Original Article

Cognitive Emotion Regulation and Problematic Video Gaming During Adolescence

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Abstract: Given the significant negative consequences of problematic video gaming among adolescents, it is crucial to identify risk and protective factors to inform effective prevention and intervention strategies. The aim of the current study was to examine the associations between adaptive and maladaptive cognitive emotion regulation strategies and both prolonged and problematic video gaming among early-to-mid adolescents in Germany. A total of 626 adolescents in Grades 5 – 10 completed the Cognitive Emotion Regulation Questionnaire, as well as providing details on their prolonged gaming time and symptoms of problematic gaming. *Catastrophizing* and *acceptance* were positively associated with prolonged gaming time, while *refocus on planning* showed a negative association. The maladaptive strategies *rumination* and *blaming others* were positively associated with problematic gaming, and the adaptive strategy *positive reappraisal* showed a negative association. The findings highlight the role of emotion regulation in problematic gaming and pave the way for future studies focusing on developmental mechanisms as well as insights for prevention and intervention measures.

Keywords: emotion regulation, problematic video gaming, Internet gaming disorder, adolescence

Kognitive Emotionsregulation und problematisches Videospielen im Jugendalter

Zusammenfassung: Angesichts der erheblichen negativen Folgen von problematischem Videospielen bei Jugendlichen ist es entscheidend, Risikofaktoren und Schutzfaktoren zu identifizieren, um wirksame Präventions- und Interventionsstrategien zu entwickeln. Ziel der aktuellen Studie war es, die Zusammenhänge zwischen verschiedenen adaptiven und maladaptiven kognitiven Emotionsregulationsstrategien und sowohl lang andauerndem als auch problematischem Videospielen bei Jugendlichen in Deutschland zu untersuchen. 626 Jugendliche der Klassen 5 – 10 füllten den Cognitive Emotion Regulation Questionnaire aus und machten Angaben zur Spielzeit sowie zu Symptomen problematischen Spielens. *Katastrophisieren* und *Akzeptanz* waren positiv mit lang andauerndem Spielen assoziiert, während eine *Refokussierung auf Planung* negativ assoziiert war. Die maladaptiven Emotionsregulationsstrategien *Rumination* und *Andere beschuldigen* waren positiv mit problematischem Spielen assoziiert, während die adaptive Strategie *positive Neubewertung* negativ assoziiert war. Die Ergebnisse verdeutlichen die Rolle der Emotionsregulation beim problematischen Spielen und ebnen den Weg für zukünftige Studien, die sich auf Entwicklungsmechanismen konzentrieren sowie für Erkenntnisse zu Präventions- und Interventionsmaßnahmen.

Schlüsselwörter: Emotionsregulation, problematisches Videospielen, Internet Gaming Disorder, Jugendalter

Playing video games is a common leisure activity among adolescents, with recent statistics revealing that approximately 72% of 12- to 19-year-olds in Germany regularly play digital games (mpfs, 2023). Although video gaming can have various beneficial outcomes (Bediou et al., 2018; Oliveira et al., 2020), adolescents can spend an excessive amount of time gaming, with problems emerging in their personal, social, or educational functioning (Düll et al., 2024; King & Delfabbro, 2016). In extreme cases an internet gaming disorder (IGD) may be diagnosed (*Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition* [DSM5], American Psychiatric Association [APA], 2013; see also gaming disorder, *International Classification of Diseases, 11th Revision* [ICD-11], World Health Organization, 2022), with the prevalence rate standing at 4.1% among adolescents (Fam, 2018). IGD is marked by persistent and recurrent video gaming, with individuals typically spending 8 hr or more a day and at least 30 hr per week playing video games (DSM5, APA, 2013). Symptoms for proposed criteria include the preoccupation with games, withdrawal symptoms when gaming is ceased, an increased tolerance, unsuccessful attempts to control

