videogame genre and platform in gaming disorder tendencies: A large-scale world-wide study of gamers' preferences

DAVIDE MARENGO[1†], BRUNO SCHIVINSKI[2,3†], HALLEY M. PONTES[4] and CHRISTIAN MONTAG[5,6,7*]

[1] Department of Psychology, University of Turin, Turin, Italy

[2] School of Media and Communication, Royal Melbourne Institute of Technology, Melbourne, Australia

[3] Gdansk University of Technology, Gdansk, Poland

[4] School of Psychological Sciences, Birkbeck, University of London, United Kingdom

[5] Centre for Cognitive and Brain Sciences, Institute of Collaborative Innovation, University of Macau, Macau SAR, China

[6] Department of Computer and Information Science, Faculty of Science and Technology, University of Macau, Macau SAR, China

[7] Department of Psychology, Faculty of Social Sciences, University of Macau, Macau SAR, China

Received: February 4, 2026 • Revised manuscript received: April 15, 2026 • Accepted: April 20, 2026
Published online: May 18, 2026

ABSTRACT

Background and aims: Literature suggests that individual differences in tendencies toward gaming disorder (GD) may be associated with characteristics of the video games people prefer. We examined how game genre, multiplayer capability, and platform relate to GD tendencies assessed using both APA (DSM-5) and WHO (ICD-11) frameworks in a large international sample of gamers. *Methods:* We analyzed cross-sectional online data from 116,047 gamers. Participants completed validated measures of GD symptoms aligned with DSM-5 and ICD-11 and reported the genre, multiplayer capability, and platform of their currently preferred game. Associations were examined using bivariate and multivariate analyses. We additionally applied a Random Forest model to evaluate the predictive contribution of game-related variables to GD scores. *Results:* GD levels were highest among participants preferring games with multiplayer capabilities, while positive associations with shooter and casual games were particularly evident among console users. In contrast, puzzle, platformer, and board games showed negative associations with GD scores. Players preferring desktop or laptop computers reported higher GD scores than those favoring consoles or small devices. In Random Forest models, game genre and multiplayer capability were modestly predictive of GD scores ($R \approx .08$–$.15$) with predictive accuracy being higher for participants who used console and desktop computers and lowest among small-device users. *Conclusions:* Multiplayer capability and preferred genre were consistently related to GD tendencies across DSM-5 and ICD-11 measures. However, these variables alone offered limited predictive power, indicating that GD risk is only partly explained by game characteristics and likely depends on broader individual and contextual factors.

KEYWORDS

gaming disorder, internet gaming disorder, gaming genres, gaming device, multiplayer game

†These two authors share the first author position.

*Corresponding author.
E-mail: cmontag@um.edu.mo

AKJournals

INTRODUCTION

While gaming is a widely enjoyed recreational activity, growing evidence highlights that excessive and dysregulated engagement can lead to Gaming Disorder (GD) (Montag, Schivinski, & Pontes, 2021b; Moore, Satel, & Pontes, 2022; Pontes & Griffiths, 2020). GD was first acknowledged as a tentative disorder by the American Psychological Association (APA) as ‘Internet Gaming Disorder’ (IGD) in the fifth revision of the Diagnostic and Statistical Manual of Mental Disorders (DSM-5) (APA, 2013) and later formally recognized by the World Health Organization (WHO) in the 11th version of the International Statistical Classification of Diseases (ICD-11) (WHO, 2019). Despite targeting the same construct, the two diagnostic frameworks differ in scope and emphasis (Castro-Calvo et al., 2021). The APA’s criteria reflect an addiction-based model, requiring five out of nine symptoms to be endorsed over a 12-month period, such as preoccupation, withdrawal, tolerance, loss of control, and functional impairment. In contrast, the WHO outlines three core criteria: impaired control, increasing gaming priority, and continuation despite negative consequences, along with the requirement for experiencing significant life impairment. In sum, while both frameworks overlap, these conceptual differences raise the possibility that the two systems may not be equally sensitive to the same game-related correlates, an issue that remains insufficiently explored.

Among game-related variables, genre remains one of the most frequently examined because it offers a broad way of grouping games by shared themes, mechanics, and player expectations. However, genre is not a conceptually stable category: classification systems vary, labels overlap, and the same game may fit multiple genres depending on whether emphasis is placed on gameplay, narrative, perspective, or market conventions (Clarke, Lee, & Clark, 2017; Crawford, 1984; Wolf, 2001). Recent work has also highlighted heterogeneity in how psychological research defines and applies genre categories, raising concerns about treating them as precise analytical units (Starosta, Kiszka, Szyszka, Starzec, & Strojny, 2024). Although alternative data-driven approaches have been proposed, including factor- and network-based analyses of game tags (Li, 2020; Li & Zhang, 2020), genre remains widely used in large-scale survey research. Accordingly, in the present study, genre is treated as a broad, pragmatic descriptive framework, and classification is based on an external database (i.e., RAWG) to limit researcher discretion, consistent with prior survey-based studies while not directly replicating their specific operationalizations (e.g., Elliott, Golub, Ream, & Dunlap, 2012; Männikkö, Billieux, Nordström, Koivisto, & Kääriäinen, 2017).

Empirical findings on genre-related differences in gaming disorder (GD) are mixed. Higher GD risk has been linked to role-playing, strategy, and action-adventure games (Männikkö et al., 2017); first-person shooter, action-adventure, massively multiplayer online role-playing game (MMORPG), and gambling games (Elliott et al., 2012); role-playing games (Kim et al., 2010); role-playing and real-time strategy games (Eichenbaum, Kattner, Bradford, Gentile, & Choo, 2015a; Eichenbaum, Kattner, Bradford, Gentile, & Green, 2015b); and role-playing, simulation, and multiplayer online battle arena (MOBA) games (Han, Jeong, Jo, Son, & Yim, 2020). Overall, the literature does not support a single high-risk genre profile, suggesting that genre-related associations with GD are heterogeneous and may reflect both real differences across gaming environments and the conceptual instability of genre classification itself.

This inconsistency suggests that broad genre labels only partly capture the game features relevant to gaming disorder (GD). Genre-based analyses should therefore be complemented by more psychologically meaningful indicators, such as multiplayer status. Compared with single-player games, online and multiplayer games may involve greater social reinforcement, competitive and cooperative demands, persistent worlds, and fewer natural stopping points, all of which may increase vulnerability to GD. Consistently, massively multiplayer online role-playing games (MMORPGs) and multiplayer online battle arena (MOBA) games are often linked to higher GD risk (King et al., 2019), and time spent gaming partly mediates the association between these genres and negative outcomes (Berle, Starcevic, Porter, & Fenech, 2015; Pontes, Schivinski, Kannen, & Montag, 2022). However, findings remain fragmented, underscoring the need for further research on genre and multiplayer features across both the APA and WHO frameworks.

Gaming platform may represent another relevant dimension. Preference for desktop computers, laptops, consoles, or mobile devices may reflect differences in accessibility, immersion, session length, and social connectivity that could shape GD risk. Yet relatively few studies examine platform preference together with genre and multiplayer status within the same framework, especially across both the APA and WHO models. As a result, it remains unclear whether these game-related correlates operate similarly across diagnostic systems or show stronger associations with one framework than the other.

