

Coping, escapism, and fantasy motives and depression symptoms mediate the relationship between emotion dysregulation and gaming disorder: Cross-Sectional Mediation Analysis

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Coping, escapism, and fantasy motives and depression symptoms mediate the relationship between emotion dysregulation and gaming disorder: Cross-Sectional Mediation Analysis

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Abstract

Background: Studies have shown that emotion dysregulation, depression symptoms, and escapism motives are associated with Gaming Disorder (GD) symptoms. Findings indicate a discrepancy between the World Health Organization (WHO) and the American Psychiatric Association (APA) GD symptoms frameworks.

Objective: The current study aimed to investigate the serial mediating effect of depression symptoms and coping, escapism and fantasy motives on the relationship between emotion dysregulation and GD symptoms and compare the WHO and APA frameworks.

Methods: Data was collected through an online survey utilizing validated self-reported measures. The final convenience sample consisted of 678 video game players (68.44 % men [n = 464], 29.65% women [n = 201], and 1.92% reported 'other' as gender identification [n = 13]) with an average age of 29.50 years (SD = 8.92). Structural equation modeling (SEM) was used to analyze the mediating effects.

Results: The results showed that depression symptoms and a composite measure of coping, escapism, and fantasy motivations, in sequence, fully mediated the relationship between emotion dysregulation and GD symptoms within the WHO framework and partially mediated it within the APA framework.

Conclusions: The results indicate that individuals with emotion dysregulation and higher levels of depression symptoms may use video games as an emotion regulation strategy. Managing emotion dysregulation and coping in the context of video games may aid in the clinical course for gaming disorder and co-occurring depression. Future research should utilize longitudinal designs to investigate study variables.

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Original Manuscript

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Abstract

Background

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The current study aimed to investigate the serial mediating effect of depression symptoms and coping, escapism and fantasy motives on the relationship between emotion dysregulation and GD symptoms and compare the WHO and APA frameworks.

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The results indicate that individuals with emotion dysregulation and higher levels of depression symptoms may use video games as an emotion regulation strategy. Managing emotion dysregulation and coping in the context of video games may aid in the clinical course for gaming disorder and co-occurring depression. Future research should utilize longitudinal designs to investigate study variables.

Keywords: gaming disorder; internet gaming disorder; emotion dysregulation; motivation; depression

1. Introduction

The American Psychiatric Association (APA) acknowledged the potential issues of problematic gaming by including *Internet Gaming Disorder* (IGD) as a condition requiring further investigation in the fifth revision of the Diagnostic and Statistical Manual of Mental Disorders (DSM-5; APA, 2013). In 2019, the World Health Organization (WHO) proposed an official diagnostic framework for problematic gaming with the inclusion of Gaming Disorder (GD) under the section of disorders due to addictive behaviors in the 11th revision of the International Classification of Diseases (ICD-11; WHO, 2019). Despite some differences concerning the criteria used by the WHO and APA, both diagnostic frameworks show overlap regarding the coverage of impairment in functioning, negative consequences, and loss of control (Király et al., 2022). The inclusion of IGD and GD has generated a debate concerning the risks and benefits of establishing an official gaming-related diagnosis (e.g., Aarseth et al., 2017; Király et al., 2015; Király & Demetrovics, 2017; Van Den Brink, 2017; Van Rooij et al., 2018). Recent reviews indicate that problematic gaming behavior's global prevalence (i.e., potential risk group) may range from 1.96% to 2.4% (Kim et al., 2022; Stevens et al., 2020). However, earlier results have shown inconsistencies in estimating prevalence rates when comparing the frameworks of the WHO and the APA (Bäcklund et al., 2024; Darvesh et al., 2020). Findings suggest that the framework proposed by the WHO results in more conservative prevalence estimations in non-clinical samples (Bäcklund et al., 2024; Montag et al., 2019; Pontes et al., 2022) and among those seeking treatment (Starcevic et al., 2020). Considering that the frameworks proposed by the WHO and APA are widely used in research today (King et al., 2020; Wang & Cheng, 2020), additional studies comparing the APA and WHO frameworks are needed (Király et al., 2022) to avoid possible biases in future studies on problematic gaming.

1.1 Emotion regulation and gaming disorder symptoms

Affective processes (e.g., emotional regulation) have been emphasized as a critical component of various behavioral addictions (Baker et al., 2004; Koob, 2015; Wegmann & Brand, 2021). Emotion regulation refers to an individual's ability to understand and accept emotional experiences and conscious or unconscious attempts to control various emotional states (Gratz et al., 2015; Gratz & Roemer, 2004; Gross, 1998; McRae & Gross, 2020). However, definitions and conceptualizations of emotion regulation vary in the literature (Weiss et al., 2022). In an editorial overview, Tull & Aldao (2015) differentiate between *emotion regulation abilities*, emphasizing the extent of an individual's potential for regulation of emotions (e.g., Gratz & Roemer, 2004; Preece et al., 2018), and *emotion regulation strategies*, which focus on the specific behaviors of the individual that influence the experience and expression of emotions (See Gross, 2015). Previous findings have demonstrated that specific emotion regulation strategies, such as reappraisal and acceptance, relate to psychological well-being (Kraiss et al., 2020). Conversely, maladaptive emotional regulation strategies such as emotional avoidance are associated with addictive behaviors (Kraft et al., 2023). Emotion dysregulation (i.e., difficulties in emotion regulation) has been recognized as a crucial transdiagnostic construct in consideration of the robust associations observed with numerous psychopathological conditions (Aldao et al., 2010; Cludius et al., 2020; D'Agostino et al., 2017; Fernandez et al., 2016; Sloan et al., 2017), including depression (Pico-Pérez et al., 2017), Attention Deficit Hyperactivity Disorder (Faraone et al., 2019; Petrovic & Castellanos; Shaw et al., 2014). Additionally, empirical findings also indicate robust associations with various addictive conditions including substance addictions (Estévez et al., 2017; Garke et al., 2021; Shahbazirad & Azizi, 2018), nicotine dependence (Poormahdy et al., 2022), and behavioral addictions (Arrivillaga et al., 2023; Marchica et al., 2020) such as gaming disorder (Gisbert-Pérez et al., 2024; Lin et al., 2020; Lin et al., 2023; Marchica. et al., 2019).

1.2 The Interaction Person Affect Cognition Execution model

The relationship between emotion dysregulation and gaming disorder may be comprehended through

the Interaction Person Affect Cognition Execution (I-PACE) model, a comprehensive theoretical model that describes how addictive behaviors are developed and maintained (Brand et al., 2016; Brand et al., 2019). According to the I-PACE model, the addictive process encompasses, in part, an interaction between individual predisposing factors (e.g., temperamental features or psychopathological conditions) and affective responses (i.e., various emotion regulation processes) to internal or external stimuli that, in turn, influence the decision to engage in video game play. Thus, according to the I-PACE model, individuals with inadequate emotion regulation abilities independently or with concurrent psychiatric symptoms may be increasingly susceptible to negative emotional states and predominantly resort to video games as a maladaptive emotional coping strategy, which may gradually, over time, result in gaming disorder. Essentially, addictive behaviors, such as maladaptive videogame play, may potentially serve as a strategy for emotional regulation in and of themselves (Kober, 2014).

1.3 The mediating role of depression symptoms

Empirical evidence show that depression symptoms have a robust association with emotion dysregulation (Hernández-Posadas et al., 2024; Joormann & Stanton, 2016; Lincoln et al., 2022; Visted et al., 2018) and GD symptoms (Gao et al., 2022; Männikkö et al., 2017; Ostinelli et al., 2021; Ropovik et al., 2023). Findings indicate that individuals experiencing continuous difficulties in the regulation of negative emotions may be more susceptible to developing mood disorders such as depression (Berking et al., 2014; Hofmann et al., 2012). Result from longitudinal studies demonstrate that depressive symptoms are associated with GD symptoms (Liu et al., 2018; Richard et al., 2020; Teng et al., 2021; Wang et al., 2021). Thus, the robust empirical evidence concerning these relationships warrants further investigation into the mediating role of depression symptoms between emotional dysregulation and GD symptoms.

1.4 The mediating role of gaming motivations

In line with the I-PACE model, Tull and Aldao (2015) suggest that emotion regulation abilities influence emotion regulation strategies, making them related but separate operations. Established gaming motivation factors such as Coping, Escapism, and Fantasy (CEF motives) represent variations of urges for avoidance and distraction from reality and emotional coping through video game play (Demetrovics et al., 2011), reflecting different forms of motivations concerning emotion regulation that may be maladaptive (Lincoln et al., 2022). Escapism motivations encompass the desire to forget about daily difficulties and withdraw from reality via video games; coping motivations capture the urge to manage or alleviate negative emotions through video game play; and fantasy motivations include the wish to feel part of another world or be someone else (Demetrovics et al., 2011). Empirical evidence shows that CEF motives are associated with GD symptoms (Bäcklund et al., 2022) and depression symptoms (Laconi et al., 2017). Additionally, findings indicate that maladaptive emotional regulation strategies, such as avoidance, are associated with depression (Cookson et al., 2020). The present study will use CEF motives as a composite gaming motivation factor reflecting various underlying urges to use video games as an emotional regulation strategy. Based on earlier findings, it can be hypothesized that individuals with emotional dysregulation may exhibit more depression symptoms and use video games as a strategy for emotional coping, which may be associated with higher GD symptoms.

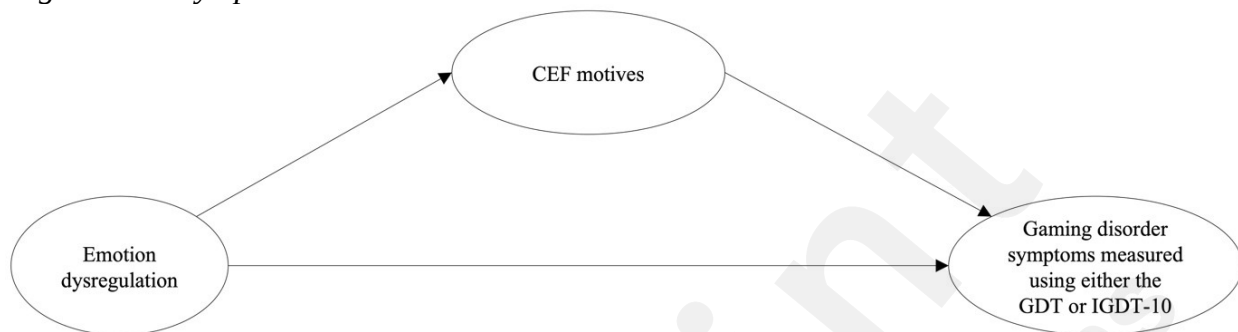
1.5 Overview of the present study

Based on empirical evidence and the theoretical framework proposed by the I-PACE model, the current study investigated the mediating effect of CEF motives on the relationship between self-reported emotion dysregulation and self-assessed GD symptoms. In addition, the present study

compared these associations across the WHO and APA frameworks. The first hypothesized model (prospectively registered: osf.io/kf3bh) of the study is shown in Figure 1. It was hypothesized that CEF motives positively mediate the relationship between emotion dysregulation and GD symptoms (H1).