gaming, loss of interest in other hobbies, continued use despite known psychosocial problems, deception regarding the amount of gaming, use of games to escape or relieve negative moods, and jeopardized relationships or educational opportunities due to gaming (DSM5, APA, 2013). Individuals who show these symptoms, irrespective of clinical diagnosis, are more likely to develop depression and anxiety and to report higher psychological distress and lower life satisfaction, as well as decreased academic achievement (Düll et al., 2024). As such, researchers have often focused on problematic gaming among adolescents who exhibit mild to severe symptoms of IGD (without a categorical diagnosis; Boonen et al., 2024), viewing gaming as a continuum from nonproblematic regular/occasional gaming at one end to excessive problematic gaming and IGD at the other end (Griffiths et al., 2017). Thus, the relatively prolonged time that adolescents spend gaming has also been noted (Boonen et al., 2024). Although the excessive involvement in an activity should not be overpathologized (Billieux et al., 2015), studies have revealed a positive correlation between the weekly hours spent gaming and the number of IGD symptoms (Katz et al., 2024; Rehbein et al., 2015). Given the negative psychosocial and educational outcomes of prolonged and problematic video gaming and the increased likelihood for the development of IGD, it is necessary to identify risk and protective factors during adolescence. A specialized focus on factors that are modifiable and related to a range of psychopathological problems can lead to a more holistic understanding and approach for prevention and intervention initiatives (Bender et al., 2020). The focus of the current study was on emotion regulation, which is viewed as a transdiagnostic process that plays a crucial role in psychopathological development (Cludius et al., 2020) and is considered a malleable construct that can be modified and improved with training (Eadeh et al., 2021). Initial studies have revealed that emotion (dys)regulation is associated with problematic video gaming (Bender et al., 2020), yet a closer examination of the different emotion regulation strategies during adolescence is scarce. Thus, the aim of the current study was to build upon previous research, by examining the associations between different types of cognitive emotion regulation strategies with prolonged and problematic video gaming during adolescence.

Theoretical and Empirical Background

A complex etiology underlies problematic gaming, with a range of biological, individual, and environmental factors having been identified (Ropovik et al., 2023). At an individual level, examinations of gaming motivations have revealed that video gaming is often used to avoid negative emotions, foster positive emotions, escape from reality, and control stress and overwhelming emotions (Bäcklund et al., 2022). Although providing temporary relief, the urge to escape from real-life difficulties as a gaming motivation has been associated with problematic gaming (Wang & Cheng, 2022). Furthermore, adolescents who go online to cope with daily stressors are less likely to deal adaptively with subsequent stressors (Duvenage et al., 2020). Thus, theoretical models on the development and maintenance of problematic gaming often note the significance of affective and cognitive predispositions and response styles (Brand et al., 2019). Specifically, the *interaction of person–affect–cognition–execution* (I-PACE) model for addictive behaviors outlines a range of personal factors (e.g., general coping styles) and behavior-specific factors (e.g., motives) that may predispose individuals to problematic gaming behaviors (Brand et al., 2019). In line with the model, adolescents with poor coping skills (i.e., higher usage of maladaptive emotion-focused coping strategies) are at greater risk of developing symptoms of IGD (Schneider et al., 2018). When adolescents who lack adaptive strategies experience distress, they might be triggered into excessive gaming (Schettler et al., 2024). Individuals with poor strategies may be more likely to compensate with video gaming, as they learn that it is (temporarily) effective for enhancing their moods and avoiding negative emotions (Brand et al., 2019). Although the use of video gaming for emotion regulation is considered normative, the continued and excessive use is not adaptive (Bender et al., 2020; Kökönyei et al., 2019). The I-PACE model and previous research therefore emphasize the role that emotion regulation plays in the development and maintenance of problematic gaming and IGD.

Emotion regulation can be described as "extrinsic and intrinsic processes responsible for monitoring, evaluating and modifying emotional reactions, especially their intensive and temporal features, to accomplish one's goals" (Thompson, 1994, p. 27). Although all emotion regulation strategies serve a functional purpose, they may be classified as adaptive or maladaptive based on their relation to psychopathological symptoms (Loch et al., 2011). Cognitive emotion regulation strategies describe the use of specific internal cognitive processes to regulate emotions following stressful situations and experiences (Garnefski

et al., 2001). Among the adaptive strategies are acceptance (i.e., accepting negative experiences), refocus on planning (i.e., planning steps to tackle negative experiences), positive refocusing (i.e., focusing on pleasant issues instead of negative experiences), positive reappraisal (i.e., finding positive meaning in negative experiences), and putting into perspective (i.e., minimizing the severity or relativizing the negative experiences in comparison with others; Garnefski et al., 2001). The maladaptive strategies are self-blame (i.e., blaming oneself for negative experiences), blaming others (i.e., putting the blame on others for negative experiences), rumination (i.e., continuously thinking about negative experiences), and catastrophizing (i.e., exaggerated alarmist emphasis of negative experiences; Garnefski et al., 2001).