The current study

The present study addresses this gap by examining how preferences for specific game genres, platforms, and multiplayer status relate to GD tendencies across the APA and WHO diagnostic frameworks. First, we investigate whether these broad game-related characteristics show different associations with GD across the two diagnostic systems. Next, because game characteristics are unlikely to relate to GD in a purely additive way (Rehbein, King, Staudt, Hayer, & Rumpf, 2021; Flayelle, Andronicos, King, & Billieux, 2025), we complement the correlational analyses with a machine-learning approach capable of capturing non-linear patterns, using Random Forest (Breiman, 2001) to examine the joint contribution of multiple game-related characteristics to GD tendencies across both frameworks. Overall, by jointly considering genre, platform, and multiplayer status, the study aims to provide a more nuanced account of game-related correlates of GD, while treating these classifications as pragmatic rather than definitive representations of psychologically meaningful game properties.

METHODS

Participants and procedure

This study was part of a global campaign promoting healthy gaming through the platform www.do-i-play-too-much.com, in partnership with the Electronic Sports League (ESL). ESL provided access to the survey via its platform but had no involvement in the study design or direct/indirect financial support. For transparency, however, ESL likely benefited reputationally and strategically from the collaboration through positive public relations, player engagement, and the promotion of corporate social responsibility. Starting in 2019, the survey was advertised through online and offline channels, offered no financial incentives but provided personalized feedback on gaming behavior upon completion. For participants aged 12–15, parental e-consent was required. Participants aged 16 and older provided e-consent independently. The survey was in English. Ethical approval was granted by Nottingham Trent University. The present study is based on the resulting international dataset, which has also been used in previous publications addressing different research questions, including gaming disorder and playtime (Pontes et al., 2022), gaming disorder and personality (Montag, Kannen, Schivinski, & Pontes, 2021a), and comorbidity across online addictive behaviors (Rozgonjuk, Schivinski, Pontes, & Montag, 2021). Only pre-COVID-19 responses from 2019 were included.

The initial sample included $N = 188{,}775$ entries/gamers from 181 countries. After applying strict data cleaning criteria (e.g., excluding implausible ages or hours, fake games, and non-gamers), $N = 127{,}028$ valid cases remained. An additional filtering step removed entries for which the preferred game entry could not be classified via the RAWG database, resulting in a final sample of $N = 116{,}121$. As a final quality check, duplicate observations were examined. Only 74 duplicate entries remained in the data, accounting for less than 1% of the data. After removing duplicate observations, the sample consisted of 116,047 participants. This final sample was predominantly male ($n = 107{,}854$; females: $n = 8{,}193$), with a mean age of 24.12 years (SD = 7.44; range: 12–80). Educational background varied, with 48.4% of participants reporting at most a high school diploma and 51.6% reporting post-secondary education, including a college diploma, bachelor's degree, master's degree, or PhD. Self-report questions also assessed weekly gaming time and preferred device (desktop computer, laptop, console, or mobile device, e.g., smartphone or tablet). Participants reported an average of 23.34 h of gaming per week (SD = 16.63) and mainly preferred desktop computers (57.0%), followed by consoles (27.1%), laptops (12.3%), and mobile devices (3.5%). Additional demographic information is provided in the Appendix (Table A1).

Instruments

Gaming disorder. Two psychometrically validated tools aligned with the APA and WHO frameworks were used to assess GD: Specifically, the Internet Gaming Disorder Scale–Short-Form (IGDS9-SF) and the Gaming Disorder Test (GDT). The IGDS9-SF (Pontes & Griffiths, 2015), based on the nine DSM-5 criteria for Internet Gaming Disorder (APA, 2013), assesses gaming-related problems over a 12-month period. Items are rated on a 5-point Likert scale (1 = never to 5 = very often) and scores reflect the average across items. Reliability was adequate ($\alpha = .83$); the mean score in our sample was 2.00 (SD = 0.70); on average, the sum score was 18.00 (SD = 6.27). The GDT (Pontes et al., 2021) includes four items reflecting the ICD-11 criteria for GD. It also uses a 5-point Likert scale, with scores averaged across items. Reliability was acceptable ($\alpha = .76$); the sample mean was 2.23 (SD = 0.80). On average, the sum score was 8.94 (SD = 3.21). For the analyses presented in this paper, mean scores were used for both the IGDS9-SF and the GDT. However, results are expected to be computationally identical if sum scores were used instead. The two instruments showed high concurrent validity, with a strong positive Spearman correlation ($\rho = .71$, $p < .001$, $N = 116{,}047$). This agreement is illustrated in Fig. 1, a bubble scatterplot in which each bubble represents a videogame or franchise, positioned by its mean IGDS9-SF and GDT scores, with bubble size proportional to the number of participants indicating that preference. For readability, only entries preferred by at least 30 participants are shown, and labels are displayed only for the most prominent ones ($N \geq 500$). Among labeled videogame entries, the number of participants ranged from $N = 554$ for The Sims to $N = 11{,}240$ for League of Legends.

Characteristics of preferred game. Participants identified their primary game via an open-ended text field, which resulted in a high degree of variation in how titles were reported. To ensure data consistency, entries were manually reviewed and harmonized. Figure 1 illustrates the distribution of games and franchises along the GD score continuum as measured by the two instruments. Game information, including genres and tags, was retrieved from the RAWG database (http://www.rawg.io, a large video game community-powered database with over 618,000 games across multiple platforms, including consoles, desktop computer, and laptop, and smaller devices such as smartphones and tablets). Based on the RAWG data, we generated binary indicators for the *multiplayer* tag (i.e., yes/no) and for the presence of specific genres, namely: *Action, Adventure, Arcade, Board games, Card games, Casual, Educational, Family, Fighting, Indie, Massively multiplayer, Military, Platformer, Puzzle, Racing, RPG, Shooter, Simulation, Sports, Strategy,* and *War*. Most participants ($n = 90{,}746$; 78.2%) selected games tagged for multiplayer features. Note, however, that *multiplayer tag* was operationalized as a broad indicator of whether the preferred game included multiplayer features according to RAWG tags. This coding does not distinguish between games designed primarily around multiplayer interaction and games in which multiplayer is optional or secondary to a predominantly single-player experience. Figure 2 displays the prevalence of game genres and their combinations. The most frequent combination was action/shooter ($n = 16{,}510$). Genres with <.3% prevalence (i.e., *Educational, Family, Military, War*) were excluded from further analyses.

