

Brief online mindfulness and self-control in problematic gaming: A pilot randomized study

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Abstract

Problematic gaming is characterized by difficulty regulating gaming despite adverse consequences, but brief and accessible interventions for people who screen positive remain underdeveloped. This pilot study examined whether a synchronous online mindfulness program could improve self-control in young adults exhibiting problematic gaming behavior. Twelve people were screened; eight who met the study's gaming and low-self-control thresholds were randomly allocated to mindfulness training (n = 4) or a no-intervention control group (n = 4). The intervention comprised two Google Meet sessions lasting approximately 2-2.5 hours each and included breathing awareness, open monitoring, acceptance, and gaming-urge practices. Self-control was assessed at baseline, posttest, and five-day follow-up. The mindfulness group showed higher self-control than the control group at posttest ($Z = -2.323$, $p = .020$, $r = .82$) and follow-up ($Z = -2.309$, $p = .021$, $r = .82$). Its mean score increased from 34.50 to 46.50 and remained 45.50 at follow-up, whereas control-group means were stable. The within-group pretest-posttest result did not reach the conventional significance threshold ($Z = -1.826$, $p = .068$). The findings indicate a preliminary signal, not confirmatory efficacy, because the sample was extremely small, follow-up was brief, the control condition was inactive, and adherence and participant-level confidence intervals were unavailable. Larger preregistered trials should test durability, mechanisms, and clinically meaningful change.

Keywords: digital mindfulness; pilot randomized study; problematic gaming; self-control; young adults

INTRODUCTION

Background

Digital games are a common form of leisure, social connection, competition, and skill development. High engagement is therefore not inherently harmful. The distinction between enthusiastic play and problematic involvement depends on impaired control and negative



consequences rather than time alone (Billieux et al., 2015; Charlton & Danforth, 2007). In this article, problematic gaming is used as a non-diagnostic umbrella term for a pattern in which gaming becomes difficult to regulate and interferes with personal, academic, social, or health-related functioning. This wording is appropriate because participants were selected with self-report screening measures rather than a diagnostic interview.

Problematic gaming has been associated with depression, anxiety, somatic symptoms, sleep disruption, and reduced quality of life, although the size and direction of associations vary across populations and study designs (Männikkö et al., 2020). The construct is best treated as a continuum. At one end, gamers may report emerging problems while retaining substantial day-to-day functioning. At the other, people may meet formal criteria for gaming disorder. This continuum-based approach avoids equating elevated questionnaire scores with a clinical diagnosis and reduces the risk of pathologizing highly involved but functional players.

Young adults may be especially relevant for prevention and early intervention. University life often combines increased autonomy, academic demands, irregular schedules, and unrestricted access to digital entertainment. Gaming can become an efficient way to escape stress or unpleasant affect. A systematic review found that avoidance coping and escape motives are recurrent correlates of problematic online gaming (Melodia et al., 2022). When gaming repeatedly provides rapid relief, the behavior can become habitual even when it conflicts with longer-term goals.

Self-control is central to this process. It refers to the capacity to regulate thoughts, emotions, and behavior in the service of valued or delayed outcomes (Tangney et al., 2004). A 2025 systematic review and meta-analysis of 46 studies involving 64,681 adolescents and emerging adults found a medium negative association between problematic gaming and self-control, $r = -.287$, 95% CI $[-.33, -.25]$ (Hu et al., 2025). Evidence from clinically validated samples also indicates weaker self-control-related performance among people with specific problematic uses of the internet, including gaming (Müller et al., 2025). These findings support self-control as a plausible intervention target, while also showing that it is only one element in a heterogeneous behavioral pattern.

Emotion regulation provides a complementary explanation. People may game to suppress, avoid, or rapidly change difficult internal states. Estupiñá et al. (2024) concluded that emotional suppression, negative escapism, and related regulation difficulties are consistently associated with problematic video-game use. This relationship is important because repeated reliance on gaming for relief can narrow the person's behavioral repertoire. A self-regulation intervention should therefore do more than encourage abstinence. It should help the individual notice urges, tolerate affect, and choose a response that is consistent with current goals.

Literature review and previous studies

Mindfulness training develops present-moment attention and a less reactive stance toward thoughts, emotions, and bodily sensations. In a problematic-gaming context, this may

create a pause between an urge and the decision to play. Attention to breathing can anchor awareness. Open monitoring can make gaming-related thoughts more observable, and acceptance can reduce the need to escape discomfort immediately. These processes are theoretically compatible with both self-control models and affect-regulation accounts of problematic gaming.

The evidence base has advanced substantially since the earliest small trials. Li et al. (2017) reported a stage I randomized trial of mindfulness-oriented recovery enhancement among adults with severe gaming problems. Reichrath and Pietrowsky (2022) subsequently developed a four-week online mindfulness intervention for people with problematic internet gaming behavior and showed that a gamified format was usable in a subclinical sample. These studies established feasibility, but they left uncertainty about the effect of very brief synchronous delivery on self-control.