In their systematic review, Marchica et al. (2019) found five studies that showed an association between emotion (dys)regulation and problematic gaming during childhood and adolescence. Newer studies have also found that emotion regulation skills predict concurrent problematic gaming among adolescents in the United States (Giordano, Schmit et al., 2023) and that emotion regulation difficulties predict problematic gaming symptoms 1 year later among adolescents in Germany (Schettler et al., 2024). Examining emotion regulation strategies, Guo et al. (2023) reported that general maladaptive and adaptive emotion regulation strategies (i.e., summed scores across strategy types) were concurrently related to problematic gaming among adolescents in China (see also Wu et al., 2022). A few studies have also taken a differentiated look at the emotion regulation strategies, finding variation in their association with problematic gaming. Akbari et al. (2024) found in a cross-sectional study that cognitive reappraisal negatively predicted problematic gaming among Iranian adolescents, while emotional suppression did not. Schneider et al. (2018) found that the majority of strategies (including acceptance, positive reappraisal, refocus on planning, and self-blame) were not associated with prolonged or problematic gaming among adolescents in Australia. Lastly, Kökönyei et al. (2019) showed that all maladaptive emotion regulation strategies that were investigated (i.e., self-blame, blaming others, rumination, and catastrophizing) independently predicted concurrent problematic gaming, while only one adaptive emotion regulation strategies (i.e., positive reappraisal) negatively predicted problematic gaming during mid-to-late adolescence in Hungary.

Current Study

Emotion regulation has been considered a transdiagnostic factor over various psychopathologies (Cludius et al., 2020) and has also been labeled a crucial factor for problematic gaming (Bender et al., 2020). Yet, despite adolescents being considered a vulnerable group for problematic gaming (Fam, 2018), showing a reduced usage of adaptive emotion regulation strategies (Zimmermann & Iwanski, 2014), and displaying an increased use of media as a coping mechanism (Eschenbeck et al., 2018), there are only a few studies examining the association between emotion regulation and problematic gaming in this age group. Furthermore, examining different emotion regulation strategies individually is important, as they have been found to influence problematic gaming in distinct ways (Akbari et al., 2024; Kökönyei et al., 2019). Understanding these nuances can lead to a better view of the development of problematic gaming and can guide targeted prevention and intervention measures. A further important distinction for research is between prolonged gaming and problematic gaming; although the former remains somewhat contentious in the discussion of IGD, given that the time spent gaming is related to symptoms yet is also considered normative and showing variation (Katz et al., 2024). Nonetheless, public debate and legislative efforts often center around the time children and adolescents spend gaming, indicating that it should not be ignored within research but rather included to carefully assess relevant evidence for antecedents and outcomes (Katz et al., 2024). Lastly, the generalizability of previous findings cannot be assumed across different regional contexts without replication, as studies have shown that the influence of emotion regulation on psychopathology varies across countries (Tamir et al., 2024), as does the association between gaming motivations and psychopathological outcomes (Hussain et al., 2021). The aim of the current study was to expand on initial studies by addressing knowledge and research gaps with the following research question:

RQ1: Which associations exist between various adaptive and maladaptive cognitive emotion regulation strategies and prolonged and problematic video gaming among early-to-mid adolescents in Germany?

Method

Participants

The recruitment took place in a northern region of Germany, with every secondary school therein being contacted and informed about the research project. Schools that volunteered to participate (n = 6) distributed consent forms to parents/legal guardians of students attending Grades 5–10. Noting the full schedule of students (e.g., exam preparations), some schools only distributed consent forms within certain grades. The final sample for analysis consisted of 626 adolescents, with a relatively equal distribution across the grades. The mean age of the adolescents was 13.29 years (SD = 1.85), with 52.9% falling in the age group early adolescence (age 9–13) and 47.1% in middle adolescence (age 14–18). The sample included 338 female and 286 male adolescents as well as two adolescents who indicated their gender as diverse. In total, 96.2% stated that they were born in Germany, and 86.9% that their mother was born in Germany; 39 participants indicated that they had a special educational need.

Design and Procedure

The current data stem from a larger research study titled "Substanzkonsum und Abhängigkeit im Jugendalter" ("Substance Use and Addiction During Adolescence"), which aimed to assess a range of problematic behaviors and potential risk/protective factors for students in lower secondary school in a specific northern region of Germany. The study was initiated and conducted as a collaborative effort between a regional prevention council and the university. Approval was received from the university's ethics committee and data protection officer as well as the state school authority board. The questionnaire was piloted with a fifth-grade class, with special attention given to ensuring that the items were clear and easily understood; small amendments were subsequently made. Data collection began in 2020, yet was paused due to the Covid-19 pandemic. Data collection resumed in 2022, when regulations were lifted and the schools indicated they had the capacity to participate again. The study followed a cross-sectional design, with data being collected anonymously via paper–pencil questionnaires at the schools in a double-period slot. In the classrooms, participating students were seated in a manner that ensured privacy while completing their questionnaires. Teachers were not present in the classrooms, and the data collection procedure was mainly conducted by trained undergraduate and postgraduate students. After being informed about the purpose of the study, an explanation on how to complete the questionnaire ensued. The first two pages were completed with all students to ensure that they understood how to complete the questionnaire. When questions or uncertainties arose, they were quietly resolved at the table. Some younger students and those with special educational needs received additional assistance with completing the questionnaire; for instance, items were read aloud or discussed shortly.