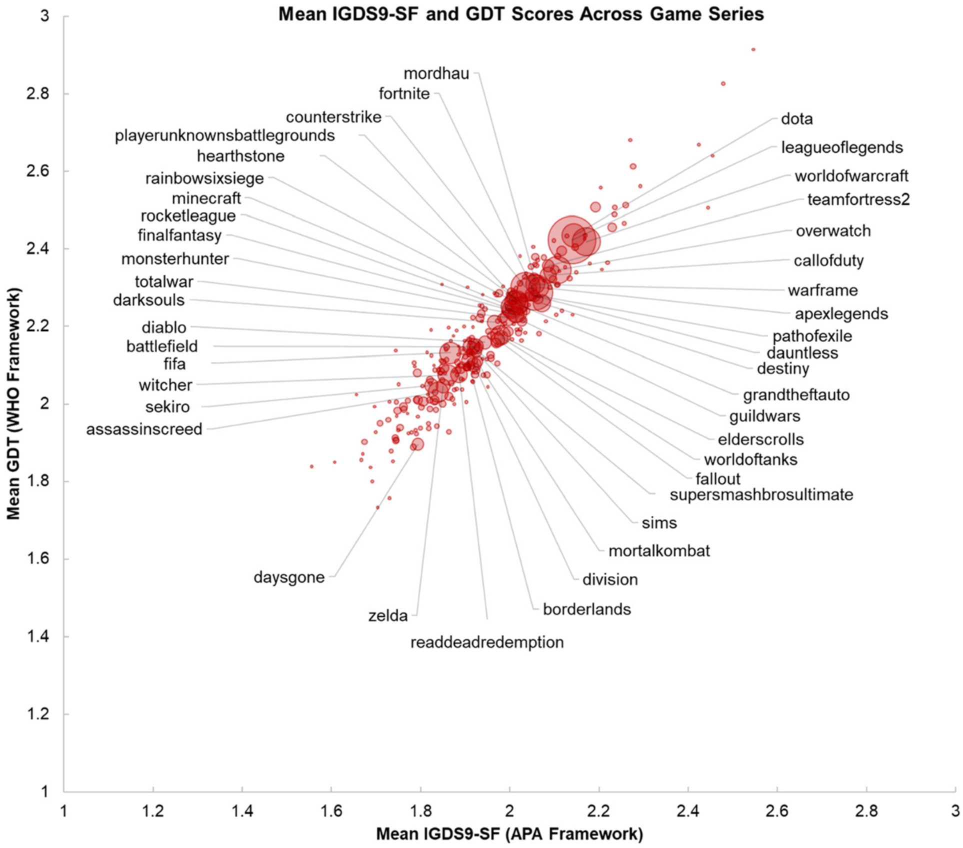


Fig. 1. Average IGDS9-SF and GDT Scores by Preferred Game/Franchise

Note. Each bubble represents a game series positioned according to its mean score based on the APA framework (IGDS9-SF) and WHO framework (GDT). Bubble size is proportional to the number of participants reporting that series. Labels are shown for selected series with the largest sample sizes ($N \geq 500$) to improve readability. Larger bubbles therefore indicate more frequently reported game series in the dataset.

Data analysis

We first examined associations between demographic variables (i.e., age, gender, education) and both GD measures, IGDS9-SF (APA) and GDT (WHO), as well as game characteristics (genres, multiplayer). Due to non-normality of GD scores (Shapiro–Wilk test), nonparametric tests were used. Rank-biserial correlations (computed as Somers' D, de la Rubia, 2022) were used for associations between binary variables (e.g., gender and game genres) and age, education, and GD scores. Spearman correlations were used to investigate associations between age and education and the GD scores. Associations between binary variables were tested using the Phi coefficient. Next, we compared GD levels and game preferences across device types (console, desktop computer, laptop, mobile). Kruskal–Wallis tests assessed GD differences, while generalized linear models with Bonferroni-corrected post hoc comparisons examined differences in genre and multiplayer preferences across devices. We then examined bivariate associations between binary game-characteristic indicators and GD scores using rank-biserial correlations, both in the full sample and within each device group (i.e., console, desktop computer, laptop, and small devices). These analyses were conducted using IBM SPSS (v23).

To assess the predictive value of game-related variables (RAWG tags for multiplayer capability and game genres), we estimated Random Forest (Breiman, 2001) regression models separately for each GD outcome (IGDS9-SF and GDT), both in the full sample and within each preferred-device subgroup. GD outcomes were treated as continuous mean scores; accordingly, class-imbalance procedures were not relevant. Random Forest was selected because it can accommodate correlated predictors, nonlinear associations, and higher-order interactions without requiring distributional assumptions or pre-specified interaction terms. We adopted this approach because the effects of genre and multiplayer features on GD tendencies were not assumed to be strictly linear or additive. For each model, 100 trees were grown, and performance was evaluated using out-of-bag (OOB) prediction metrics rather than a separate train-test split. This approach provides an internal estimate of generalization performance while reducing computational burden. Model performance was summarized using the correlation between observed and predicted scores (R), mean absolute error (MAE), and root mean square error (RMSE). Analyses were conducted in WEKA 3.8.6 (Frank, Hall, & Witten, 2016).

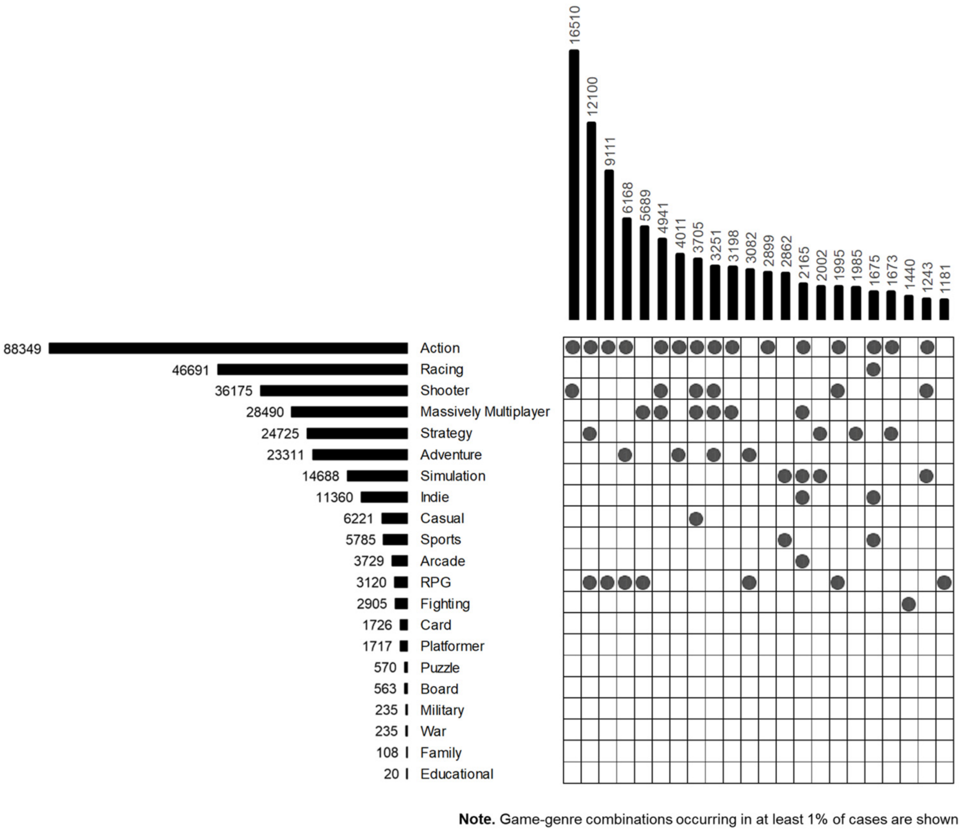


Fig. 2. Prevalence of preferred game genres, and combinations of game genres (N = 116,047); a dot is set for each genre associated with the game

Ethics

The study has been approved by the College Research Ethics Committee of the Nottingham Trent University (2018/95).