Recent syntheses also support cautious optimism. Fendel et al. (2024) reviewed mindfulness programs for problematic internet use and found probable benefits, although study quality and heterogeneity limited certainty. In university populations not selected for gaming problems, online mindfulness programs have improved stress, anxiety, depression, and mindfulness relative to controls (Gong et al., 2023). A four-week randomized digital program likewise reduced stress and anxiety in unselected college students (Xiong et al., 2025), and a newer meta-analysis reported broadly comparable stress reduction for online and traditional formats (Wang et al., 2026). These student studies support the delivery method only; they are not direct evidence for people exhibiting problematic gaming. Digital delivery is therefore plausible and scalable, yet its effects cannot be assumed to generalize automatically to problematic gaming or to self-control.

Gaming-specific intervention studies provide stronger mechanistic evidence, but most have examined participants at the clinical end of the severity spectrum. A systematic review has documented structural and functional neural differences among adolescents exhibiting problematic gaming (Schettler et al., 2022), while a treatment review found that the early intervention evidence remained limited by small samples and methodological variation (Zajac et al., 2020). In a randomized clinical trial, Ni et al. (2024) found that eight mindfulness sessions reduced gaming severity and craving more than progressive muscle relaxation. Changes in frontopallidal activity and connectivity were associated with craving reduction. Xu et al. (2024) similarly reported reduced gaming craving alongside altered connectivity between default-mode and executive-control regions. Later neuroimaging work linked mindfulness-related improvement to stronger coupling within executive-control and frontostriatal networks (Li et al., 2025; Xu et al., 2025). In 2026, Xu et al. extended these findings to participants with co-occurring gaming problems and depression, reporting improvements in craving, gaming severity, and affective symptoms after eight sessions.

These clinical trials are relevant because they identify plausible attentional and inhibitory mechanisms. Nevertheless, their samples, intensity, imaging protocols, and active control conditions differ markedly from a two-session online pilot. Their results should not be

treated as direct evidence that an ultra-brief program will work in a subclinical or screening-positive population. The current study instead asks whether the direction of change is consistent with that broader mechanistic literature.

The newest directly comparable evidence comes from a South Korean pilot study of mindfulness-based cognitive therapy for college-aged students at risk for problematic gaming. Eight group sessions improved self-control and reduced gaming-related symptoms, with several effects retained four weeks later (Yoon et al., 2026). That study strengthens the rationale for mindfulness in an at-risk student population. It also sharpens the remaining question: can a much shorter, fully online format produce an observable self-control signal when resources and participant availability are limited?

Research gap and objectives

Previous studies have established three points. First, lower self-control and emotion-regulation difficulties are associated with problematic gaming. Second, mindfulness interventions can improve regulatory outcomes in students and in people with problematic technology use. Third, gaming-specific clinical trials suggest that mindfulness may reduce craving by changing the relationship between executive-control and reward-related processes.

What remains unclear is whether a two-session synchronous online program is sufficient to improve self-control among young adults selected through problematic-gaming and low-self-control screening. Existing gaming-specific trials have usually involved four to eight weeks of training, larger samples, or clinically characterized participants. Online programs have often targeted general distress rather than gaming-related self-regulation. Evidence for short-duration, facilitator-led online delivery in a screening-positive population is therefore limited.

Unlike previous studies that tested multiweek clinical protocols or general student mental-health programs, the present study evaluated two extended online sessions focused on awareness, acceptance, and gaming urges. Its contribution is deliberately modest: it tests whether an ultra-brief format shows a preliminary signal and documents the limitations that must be addressed before an efficacy claim is warranted. The primary objective was to compare self-control between the mindfulness and control groups at posttest. The secondary objectives were to examine the five-day follow-up difference and within-group change over time. It was hypothesized that self-control would increase more in the mindfulness group than in the no-intervention control group.

Research benefits

Theoretically, the study connects problematic gaming with a trainable regulatory process rather than treating the behavior as a fixed identity or diagnosis. Methodologically, it illustrates the value and the danger of small pilot experiments: they can reveal feasibility and effect direction, but their estimates are unstable and should not be used as definitive proof. Practically, an effective brief online module could be incorporated into university counseling or prevention services as a low-threshold adjunct. Any such use should include screening for

severity, referral pathways for clinically significant impairment, and clear communication that mindfulness is not a substitute for comprehensive assessment or treatment.

RESEARCH METHOD

Design

The study used a parallel, randomized pretest-posttest control-group design with a short follow-up. Participants were assigned to a mindfulness condition or a no-intervention control condition. Self-control was assessed at baseline, immediately after the intervention period, and five days later. The source record described random assignment but did not retain details about sequence generation or allocation concealment. The design should therefore be understood as a pilot randomized study rather than a definitive randomized clinical trial.

Pilot status was determined by the restricted recruitment yield and the study's developmental purpose. Only 12 people entered screening, and eight met both the problematic-gaming and low-self-control criteria. The synchronous format also required availability for two lengthy online sessions. No prospective power analysis was reported. Consistent with recommendations for pilot and feasibility studies, the results are used to examine direction, implementation, and reporting needs rather than to establish population-level efficacy (Eldridge et al., 2016; Leon et al., 2011).