Figure 1

Visual overview of the proposed simple mediation models between emotion dysregulation and gaming disorder symptoms



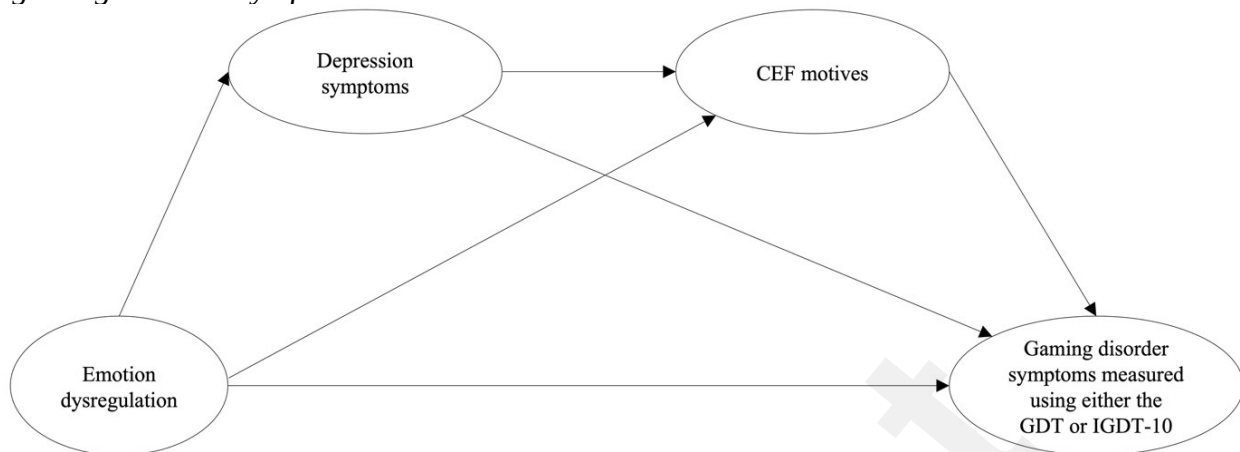
Note. GDT = The Gaming Disorder Test, IGDT-10 = Ten-Item Internet Gaming Disorder Test, CEF motives = Coping, Escapism, and Fantasy motives. Latent variables are depicted as circles. Individual measurement models of each latent factor can be seen in Appendix A.

The present study also investigated the mediating effects of depression symptoms and CEF motives in sequence on the association between emotion dysregulation and GD symptoms. This examination addressed a critical knowledge gap (Marchica et al., 2019), and the associations were also compared across the WHO and APA frameworks. The second hypothesized model, in which depressive symptoms were included, is illustrated in Figure 2. It was hypothesized that depression symptoms (H2) and CEF motives (H3) may independently positively mediate the relationship between emotion dysregulation and GD symptoms in the same model and that depression symptoms and CEF motives may, in a sequence, positively mediate the relationship between emotion dysregulation and GD symptoms (H4).

Figure 2

Visual overview of the proposed serial multiple mediation models between emotion dysregulation

and gaming disorder symptoms



Note. GDT = The Gaming Disorder Test, IGDT-10 = Ten-Item Internet Gaming Disorder Test, CEF motives = Coping, Escapism, and Fantasy motives. Circles represent latent variables. Separate measurement models of each latent factor can be seen in Appendix A.

2. Method

2.1 Participants and procedures

The present study was part of a research project at the Luleå University of Technology that used cross-sectional data and convenience sampling (osf.io/kf3bh; Bäcklund et al., 2024). From September 13 to November 15, 2022, data was collected using an online survey that took approximately 15-30 minutes. The first 500 participants who completed the survey received a gift card valued at 50 SEK (approximately 4.5€). The current study utilized the following inclusion criteria: (I) fluent in the Swedish language, (II) aged at least 15 years old, and (III) engaging in video game play for a minimum of 10 hours weekly on average. A total of 723 individuals completed the online survey, out of which 45 individuals were excluded from the study due to one of the following reasons: stated an average weekly gaming duration of less than 10 hours ($n = 35$), did not report age ($n = 3$), reported ages below 15 years ($n = 3$), improbable values ($n = 1$) and did not complete most of the current study variables concerning gaming motivations ($n = 3$). Thus, the final sample consisted of 678 Swedish video game players.

2.2 Measures

2.2.1. Socio-demographics and gaming related characteristics

Data concerning socio-demographics and gaming-related characteristics included gender (68.44% men [$n = 464$], 29.65% women [$n = 201$], and 1.92% reported 'other' as gender identification [$n = 13$]) age ($M = 29.50$, $SD = 8.92$), and average weekly gaming time ($M = 23.28$, $SD = 14.18$).

2.2.2. The Gaming Disorder Test (GDT)

The GDT (Pontes et al., 2021) is a four-item self-report questionnaire that operationalizes the three core GD criteria according to the ICD-11 (e.g., "I have had difficulties controlling my gaming activity") with an additional item that reflects the extent of significant problems in life due to disordered gaming (WHO, 2019). The four items of the GDT are measured on a 5-point Likert scale (1 = never; 2 = rarely; 3 = sometimes; 4 = often; and 5 = very often). The total scores may range from 4 to 20, with higher scores indicating a higher degree of disordered gaming. Prior validation supports the Swedish GDT's one-factor structure (Bäcklund et al., 2024).

2.2.3. Ten-Item Internet Gaming Disorder Test (IGDT-10)

The APA's nine diagnostic criteria proposed for IGD were assessed with the IGDT-10 (Király et al., 2017a). The self-reported questionnaire contains ten items (e.g., "Have you ever unsuccessfully tried to reduce the time spent on gaming?") and utilizes a three-point scale (0 = *never*; 1 = *sometimes*; and 2 = *often*) to represent the frequency of each statement. During the scoring and analyses, responses of "often" are coded as 1 (possible endorsement of the criteria) while "never" and "sometimes" are recoded as 0 (potentially not endorsing the criteria) to reflect the dichotomous format of IGD in DSM-5. Responding 'often' to either item 9, item 10, or both culminated in a score of one point. Thus, the total score of IGDT-10 may range from 0 to 9, with higher scores indicating more severe levels of IGD. Prior validation supports the Swedish IGDT-10's one-factor structure (Bäcklund et al., 2024).

2.2.4. Difficulties in Emotion Regulation Scale (DERS-16)

The DERS-16 (Bjureberg et al., 2016) is a brief 16-item self-report version of the original form of DERS (Gratz & Roemer, 2004), assessing emotion dysregulation across five domains, including lack of emotional clarity (e.g., "I have difficulty making sense out of my feelings"), difficulty engaging in goal-directed behaviors (e.g., "When I'm upset, I have difficulty focusing on other things"), impulse control difficulties (e.g., "When I'm upset, I feel out of control"), limited access to emotion

regulation strategies (e.g., "When I'm upset, I believe that I will remain that way for a long time"), and nonacceptance of emotions (e.g., "When I'm upset, I feel ashamed with myself for feeling that way"). The questionnaire uses a 5-point Likert scale (1 = *almost never*; 2 = *sometimes*; 3 = *About half the time*; 4 = *Most of the time* and 5 = *almost always*) to represent the frequency of each statement. Thus, a total score on the entire scale may range from 16 to 80, with higher scores indicating more emotion dysregulation. The current study validated the factor structure through a second-order CFA (See Appendix A), which provided an excellent fit to the data after a minor modification.

2.2.5. Patient Health Questionnaire (PHQ-9)

Depression symptoms over the last two weeks were measured with eight items (e.g., "Feeling down, depressed, or hopeless") from the nine-item PHQ-9 (Kroenke et al., 2001). Item 9 from the original questionnaire covered thoughts of suicide and was therefore removed due to ethical considerations. A 4-point Likert scale was used to estimate the frequency of each symptom (0 = *Not at all*; 1 = *Several days*; 2 = *More than half the days*; 3 = *Nearly every day*). A total severity score may range from 0 to 24, where higher scores reflect a higher frequency of symptoms. The one-factor structure of the PHQ-9 was psychometrically investigated in the present study (See Appendix A).

2.2.6. Motives for Online Gaming Questionnaire (MOGQ)

The MOGQ (Demetrovics et al., 2011) is a self-reported questionnaire that assesses seven dimensions of gaming motivations (social, escapism, competition, coping, skill development, fantasy, and recreation). The present study included three of the gaming motivation factors: escapism (e.g., "because it makes me forget real life"), coping (e.g., "because it helps me relieve stress") fantasy (e.g., "to feel as if I were someone else") measured with four items each and answered on a 5-point Likert scale (1 = *almost never / never*; 2 = *some of the time*; 3 = *half of the time*; 4 = *most of the time*; and 5 = *almost always / always*). A total CEF motives score may range from 12 to 60, with higher scores indicating a higher frequency of these motivations. A second-order CFA was estimated to assess the appropriateness of utilizing three of the motivational factors from the MOGQ as a composite measure of CEF motives (see Appendix A).

2.3. Data management and statistical analysis

Descriptive statistics, including mean and standard deviation, were estimated based on the sum score of the included measures. Skewness and kurtosis were calculated to assess the normality of the study variables (Kim, 2013; Kline, 2015). Measurement models (i.e., confirmatory factor analyses) were estimated to assess the dimensionality of the included measures (see Appendix A). A full measurement model (see Figure A4) was estimated where no structural relationships were specified, and all measures (including covariates: average weekly gaming time, age, and gender) were considered exogenous and correlated (i.e., a CFA that included all study measures). Women were coded as 0, and men were coded as 1 during the analyses. Interpretation of the standardized correlation coefficient was based on established guidelines (≥ 0.1 = small, ≥ 0.3 = moderate, and ≥ 0.5 = large) (Cohen, 1988). Structural equation modeling (SEM) was used to test the simple and serial multiple mediation models, examining the mediating effects of depression symptoms and CEF motives on the association between emotion dysregulation and GD symptoms. All SEM models, including the CFA, were conducted using the Weighted Least Square Mean and Variance Adjusted (WLSMV) estimator, suited for measures that include items with four or fewer response options (Rhemtulla et al., 2012) or when departures from multivariate normality are observed (Li, 2016a; Li, 2016b). The significance of indirect effects was tested by inspecting bootstrap 95% confidence intervals (CI) (5000 bootstrap iterations), and were considered statistically significant if the CI did not include zero. Multiple goodness-of-fit indices were used to examine the model fit: a nonsignificant chi-square (χ^2) value, Comparative Fit Index (CFI: near or above 0.95), Tucker-Lewis Fit Index (TLI: near or above 0.95), Standardized Root Mean Square Residual (SRMR: near or below 0.08), and Root Mean Square Error of Approximation (RMSEA: near or below 0.06 with a nonsignificant p -value [$p \leq 0.05$]), including its 90% confidence interval (90% CI) and p -value (Hu & Bentler, 1999; Kline, 2015). All data management and descriptive statistics were conducted using IBM SPSS Statistics version 28 (IBM Corp., 2020). All SEM analyses were conducted using Mplus Version 8.8 (Muthén & Muthén, 1998–2017). Missing data in Mplus were treated with pairwise deletion utilizing all available data.

2.3.1. Sensitivity analyses

Several sensitivity analyses were conducted to assess the robustness of the findings in the present study (see Appendix B). The first series of sensitivity mediation analyses was conducted with the following covariates: average weekly gaming time, age, and gender. Only men and women were included as gender in the sensitivity analyses. Thus, the sensitivity analyses were conducted with part of the sample ($n = 665$) since missingness is not allowed for the observed covariates in Mplus (Muthén & Muthén, 2017). The second series of sensitivity analyses were only conducted on the models including the IGDT-10 but without item 8 ("Have you played to relieve a bad mood...") considering the conceptual overlap with the escapism motivation factor.