RESULTS

Associations between demographic variables and gaming-related variables

There were significant but negligible associations between age and both GD scores according to the APA and WHO frameworks (APA: $\rho = -.05$; WHO: $\rho = -.06$). A similar pattern was observed when examining associations between education level and GD scores (APA: $\rho = -.07$; WHO: $\rho = -.07$).

Gender (being female) also showed negligible associations with the GD scores (APA: $r_{rb} = .03$; WHO: $r_{rb} = -.01$). In turn, associations between demographic variables and game characteristics typically showed a larger effect-size (see Table 1). Here, we only comment on associations showing at least a small effect size ($r_{rb} \geq |.10|$). Age was positively associated with a preference for adventure ($r_{rb} = .19$), board ($r_{rb} = .32$), card ($r_{rb} = .19$), puzzle ($r_{rb} = .19$), and RPG games ($r_{rb} = .16$), and negatively correlated with a preference for games with multiplayer capabilities ($r_{rb} = -.20$), as well as with action ($r_{rb} = -.18$),

Table 1. Associations between game characteristics and demographic variables (age, gender, education level)

	Age		Gender		Education level	
	r_{rb}	p	φ	p	r_{rb}	p
Multiplayer capability	−.202	<.001	−.058	<.001	−.127	<.001
Genre						
Action	−.178	<.001	−.051	<.001	−.099	<.001
Adventure	.189	<.001	.031	<.001	.093	<.001
Arcade	−.302	<.001	.016	<.001	−.225	<.001
Board games	.315	<.001	−.008	.009	.215	<.001
Card games	.195	<.001	−.014	<.001	.157	<.001
Casual games	−.062	<.001	.101	<.001	−.030	<.001
Fighting	−.040	<.001	−.019	<.001	−.011	.270
Indie	−.026	<.001	−.006	.037	−.051	<.001
Massively multiplayer	.094	<.001	.001	.799	.024	<.001
Platformer	.077	<.001	.013	<.001	.052	<.001
Puzzle	.191	<.001	.041	<.001	.132	<.001
Racing	.001	.971	−.037	<.001	−.014	.161
RPG	.158	<.001	.065	<.001	.074	<.001
Shooter	−.176	<.001	−.051	<.001	−.100	<.001
Simulation	−.024	<.001	.010	.001	−.037	<.001
Sports	−.030	<.001	−.053	<.001	.002	.818
Strategy	−.025	<.001	−.002	.509	−.009	.020

Note. Gender is coded as follows: Female = 1; Male = 0.

arcade (r_{rb} = −.30), and shooter (r_{rb} = −.18) games. Gender (being female) positively correlated with a preference for casual games (φ = .10). Education level was positively correlated with a preference for board (r_{rb} = .21), card (r_{rb} = .16), and puzzle (r_{rb} = .13) games, and negatively correlated with preference for action (r_{rb} = −.10), arcade (r_{rb} = −.23) and shooter (r_{rb} = −.10) games, as well as games with multiplayer capabilities (r_{rb} = −.13).

Associations between preferred gaming devices, and game characteristics and tendencies towards GD

Table 2 summarizes differences in game characteristics and overall GD levels across preferred gaming devices. Based on Kruskal-Wallis tests, participants reporting a preference for desktop and laptop computers showed similar mean GD scores according to both the APA and WHO frameworks, and both showed higher GD scores than participants reporting a preference for consoles and small devices. Participants preferring desktop or laptop computers were more likely to prefer games with multiplayer capability, massively multiplayer games, indie and RPG games than those prevalently using consoles or small devices. In turn, participants indicating consoles as their prevalent gaming device were more likely to show a preference for action, adventure, fighting, platformer, shooter, and sports games than those indicating prevalent use of other types of devices. Notably, for shooter games, a clear pattern could be observed in that over 30% of participants indicating either a preference for consoles or desktop computers also played shooter games, while the other groups reported significantly lower prevalence. Finally, participants with a preference for small devices showed the highest prevalence for arcade, card, casual, and puzzle games.

Associations between game characteristics and tendencies towards GD

Figure 3 provides a visualization of the results of bivariate associations between features of participants' preferred games and their tendencies towards GD. There were many significant results, but most of them were negligible in size, based on rank-biserial correlations ($r_{rb} < |.10|$). For improved readability, this section will only address rank-biserial correlations showing at least a small effect-size ($r_{rb} \geq |.10|$) in either framework. First, regarding the overall GD scores according to the APA and WHO frameworks (see Fig. 3), the findings yielded small positive correlations with preference for games with multiplayer capabilities (APA: r_{rb} = .11; WHO: r_{rb} = .11) and small negative correlations with preference for puzzle (APA: r_{rb} = −.17;

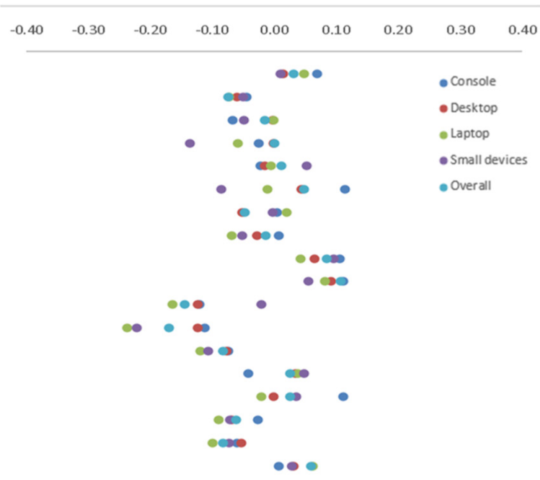
Table 2. Prevalence of game characteristics and mean GD score by preferred gaming device

	Preferred gaming device					
	Console N = 31,435 Mean (SD)	Desktop computer N = 66,188 Mean (SD)	Laptop computer N = 14,311 Mean (SD)	Small device N = 4,113 Mean (SD)	KW (df)	p
Gaming Disorder						
IGDS9-SF (APA)	1.92 (0.68)	2.03 (0.70)[a]	2.03 (0.70)[a]	1.99 (0.74)	706.65 (3)	<.001
GDT (WHO)	2.12 (0.77)	2.28 (0.81)[a]	2.28 (0.80)[a]	2.24 (0.84)	999.33 (3)	<.001
	%	%	%	%	Wald's χ^2 (df)	p
Multiplayer capability	70.52	82.00	80.98	65.99	1836.86 (3)	<.001
Genre						
Action	78.46	76.48	74.12	59.81	588.66 (3)	<.001
Adventure	31.44	16.14	13.00	21.47	3115.66 (3)	<.001
Arcade	2.16	3.03	4.10	11.18	421.71 (3)	<.001
Board games	0.11	0.57[a]	0.92	0.51[a]	245.553 (3)	<.001
Card games	0.42	1.51	2.60	5.40	663.94 (3)	<.001
Casual games	3.32	5.84[a]	6.02[a]	10.97	537.800 (3)	<.001
Fighting	5.70	1.30[a]	1.14[a]	2.12	1060.19 (3)	<.001
Indie	5.26[a]	11.74[b]	11.92[b]	5.66[a]	1550.95 (3)	<.001
Massively multiplayer	13.97[a]	29.99	25.28	15.29[a]	3893.14 (3)	<.001
Platformer	2.68	0.94	1.37[a]	1.43[a]	318.98 (3)	<.001
Puzzle	0.51[a]	0.30[b]	0.41[ab]	3.65	147.91 (3)	<.001
RPG	32.05	43.03	45.89	38.12	1366.01 (3)	<.001
Racing	3.05[a]	2.78[a]	1.89	1.14	146.38 (3)	<.001
Shooter	36.14	31.20	24.31	16.68	1310.26 (3)	<.001
Simulation	13.86[a]	11.88[b]	14.01[a]	11.23[b]	106.14 (3)	<.001
Sports	9.13	3.52[a]	2.99[b]	3.87[ab]	1084.86 (3)	<.001
Strategy	3.99	25.85	34.74[a]	33.77[a]	16027.52 (3)	<.001