Research participants

Participants were recruited through online announcements. Eligibility required a screening result indicating problematic gaming, low self-control according to the study threshold, and daily gaming exposure exceeding three hours. Twelve individuals were screened and eight were eligible. They were predominantly undergraduate students, with a mean age of 21.4 years (SD = 1.8). Four participants were allocated to the mindfulness group and four to the control group.

The revised terminology is important for interpreting the sample. The Gaming Addiction Scale was used as a screening instrument, and the available record did not document a structured diagnostic interview. Participants are therefore described as exhibiting problematic gaming behavior, not as having a diagnosed disorder. The threshold value and scoring rule used during recruitment were not preserved in the source manuscript. This reporting gap limits reproducibility and should be corrected from the original screening file if it becomes available.

All participants provided electronic informed consent. The source manuscript stated that the research followed institutional ethical guidelines, but it did not report the name of the approving committee or an approval number. No such information has been invented in this revision. The authors should supply the formal ethics details during editorial processing if approval documentation exists.

Data collection instruments

Problematic gaming was screened with the Gaming Addiction Scale developed by Lemmens et al. (2009). The instrument was designed to assess salience, tolerance, mood modification, relapse, withdrawal, conflict, and problems. These domains capture impaired regulation and consequences, which makes the measure compatible with the broader term problematic gaming. The source manuscript reported Cronbach's alpha of .935 in the present sample. With only eight participants, however, this coefficient is highly unstable and should not be interpreted as a precise reliability estimate. The cited scale development and validation literature provides the stronger basis for measurement quality (Costa et al., 2020; Lemmens et al., 2009).

Self-control was assessed with the study's Self-Control Scale. The source manuscript linked its conceptual basis to general self-control theory and to the work of Tangney et al. (2004), and it reported Cronbach's alpha of .874. Higher scores represented stronger self-control. The archived article did not specify the number of items, response anchors, possible score range, adaptation source, or final Indonesian items. Consequently, the present revision does not claim that the instrument was the Brief Self-Control Scale or another named version. This distinction prevents an unsupported psychometric attribution. Future reports should provide the full instrument description or cite a documented adaptation.

The source manuscript stated that the measures were administered in Bahasa Indonesia after forward and backward translation and pilot pretesting. Translator qualifications, reconciliation procedures, and pilot results were not available. These details are reported as unavailable rather than reconstructed. Internal consistency values are presented as sample descriptors, not evidence that translation equivalence was established.

Intervention and data collection procedure

The intervention was delivered synchronously through Google Meet in two sessions. Each session lasted approximately 2-2.5 hours. A licensed psychologist with training in mindfulness-based therapy facilitated both meetings. Across the two sessions, the documented elements were breathing and awareness practice, open-monitoring meditation, nonjudgmental acceptance of thoughts and affective states, and a craving-release exercise focused on disengaging from gaming urges.

Breathing awareness was intended to stabilize attention and help participants recognize when attention had been captured automatically. Open monitoring broadened awareness to thoughts, emotions, and bodily sensations without requiring participants to suppress them. Acceptance practice emphasized allowing an urge to be present without treating it as a command. The gaming-urge exercise then applied these skills to a personally relevant cue. Participants were encouraged to notice the onset, bodily quality, and changing intensity of an urge before choosing whether and how to respond.

The control group received no active intervention during the study period. This condition permits comparison with the passage of time but does not control for facilitator

attention, expectancy, group contact, or time spent in a structured activity. Improvements in the mindfulness group could therefore reflect specific mindfulness skills, nonspecific therapeutic factors, or both.

Table 1. Documented intervention and implementation characteristics

Characteristic		Documented information
Format and platform		Synchronous group meetings through Google Meet
Dose		Two sessions; approximately 2-2.5 hours per session (approximately 4-5 total contact hours)
Facilitator		Licensed psychologist trained in mindfulness-based therapy
Core components		Breathing awareness; open monitoring; nonjudgmental acceptance; gaming-urge and craving-release practice
Control condition		No active intervention during the study period
Assessment retention		Eight of eight randomized participants contributed scores at baseline, posttest, and five-day follow-up
Attendance adherence	and	Session-level attendance counts and practice logs were not available in the source record
Homework monitoring	and	No structured homework dose, technical-disruption log, or independent fidelity rating was documented

All eight participants contributed scores at the three reported assessment points, which indicates complete assessment retention in the summary dataset. The available record did not contain session-level attendance counts, practice logs, homework frequency, technical-disruption records, or independent fidelity ratings. It also did not document a structured homework dose. Table 1 separates what is known from what was not available, thereby avoiding retrospective fabrication. These omissions are methodologically important because digital mindfulness effects can depend on exposure, engagement, and human support.