Materials

Cognitive Emotion Regulation Strategies

The Cognitive Emotion Regulation Questionnaire (CERQ; Garnefski et al., 2001; Loch et al., 2011) was used to assess adolescents' cognitive emotion regulation strategies in response to general unpleasant, negative, stressful events that an individual may experience. The German version consists of 27 items (Loch et al., 2011), that form the scales *self-blame* (e.g., "I feel that I am the one who is responsible for what has happened"; α = .80), *blaming others* (e.g., "I feel that others are responsible for what has happened"; α = .83), *rumination* (e.g., "I often think about how I feel about what I have experienced"; α = .68), *catastrophizing* (e.g., "I keep thinking about how terrible it is what I have experienced; α = .78), *putting into perspective* (e.g., "I think that it hasn't been too bad compared to other things"; α = .71), *positive refocusing* (e.g., "I think of something nice instead of what has happened"; α = .75), *positive reappraisal* (e.g., "I look for the positive sides to the matter"; α = .74), *acceptance* (e.g., "I think that I have to accept the situation"; α = .79), and *refocus on planning* (e.g., "I think about how I can best cope with the situation"; α = .69). Participants responded on a 5-point Likert-scale ranging from *(almost) never* to *(almost) always*.

Video Gaming

Based on their responses to games played on any device (e.g., computers, gaming consoles, smartphones) in the last month, participants who had not played in the past month were asked to skip all following gaming items. Participants who had played in the past month were asked to answer further gaming items, with the note that these pertain to any form of gaming on any device, but not to Internet gambling.

To assess *prolonged gaming*, two items asked how many hours participants typically play video games on a normal weekday and on a normal weekend day, ranging from 0 to 10 hr or more. To assess *problematic gaming*, participants responded to nine items that were derived from the diagnostic criteria for IGD in the DSM5 (APA, 2013), such

as thinking often about gaming; the feeling of wanting to play more; as well as neglecting hobbies, homework, and bunking school due to video gaming (α = .80; see Table E1 in Electronic Supplementary Material ESM 1 for complete list of items). Participants responded on a 5-point Likert-scale, ranging from *strongly disagree* to *strongly agree*.

Data Analysis

The data analyses were completed with SPSS 29. As a first step, all participants (n = 54) who clearly indicated that they did not play any video games in the past month were removed (as done by Giordano, Schmit et al., 2023; Kökönyei et al., 2019). Mean scores for the emotion regulation scales and problematic gaming were calculated with allowance for up to one item missing, with final scores ranging from 1 to 5. Based on previous procedures (Katz et al., 2024; Rehbein et al., 2015), average daily gaming time was calculated as (week day × 5) + (weekend day × 2)/7 for prolonged gaming, resulting in a range from 0 to 11. Dummy codes were created for the age group (0 = early adolescence, 1 = middle adolescence) and gender group (0 = male/diverse, 1 = female). In the sample, too few participants identified as diverse (n = 2), which limited the possibility of including them as a separate group in the statistical analysis. However, to retain all participants, we merged them into a group with male participants, as their prolonged and problematic gaming scores were more closely aligned with this group. A missing data analysis with the emotion regulation and gaming variables, as well as gender and age group, revealed that 1.72% of values were missing (58 cases). Little's MCAR test was not significant, χ^2 = 162.56, df = 141, p = .10, which prompted us to proceed with listwise deletion, resulting in the final sample of 626 participants. Independent sample t tests (one-sided) were used to examine gender and age group differences for the emotion regulation and gaming variables. Pearson product–moment correlation coefficients (one-sided) were calculated, followed by multiple linear regression analyses with prolonged and problematic gaming as the criterion variable. Correlation coefficients and variance inflation factor (VIF) values were used to check for the absence of multicollinearity. Normal P–P plots were used to check the distribution of residuals and scatter plots for homoscedasticity; improvements were made by conducting square root and inverse transformations for prolonged and problematic gaming, respectively, prior to conducting the regression analyses and follow-up correlations; for the latter, resulting β coefficients and t values are reported in reversed sign for clarity. Block 1 included the gender and age groups, Block 2 additionally included the emotion regulation strategies, and Block 3 alternately included interaction terms with gender and age groups.