3. Result

3.1 Descriptive statistics

Table 1 shows the descriptive statistics for the study measures. The distribution of GD symptoms (GDT and IGDT-10) showed positive skewness, suggesting that most participants report lower to moderate levels of gaming-related issues.

Table 1

Descriptive statistics of the included measures sum score (n = 678)

	Mean (SD)	Possible range	Skewness	Kurtosis
1. Gaming disorder symptoms				
GDT	7.92 (3.47)	4-20	0.92	0.42
IGDT-10	1.11 (1.71)	0-9	2.15	5.09
2. DERS _{Total score}	32.22 (13.91)	16-80	0.95	0.31
Clarity	3.63 (1.96)	2-10	1.28	0.99
Goals	7.47 (3.39)	3-15	0.61	-0.60
Impulse	4.92 (2.72)	3-15	1.72	2.63
Strategies	9.80 (4.91)	5-25	1.05	0.38
Nonacceptance	6.41 (3.42)	3-15	0.88	-0.20
3. CEF motives _{Total score}	26.08 (9.67)	12-60	0.68	-0.04
Escapism	8.92 (4.50)	4-20	0.82	-0.32
Coping	9.84 (3.33)	4-20	0.31	-0.24
Fantasy	7.31 (3.87)	4-20	1.30	1.08
4. Depression symptoms	6.16 (5.39)	0-24	0.97	0.39

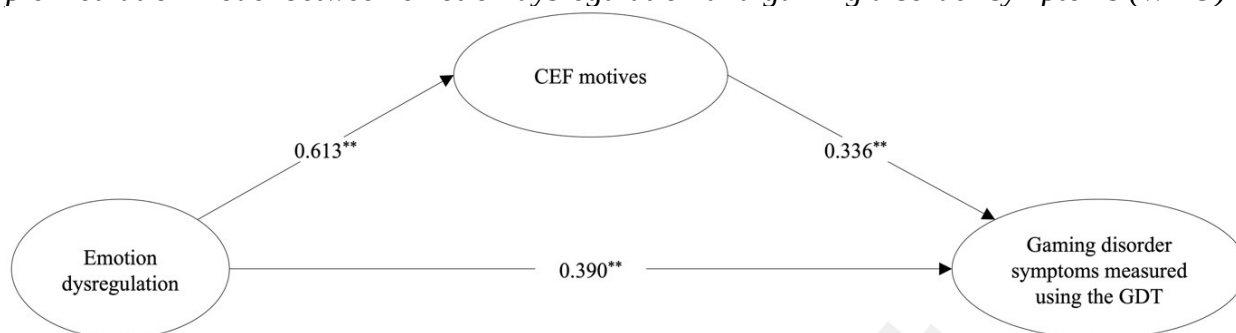
Note. GDT = The Gaming Disorder Test (WHO); IGDT-10 = Ten-Item Internet Gaming Disorder Test (APA), DERS = Difficulties in Emotion Regulation Scale, CEF motives = Coping, Escapism, and Fantasy motives.

3.3 Simple mediation models between emotion dysregulation and gaming disorder symptoms

The results showed that the two simple mediation models, Model_{GDT} and Model_{IGDT-10}, fit the data well. The Model_{GDT}, including the GDT as a measure of GD symptoms, showed the following fit indices: $\chi^2 = 1081.641$, $df = 453$, $p < .0001$; CFI = 0.977; TLI = 0.974; RMSEA = 0.045 [0.042 - 0.049, $p = 0.988$], and SRMR = 0.044). The Model_{IGDT-10}, including the IGDT-10 as a measure of GD symptoms showed the following fit statistics: $\chi^2 = 1240.978$, $df = 618$, $p < .0001$; CFI = 0.977; TLI = 0.975; RMSEA = 0.039 [0.035 - 0.042, $p = 1.000$], and SRMR = 0.060. Most standardized factor loadings for the latent variables in both models were large ($\lambda > 0.60$) and all were significant ($p < 0.001$). Table 3 shows the path coefficients from the two mediation models, Model_{GDT} and Model_{IGDT-10}, including total, direct, and indirect effects (See Figures 3 and 4 for illustrations of the path coefficients). The positive direct effect of self-reported emotion dysregulation on self-assessed GD symptoms was statistically significant, as shown by the 95% bootstrap confidence interval (Model_{GDT} = 0.282 to 0.491; Model_{IGDT-10} = 0.187 to 0.452). The mediating effect of CEF motives in the relationship between emotion dysregulation on gaming disorder symptoms was statistically significant in both models, as shown by the 95% bootstrap confidence interval (Model_{GDT} = 0.138 to 0.283; Model_{IGDT-10} = 0.181 to 0.353). The results showed that the total model explained 42.6% of the variance in GD symptoms in the Model_{GDT} and 45.2% in the Model_{IGDT-10}.

Figure 3

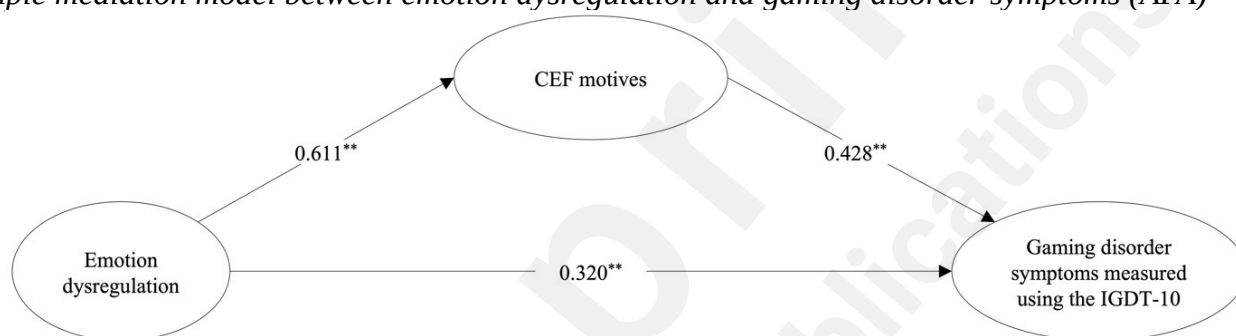
Simple mediation model between emotion dysregulation and gaming disorder symptoms (WHO)



Note. ** Significant indicated by $p < 0.001$ and a bootstrap confidence interval that does not extend across zero. GDT = The Gaming Disorder Test. CEF motives = Coping, Escapism, and Fantasy motives. The GDT was used to assess gaming disorder symptoms according to the WHO framework.

Figure 4

Simple mediation model between emotion dysregulation and gaming disorder symptoms (APA)



Note. ** Significant indicated by $p < 0.001$ and a bootstrap confidence interval that does not extend across zero. IGDT-10 = Ten-Item Internet Gaming Disorder Test. CEF motives = Coping, Escapism, and Fantasy motives. The IGDT-10 was used to assess gaming disorder symptoms according to the APA framework.

Table 3

Simple mediation models between emotion dysregulation and gaming disorder symptoms

Path coefficients including direct effects	Model _{GDT}			Model _{IGDT-10}		
	Estimate β (S.E.)	p value	95% CI	Estimate β (S.E.)	p value	95% CI
Emotion dysregulation $\rightarrow$ Coping, Escapism, and Fantasy motives	0.613 (0.032)	< .001	0.542-0.681	0.611 (0.032)	< .001	0.541-0.680
Emotion dysregulation $\rightarrow$ Gaming disorder symptoms	0.390 (0.051)	< .001	0.282-0.491	0.320 (0.064)	< .001	0.187-0.452
Coping, Escapism, and Fantasy motives $\rightarrow$ Gaming disorder symptoms	0.336 (0.051)	< .001	0.232-0.442	0.428 (0.058)	< .001	0.308-0.553
Indirect Effects						
Emotion dysregulation $\rightarrow$ Coping, Escapism, and Fantasy motives $\rightarrow$ Gaming disorder symptoms	0.206 (0.034)	< .001	0.138-0.283	0.262 (0.040)	< .001	0.181-0.353
Total effects						
Emotion dysregulation $\rightarrow$ Gaming disorder symptoms	0.596 (0.031)	< .001	0.529-0.658	0.581 (0.042)	< .001	0.498-0.664

Note. Standardized coefficients (Estimate β) and the corresponding standard error (S.E.). GDT = The Gaming Disorder Test (WHO); IGDT-10 = Ten-Item Internet Gaming Disorder Test (APA).

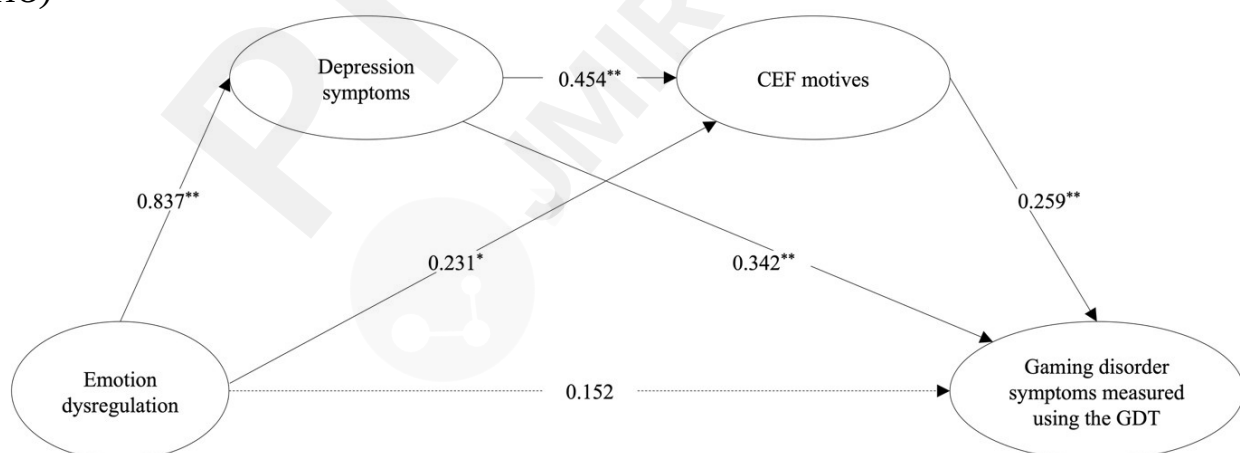
3.4 Serial multiple mediation models between emotion dysregulation and gaming disorder symptoms

The results showed that the two serial multiple mediation models, Model_{SerialGDT} and Model_{SerialIGDT-10},

fit the data well. Model_{SerialGDT}, including the GDT as a measure of GD symptoms, showed the following fit indices: $\chi^2 = 1803.014$, $df = 726$, $p < .0001$; CFI = 0.966; TLI = 0.963; RMSEA = 0.047 [0.044 - 0.049, $p = 0.975$], and SRMR = 0.050. Model_{SerialIGDT-10}, including the IGDT-10 as a measure of GD symptoms with covariates showed the following fit statistics: $\chi^2 = 1897.816$, $df = 931$, $p < .0001$; CFI = 0.970; TLI = 0.968; RMSEA = 0.039 [0.037 - 0.042, $p = 1.000$], and SRMR = 0.060. Table 4 shows the path coefficients from the two serial mediation models, Model_{SerialGDT} and Model_{SerialIGDT-10}, including total, direct, and indirect effects (See Figures 5 and 6 for illustrations of the path coefficients). Most standardized factor loadings for the latent variables in both models were large ($\lambda > 0.60$) and all were significant ($p < 0.001$). The direct effect of self-reported emotion dysregulation on self-assessed GD symptoms was not significant in the Model_{SerialGDT} because the 95% bootstrap confidence interval straddles zero (-0.042 to 0.324) and positively statistically significant in the Model_{SerialIGDT-10}, as shown by the 95% bootstrap confidence interval (0.028 to 0.484). The indirect effect of emotion dysregulation on GD symptoms through only depression symptoms was significantly positive in the Model_{SerialGDT} as indicated by the bootstrap confidence interval above zero (0.135 to 0.451) and not significant in the Model_{SerialIGDT-10} because the bootstrap confidence interval extend across zero (-0.114 to 0.272). The indirect effect of emotion dysregulation on GD symptoms through only CEF motives was significantly positive in both models because the bootstrap confidence interval is above zero in both models (Model_{SerialGDT} = 0.013 to 0.121; Model_{SerialIGDT-10} = 0.021 to 0.184). The indirect effect of emotion dysregulation on GD symptoms through depression symptoms and CEF motives in a sequence was significantly positive in both models because the bootstrap confidence interval is above zero (Model_{SerialGDT} = 0.050 to 0.158; Model_{SerialIGDT-10} = 0.088 to 0.234). The total indirect effect, estimated as cumulative of the specific indirect effects statistically significant as indicated by the bootstrap confidence interval not containing zero (Model_{SerialGDT} = 0.300 to 0.612; Model_{SerialIGDT-10} = 0.133 to 0.523). The results showed that the total model explained 45.6% of the variance in GD symptoms in the Model_{GDT} and 45.3% in the Model_{IGDT-10}.