Data analysis

The original analysis was conducted in SPSS version 26. Because each group contained only four participants and normality could not be evaluated meaningfully, between-group comparisons used the Mann-Whitney U test and within-group comparisons used the Wilcoxon signed-rank test. Tests were two-tailed with alpha set at .05. The reported p values are the asymptotic values preserved in the source output. Exact p values and participant-level resampling were not available.

To improve interpretability, rank-based effect sizes were recalculated from the reported Z statistics as $r = |Z| / \text{square root of } N$. For between-group tests, N was the total number of participants (N = 8). For paired within-group tests, N was the number of paired observations (N = 4). These calculations yield larger values than those reported in the reviewed draft and

correct the denominator used there. Because r is based on only four participants per condition, it should be treated as an unstable magnitude indicator.

Exploratory 95% confidence intervals for posttest and follow-up mean differences were calculated from the reported group means, standard deviations, and sample sizes using Welch's method. These intervals describe the difference in means under a parametric approximation; they are not confidence intervals for the Mann-Whitney statistic. Participant-level confidence intervals for the rank effect and paired change could not be reconstructed from aggregate information. No correction for multiple testing was reported, so secondary analyses are interpreted cautiously.

RESULTS AND DISCUSSION

Results

Descriptive statistics

At baseline, the mindfulness group had a mean self-control score of 34.50 ($SD = 3.20$), compared with 32.25 ($SD = 3.40$) in the control group. The exploratory mean difference was 2.25 points, 95% CI $[-3.47, 7.97]$. The interval includes no difference and reflects substantial uncertainty. Baseline comparability cannot be established confidently with four participants per group.

After the intervention, the mindfulness-group mean increased to 46.50 ($SD = 2.80$). The control-group mean remained similar at 33.00 ($SD = 3.10$). At the five-day follow-up, the mindfulness-group mean was 45.50 ($SD = 3.10$), while the control-group mean was 32.00 ($SD = 3.00$). Table 2 presents the descriptive values and observed ranges. Figure 1 shows the group means across the three assessments.

Table 2. Self-control scores by group and assessment

Group	Assessment	n	Mean	SD	Observed range
Mindfulness	Baseline	4	34.50	3.20	29-38
Mindfulness	Posttest	4	46.50	2.80	42-50
Mindfulness	Five-day follow-up	4	45.50	3.10	40-49
Control	Baseline	4	32.25	3.40	28-37
Control	Posttest	4	33.00	3.10	29-37
Control	Five-day follow-up	4	32.00	3.00	28-36

Note. SD = standard deviation. Higher scores indicate stronger self-control. Values reproduce the descriptive statistics reported in the reviewed manuscript.

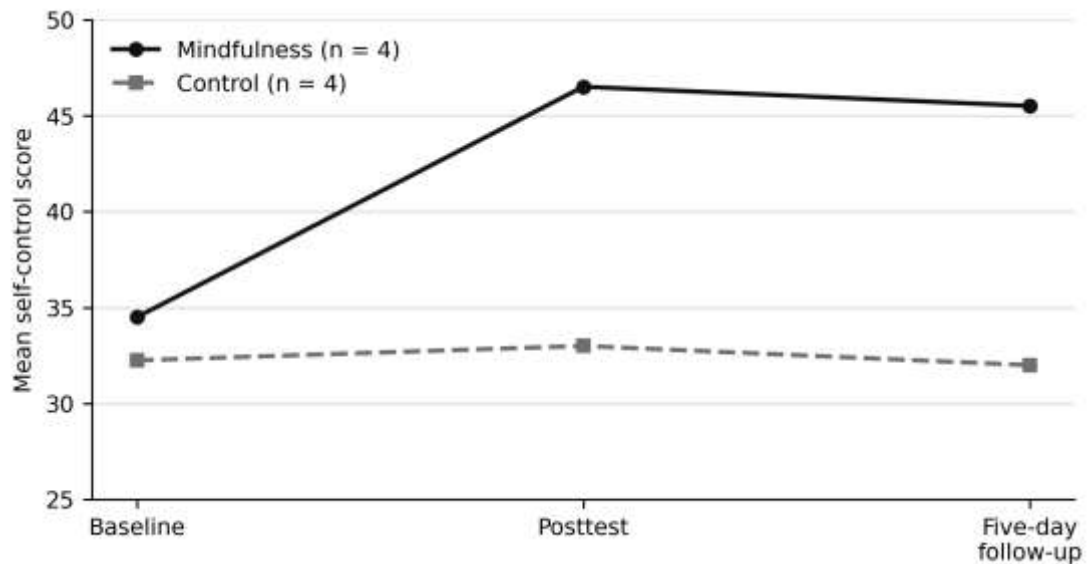


Figure 1. Mean self-control scores across assessments

Note. The figure plots reported group means; error bars are omitted because participant-level data were unavailable.

Between-group comparisons

At posttest, the reported Mann-Whitney analysis indicated higher self-control in the mindfulness group, $Z = -2.323$, $p = .020$. The recalculated rank effect was $r = .82$. The mean difference was 13.50 points, with an exploratory Welch 95% CI [8.38, 18.62]. At follow-up, the between-group result was also statistically significant, $Z = -2.309$, $p = .021$, $r = .82$. The mean difference remained 13.50 points, 95% CI [8.22, 18.78].