Results

Descriptive and Preliminary Analyses

Among the participants, 43.8% engaged in 2 hr or less of average daily gaming over the entire week, 31.3% played between 2 and 4 hr, 13.4% played between 4 and 6 hr, and 11.5% played for more than 6 hr. Table 1 reports the mean and standard deviations of all variables, as well as the gender- and age-group differences. Female participants reported more frequent use of rumination, catastrophizing, and self-blame, and less frequent use of blaming others, positive refocusing, and positive reappraisal compared with participants in the male/diverse group. Furthermore, female participants also reported lower levels of prolonged and problematic gaming. Early adolescence was marked by less frequent use of the majority of adaptive and maladaptive emotion regulation strategies. Only catastrophizing and positive reappraisal were equally used among early and middle adolescence, and the latter group less frequently used positive refocusing. There was no significant difference for prolonged and problematic gaming between early and middle adolescence. The correlations between the emotion regulation strategies and prolonged and problematic gaming are displayed in Table 2. All adaptive emotion regulation strategies correlated positively with each other, as did most maladaptive emotion regulation strategies. Prolonged and problematic gaming also correlated positively. Prolonged and problematic gaming both correlated with catastrophizing, blaming others, acceptance, and positive reappraisal; additionally, each also showed correlations with other emotion regulation strategies. Correlation coefficients ranged between –.12 and .58, thereby not reaching the multicollinearity threshold.

Linear Regression Analyses

The main results of the multiple linear regression analyses with prolonged and problematic gaming as the criterion are presented in Table 3. For prolonged gaming, Model 1 demonstrated a good model fit, $F(2, 623) = 42.41$, $p < .001$; R^2 = .12, with gender emerging as a significant predictor (β = –.35, $p < .001$). Model 2 also showed a good model fit, $F(11, 614) = 10.34$, $p < .001$, R^2 = .16, with emotion regulation strategies accounting for small yet significant additional variance in prolonged gaming, ΔR^2 =

Table 1. Gender and age group differences in cognitive emotion regulation strategies and video gaming

	Total		Gender group						Age group					
	N = 626		Male/Diverse *n* = 288		Female *n* = 338				Early adolescence *n* = 331		Middle adolescence *n* = 295			
	M	*SD*	*M*	*SD*	*M*	*SD*	*t*(624)	Cohen's *d*	*M*	*SD*	*M*	*SD*	*t*(624)	Cohen's *d*
Emotion regulation strategies														
Rumination	2.81	1.01	2.64	.99	2.95	1.02	−3.80**	−.30	2.71	.99	2.92	1.04	−2.53*	−.20
Catastrophizing	2.31	1.06	2.16	.96	2.44	1.12	−3.44**	−.28	2.36	1.09	2.25	1.03	1.32	.11
Self-blame	2.71	1.02	2.53	.90	2.87	1.09	−4.26**	−.34	2.64	1.00	2.79	1.04	−1.89*	−.15
Blaming others	1.88	.83	2.02	.89	1.76	.76	4.01**	.32	1.82	.85	1.94	.80	−1.73*	−.14
Acceptance	3.35	1.06	3.37	1.09	3.29	1.03	1.00	.08	3.21	1.09	3.45	1.00	−2.85**	−.23
Positive refocusing	2.62	1.03	2.70	1.02	2.55	1.04	1.73*	.14	2.71	1.06	2.52	1.00	2.29*	.18
Refocus on planning	3.17	.99	3.23	1.01	3.13	.98	1.21	.10	3.11	.99	3.25	.99	−1.77*	−.14
Putting into perspective	2.94	1.05	2.97	1.03	2.92	1.07	.57	.05	2.85	1.02	3.05	1.08	−2.36*	−.19
Positive reappraisal	2.65	1.06	2.75	1.00	2.57	1.09	2.19*	.18	2.61	1.01	2.70	1.10	−1.12	−.09
Video gaming														
Prolonged	2.95	2.48	3.78	2.60	2.24	2.13	8.15**	.65	2.83	2.39	3.09	2.57	−1.32	−.11
Problematic	1.61	.63	1.81	.63	1.44	.58	7.66**	.61	1.63	.62	1.60	.64	.63	.05

Note. *$p < .05$. **$p < .01$ (based on one-sided tests).