Note. Percentage values are model-estimated marginal means from binomial generalized linear models. Wald's χ^2 (df) values refer to omnibus tests based on linearly independent pairwise comparisons among estimated marginal means. Mean and percentage values labeled with the same letter do not differ at p <.05. KW: Kruskal-Wallis test.

a) Association between game characteristics and the IGD9-SF (APA Framework)

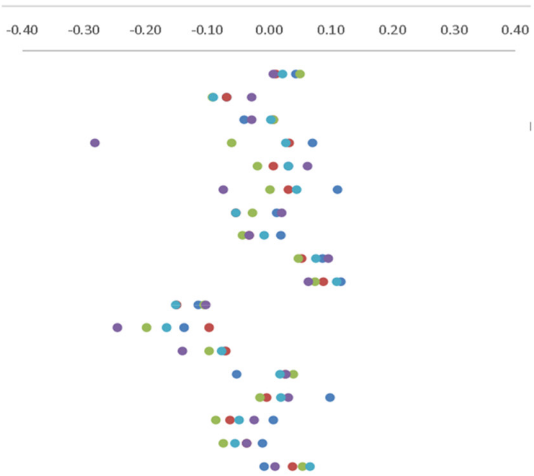
Rank-biserial correlation (Somers' D)



Genre/Tag	Console	Desktop	Laptop	Small devices	Overall
Action	**0.07**	**0.01**	**0.05**	0.01	**0.03**
Adventure	**-0.05**	**-0.06**	**-0.07**	**-0.05**	**-0.07**
Arcade	**-0.07**	0.00	0.00	-0.05	-0.01
Board	-0.02	0.00	-0.06	-0.14	0.00
Card	-0.02	-0.02	-0.01	0.05	0.01
Casual	**0.11**	**0.04**	-0.01	**-0.09**	**0.05**
Fighting	0.00	-0.05	0.02	0.00	**-0.05**
Indie	0.01	**-0.03**	**-0.07**	-0.05	**-0.01**
Massively Multiplayer	**0.11**	**0.06**	**0.04**	**0.10**	**0.08**
Multiplayer	**0.11**	**0.09**	**0.08**	**0.06**	**0.11**
Platformer	**-0.12**	**-0.12**	**-0.16**	-0.02	**-0.14**
Puzzle	**-0.11**	**-0.12**	**-0.24**	**-0.22**	**-0.17**
Racing	**-0.07**	**-0.08**	**-0.12**	-0.11	**-0.08**
RPG	**-0.04**	**0.03**	**0.04**	**0.05**	**0.03**
Shooter	**0.11**	0.00	-0.02	0.04	**0.03**
Simulation	**-0.03**	**-0.07**	**-0.09**	**-0.07**	**-0.06**
Sports	**-0.06**	**-0.05**	**-0.10**	-0.07	**-0.08**
Strategy	0.01	**0.03**	**0.06**	0.03	**0.06**

b) Association between game characteristics and the GDT (WHO Framework)

Rank-biserial correlation (Somers' D)



Genre/Tag	Console	Desktop	Laptop	Small devices	Overall
Action	**0.04**	**0.01**	**0.05**	0.01	**0.02**
Adventure	**-0.07**	**-0.07**	**-0.09**	-0.03	**-0.09**
Arcade	-0.04	0.01	0.01	-0.03	0.00
Board	0.07	0.03	-0.06	**-0.28**	0.03
Card	0.03	0.01	-0.02	0.06	**0.03**
Casual	**0.11**	**0.03**	0.00	**-0.07**	**0.05**
Fighting	0.01	**-0.05**	-0.03	0.02	**-0.05**
Indie	0.02	**-0.03**	**-0.04**	-0.03	-0.01
Massively Multiplayer	**0.09**	**0.05**	**0.05**	**0.10**	**0.08**
Multiplayer	**0.12**	**0.09**	**0.07**	**0.06**	**0.11**
Platformer	**-0.11**	**-0.15**	**-0.10**	-0.10	**-0.15**
Puzzle	**-0.14**	**-0.10**	**-0.20**	**-0.25**	**-0.17**
Racing	**-0.07**	**-0.07**	**-0.10**	-0.14	**-0.08**
RPG	**-0.05**	**0.03**	**0.04**	0.03	**0.02**
Shooter	**0.10**	0.00	**-0.01**	0.03	**0.02**
Simulation	0.01	**-0.06**	**-0.09**	-0.02	**-0.05**
Sports	-0.01	**-0.04**	**-0.07**	-0.04	**-0.05**
Strategy	-0.01	**0.04**	**0.05**	0.01	**0.07**

Note. Values in bold indicate significant rank-biserial correlations. For each game feature, the dots in the plot represent rank-biserial correlations as reported in the same line of the table.

Fig. 3. Rank-biserial correlation between game characteristics and gaming disorder tendencies according to IGDS9-SF (panel a) and GDT (panel b) in the overall sample and by preferred gaming device (N = 116,047)

WHO: r_{rb} = −.17) and platformer games (APA: r_{rb} = −.14; WHO: r_{rb} = −.15).

After splitting the sample according to the preferred video game device, different patterns emerged. Among gamers using mainly console devices, the findings reveal small positive correlations with preference for games allowing multiplayer (APA: r_{rb} = .11; WHO: r_{rb} = .12), massively multiplayer (APA: r_{rb} = .11; WHO: r_{rb} = .09), casual games (APA: r_{rb} = .11; WHO: r_{rb} = .11), and shooter games (APA: r_{rb} = .11; WHO: r_{rb} = .10). The preference for platformer (APA: r_{rb} = −.12; WHO: r_{rb} = −.11) and puzzle game (APA: r_{rb} = −.11; WHO: r_{rb} = −.14) genres showed negative correlation with GD across both diagnostic frameworks.