Figure 5

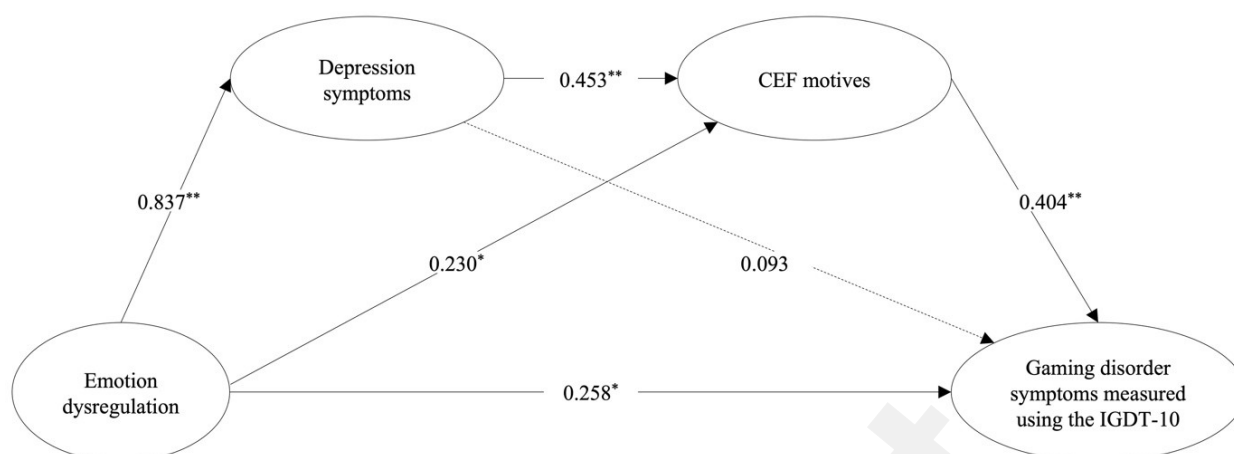
Serial multiple mediation model between emotion dysregulation and gaming disorder symptoms (WHO)



Note. ** Significant indicated by $p < 0.001$ and a bootstrap confidence interval that does not extend across zero. * Significant at level $p < 0.05$ and a bootstrap confidence interval that does not extend across zero. The dotted lines represent nonsignificant pathways. GDT = The Gaming Disorder Test. CEF motives = Coping, Escapism, and Fantasy motives. The GDT was used to assess gaming disorder symptoms according to the WHO framework.

Figure 6

Serial multiple mediation model between emotion dysregulation and gaming disorder symptoms (APA)



Note. ** Significant indicated by $p < 0.001$ and a bootstrap confidence interval that does not extend across zero. * Significant at level $p < 0.05$ and a bootstrap confidence interval that does not extend across zero. The dotted lines represent nonsignificant pathways. IGDT-10 = Ten-Item Internet Gaming Disorder Test. CEF motives = Coping, Escapism, and Fantasy motives. The IGDT-10 was used to assess gaming disorder symptoms according to the APA framework.

Table 4

Serial multiple mediation models between emotion dysregulation and gaming disorder symptoms

Path coefficients including direct effects	Model _{SerialGDT}			Model _{SerialIGDT-10}		
	Estimate β (S.E.)	p value	95% CI	Estimate β (S.E.)	p value	95% CI
Emotion dysregulation $\rightarrow$ Depression symptoms	0.837 (0.018)	< .001	0.797-0.874	0.837 (0.018)	< .001	0.797-0.874
Emotion dysregulation $\rightarrow$ Coping, Escapism, and Fantasy motives	0.231 (0.078)	.003	0.057-0.400	0.230 (0.077)	.003	0.057-0.398
Emotion dysregulation $\rightarrow$ Gaming disorder symptoms	0.152 (0.088)	.085	-0.042-0.324	0.258 (0.110)	.019	0.028-0.484
Depression symptoms $\rightarrow$ Coping, Escapism, and Fantasy motives	0.454 (0.077)	< .001	0.286-0.620	0.453 (0.077)	< .001	0.287-0.619
Depression symptoms $\rightarrow$ Gaming disorder symptoms	0.342 (0.090)	< .001	0.162-0.532	0.093 (0.112)	.407	-0.135-0.325
Coping, Escapism, and Fantasy motives $\rightarrow$ Gaming disorder symptoms	0.259 (0.052)	< .001	0.149-0.370	0.404 (0.058)	< .001	0.282-0.528
Direct Effects						
Emotion dysregulation $\rightarrow$ Depression symptoms	0.286 (0.076)	< .001	0.135-0.451	0.078 (0.094)	.407	-0.114-0.272
Emotion dysregulation $\rightarrow$ Gaming disorder symptoms	0.060 (0.024)	.015	0.013-0.121	0.093 (0.035)	.008	0.021-0.184
Emotion dysregulation $\rightarrow$ Depression symptoms	0.098 (0.026)	< .001	0.050-0.158	0.153 (0.034)	< .001	0.088-0.234
Emotion dysregulation $\rightarrow$ Coping, Escapism, and Fantasy motives						
Emotion dysregulation $\rightarrow$ Gaming disorder symptoms						
Total effects						
Total effects	0.596 (0.031)	< .001	0.528-0.658	0.582 (0.042)	< .001	0.498-0.665
Total indirect	0.444 (0.074)	< .001	0.300-0.612	0.324 (0.094)	.001	0.133-0.523

Note. Standardized coefficients (Estimate β) and the corresponding standard error (S.E.). The Gaming Disorder Test (WHO), IGDT-10 = Ten-Item Internet Gaming Disorder Test (APA).

3.5 Sensitivity analyses

The results from the sensitivity analyses were mainly consistent with the primary analyses. When covariates were controlled for, the indirect effects of the mediation and serial multiple mediation analyses showed mostly consistent effect sizes and significance across the WHO and APA models. The serial mediation WHO model, including covariates, showed a marginal significant direct effect of emotion dysregulation on GD symptoms ($\beta = 0.212$, 95% CI = 0.002 to 392), indicating partial mediation. In the mediation models with the IGDT-10 excluding Item 8, the indirect standardized effect sizes were consistent with the primary model.

4. Discussion

The present study aimed to investigate the mediating effect of depression symptoms and CEF motives on the relationship between self-reported emotion dysregulation and self-assessed GD symptoms across the WHO and APA GD symptoms frameworks. To the authors' knowledge, the current study was the first to investigate the sequentially mediating effect of depression symptoms and CEF motives on this relationship. The results from the first hypothesized model (simple mediation) showed a significant direct association between emotion dysregulation and GD symptoms. The simple mediation models also demonstrated significant positive indirect effects of CEF motives between emotion dysregulation and GD symptoms across the WHO and APA frameworks, aligning with the present study's first hypothesis (H1). These findings indicate that CEF motives partially mediate the relationship between emotion dysregulation and GD symptoms within the WHO and APA frameworks.

The results from the second hypothesized model (serial multiple mediations) showed that the direct relationship between emotion dysregulation and GD symptoms was not significant within the WHO framework and significant within the APA framework. In the WHO model, the results showed that depression symptoms (H2), CEF motives (H3), and depression symptoms and CEF motives in a sequence (H4) mediated the relationship. In the APA model, the results indicated that depression symptoms independently did not mediate the relationship, contrary to the second hypothesis (H2). However, CEF motives (H3) and depression symptoms and CEF motives in a sequence (H4) significantly mediated the relationship between emotion dysregulation and GD symptoms. These findings indicate that depression symptoms and CEF motives fully mediate the relationship between emotion dysregulation and GD symptoms within the WHO framework and partially mediate the association within the APA framework.

The results from the simple mediation models align with a prior study investigating the mediating role of escapism on the relationship between emotion dysregulation and GD symptoms among massively multiplayer online role-playing game players (Blasi et al., 2019). Based on the serial multiple mediation models, emotion dysregulation was positively associated with higher depression symptoms and CEF motives. Findings from cross-sectional and longitudinal studies have shown a relationship between emotion dysregulation and depression (Daros et al., 2021; Hernández-Posadas et al., 2024; Joormann & Stanton, 2016; Lincoln et al., 2022; Visted et al., 2018). The current study also indicated a positive relationship between emotion dysregulation, depression symptoms, CEF motives, and GD symptoms in a chained sequence. This result adds to similar studies showing that CEF motives mediate the relationship between psychiatric symptoms and GD symptoms (Ballabio et al., 2017; Bányai et al., 2019; Cudo et al., 2022; Király et al., 2015; Montag et al., 2019). Furthermore, meta-analytic results have shown a strong relationship between CEF motives and GD symptoms (Bäcklund et al., 2022). The findings indicate that individuals with difficulties in emotion regulation and higher depression symptoms play video games to avoid reality and cope with emotional states. The current study findings are consistent with research on substance use disorders, which has shown that coping motivations mediate the relationship between difficulties concerning emotion regulation abilities and alcohol use problems (Brown & Melas, 2024).

Empirical evidence indicate that early life experiences may influence emotional dysregulation and vulnerability to problematic gaming (Kim et al., 2023), and emotion regulation and depression symptoms in a sequence mediate the relationship between childhood psychological maltreatment and GD symptoms (Wu et al., 2022). Future research should employ longitudinal research designs to provide knowledge regarding the role of emotion dysregulation in the onset and development of gaming disorder and related co-occurring psychiatric conditions such as depression.