Table 2. Correlations between cognitive emotion regulation strategies and prolonged and problematic gaming

		1	2	3	4	5	6	7	8	9	10	11
1	Rumination	-	.55**	.50**	.08*	.41**	.14**	.36**	.17**	.19**	.01	.18**
2	Catastrophizing		-	.41**	.24**	.16**	-.02	.09**	-.12**	-.05	.08*	.20**
3	Self-blame			-	-.10**	.36**	.00	.18**	.10**	-.04	.02	.13**
4	Blaming others				-	-.04	.05	.04	-.03	.06	.09**	.18**
5	Acceptance					-	.24**	.47**	.40**	.35**	.08*	.09*
6	Positive refocusing						-	.38**	.41**	.49**	-.02	-.01
7	Refocus on planning							-	.45**	.53**	-.08*	-.03
8	Putting into perspective								-	.58**	-.01	-.01
9	Positive reappraisal									-	-.07*	-.09*
10	Prolonged gaming										-	.48**
11	Problematic gaming											-

Note. *$p < .05$. **$p < .01$ (based on two-sided test).

.04, $\Delta F(9, 614) = 2.95$, $p = .002$. Catastrophizing and acceptance emerged as positive predictors (β = .11, p = .032, and β = .10, p = .034, respectively) and refocus on planning as a negative predictor (β = –.13, p = .007), while all other emotion regulation strategies were not significant. VIF values remained lower than 2, indicating the absence of multicollinearity. Neither the addition of interaction terms for the gender group, $\Delta R^2 = .01$, $\Delta F(9, 605) = 1.10$, $p = .361$, nor for age group, $\Delta R^2 = .01$, $\Delta F(9, 605) = .83$, $p = .592$, resulted in a significant change in Model 3. However, a significant gender-group interaction was found for acceptance (β = –.35, p = .032; see Table E2 in ESM 2 for all other β coefficients). An examination of the correlation between acceptance and prolonged gaming per gender group, revealed a significant positive correlation for the male/diverse group (r = .15, p = .009) and no correlation for the female group (r = –.03, p = .594).

For problematic gaming, Model 1 demonstrated a good model fit, ($F(2, 623) = 47.12$, $p < .001$; $R^2 = .13$, with gender and age group emerging as a significant predictor (β = –.36, $p < .001$, and β = –.07, p = .048, respectively). Model 2 also showed a good model fit, $F(11, 614) = 18.09$, $p < .001$, $R^2 = .25$, with emotion regulation strategies accounting for significant additional variance in problematic gaming, $\Delta R^2 = .11$, $\Delta F(9, 614) = 10.24$, $p < .001$. Problematic gaming was predicted by rumination (β = .19, $p < .001$), blaming others (β = .12, p = .001), and positive reappraisal (β = –.18, $p < .001$). VIF values remained lower than 2, indicating the absence of multicollinearity. Although model fit remained good, no significant changes occurred with the addition of interaction terms for gender, $\Delta F(9, 605) = .63$, p = .776, and age group, $\Delta F(9, 605) = 1.23$, p = .275, and no interactions were significant (see Table E3 in ESM 3 for β coefficients).

Discussion

The aim of the current study was to examine the associations between maladaptive and adaptive cognitive emotion regulation strategies and prolonged and problematic video gaming during adolescence. Although Schneider et al. (2018) found that coping strategies were not related to weekly gaming hours, we found that the emotion regulation strategies catastrophizing and refocus on planning were associated with prolonged gaming. Thus, adolescents who were more inclined to plan steps to tackle negative experiences spent less time playing video games, and the more often they catastrophized negative and stressful events, the more hours they would play games during the week. Refocusing on planning as an emotion regulation strategy indicates that adolescents are involved

Table 3. Linear regression analyses for prolonged gaming and problematic gaming as the criterion variable