Among participants reporting a preference for the desktop computer gaming platform, for both frameworks significant negative correlations emerged between GD scores and puzzle (APA: r_{rb} = −.12; WHO: r_{rb} = −.10) and platformer (APA: r_{rb} = −.12; WHO: r_{rb} = −.15) games genres. In this group, we could also observe positive correlations between GD scores and multiplayer capabilities, but these correlations were negligible in size. Participants reporting laptop computers as their favorite platform showed a similar pattern, showing negative correlations between GD scores and puzzle (APA: r_{rb} = −.24; WHO: r_{rb} = −.20), platformer (APA: r_{rb} = −.16; WHO: r_{rb} = −.10), racing (APA: r_{rb} = −.12; WHO: r_{rb} = −.10), and sports (APA: r_{rb} = −.10; WHO: r_{rb} = −.07) games genres.

Finally, among participants reporting a more prevalent use of small devices for gaming (i.e., smartphones and tablets), the findings show a positive correlation with massively multiplayer games (APA: r_{rb} = .10; WHO: r_{rb} = .10). Significant negative correlations emerged between GD scores and board games (APA: r_{rb} = n.s.; WHO: r_{rb} = −.28) and puzzle (APA: r_{rb} = −.22; WHO: r_{rb} = −.25) games genres.

The findings above are also illustrated in Fig. 1, which shows the distribution of game series across the GD score continuum for both instruments. Consistent with the main results, multiplayer and competitive titles such as *World of Warcraft*, *Dota*, and *League of Legends* cluster at the higher end, whereas single-player, puzzle, and platformer-oriented series such as *Zelda*, *Sekiro*, and *Assassin's Creed* appear at the lower end.

Prediction of GD tendencies based on game characteristics

Table 3 reports the results of Random Forest models predicting GD tendencies across both APA and WHO frameworks based on participants' preferred game's features (i.e., variables representing information on multiplayer capabilities and game genres of participants' preferred game). Overall, based on multiple correlation coefficients computed between predicted and observed values, we found a small predictive power ($R \geq .10$) when predicting the APA and WHO frameworks scores in the overall sample, and among participants indicating console, desktop and laptop computers as their preferred gaming devices. Prediction accuracy was especially poor ($R = .08$) when predicting the IGDS9-SF (APA framework) among small-device users. The results of MAE and RMSE also showed a similar pattern, indicating the prediction performance was at best small and generally more accurate when performed on the data combining all devices.

Table 3. Prediction of gaming disorder tendencies: out-of-bag prediction accuracy

	R	MAE	RMSE
IGDS9-SF (APA)			
Overall	.14	0.54	0.69
Consoles	.13	0.52	0.67
Desktop	.12	0.54	0.69
Laptop	.10	0.55	0.70
Small devices	.08	0.59	0.74
GDT (WHO)			
Overall	.15	0.63	0.79
Consoles	.13	0.60	0.76
Desktop	.13	0.64	0.80
Laptop	.11	0.64	0.80
Small devices	.10	0.68	0.84

Note. R: correlation between observed and predicted GD scores; MAE: Mean Absolute Error; RMSE: Root Mean Square Error.

DISCUSSION

This study explored the relationship between preferred game genres, multiplayer capability, gaming device preference, and GD as assessed through both APA and WHO frameworks. Findings showed consistent links between game preferences, device use, and GD tendencies. Gamers who preferred desktop and laptop computers reported higher GD tendencies than those preferring consoles or small devices, regardless of diagnostic framework. However, these between-group differences were small and, although statistically reliable, are better understood as emerging patterns that may help identify broader vulnerabilities and guide future research on game-related correlates of GD, rather than as strong or clinically decisive effects at the individual level. Notably, desktop and laptop users were more likely to prefer multiplayer and massively multiplayer games, while console gamers favored shooter games and small device users preferred arcade, card, casual, and puzzle games.

Overall, gamers who favored multiplayer games reported the highest GD scores, followed by those preferring casual and shooter games. At the subgroup level, the strongest associations with GD were observed among console gamers who preferred multiplayer, massively multiplayer, and shooter games. By contrast, preferences for platformers, board games, and puzzle games were negatively associated with GD. These findings are broadly consistent with prior research linking disordered gaming to online, socially reinforcing, and highly engaging gaming environments (Bonnaire & Baptista, 2019; Hussain, Griffiths, & Baguley, 2012; Mora-Cantallops & Sicilia, 2018; Müller et al., 2015). At the same time, the broader literature on genre-related differences in GD remains mixed, with previous studies linking elevated GD risk to different genres, including role-playing, strategy, action-adventure, first-person shooter, MMORPG, gambling, simulation, and MOBA games (Eichenbaum et al., 2015a, Eichenbaum et al., 2015b; Elliott et al., 2012; Han et al., 2020; Kim et al., 2010; Männikkö et al., 2017). Accordingly, the present findings should not be interpreted as supporting a single, stable hierarchy of genre-related risk, but rather as identifying patterns of association within the present classification framework. Future research should examine how specific structural characteristics and specific game mechanics interact with individual traits, such as personality, to shape vulnerability to dysregulated gaming.

The findings further showed that preferences for game genre and multiplayer features helped predict GD tendencies, though overall predictive power was limited. This pattern further suggests that game-related variables should not be understood as strong stand-alone indicators of GD risk, but rather as contextual correlates that may contribute modestly to broader risk profiles. Associations between game-related variables and GD were stronger among users of consoles or desktop and laptop computers, and weaker for small device users. Importantly, both APA and WHO frameworks yielded highly similar patterns of association, reinforcing their convergent validity in identifying GD risk factors despite differing diagnostic criteria (Castro-Calvo et al., 2021).

Our findings also align with demographic trends in gaming. Age was positively associated with preferences for strategic and cognitive genres (e.g., adventure, board, card, puzzle, RPGs) and negatively with action and multiplayer games, suggesting older gamers favor narrative or cognitively challenging experiences (Allaire et al., 2013; Entertainment Software Association, 2020). This pattern mirrored associations with education level, which was positively related to cognitive genres and negatively to action and multiplayer games (Granic, Lobel, & Engels, 2014). Female participants showed a slight preference for casual games, in line with previous literature (Entertainment Software Association, 2020; Lopez-Fernandez, Williams, Griffiths, & Kuss, 2019).

Several limitations should be considered. First, reliance on self-report may introduce bias, particularly when assessing potentially problematic behaviors. Although prior work supports the validity of GD self-report measures and their associations with behavioral indicators (Schivinski, Brzozowska-Woś, Buchanan, Griffiths, & Pontes, 2018), related research has noted that objective behavioral data may provide a more detailed picture of gamers' behavior (Rozgonjuk et al., 2021). Future research should incorporate alternative methodologies, including objective gaming data, qualitative approaches, mixed methods, and experimental or clinical designs, to validate our findings. Second, our classification of multiplayer features was intentionally broad and should be interpreted cautiously. Because multiplayer status was derived from RAWG tags, some games may have been classified as multiplayer even when multiplayer functions are optional rather than central to the typical gameplay experience. Accordingly, this variable captures the presence of multiplayer features rather than a fine-grained distinction between multiplayer-by-design and primarily single-player games, which may have introduced some classification noise. Future studies should adopt more granular approaches to better understand how multiplayer configurations influence GD risk; see also older work "only" comparing online, offline or mixed game mode in the context of GD (Montag, Schivinski, & Pontes, 2021b). Third, our sample was predominantly male. This is a common limitation in GD research (Montag et al., 2012), here likely reflecting recruitment through gaming-focused platforms and the ESL portal, which may have reduced participation among some groups, such as casual gamers. Future research should include more balanced samples and explore gender identity as a potential moderator. In addition, the small effect sizes suggest that other factors, such as personality, also play an important role, as higher neuroticism and lower conscientiousness have been linked to greater GD risk (Montag, Kannen, et al., 2021a). Future work should also examine more specific structural features that cut across genres, such as avatar customization and virtual simulation elements, which may increase immersion and GD vulnerability (Stavropoulos, Dumble, Cokorilo, Griffiths, & Pontes, 2022). Overall, these findings are best viewed as identifying contextual correlates of GD rather than providing stand-alone guidance for clinical or policy decisions.