The present study highlights the significance of emotion regulation abilities and maladaptive coping concerning GD symptoms, supporting the affective process component in the I-PACE model (Brand et al., 2016; Brand et al., 2019). Based on the I-PACE model, an individual with difficulties in emotion regulation and depression might be increasingly susceptible to using video games as a strategy to manage negative affective states. The emotional gratification or compensation may increase the desire to continue playing, even when gaming causes life problems or impairments. Over time, the repeated association between gaming and the relief of negative emotions can lead to the development of habitual maladaptive gaming behavior, potentially resulting in a gaming disorder. This emotional process aligns with the negative reinforcement model (Baker et al., 2004) and the self-medication hypothesis (Khantzian, 1997), suggesting that addictive behaviors may develop to mitigate negative emotions. The I-PACE model further states that repeated relief from negative states through gaming may negatively reinforce the behavior, causing future cravings that could contribute to the development of gaming disorder. Future research should investigate the day-to-day associations between cravings and gaming patterns, similar to studies on alcohol-related problems (Dora et al., 2023; Knapp et al., 2024; Wemm et al., 2019).

The current results showed that the mediating effects concerning depression symptoms and CEF motives were primarily consistent across the WHO and APA frameworks. This may be due to the similarities between the two diagnostic frameworks, such as overlapping criteria covering losing control over gaming, giving up other activities, and continuing despite adverse consequences. Furthermore, the analysis treated all included variables along a continuum (i.e., as composite latent variables). Thus, the associations with emotion dysregulation, depressive symptoms, and CEF motives may, primarily, be equally relevant across the entire spectrum of GD symptoms in both frameworks. The only dissimilarity between the serial multiple mediation models showed no significant direct effect between depression and (GD) symptoms in the APA model. This difference may be due to the unique criteria within the APA framework, such as preoccupation, withdrawal, and tolerance. Future studies may investigate the contributions of specific criteria within each diagnostic framework to external associations.

4.1 Practical implications

The current findings indicate that addressing emotion dysregulation and CEF motives in the context of video games may aid in the clinical course for gaming disorder and co-occurring depression. Additionally, learning specific emotion regulation techniques (e.g., mindfulness practices) may enhance life quality and minimize the risk of mental health issues reaching clinical severity (Blanchard et al., 2019; Menefee et al., 2022). Future research should investigate interventions to reduce emotional dependence on video games, potentially disrupting the addictive cycle (Dong et al., 2024).

4.2 Study limitations

The findings of the present study warrant consideration concerning its limitations. First, the present study utilized an online convenience sample, which may not represent the entire population or a clinical population of individuals diagnosed with depression and/or gaming disorder. Future studies should include representative random sampling and stratified random sampling for more accurate generalization of the findings. Additionally, future studies should investigate the interplay of emotion regulation abilities, depression, and the use of video games as an emotion regulation strategy within a clinical gaming disorder sample. Second, using self-reported measures opens to various response biases (e.g., memory recall and social desirability biases). Finally, the current study utilizes data from a cross-sectional survey where no causal inferences can be fully established. However, some argue that mediation models firmly grounded in theory may be applied to cross-sectional data without making any claims concerning the temporal ordering of the study measures (Hayes, 2022; Hayes &

Rockwood, 2017). Future studies should utilize longitudinal and experimental research designs to establish covariation, temporal order, and removal of competing causes concerning the relationship between the study variables (i.e., examine evidence of causation), considering that emotional dysregulation may be a predictor and a consequence of psychopathology, including depression (Lincoln et al., 2022).

5. Conclusions

The current study showed that depression symptoms and CEF motives sequentially mediated the relationship between self-reported emotion dysregulation and self-assessed GD symptoms similarly across the WHO and APA diagnostic frameworks. The findings indicate that individuals with inadequate emotion regulation abilities and higher levels of depression symptoms may use video games as an emotion regulation strategy. Future research should utilize longitudinal and experimental designs to investigate study variables. Future intervention studies should investigate the effects of implementing adaptive emotion regulation strategies, which may address a core component of gaming disorder depression and improve psychological well-being.

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Appendix A. Descriptive item statistics and measurement models

Table A1.

Descriptive Item statistics for the Difficulties in Emotion Regulation Scale ($n=674 - 678$)

	Mean	SD	Skewness	Kurtosis
DERS 1	1.82	1.04	1.35	1.28
DERS 2	1.82	1.09	1.28	0.74
DERS 3	2.38	1.26	0.64	-0.66
DERS 4	1.59	0.97	1.86	3.06
DERS 5	1.91	1.15	1.17	0.35
DERS 6	1.75	1.12	1.42	0.98
DERS 7	2.49	1.27	0.57	-0.76
DERS 8	1.68	1.09	1.62	1.67
DERS 9	2.05	1.30	1.06	-0.10
DERS 10	2.07	1.29	1.00	-0.22
DERS 11	1.67	1.00	1.63	2.25
DERS 12	1.91	1.91	1.21	0.42
DERS 13	2.30	1.35	0.76	-0.68
DERS 14	2.03	1.30	1.13	0.07
DERS 15	2.61	1.29	0.46	-0.94
DERS 16	2.22	1.31	0.80	-0.58

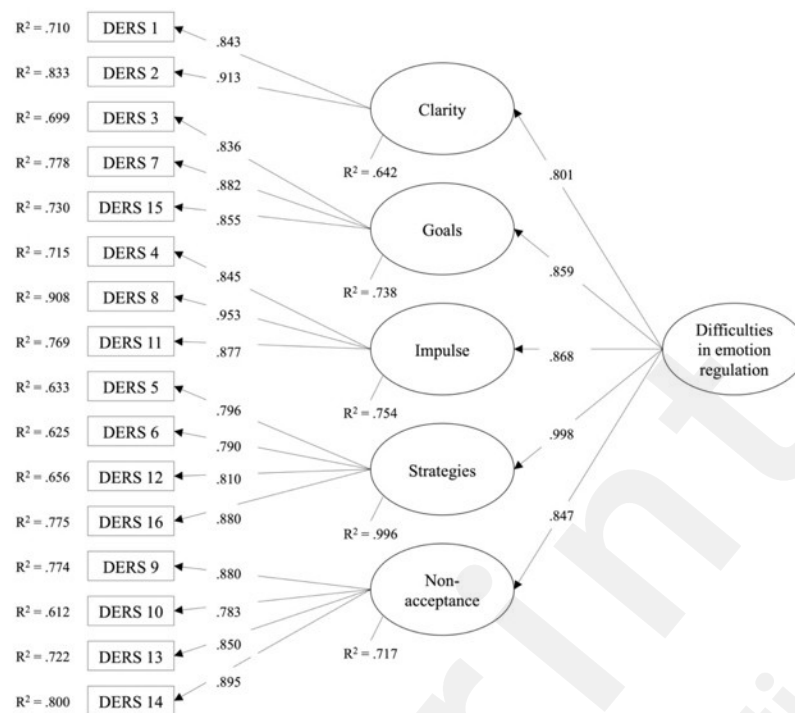
Note. DERS = Difficulties in Emotion Regulation Scale.

Confirmatory factor analysis for the Difficulties in emotion regulation scale (DERS-16)

The present study investigated the factor structure of the DERS-16 via a CFA since this was not included during the development of this scale (Bjureberg et al., 2016). The first second-order CFA provided an acceptable model fit ($\chi^2 = 526.944$, $df = 99$, $p < .0001$; CFI = 0.974; TLI = 0.969; RMSEA = 0.080 [0.073 - 0.087, $p < 0.000$], and SRMR = 0.036). However, the RMSEA value above the recommended threshold warranted inspection of residuals and modification indices. The residual values were all acceptable, but the modification indices indicated that Item 14 ("when I'm upset, I start to feel very bad about myself) showed high cross-loadings onto the nonacceptance factor (205.148). Considering the conceptual overlap between Item 14 and the three items within the nonacceptance factor (Items 9, 10, and 13), Item 14 was repositioned from the strategies factor to the nonacceptance factor for further investigation. Subsequently, the second second-order CFA model for DERS-16 showed an excellent fit to the data ($\chi^2 = 359.159$, $df = 99$, $p < .0001$; CFI = 0.984; TLI = 0.981; RMSEA = 0.062 [0.055 - 0.069, $p = 0.002$], and SRMR = 0.029). Inspection of modification indices in the modified model showed no indications of high cross-loadings. All standardized factor loadings were high and statistically significant (See Figure A1).

Figure A1

Confirmatory factor analysis for the Difficulties in emotion regulation (n = 678)



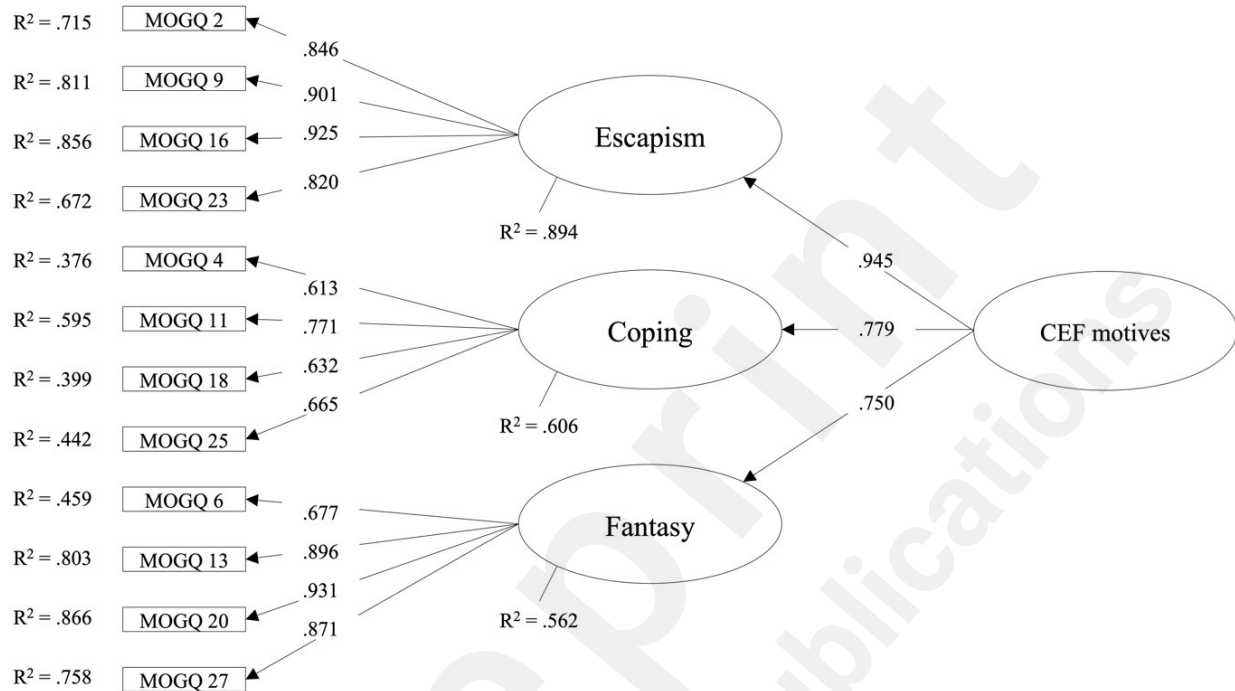
Note. DERS = Difficulties in Emotion Regulation Scale.

Confirmatory factor analysis for coping, escapism, and fantasy motives

The second order CFA model containing the factors coping, escapism, and fantasy loading onto an combined latent gaming motivation factor provided a good fit to the data: $\chi^2 = 214.472$, $df = 51$, $p < .0001$; CFI = 0.986; TLI = 0.982; RMSEA = 0.069 [0.059 - 0.078, $p = 0.001$], and SRMR = 0.037. All standardized factor loadings were high and statistically significant (See Figure A2).

Figure A2

Second-order confirmatory factor analysis for coping, escapism, and fantasy motives ($n = 678$)



Note. MOGQ = Motives for online gaming questionnaire, CEF motives = Coping, Escapism, and Fantasy motives.