		Prolonged gaming			Problematic gaming		
		β	*t*	*p*	β	*t*	*p*
Model 1							
	Gender group	–.35	–9.14	< .001	–.36	–9.64	< .001
	Age group	.01	.26	.793	–.07	–1.99	.048
Model 2							
	Gender group	–.37	–9.37	< .001	–.41	–11.12	< .001
	Age group	.01	.17	.863	–.11	–3.07	.002
	Rumination	–.01	–.24	.809	.19	3.79	< .001
	Catastrophizing	.11	2.15	.032	.06	1.24	.215
	Self-blame	.01	.29	.772	.08	1.75	.081
	Blaming others	.02	.49	.623	.12	3.21	.001
	Acceptance	.10	2.12	.034	.05	1.11	.266
	Positive refocusing	–.01	–.15	.879	–.02	–.42	.674
	Refocus on planning	–.13	–2.72	.007	–.05	–1.07	.238
	Putting into perspective	.08	1.51	.130	.08	1.64	.101
	Positive reappraisal	–.09	–1.66	.098	–.18	–3.66	< .001

in planning counteractions and changing situations, which speaks to their agency in the real world. Adolescents not equipped with this strategy might spend more time video gaming, where they can feel more autonomy and competence than in real life (Bäcklund et al., 2022). Thoughts characterized by catastrophizing and rumination have been found to relate to sleep disturbances during childhood (Gregory et al., 2010); adolescents who more frequently catastrophize may have difficulty sleeping and, as a result, spend more time playing video games. Prolonged gaming may also be related to a harm avoidance temperament, which is characterized by fearfulness of uncertainty, shyness among strangers, and fatigability, and related to the use of catastrophizing as an emotion regulation strategy (Izadpanah et al., 2016); staying at home and playing games may serve as a way for adolescents to avoid perceived harm and catastrophizing thoughts. Contrary to the expected direction and past studies (Schneider et al., 2018), the adaptive strategy of acceptance was found to be positively associated with prolonged gaming. Apart from the emotion regulation strategies, which revealed only a small effect, no others were associated with prolonged gaming. It is likely that gaming time during early-to-mid adolescence is more controlled by external restrictions and social factors, which limit the influence of internal emotion regulation strategies. Firstly, adolescents in Germany have mandatory school attendance, with school often ending mid-afternoon and thereby leaving less time for gaming during the week. Secondly, parental regulation of gaming behavior may still be prominent within the age range (Choo et al., 2015). Thirdly, social norms and peer influence have been shown to impact gaming time during early-to-mid adolescence (Amialchuk & Kotalik, 2016). Our findings reveal that although emotion regulation strategies are associated with prolonged gaming, differences exist in the type and magnitude in relation to problematic gaming.

For problematic gaming, the current study revealed positive associations with the maladaptive emotion regulation strategies rumination and blaming others, while there was a negative association with the adaptive strategy positive reappraisal. This aligns with findings from the study by Kökönyei et al. (2019), in which these strategies also emerged as significant. As such, the findings underscore empirical findings and theoretical contemplations that maladaptive emotion regulation can predispose individuals to problematic gaming (Brand et al., 2019; Schneider et al., 2018). When adolescents often ruminate about negative and stressful events they have experienced, playing video games may offer a good cognitive distraction that they learn to grow dependent on (Bender et al., 2020). Blaming others could be linked to frustrations about low competence and autonomy in the real world (i.e., feelings of failure and doubts about self-efficacy, and feeling pressured and controlled by external forces, respectively; Chen et al., 2015), which have been shown to promote escapist motivations and continued gaming (Liao et al., 2022). Furthermore, affinities between emotion regulation strategies and self-esteem may also be relevant (Doron et al., 2013), as the latter has also been connected to problematic gaming (Kavanagh et al., 2023).

In line with previous studies (e.g., Dong & Potenza, 2022; Zimmermann & Iwanski, 2014) we found main effects of gender and age group for most emotion regulation strategies and gaming. On the basis of previous appeals to further investigate the moderating effects of gender and age on the association between emotion regulation strategies and problematic gaming (Giordano, Schmit et al., 2023; Kökönyei et al., 2019; Schettler et al., 2024), we included these in our analyses. However, we found no interaction effects for age group, indicating that in both early and mid-adolescence the emotion regulation strategies identified predict prolonged and problematic gaming. Although one gender-group interaction was found, it should be interpreted with caution due to the potential for Type 1 errors and the lack of theoretical argumentations for differences. Our findings thus suggest that the overall association between emotion regulation strategies and problematic gaming is likely present irrespective of gender.