These values indicate clear separation in the observed sample. They do not establish a stable population effect. With four participants per group, one observation can materially change the rank ordering, variance, and effect estimate. The confidence intervals for mean differences rely on a parametric approximation, while the primary tests were nonparametric. The results are therefore best described as a strong preliminary signal within this dataset.

Within-group comparisons

The mindfulness group showed a pretest-posttest increase, but the Wilcoxon result did not cross the conventional threshold, $Z = -1.826$, $p = .068$. The recalculated effect was $r = .91$. This combination of a large standardized rank effect and a nonsignificant p value is possible in an extremely small sample. It demonstrates why statistical significance alone is insufficient and why a large pilot effect should not be taken literally.

The control group showed little change, $Z = -0.447$, $p = .655$, $r = .22$. Its mean decreased by 0.25 points from baseline to follow-up. Participant-level paired differences and their confidence intervals were not available, so the temporal results cannot be examined for individual variability or reliable change.

Table 3. Nonparametric comparisons and effect-size estimates

Comparison	Test	Z	p	r	Mean difference (95% CI)
Posttest: mindfulness vs control	Mann-Whitney U	- 2.32 3	.020 *	.82	13.50 (8.38, 18.62)
Follow-up: mindfulness vs control	Mann-Whitney U	- 2.30 9	.021 *	.82	13.50 (8.22, 18.78)
Baseline to posttest: mindfulness	Wilcoxon signed-rank	- 1.82 6	.068	.91	Not estimable from aggregate data
Baseline to posttest: control	Wilcoxon signed-rank	- 0.44 7	.655	.22	Not estimable from aggregate data

Note. CI = confidence interval. Rank effect size $r = |Z| / \text{square root of } N$, where $N = 8$ for between-group tests and $N = 4$ for paired tests. The 95% CIs are exploratory Welch intervals for differences in means, not intervals for the Mann-Whitney statistic. Reported p values are asymptotic and unadjusted. * $p < .05$.

Informal participant feedback

The reviewed manuscript recorded informal post-session reports of greater awareness of gaming urges, less impulsive responding, improved calmness, and better concentration. These comments were not collected with a qualitative protocol, transcribed, coded, or linked systematically to individual scores. They are therefore contextual observations rather than qualitative findings. They may help generate hypotheses about mechanisms, but they cannot corroborate the quantitative outcome.

Discussion

Interpretation of the findings

The study found higher posttest and five-day follow-up self-control scores in the mindfulness group than in the no-intervention control group. The descriptive trajectory was consistent: the mindfulness mean rose after training and remained close to the posttest value, while the control mean changed little. The appropriate conclusion is that the program produced a promising short-term signal in this pilot sample. The data do not support a definitive efficacy claim.

This restrained interpretation is necessary for several reasons. The between-group tests were significant, but the within-group mindfulness comparison was not. The sample was too small to estimate an effect precisely, and the p values were asymptotic rather than exact. The control group did not receive an attention-matched activity. The follow-up lasted only five days. In addition, the study measured self-control but did not report post-intervention problematic-gaming scores. It therefore cannot show that improved self-control translated into less gaming-related impairment.

The finding nevertheless aligns with the broader literature. Hu et al. (2025) identified self-control as a consistent correlate of problematic gaming across adolescents and emerging adults. Yoon et al. (2026) reported that an eight-session mindfulness-based cognitive therapy program improved self-control among college-aged students at risk for problematic gaming. The present study differs in dose and delivery: it compressed training into two synchronous online meetings and assessed only short-term change. Similar direction across these designs supports further investigation, but it does not make the studies equivalent.

Possible psychological mechanisms

One plausible mechanism is attentional interruption. Problematic gaming can involve rapid progression from cue to urge to action. Breath-focused attention may help participants detect that sequence earlier. Open monitoring may then reduce attentional capture by allowing a gaming thought to be noticed without prolonged elaboration. In this account, self-control improves because the decision point becomes more visible, not because the urge disappears.

A second mechanism is decentering. Participants were invited to experience a thought such as "I need to play now" as a mental event rather than an instruction. This shift may weaken the perceived inevitability of gaming. It also fits the distinction between suppression and regulation. Trying to force an urge away can make it more salient, whereas noticing its rise and decline may support a deliberate response.

A third mechanism is improved tolerance of negative affect. Emotion-regulation research indicates that problematic gaming is often connected with escapism, suppression, and difficulty managing distress (Estupiñá et al., 2024; Melodia et al., 2022). If mindfulness increases willingness to remain with discomfort briefly, gaming may become less necessary as an immediate escape strategy. The intervention's acceptance and craving-release components were designed to exercise this capacity.