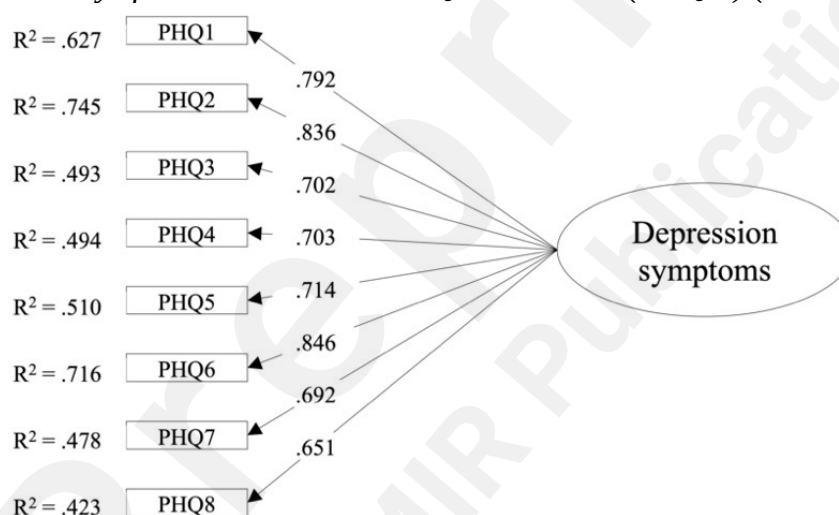
Table A2.Descriptive Item statistics for the Patient Health Questionnaire (PHQ-9) ($n = 672-677$)

	Mean	SD	Skewness	Kurtosis
PHQ1	0.73	0.90	1.13	0.41
PHQ2	0.74	0.94	1.14	0.32
PHQ3	1.05	1.05	0.64	-0.81
PHQ4	1.26	1.05	0.40	-1.03
PHQ5	0.83	1.06	1.00	-0.37
PHQ6	0.68	0.98	1.29	0.44
PHQ7	0.61	0.92	1.41	0.93
PHQ8	0.27	0.63	2.53	5.95

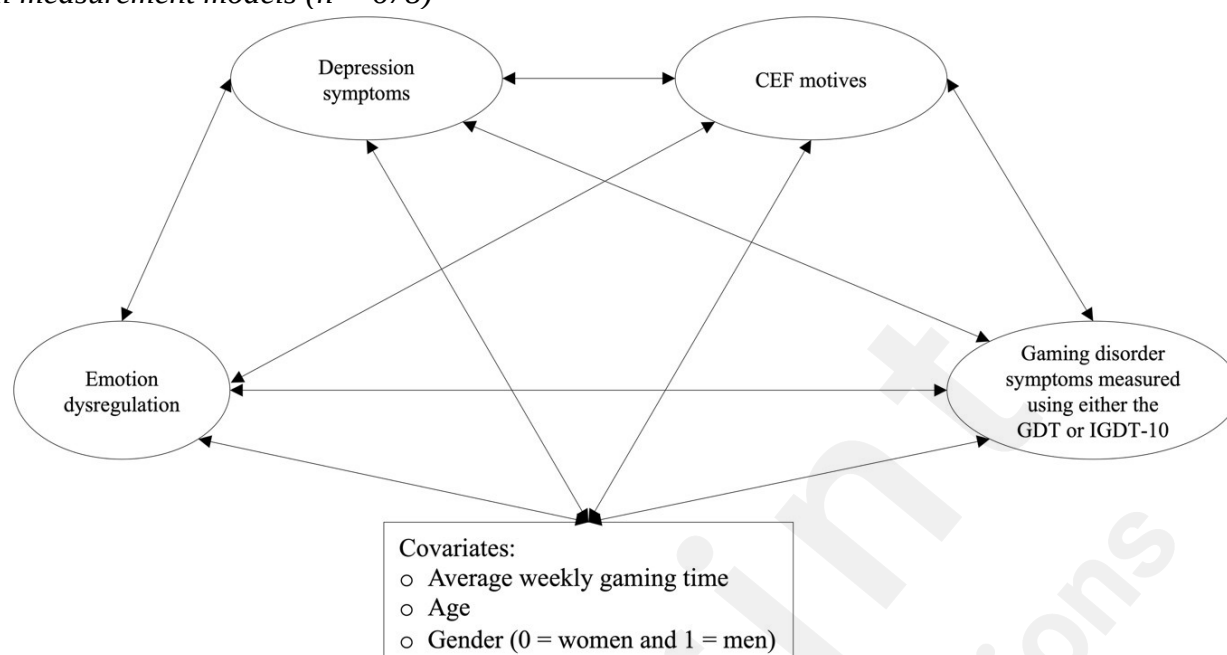
Note. PHQ = Patient Health Questionnaire

Confirmatory factor analysis for the Patient Health Questionnaire (PHQ-9)

The CFA of the one-factor model for the PHQ-9 provided a good fit to the data: $\chi^2 = 160.429$, $df = 20$, $p < .0001$; CFI = 0.969; TLI = 0.956; RMSEA = 0.102 [0.088 - 0.078, $p < 0.001$], and SRMR = 0.042. All standardized factor loadings were high and statistically significant (See Figure A3).

Figure A3Confirmatory factor analysis for the Patient Health Questionnaire (PHQ-9) ($n = 677$)

Note. PHQ = Patient Health Questionnaire

Figure A4*Full measurement models (n = 678)*

Note. GDT = The Gaming Disorder Test (WHO), IGDT-10 = Ten-Item Internet Gaming Disorder Test (APA), CEF motives = Coping, Escapism, and Fantasy motives.

Full measurement models

Figure 1 illustrates the full measurement models where no structural relationships were specified. The standardized correlation coefficients between the variables in the full measurement model are shown in Table 2. The full measurement models when gaming disorder symptoms were measured with the GDT ($\chi^2 = 1962.680$, $df = 834$, $p < .0001$; CFI = 0.965; TLI = 0.962; RMSEA = 0.048 [0.042 - 0.047, $p = 1.000$], and SRMR = 0.049) and with the IGDT-10 ($\chi^2 = 2062.276$, $df = 1054$, $p < .0001$; CFI = 0.969; TLI = 0.967; RMSEA = 0.038 [0.035 - 0.040, $p = 1.000$], and SRMR = 0.059) showed a good fit to the data. Gaming disorder symptoms measured with the GDT showed a large positive association with emotion dysregulation, depression symptoms, and CEF motives and a moderate positive relation with average weekly gaming time. Gaming disorder symptoms measured with the IGDT-10 also showed a large positive association with emotion dysregulation, depression symptoms, and CEF motives and a moderate positive relation with average weekly gaming time. Emotion dysregulation showed a large positive relationship with depression symptoms and CEF motives. Depression symptoms showed a large positive association with CEF motives. CEF motives showed a moderate positive association with average weekly gaming time.

Table A3*Standardized correlations from the full measurement model*

	1	2	3	4	5	6
1. Gaming disorder symptoms (GDT / IGDT-10)	-					
2. Emotion dysregulation	.596*** / .582***	-				
3. Depression symptoms	.636*** / .570***	.837***	-			
4. Coping, Escapism, and Fantasy motives	.573*** / .621***	.611***	.647***	-		
5. Average weekly gaming time	.375*** / .352***	.224***	.278***	.332***	-	
6. Age	-.199*** / -.182**	-.171***	-.143**	-.066	-.092***	-
7. Gender ^a	.185** / .085	-.187**	-.098	-.027	.143**	-.052

Notes. * $p < .05$; ** $p < .01$; *** $p < .001$. GDT = The Gaming Disorder Test (WHO); IGDT-10 = Ten-Item Internet Gaming Disorder Test (APA). ^aCoded as: 0 = Women, 1 = Men.



Appendix B. Sensitivity analyses

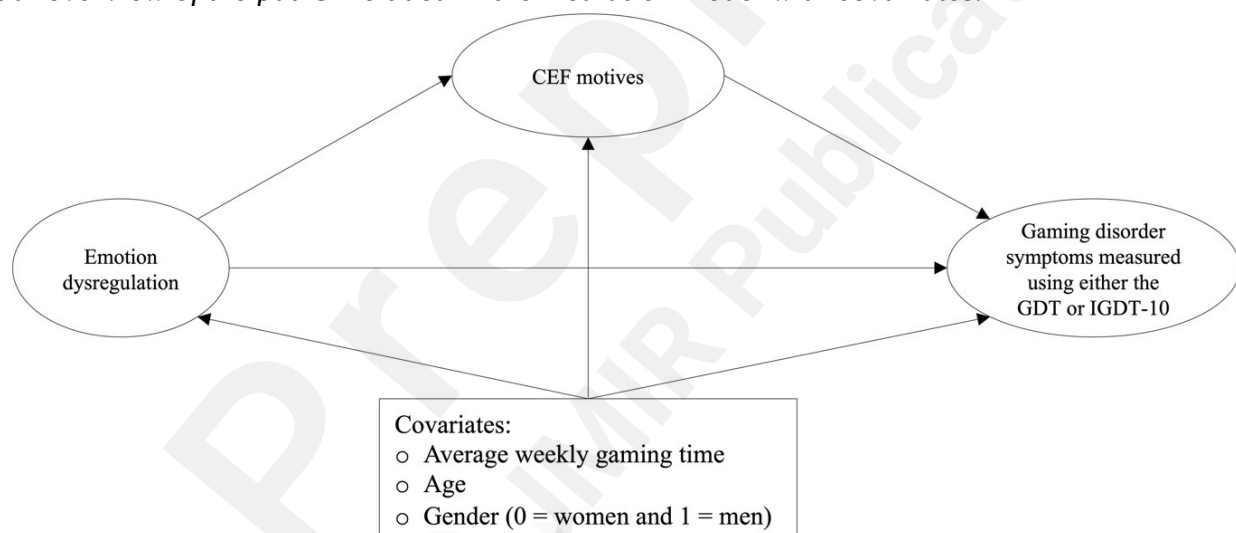
Sensitivity analyses 1: Simple mediation models with covariates

Simple mediation models with covariates

The results showed that the two mediation models, Model_{GDT}C and Model_{IGDT-10}C, fit the data well. The Model_{GDT}, including the GDT as a measure of gaming disorder symptoms and with covariates, showed the following fit indices: $\chi^2 = 1188.913$, $df = 540$, $p < 0.001$; CFI = 0.974; TLI = 0.971; RMSEA = 0.043 [0.039–0.046, $p = 1.000$]; and SRMR = 0.048. The Model_{IGDT-10}, including the IGDT-10 as a measure of gaming disorder symptoms and with covariates, showed the following fit statistics: $\chi^2 = 1370.983$, $df = 720$, $p < 0.001$; CFI = 0.974; TLI = 0.972; RMSEA = 0.037 [0.034–0.040, $p = 1.000$]; and SRMR = 0.061. Most standardized factor loadings for the latent variables in both models were large ($\lambda > 0.60$) and significant ($p < 0.001$). The results from the Model_{GDT}C showed that emotion dysregulation explained 41.8% of the variance of CEF motives and that the other variables in the model explained 50.4% of gaming disorder symptoms variance. The results from the Model_{IGDT-10}C showed that emotion dysregulation explained 41.1% of the variance of CEF motives and that the other variables in the model explained 50.9% of gaming disorder symptoms variance.

Figure B1

Visual overview of the paths included in the mediation model with covariates.