CONCLUSIONS

This study examined how game genre, multiplayer status, and gaming device related to GD tendencies under both the APA and WHO frameworks. Despite differences in diagnostic criteria, the two frameworks showed similar patterns of association. Massively multiplayer games and desktop/laptop gaming were positively associated with GD, whereas puzzle and platformer games showed negative associations. These findings should be interpreted cautiously, however, because the use of broad industry-based genre labels and a dichotomous multiplayer classification lacks theoretical precision, and the observed associations were generally small. These insights have implications for ethical game design and the prevention of problematic gaming. Continued research into the interplay between game features and psychological outcomes is essential to guide the development of games that are both engaging and conducive to well-being.

Funding sources: Christian Montag received funding by the University of Macau (Grant number: CPG2026-00036-ICI).

Authors' contribution: DM: Study concept and design; methodology; investigation; data curation; statistical analysis and interpretation of data; validation; visualization; writing—original draft. BS: Data curation; statistical analysis and interpretation of data; visualization; writing—original draft. HMP: Study concept and design; methodology; investigation; study supervision; project administration; writing—original draft. CM: Study concept and design; methodology; investigation; study supervision; project administration; writing—original draft.

Conflict of interest: The authors report no financial or other relationship relevant to the subject of this article.

Acknowledgments: The present study is part of the ESL "Smart Gaming" campaign. While ESL supported the present study by advertising information about it on their website, this organization had no direct or indirect role in the present study. The present study was conducted entirely independently, and ESL did not provide any financial support to this research.

REFERENCES

Allaire, J. C., McLaughlin, A. C., Trujillo, A., Whitlock, L. A., LaPorte, L., & Gandy, M. (2013). Successful aging through digital games: Socioemotional differences between older adult gamers and non-gamers. *Computers in Human Behavior*, *29*(4), 1302–1306. https://doi.org/10.1016/j.chb.2013.01.014

American Psychiatric Association. (2013). *Diagnostic and statistical manual of mental disorders*, (5th ed.). American Psychiatric Publishing. https://doi.org/10.1176/appi.books.9780890425596

Berle, D., Starcevic, V., Porter, G., & Fenech, P. (2015). Are some video games associated with more life interference and psychopathology than others? Comparing massively multiplayer online role-playing games with other forms of video game. *Australian Journal of Psychology*, *67*(2), 105–114. https://doi.org/10.1111/ajpy.12066

Bonnaire, C., & Baptista, D. (2019). Internet gaming disorder in male and female young adults: The role of alexithymia, depression, anxiety and gaming type. *Psychiatry Research*, *272*, 521–530. https://doi.org/10.1016/j.psychres.2018.12.158

Breiman, L. (2001). Random forests. *Machine Learning*, *45*, 5–32. https://doi.org/10.1023/A:1010933404324

Castro-Calvo, J., King, D. L., Stein, D. J., Brand, M., Carmi, L., Chamberlain, S. R., … Billieux, J. (2021). Expert appraisal of criteria for assessing gaming disorder: An international Delphi study. *Addiction*, *116*(9), 2463–2475. https://doi.org/10.1111/add.15411

Clarke, R. I., Lee, J. H., & Clark, N. (2017). Why video game genres fail: A classificatory analysis. *Games and Culture*, *12*(5), 445–465. https://doi.org/10.1177/1555412015591900

Crawford, C. (1984). *The art of computer game design*. McGraw-Hill.

de la Rubia, J. M. (2022). Note on rank-biserial correlation when there are ties. *Open Journal of Statistics*, *12*(5), 597–622. https://doi.org/10.4236/ojs.2022.125036

Eichenbaum, A., Kattner, F., Bradford, D., Gentile, D. A., & Choo, H. (2015a). The role of game genres and the development of internet gaming disorder in school-aged children. *Journal of Addictive Behaviors, Therapy & Rehabilitation*, *4*(3). https://doi.org/10.4172/2324-9005.1000141

Eichenbaum, A., Kattner, F., Bradford, D., Gentile, D. A., & Green, C. S. (2015b). Role-playing and real-time strategy games associated with greater probability of internet gaming disorder. *Cyberpsychology, Behavior, and Social Networking*, *18*(8), 480–485. https://doi.org/10.1089/cyber.2015.0092

Elliott, L., Golub, A., Ream, G., & Dunlap, E. (2012). Video game genre as a predictor of problem use. *Cyberpsychology, Behavior, and Social Networking*, *15*(3), 155–161. https://doi.org/10.1089/cyber.2011.0387

Entertainment Software Association. (2020). 2020 essential facts about the computer and video game industry. Retrieved from https://www.theesa.com/resource/2020-essential-facts/.

Flayelle, M., Andronicos, M., King, D. L., & Billieux, J. (2025). Understanding the interplay between video game design features and dysregulated gaming patterns: A call to anchor future research directions in interactionist frameworks. *Addictive Behaviors Reports*, *21*, 100609. https://doi.org/10.1016/j.abrep.2025.100609

Frank, E., Hall, M. A., & Witten, I. H. (2016). *The WEKA workbench. Online appendix for 'Data Mining: Practical Machine Learning Tools and Techniques'*, (4th ed., 2016). Morgan Kaufmann.

Granic, I., Lobel, A., & Engels, R. C. M. E. (2014). The benefits of playing video games. *American Psychologist*, *69*(1), 66–78. https://doi.org/10.1037/a0034857

Han, H., Jeong, H., Jo, S. J., Son, H. J., & Yim, H. W. (2020). Relationship between the experience of online game genre and high risk of internet gaming disorder in Korean adolescents. *Epidemiology and Health*, *42*, e2020016. https://doi.org/10.4178/epih.e2020016

Hussain, Z., Griffiths, M. D., & Baguley, T. (2012). Online gaming addiction: Classification, prediction and associated risk factors. *Addiction Research & Theory*, *20*(5), 359–371. https://doi.org/10.3109/16066359.2011.640442

Kim, J. W., Han, D. H., Park, D. B., Min, K. J., Na, C., Won, S. K., & Park, G. N. (2010). The relationships between online game player biogenetic traits, playing time, and the genre of the game being played. *Psychiatry Investigation*, *7*(1), 17–23. https://doi.org/10.4306/pi.2010.7.1.17