Neurocognitive studies offer convergent, but indirect, support. Recent randomized work in clinical samples has linked mindfulness-related reductions in gaming craving to altered activity and connectivity across medial frontal, striatal, executive-control, and default-mode systems (Li et al., 2025; Ni et al., 2024; Xu et al., 2024, 2025). These findings are compatible with stronger top-down regulation and reduced cue reactivity. However, the present study did not measure neural activity, attention, emotion regulation, or craving. Any mechanistic explanation remains a hypothesis rather than a tested mediator.

Theoretical implications

The results support a process-oriented view of problematic gaming. Under this view, the relevant target is not gaming itself but the loss of flexible choice around gaming. This avoids framing all frequent play as pathology. It also explains why self-control and emotion regulation can be useful intervention targets without being treated as the sole cause of the behavior.

The study also suggests that trait and state perspectives should be distinguished. The Self-Control Scale was described as measuring a broad regulatory capacity, yet a two-session

program is more likely to alter accessible strategies, momentary confidence, or context-specific control than a stable trait. The observed score increase may reflect genuine regulatory change, demand characteristics, or changed interpretation of items. Future studies should combine trait questionnaires with behavioral tasks, ecological momentary assessment, and gaming-specific outcomes.

The intervention dose raises another theoretical issue. Traditional mindfulness programs rely on repeated practice to consolidate attention and acceptance skills. A brief intensive format may produce rapid insight or motivation, but its effects may fade without continued practice. The five-day follow-up cannot distinguish initial learning from durable self-regulation. Dose-response studies should compare brief, extended, and booster-supported formats rather than assuming that more or less training is universally better.

Practical implications

For university counseling services, synchronous online delivery may reduce geographic and scheduling barriers. A two-session module could be offered as an entry point for students who recognize difficulty controlling gaming but do not seek formal treatment. The program should be presented as skill training, not as a diagnostic intervention. Screening should include functional impairment, distress, safety concerns, and co-occurring symptoms, followed by referral when problems are severe.

Implementation requires more structure than was documented in this pilot. A replicable program should specify learning objectives, minute-by-minute activities, facilitator scripts, practice recordings, homework dose, attendance criteria, and procedures for managing technical difficulties. Engagement should be measured through session attendance, practice logs, and brief in-session competency checks. Human support may be particularly important in digital interventions because it can clarify exercises and respond to disengagement.

An active control is also needed. Progressive muscle relaxation, health education, or supportive group contact could match attention and expectancy while differing in the hypothesized mechanism. Recent clinical trials have used progressive muscle relaxation successfully for this purpose (Ni et al., 2024; Xu et al., 2025). A three-arm design could distinguish mindfulness-specific effects from relaxation and nonspecific contact.

Limitations

The first limitation is sample size. Four participants per condition provide very low power and highly unstable effect estimates. Randomization cannot be expected to balance prognostic characteristics reliably at this scale. The recruitment yield also limits external validity because eligible and available volunteers may be more motivated than other people with problematic gaming. The large observed effects may reflect sampling variability, regression to the mean, or both.

Second, the follow-up was only five days. This interval can show immediate persistence but cannot establish maintenance, relapse prevention, or behavior change. Studies of online mindfulness in students typically use longer programs and assessment windows (Gong et al.,

2023; Wang et al., 2026). Gaming-specific pilots have also used multiweek interventions and later follow-up points (Reichrath & Pietrowsky, 2022; Yoon et al., 2026).

Third, all principal outcomes were self-reported. Participants knew their condition, and the intervention group had substantial contact with a psychologist. Expectancy, social desirability, and demand characteristics could increase posttest scores. The no-intervention control group did not receive equivalent contact. Future trials should add behavioral inhibition tasks, device-verified gaming metrics with consent, informant reports where appropriate, and blinded outcome processing.

Fourth, the source record did not provide the gaming-screening cutoff, full Self-Control Scale specification, allocation procedure, adherence metrics, homework records, fidelity assessment, or ethics approval identifier. These omissions constrain replication. They also prevent sensitivity analyses based on intervention dose and baseline severity. Transparent absence reporting is preferable to reconstructing details after the fact, but it does not eliminate the limitation.

Fifth, the analysis relied on multiple nonparametric comparisons and preserved asymptotic p values from the original output. Participant-level data were not available for exact tests, bootstrap confidence intervals, missing-data checks, or baseline-adjusted modeling. The exploratory Welch intervals are based on summary statistics and should not be confused with distribution-free intervals. A larger trial should prespecify one primary endpoint, use an intention-to-treat approach, and report exact or model-based estimates with confidence intervals.

Sixth, the sample consisted predominantly of young undergraduate students who played more than three hours daily. The findings may not generalize to adolescents, older adults, nonstudents, casual players, people with severe impairment, or players whose difficulties arise in different cultural and family contexts. Because gaming can be beneficial and socially meaningful, future work should assess functional impairment and personal goals rather than using time thresholds as a proxy for harm.

Finally, the study measured self-control rather than change in problematic gaming itself. A stronger design would include gaming-related impairment, craving, gaming time, sleep, academic functioning, and quality of life as outcomes. Mediation measures collected repeatedly could test whether changes in attention, acceptance, craving, or emotion regulation precede changes in self-control and gaming behavior.