Note. GDT = The Gaming Disorder Test (WHO), IGDT-10 = Ten-Item Internet Gaming Disorder Test (APA), CEF motives = Coping, Escapism, and Fantasy motives. Individual measurement models of each latent factor can be seen in Appendix A.

Table B1*Mediation model including covariates (5000 bootstrap) (N = 665).*

Path coefficients	Model _{GDT-C}			Model _{IGDT-10C}		
	Estimate β (S.E.)	<i>p</i> value	95% CI	Estimate β (S.E.)	<i>p</i> value	95% CI
Emotion dysregulation → Coping, Escapism, and Fantasy motives	0.576 (0.035)	< .001	0.497-0.651	0.574 (0.035)	< .001	0.495-0.650
Emotion dysregulation → Gaming disorder symptoms	0.416 (0.049)	< .001	0.300-0.525	0.341 (0.064)	< .001	0.196-0.482
Coping, Escapism, and Fantasy motives → Gaming disorder symptoms	0.260 (0.050)	< .001	0.156-0.370	0.364 (0.061)	< .001	0.232-0.503
Indirect Effects						
Emotion dysregulation → Coping, Escapism, and Fantasy motives → Gaming disorder symptoms	0.150 (0.031)	< .001	0.089-0.223	0.209 (0.039)	< .001	0.130-0.303
Total effects						
Emotion dysregulation → Gaming disorder symptoms	0.566 (0.032)	< .001	0.488-0.638	0.549 (0.044)	< .001	0.458-0.644
Covariates						
Average weekly gaming time → Gaming disorder symptoms	0.168 (0.035)	< .001	0.085-0.252	0.158 (0.044)	< .001	0.061-0.246
Average weekly gaming time → Emotion dysregulation	0.237 (0.035)	< .001	0.158-0.310	0.237 (0.035)	< .001	0.158-0.310
Average weekly gaming time → Coping, Escapism, and Fantasy motives	0.203 (0.032)	< .001	0.132-0.275	0.202 (0.032)	< .001	0.132-0.275
Gender → Gaming disorder symptoms	-0.081 (0.036)	.027	-0.156-(-0.007)	-0.078 (0.051)	.124	-0.185-0.009
Gender → Emotion dysregulation	-0.153 (0.040)	< .001	-0.234-(-0.075)	-0.153 (0.040)	< .001	-0.234-(-0.076)
Gender → Coping, Escapism, and Fantasy motives	0.061 (0.037)	.099	-0.011-0.136	0.061 (0.037)	.099	-0.011-0.136
Gender → Gaming disorder symptoms	0.184 (0.033)	< .001	0.119-0.250	0.087 (0.041)	.034	0.011-0.171
Gender → Emotion dysregulation	-0.172 (0.040)	< .001	-0.248-(-0.089)	-0.172 (0.040)	< .001	-0.248-(-0.089)
Gender → Coping, Escapism, and Fantasy motives	0.044 (0.037)	.233	-0.028-0.118	0.044 (0.037)	.233	-0.028-0.117

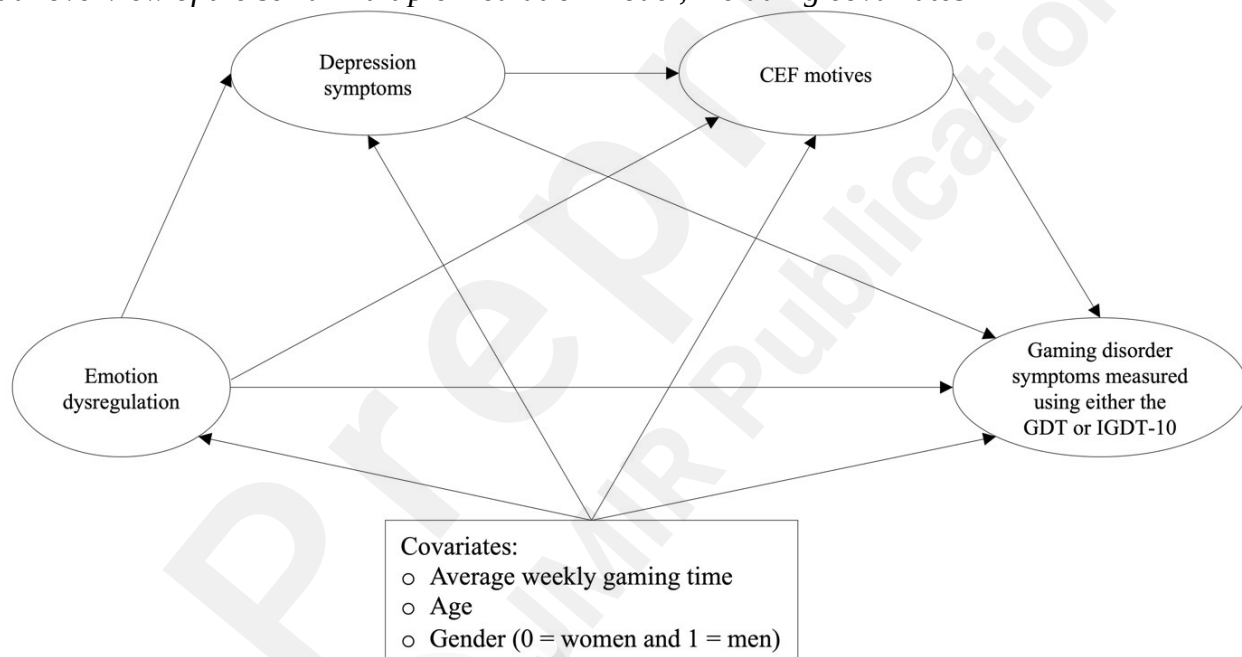
Note. β = standardized regression coefficients; S.E. = associated standard error value. GDT = The Gaming Disorder Test (WHO), IGDT-10 = Ten-Item Internet Gaming Disorder Test (APA). ^aCoded as: 0 = Women, 1 = Men.

Serial multiple mediation model with covariates

The results showed that the two serial multiple mediation models, Model_{SerialGDTc} and Model_{SerialIGDT-10c}, fit the data well. Model_{SerialGDTc}, including the GDT as a measure of gaming disorder symptoms with covariates, showed the following fit indices: $\chi^2 = 1897.081$, $df = 834$, $p < 0.001$; CFI = 0.964; TLI = 0.961; RMSEA = 0.044 [0.041– 0.046, $p = 1.000$]; and SRMR = 0.052. Model_{SerialIGDT-10c}, including the IGDT-10 as a measure of gaming disorder symptoms with covariates showed the following fit statistics: $\chi^2 = 2020.733$, $df = 1054$, $p < 0.001$; CFI = 0.967; TLI = 0.965; RMSEA = 0.037 [0.035– 0.040, $p = 1.000$]; and SRMR = 0.061. The results from the Model_{SerialGDTc} showed that emotion dysregulation explained 0.72.0% of the variance of self-reported depression symptoms, that self-reported emotion dysregulation and depression symptoms explained 0.45.6% of the variance of CEF motives, and that the variables in the model explained 0.52.5% of gaming disorder symptoms variance. The results from the Model_{SerialIGDT-10c} showed that emotion dysregulation explained 72.0% of the variance of self-reported depression symptoms, that self-reported emotion dysregulation and depression symptoms explained 45.4% of the variance of CEF motives, and that the variables in the model explained 50.8% of gaming disorder symptoms variance.

Figure B2

Visual overview of the serial multiple mediation model, including covariates



Note. GDT = The Gaming Disorder Test (WHO), IGDT-10 = Ten-Item Internet Gaming Disorder Test (APA), CEF motives = Coping, Escapism, and Fantasy motives.

Table B2*Serial multiple mediation model including covariates (5000 bootstrap) (N = 665)*

Path coefficients	Model _{SerialGDT}			Model _{SerialIGDT-10C}		
	Estimate β (S.E.)	<i>p</i> value	95% CI	Estimate β (S.E.)	<i>p</i> value	95% CI
Emotion dysregulation → Depression symptoms	0.831 (0.022)	< .001	0.783-0.875	0.831 (0.022)	< .001	0.782-0.875
Emotion dysregulation → Coping, Escapism, and Fantasy motives	0.240 (0.080)	.003	0.055-0.420	0.239 (0.079)	.003	0.054-0.418
Emotion dysregulation → Gaming disorder symptoms	0.212 (0.087)	.015	0.002-0.392	0.315 (0.119)	.008	0.054-0.561
Depression symptoms → Coping, Escapism, and Fantasy motives	0.402 (0.079)	< .001	0.228-0.579	0.402 (0.079)	< .001	0.228-0.577
Depression symptoms → Gaming disorder symptoms	0.286 (0.088)	.001	0.096-0.486	0.041 (0.117)	.727	-0.200-0.285
Coping, Escapism, and Fantasy motives → Gaming disorder symptoms	0.203 (0.051)	< .001	0.097-0.318	0.352 (0.059)	< .001	0.227-0.486
Direct Effects						
Emotion dysregulation → Depression symptoms → Gaming disorder symptoms	0.237 (0.074)	.001	0.080-0.411	0.034 (0.097)	.727	-0.167-0.240
Emotion dysregulation → Coping, Escapism, and Fantasy motives → Gaming disorder symptoms	0.049 (0.021)	.021	0.009-0.105	0.084 (0.033)	.010	0.018-0.168
Emotion dysregulation → Depression symptoms → Coping, Escapism, and Fantasy motives → Gaming disorder symptoms	0.068 (0.021)	.001	0.027-0.121	0.117 (0.030)	< .001	0.060-0.190
Indirect effects						
Indirect effects	0.566 (0.032)	< .001	0.488-0.637	0.550 (0.044)	< .001	0.459-0.644
Indirect effects	0.354 (0.074)	< .001	0.201-0.536	0.235 (0.101)	.021	0.028-0.461
Covariates						
Age weekly gaming time → Gaming disorder symptoms	0.156 (0.035)	< .001	0.074-0.238	0.157 (0.045)	< .001	0.059-0.249
Age weekly gaming time → Emotion dysregulation	0.236 (0.035)	< .001	0.157-0.310	0.236 (0.035)	< .001	0.157-0.310
Age weekly gaming time → Coping, Escapism, and Fantasy motives	0.168 (0.031)	< .001	0.101-0.236	0.168 (0.031)	< .001	0.101-0.235
Age weekly gaming time → Depression symptoms	0.086 (0.031)	.005	0.023-0.150	0.086 (0.031)	.005	0.024-0.150
→ Gaming disorder symptoms	-0.082 (0.036)	.022	-0.156-(-0.010)	-0.078 (0.051)	.126	-0.186-0.009
→ Emotion dysregulation	-0.153 (0.40)	< .001	-0.235-(-0.076)	-0.153 (0.040)	< .001	-0.235-(-0.076)
→ Coping, Escapism, and Fantasy motives	0.054 (0.036)	.131	-0.013-0.125	0.054 (0.036)	.131	-0.013-0.125
→ Depression symptoms	0.017 (0.029)	.551	-0.040-0.078	0.017 (0.029)	.552	-0.040-0.078
Gender → Gaming disorder symptoms	0.176 (0.033)	< .001	0.110-0.241	0.086 (0.041)	.035	0.009-0.169
Gender → Emotion dysregulation	-0.171 (0.040)	< .001	-0.247-(-0.089)	-0.171 (0.040)	< .001	-0.247-(-0.089)
Gender → Coping, Escapism, and Fantasy motives	0.029 (0.035)	.409	-0.041-0.099	0.029 (0.035)	.409	-0.041-0.099
Gender → Depression symptoms	0.035 (0.028)	.210	-0.021-0.090	0.035 (0.028)	.212	-0.021-0.090

Note. Standardized coefficients (Estimate β) and the corresponding standard error (S.E.); GDT = The Gaming Disorder Test (WHO); IGDT-10 = Ten-Item Internet Gaming Disorder Test (APA). *Coded as: 0 = Women, 1 = Men.