In agreement with past research and the notion of emotion regulation representing a transdiagnostic process, our findings provide preliminary insights for prevention and intervention measures. As with treatment for other psychopathologies (Rehm & Staiger, 2018), it is important to reduce the use of maladaptive emotion regulation and foster the use of adaptive emotion regulation strategies either in stand-alone trainings or integrated into existing programs to reduce problematic gaming (Bender et al., 2020). Some studies have already shown success in incorporating emotion regulation skill training into larger programs targeting adolescents with problematic gaming (Lindenberg et al., 2022; Szász-Janocha et al., 2021). Förster et al. (2022) suggested that emotion regulation strategies are essential for depression treatments, as certain strategies, such as self-blame, can reduce treatment response and relapse. Similarly, an understanding of the emotion regulation strategies commonly used by adolescents with IGD could provide vital information for their treatment. Despite the majority of adolescents not developing IGD, the high percentage of adolescence deemed to be at risk (e.g., 8.1%; Schneider et al., 2018) speaks of more preventative support that focuses on ensuring the continuous development of social–emotional competencies to buffer against problematic gaming. Within the familial setting, this could include psychoeducation and training around emotion regulation (Giordano, Schmit et al., 2023), as well as digital parenting communications (Modecki et al., 2022), possibly about underlying motivations and emotions. While gaming primarily occurs outside of school (hours), research has shown that aspects such as school connectedness and school climate are linked to problematic gaming (Li et al., 2022; Zhang et al., 2022); this underscores the indirect but significant role of teachers in creating a positive school atmosphere, promoting social–emotional learning, and ultimately helping protect against behavior problems. Lastly, providing psychoeducation to school counselors, who often encounter students who present with problematic gaming (Giordano, Morey et al., 2023), could be beneficial in helping them plan and deliver targeted lessons and counseling.

Limitations and Future Directions

Cross-sectional data were collected in the current study, and thus no causal inferences can be drawn. Furthermore, it cannot be ruled out that memory biases or inaccurate judgments influenced responses on time spent playing video games. Future research employing pre-registered longitudinal designs and diary or ecological momentary assessments may provide a more robust understanding of the developmental processes at play. Within broader debates on the legitimacy of IGD, diagnostic criteria listed in the DSM5 (which were utilized for item creation in the current study) have also been critically questioned (Kardefelt-Winther et al., 2017; Razum et al., 2023) and need to be addressed in future. Another limitation of the current study was the inability to create a separate group for students who identified as diverse when considering gender effects. Although we found similarities, not all emotion regulation strategies identified by Kökönyei et al. (2019) emerged as significant, while Schneider et al. (2018) reported even fewer associations; this further stresses the need for replication studies and explorations for possible reasons. Zimmermann and Iwanski (2014) note that emotion regulation strategies can vary in relation to the emotions experienced (i.e., anger, fear, sadness), indicating that a differentiated examination should be considered in future studies. Given that adolescents with emotion regulation difficulties may be more prone to engaging in rewarding behaviors to manage their emotional states, they are at an increased risk of developing problematic gaming (Giordano, Schmit et al., 2023). Future research could thus focus on students with special educational needs due to emotional and behavioral disorders, who tend to have lower emotion regulation skills (Wilke & Goagoses, 2023) and are more likely to engage in risky behaviors, such as substance use (Goagoses et al., 2024). These students are likely to have an increased risk for problematic gaming (Parker et al., 2013), which should be empirically examined to advance specialized prevention and intervention measures. More research should also examine the developmental pathways to problematic gaming that involve emotion regulation. Just as emotion regulation was found to mediate the relationship between adverse childhood experiences and problematic gaming

(Kim et al., 2023), future research could examine the potential for emotion regulation to explain further familial factors that have an influence on problematic gaming. For instance, parenting styles are associated with both emotion regulation (Goagoses et al., 2023) and problematic gaming (Nielsen et al., 2020), therefore indicating a potential developmental pathway. Lastly, it would be worthwhile to examine the association between different emotion regulation strategies and gaming motivations (Blasi et al., 2019) in order to better understand the mechanisms involved by which maladaptive emotion regulation strategies foster problematic gaming.

Electronic Supplementary Material

The electronic supplementary material is available with the online version of the article at https://doi.org/10.1026/0049-8637/a000303

ESM 1. Items to assess problematic gaming based on the DSM5 Internet gaming disorder criteria.

ESM 2. Linear regression analyses for prolonged gaming as the criterion variable.

ESM 3. Linear regression analyses for problematic gaming as the criterion variable.

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Publication Ethics

Approval was received from the university's ethics committee and data protection officer as well as the regional school authority board. Parents/legal guardians signed consent forms, and participation was voluntary and anonymous.

Authorship

Naska Goagoses: Conceptualization, Methodology, Investigation, Formal analysis, Writing – original draft, Writing – review & editing. Alissa Schüürmann: Conceptualization, Methodology, Investigation, Writing – review & editing. Viktoria Pöchmüller: Data curation, Writing – review & editing. Clemens Hillenbrand: Conceptualization, Methodology, Writing – review & editing, Funding acquisition.

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