CONCLUSION

Two synchronous online mindfulness sessions were associated with higher self-control at posttest and five-day follow-up among eight young adults who screened positive for problematic gaming and low self-control. The between-group rank effects were large in the observed sample, while the within-group pretest-posttest test did not reach conventional

significance. This pattern should be interpreted as a preliminary feasibility and effect-direction signal.

The study's main contribution is its focus on an ultra-brief online format and a non-diagnostic problematic-gaming population. Recent evidence supports mindfulness as a promising approach for gaming-related craving and self-regulation, including multiweek trials in clinical and at-risk college samples. The present results extend that rationale to a shorter delivery model, but they do not establish clinical effectiveness.

Future research should use adequately powered, preregistered randomized trials with active controls, longer follow-up, detailed intervention manuals, adherence monitoring, participant-level confidence intervals, and multimethod outcomes. Such trials should test whether gains in attentional control, acceptance, and emotion regulation mediate reduced gaming-related impairment. Until then, brief online mindfulness is best regarded as a promising adjunct that requires further validation.

Conflict of interest. The authors declare that the research was conducted in the absence of commercial or financial relationships that could be construed as a potential conflict of interest.

REFERENCES

- Billieux, J., Schimmenti, A., Khazaal, Y., Maurage, P., & Heeren, A. (2015). Are we overpathologizing everyday life? A tenable blueprint for behavioral addiction research. *Journal of Behavioral Addictions*, 4(3), 119-123. <https://doi.org/10.1556/2006.4.2015.009>
- Charlton, J. P., & Danforth, I. D. W. (2007). Distinguishing addiction and high engagement in the context of online game playing. *Computers in Human Behavior*, 23(3), 1531-1548. <https://doi.org/10.1016/j.chb.2005.07.002>
- Costa, S., Barberis, N., Gugliandolo, M. C., Liga, F., Cuzzocrea, F., & Verrastro, V. (2020). Examination of the psychometric characteristics of the Italian version of the Game Addiction Scale for Adolescents. *Psychological Reports*, 123(4), 1365-1381. <https://doi.org/10.1177/0033294119838758>
- Eldridge, S. M., Chan, C. L., Campbell, M. J., Bond, C. M., Hopewell, S., Thabane, L., & Lancaster, G. A. (2016). CONSORT 2010 statement: Extension to randomised pilot and feasibility trials. *BMJ*, 355, i5239. <https://doi.org/10.1136/bmj.i5239>
- Estupiñá, F. J., Bernaldo-de-Quirós, M., Vallejo-Achón, M., Fernández-Arias, I., & Labrador, F. (2024). Emotional regulation in gaming disorder: A systematic review. *The American Journal on Addictions*, 33(6), 605-620. <https://doi.org/10.1111/ajad.13621>
- Fendel, J. C., Vogt, A., Brandtner, A., & Schmidt, S. (2024). Mindfulness programs for problematic usage of the internet: A systematic review and meta-analysis. *Journal of Behavioral Addictions*, 13(2), 327-353. <https://doi.org/10.1556/2006.2024.00024>

- Gong, X.-G., Wang, L.-P., Rong, G., Zhang, D.-N., Zhang, A.-Y., & Liu, C. (2023). Effects of online mindfulness-based interventions on the mental health of university students: A systematic review and meta-analysis. *Frontiers in Psychology*, 14, 1073647. <https://doi.org/10.3389/fpsyg.2023.1073647>
- Hu, Y., Chen, S., Qi, D., & Zhu, S. (2025). Problematic gaming and self-control among adolescents and emerging adults: A systematic review and meta-analysis. *Cyberpsychology, Behavior, and Social Networking*, 28(5), 301-317. <https://doi.org/10.1089/cyber.2024.0537>
- Lemmens, J. S., Valkenburg, P. M., & Peter, J. (2009). Development and validation of a Game Addiction Scale for adolescents. *Media Psychology*, 12(1), 77-95. <https://doi.org/10.1080/15213260802669458>
- Leon, A. C., Davis, L. L., & Kraemer, H. C. (2011). The role and interpretation of pilot studies in clinical research. *Journal of Psychiatric Research*, 45(5), 626-629. <https://doi.org/10.1016/j.jpsychires.2010.10.008>
- Li, S., Jiang, A., Ma, X., Zhang, Z., Ni, H., Wang, H., Liu, C., Song, X., & Dong, G.-H. (2025). Transformative effects of mindfulness meditation training on the dynamic reconfiguration of executive and default mode networks in internet gaming disorder. *Biological Psychiatry: Global Open Science*, 5(4), 100485. <https://doi.org/10.1016/j.bpsgos.2025.100485>
- Li, W., Garland, E. L., McGovern, P., O'Brien, J. E., Tronnier, C., & Howard, M. O. (2017). Mindfulness-oriented recovery enhancement for internet gaming disorder in U.S. adults: A stage I randomized controlled trial. *Psychology of Addictive Behaviors*, 31(4), 393-402. <https://doi.org/10.1037/adb0000269>
- Männikkö, N., Ruotsalainen, H., Miettunen, J., Pontes, H. M., & Kääriäinen, M. (2020). Problematic gaming behaviour and health-related outcomes: A systematic review and meta-analysis. *Journal of Health Psychology*, 25(1), 67-81. <https://doi.org/10.1177/1359105317740414>
- Melodia, F., Canale, N., & Griffiths, M. D. (2022). The role of avoidance coping and escape motives in problematic online gaming: A systematic literature review. *International Journal of Mental Health and Addiction*, 20(2), 996-1022. <https://doi.org/10.1007/s11469-020-00422-w>
- Müller, S. M., Antons, S., Schmid, A. M., Thomas, T. A., Kessler, A., Joshi, M., Krikova, K., Kampa, M., Mallon, L., Schmidt, L. D., Klein, L., Dominick, N., Büsche, K., Oelker, A., Brandtner, A., Montag, C., Wölfling, K., Wolf, O. T., Diers, M., ... Brand, M. (2025). Self-control abilities in specific types of problematic usage of the internet: Findings from clinically validated samples with neurocognitive tasks. *American Journal of Psychiatry*, 182(7), 660-670. <https://doi.org/10.1176/appi.ajp.20240486>