Sensitivity analyses 2: mediation models including the IGDT-10_{without item 8}

Sensitivity analyses of the full measurement model

The full measurement model when gaming disorder symptoms were measured with the **IGDT-10** without item 8 showed excellent model fit to the data ($\chi^2 = 1900.745$, $df = 1008$, $p < .0001$; CFI = 0.972; TLI = 0.970; RMSEA = 0.036 [0.034 - 0.039, $p = 1.000$], and SRMR = 0.055).

Table C1

Standardized correlations from the sensitivity analyses of the full measurement model (n = 678)

	1	2	3	4	5	6
1. IGDT-10	-					
2. Emotion dysregulation	0.547***	-				
3. Depression symptoms	0.535***	0.837***	-			
4. Coping, Escapism, and Fantasy motives	0.516***	0.611***	0.647***	-		
5. Average weekly gaming time	0.344***	0.224***	0.278***	0.332***	-	
6. Age	-0.200**	-0.171***	-0.143**	-0.066	-0.092***	-
7. Gender ^a	0.120	-0.187**	-0.098	-0.027	0.143**	-0.052

Notes. * $p < .05$; ** $p < .01$; *** $p < .001$. GDT = The Gaming Disorder Test (WHO), IGDT-10 = Ten-Item Internet Gaming Disorder Test (APA). ^aCoded as: 0 = Women, 1 = Men.

Sensitivity simple mediation model without covariates

The simple mediation model without covariates including IGDT-10_{without item 8} provided a good fit to the data ($\chi^2 = 1070.377$, $df = 583$, $p < .0001$; CFI = 0.982; TLI = 0.980; RMSEA = 0.035 [0.032 - 0.038, $p = 1.000$], and SRMR = 0.053).

Table C2

Sensitivity analyses of mediation model without covariates (5000 bootstrap) (n = 678) (See Figure B1).

Path coefficients including direct effects	IGDT-10 _{without item 8}		
	Estimate β (S.E.)	p value	95% CI
Emotion dysregulation → Coping, Escapism, and Fantasy motives	0.614 (0.032)	< .001	0.543-0.682
Emotion dysregulation → Gaming disorder symptoms	0.367 (0.070)	< .001	0.222-0.513
Coping, Escapism, and Fantasy motives → Gaming disorder symptoms	0.293 (0.068)	< .001	0.149-0.439
Indirect Effects			
Emotion dysregulation → Coping, Escapism, and Fantasy motives → Gaming disorder symptoms	0.180 (0.044)	< .001	0.089-0.280
Total effects			
Emotion dysregulation → Gaming disorder symptoms	0.547 (0.045)	< .001	0.456-0.639

Note. β = standardized regression coefficients; S.E. = associated standard error value. IGDT-10 = Ten-Item Internet Gaming Disorder Test.

Sensitivity mediation model with covariates

The mediation model with covariates including **IGDT-10** without item 8 provided a good fit to the data ($\chi^2 = 1198.795$, $df = 682$, $p < .0001$; CFI = 0.979; TLI = 0.977; RMSEA = 0.034 [0.031 - 0.037, $p = 1.000$], and SRMR = 0.055).

Table C3

Sensitivity analyses of mediation model with covariates (5000 bootstrap) (n = 665)

Path coefficients	IGDT-10 _{without item 8}		
	Estimate β (S.E.)	<i>p</i> value	95% CI
Emotion dysregulation → Coping, Escapism, and Fantasy motives	0.576 (0.035)	< .001	0.497-0.651
Emotion dysregulation → Gaming disorder symptoms	0.392 (0.071)	< .001	0.234-0.548
Coping, Escapism, and Fantasy motives → Gaming disorder symptoms	0.207 (0.071)	.003	0.055-0.371
Indirect Effects			
Emotion dysregulation → Coping, Escapism, and Fantasy motives → Gaming disorder symptoms	0.119 (0.042)	.005	0.032-0.219
Total effects			
Emotion dysregulation → Gaming disorder symptoms	0.511 (0.048)	< .001	0.408-0.614
Covariates			
Average weekly gaming time → Gaming disorder symptoms	0.186 (0.048)	< .001	0.080-0.284
Average weekly gaming time → Emotion dysregulation	0.237 (0.035)	< .001	0.158-0.310
Average weekly gaming time → Coping, Escapism, and Fantasy motives	0.203 (0.032)	< .001	0.132-0.275
Age → Gaming disorder symptoms	-0.101 (0.059)	.084	-0.222-(-0.002)
Age → Emotion dysregulation	-0.153 (0.040)	< .001	-0.234-(-0.076)
Age → Coping, Escapism, and Fantasy motives	0.062 (0.037)	.099	-0.011-0.136
Gender → Gaming disorder symptoms	0.115 (0.046)	.014	0.029-0.211
Gender → Emotion dysregulation	-0.172 (0.040)	< .001	-0.248-(-0.089)
Gender → Coping, Escapism, and Fantasy motives	0.044 (0.037)	.236	-0.028-0.117

Note. β = standardized regression coefficients; S.E. = associated standard error value. IGDT-10 = Ten-Item Internet Gaming Disorder Test. ^aCoded as: 0 = Women, 1 = Men.

Sensitivity serial multiple mediation model without covariates

The serial mediation model, including **IGDT-10** without item 8 and without covariates, provided a good fit to the data ($\chi^2 = 1739.823$, $df = 888$, $p < .0001$; CFI = 0.973; TLI = 0.971; RMSEA = 0.038 [0.035 - 0.040, $p = 1.000$], and SRMR = 0.055).

Table C4

Sensitivity analyses of serial multiple mediation model without covariates (5000 bootstrap) ($n = 678$) (See Figure B2)

Path coefficients including direct effects	IGDT-10 _{without item 8}		
	Estimate β (S.E.)	p value	95% CI
Emotion dysregulation → Depression symptoms	0.837 (0.018)	< .001	0.797-0.874
Emotion dysregulation → Coping, Escapism, and Fantasy motives	0.231 (0.078)	.003	0.057-0.399
Emotion dysregulation → Gaming disorder symptoms	0.272 (0.119)	.023	0.019-0.520
Depression symptoms → Coping, Escapism, and Fantasy motives	0.454 (0.077)	< .001	0.287-0.620
Depression symptoms → Gaming disorder symptoms	0.139 (0.123)	.257	-0.107-0.400
Coping, Escapism, and Fantasy motives → Gaming disorder symptoms	0.260 (0.069)	< .001	0.107-0.411
Indirect Effects			
Emotion dysregulation → Depression symptoms → Gaming disorder symptoms	0.117 (0.103)	.258	-0.091-0.339
Emotion dysregulation → Coping, Escapism, and Fantasy motives → Gaming disorder symptoms	0.060 (0.027)	.026	0.010-0.132
Emotion dysregulation → Depression symptoms → Coping, Escapism, and Fantasy motives → Gaming disorder symptoms	0.099 (0.031)	.001	0.039-0.173
Total effects			
Total effects	0.547 (0.045)	< .001	0.457-0.639
Total indirect	0.276 (0.101)	.006	0.070-0.490

Note. β = standardized regression coefficients; S.E. = associated standard error value. IGDT-10 = Ten-Item Internet Gaming Disorder Test.

Sensitivity serial multiple mediation model with covariates

The serial mediation model, including the IGDT-10 without item 8 and with covariates, provided a good fit to the data ($\chi^2 = 1862.973$, $df = 1008$, $p < .0001$; CFI = 0.971; TLI = 0.969; RMSEA = 0.036 [0.033 - 0.038, $p = 1.000$], and SRMR = 0.057).

Table C5

Sensitivity analyses of the serial multiple mediation model with covariates (5000 bootstrap) ($n = 665$)

Path coefficients including direct effects	IGDT-10 _{without item 8}		
	Estimate β (S.E.)	p value	95% CI
Emotion dysregulation $\rightarrow$ Depression symptoms	0.831 (0.022)	0.000	0.782-0.875
Emotion dysregulation $\rightarrow$ Coping, Escapism, and Fantasy motives	0.240 (0.080)	0.003	0.055-0.420
Emotion dysregulation $\rightarrow$ Gaming disorder symptoms	0.339 (0.129)	0.009	0.051-0.606
Depression symptoms $\rightarrow$ Coping, Escapism, and Fantasy motives	0.402 (0.079)	0.000	0.228-0.579
Depression symptoms $\rightarrow$ Gaming disorder symptoms	0.077 (0.128)	0.547	-0.187-0.363
Coping, Escapism, and Fantasy motives $\rightarrow$ Gaming disorder symptoms	0.189 (0.069)	0.006	0.039-0.351
Indirect Effects			
Emotion dysregulation $\rightarrow$ Depression symptoms $\rightarrow$ Gaming disorder symptoms	0.064 (0.106)	0.547	-0.158-0.306
Emotion dysregulation $\rightarrow$ Coping, Escapism, and Fantasy motives $\rightarrow$ Gaming disorder symptoms	0.045 (0.024)	0.056	0.003-0.114
Emotion dysregulation $\rightarrow$ Depression symptoms $\rightarrow$ Coping, Escapism, and Fantasy motives $\rightarrow$ Gaming disorder symptoms	0.063 (0.025)	0.013	0.013-0.125
Total effects			
Total effects	0.511 (0.048)	0.000	0.408-0.615
Total indirect	0.173 (0.108)	0.112	-0.054-0.419
Covariates			
Average weekly gaming time $\rightarrow$ Gaming disorder symptoms	0.183 (0.050)	0.000	0.075-0.282
Average weekly gaming time $\rightarrow$ Emotion dysregulation	0.236 (0.035)	0.000	0.157-0.310
Average weekly gaming time $\rightarrow$ Coping, Escapism, and Fantasy motives	0.168 (0.031)	0.000	0.101-0.236
Average weekly gaming time $\rightarrow$ Depression symptoms	0.086 (0.031)	0.005	0.024-0.150
Age $\rightarrow$ Gaming disorder symptoms	-0.101 (0.059)	0.086	-0.222-0.000
Age $\rightarrow$ Emotion dysregulation	-0.153 (0.040)	0.000	-0.235-(-0.076)
Age $\rightarrow$ Coping, Escapism, and Fantasy motives	0.054 (0.036)	0.131	-0.013-0.125
Age $\rightarrow$ Depression symptoms	0.017 (0.029)	0.553	-0.040-0.078
Gender $\rightarrow$ Gaming disorder symptoms	0.113 (0.046)	0.015	0.026-0.208
Gender $\rightarrow$ Emotion dysregulation	-0.171 (0.040)	0.000	-0.247-(-0.089)
Gender $\rightarrow$ Coping, Escapism, and Fantasy motives	0.029 (0.035)	0.411	-0.041-0.099
Gender $\rightarrow$ Depression symptoms	0.035 (0.028)	0.212	-0.021-0.090

Note. Standardized coefficients (Estimate β) and the corresponding standard error (S.E.). IGDT-10 = Ten-Item Internet Gaming Disorder Test. ^aCoded as: 0 = Women, 1 = Men.