King, D. L., Delfabbro, P. H., Perales, J. C., Deleuze, J., Király, O., Krossbakken, E., & Billieux, J. (2019). Maladaptive player-game relationships in problematic gaming and gaming disorder: A systematic review. *Clinical Psychology Review*, *73*, 101777. https://doi.org/10.1016/j.cpr.2019.101777

Li, X. (2020, December). Towards factor-oriented understanding of video game genres using exploratory factor analysis on steam game tags. In *2020 IEEE international conference on progress in informatics and computing (PIC)* (pp. 207–213). IEEE. https://doi.org/10.1109/PIC50277.2020.9350753

Li, X., & Zhang, B. (2020, January). A preliminary network analysis on steam game tags: Another way of understanding game genres. In *Proceedings of the 23rd international conference on academic mindtrek* (pp. 65–73). https://doi.org/10.1145/3377290.3377300

Lopez-Fernandez, O., Williams, A. J., Griffiths, M. D., & Kuss, D. J. (2019). Female gaming, gaming addiction, and the role of women within gaming culture: A narrative literature review. *Frontiers in Psychiatry*, *10*, 454. https://doi.org/10.3389/fpsyt.2019.00454

Männikkö, N., Billieux, J., Nordström, T., Koivisto, K., & Kääriäinen, M. (2017). Problematic gaming behaviour in Finnish adolescents and young adults: Relation to game genres, gaming motives and self-awareness of problematic use. *International Journal of Mental Health and Addiction*, *15*(2), 324–338. https://doi.org/10.1007/s11469-016-9726-7

Montag, C., Flierl, M., Markett, S., Walter, N., Jurkiewicz, M., & Reuter, M. (2012). Internet addiction and personality in first-person-shooter video gamers. *Journal of Media Psychology*, *23*, 163–173. https://doi.org/10.1027/1864-1105/a000049

Montag, C., Kannen, C., Schivinski, B., & Pontes, H. M. (2021a). Empirical evidence for robust personality-gaming disorder associations from a large-scale international investigation applying the APA and WHO frameworks. *Plos One*, *16*(12), e0261380. https://doi.org/10.1371/journal.pone.0261380

Montag, C., Schivinski, B., & Pontes, H. M. (2021b). Is the proposed distinction of gaming disorder into a predominantly online vs. offline form meaningful? Empirical evidence from a large German-speaking gamer sample. *Addictive Behaviors Reports*, *14*, 100391. https://doi.org/10.1016/j.abrep.2021.100391

Moore, S., Satel, J., & Pontes, H. M. (2022). Investigating the role of health factors and psychological well-being in gaming disorder. *Cyberpsychology, Behavior, and Social Networking*, *25*(2), 94–100. https://doi.org/10.1089/cyber.2021.0050

Mora-Cantallops, M., & Sicilia, M. Á. (2018). MOBA games: A literature review. *Entertainment Computing*, *26*, 128–138. https://doi.org/10.1016/j.entcom.2018.02.005

Müller, K. W., Janikian, M., Dreier, M., Wölfling, K., Beutel, M. E., Tzavara, C., … Tsitsika, A. (2015). Regular gaming behavior and internet gaming disorder in European adolescents: Results from a cross-national representative survey of prevalence, predictors, and psychopathological correlates. *European Child & Adolescent Psychiatry*, *24*(5), 565–574. https://doi.org/10.1007/s00787-014-0611-2

Pontes, H. M., & Griffiths, M. D. (2015). Measuring DSM-5 internet gaming disorder: Development and validation of a short psychometric scale. *Computers in Human Behavior*, *45*, 137–143. https://doi.org/10.1016/j.chb.2014.12.006

Pontes, H. M., & Griffiths, M. D. (2020). A new era for gaming disorder research: Time to shift from consensus to consistency. *Addictive Behaviors*, *103*, 106059. https://doi.org/10.1016/j.addbeh.2019.106059

Pontes, H. M., Schivinski, B., Kannen, C., & Montag, C. (2022). The interplay between time spent gaming and disordered gaming: A large-scale world-wide study. *Social Science & Medicine*, 114721. https://doi.org/10.1016/j.socscimed.2022.114721

Pontes, H. M., Schivinski, B., Sindermann, C., Li, M., Becker, B., Zhou, M., & Montag, C. (2021). Measurement and conceptualization of gaming disorder according to the World Health Organization framework: The development of the gaming disorder test. *International Journal of Mental Health and Addiction*, *19*(2), 508–528. https://doi.org/10.1007/s11469-019-00088-z

Rehbein, F., King, D. L., Staudt, A., Hayer, T., & Rumpf, H.-J. (2021). Contribution of game genre and structural game characteristics to the risk of problem gaming and gaming disorder: A systematic review. *Current Addiction Reports*, *8*(2), 263–281. https://doi.org/10.1007/s40429-021-00367-7

Rozgonjuk, D., Schivinski, B., Pontes, H. M., & Montag, C. (2021). Problematic online behaviors among gamers: The links between problematic gaming, gambling, shopping, pornography use, and social networking. *International Journal of Mental Health and Addiction*. https://doi.org/10.1007/s11469-021-00590-3

Schivinski, B., Brzozowska-Woś, M., Buchanan, E. M., Griffiths, M. D., & Pontes, H. M. (2018). Psychometric assessment of the internet gaming disorder diagnostic criteria: An item response theory study. *Addictive Behaviors Reports*, *8*, 176–184. https://doi.org/10.1016/j.abrep.2018.06.004

Starosta, J., Kiszka, P., Szyszka, P. D., Starzec, S., & Strojny, P. (2024). The tangled ways to classify games: A systematic review of how games are classified in psychological research. *Plos One*, *19*(6), e0299819. https://doi.org/10.1371/journal.pone.0299819

Stavropoulos, V., Dumble, E., Cokorilo, S., Griffiths, M. D., & Pontes, H. M. (2022). The physical, emotional, and identity user-avatar association with disordered gaming: A pilot study. *International Journal of Mental Health and Addiction*, *20*, 183–195. https://doi.org/10.1007/s11469-019-00136-8

Wolf, M. J. P. (2001). Genre and the video game. In M. J. Wolf (Ed.), *The medium of the video game* (pp. 113–234). University of Texas Press. https://doi.org/10.7560/791480-008.

World Health Organization. (2019). *International classification of diseases for mortality and morbidity statistics*, (11th Revision).

Appendix

Table A1. Demographic characteristics of the final analytic sample

Characteristic	Value
Sample size	N = 116,047
Sex	
Male	n = 107,854 (92.9%)
Female	n = 8,193 (7.1%)
Age, years	M = 24.12, SD = 7.44, $Range$ = 12–80
Age group	
16 years or older	n = 108,241 (93.3%)
12–15 years with parental consent	n = 7,626 (6.6%)
Education	
Less than high school	11.4%
High school graduate	37.0%
College diploma	17.1%
Bachelor's degree	22.3%
Master's degree	11.1%
PhD or higher	1.1%
Preferred device	
Desktop PC	57.0%
Console	27.1%
Laptop PC	12.3%
Mobile devices	3.5%
Weekly gaming time, hours	M = 23.34, SD = 16.63