- Ni, H., Wang, H., Ma, X., Li, S., Liu, C., Song, X., Potenza, M. N., & Dong, G.-H. (2024). Efficacy and neural mechanisms of mindfulness meditation among adults with internet gaming disorder: A randomized clinical trial. *JAMA Network Open*, 7(6), e2416684. <https://doi.org/10.1001/jamanetworkopen.2024.16684>
- Reichrath, B., & Pietrowsky, R. (2022). Usability and applicability of a mindfulness based online intervention developed for people with problematic internet gaming behavior. *International Journal of Psychology and Counselling*, 14(2), 17-25. <https://doi.org/10.5897/IJPC2021.0658>
- Schettler, L., Thomasius, R., & Paschke, K. (2022). Neural correlates of problematic gaming in adolescents: A systematic review of structural and functional magnetic resonance imaging studies. *Addiction Biology*, 27(1), e13093. <https://doi.org/10.1111/adb.13093>
- Tangney, J. P., Baumeister, R. F., & Boone, A. L. (2004). High self-control predicts good adjustment, less pathology, better grades, and interpersonal success. *Journal of Personality*, 72(2), 271-324. <https://doi.org/10.1111/j.0022-3506.2004.00263.x>
- Wang, Y., Qu, W., Liu, H., Peng, Z., & Hu, Y. (2026). Online and traditional mindfulness-based interventions for stress in university students: A systematic review and meta-analysis versus control conditions. *Frontiers in Psychology*, 17, 1755245. <https://doi.org/10.3389/fpsyg.2026.1755245>
- Xiong, W., Yu, X., Yu, L., & Yang, F. (2025). Effect of digital mindfulness on perceived stress and anxious emotion among college students. *Frontiers in Psychiatry*, 16, 1644370. <https://doi.org/10.3389/fpsyt.2025.1644370>
- Xu, X., Ma, X., Ni, H., Wang, H., Wang, T., Liu, C., Song, X., & Dong, G.-H. (2024). Mindfulness meditation training reduces gaming cravings by reshaping the functional connectivity between default mode network and executive control-related brain regions. *Biological Psychiatry: Cognitive Neuroscience and Neuroimaging*, 9(8), 827-836. <https://doi.org/10.1016/j.bpsc.2024.04.011>
- Xu, X., Ni, H., Wang, H., Wang, T., Liu, C., Song, X., & Dong, G.-H. (2025). Functional connectivity-related changes underlying mindfulness meditation for internet gaming disorder: A randomized clinical trial. *npj Mental Health Research*, 4, 31. <https://doi.org/10.1038/s44184-025-00154-6>
- Xu, X., Wang, H., Cui, S., Liu, C., Song, X., & Dong, G.-H. (2026). The effect and neural changes underlying mindfulness meditation training in patients with comorbid internet gaming disorder and depression: A randomized clinical trial. *Translational Psychiatry*, 16, 131. <https://doi.org/10.1038/s41398-026-03837-6>
- Yoon, A., Park, Y., Kim, M. A., Chiu, I., Solomon, P., Kim, S. J., Oh, H., & Kuyken, W. (2026). A pilot study of a mindfulness-based cognitive therapy for internet gaming disorder among college-aged students in South Korea. *Mindfulness*, 17, 1762-1780. <https://doi.org/10.1007/s12671-026-02855-1>

Zajac, K., Ginley, M. K., & Chang, R. (2020). Treatments of internet gaming disorder: A systematic review of the evidence. *Expert Review of Neurotherapeutics*, 20(1), 85-93. <https://doi.org/10.1080/14737175.2020.1671824>

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AI Disclosure

Generative artificial intelligence (AI) and AI-assisted technologies were used solely to improve the readability and organization of the manuscript. All outputs generated through these tools were carefully reviewed, edited, and validated by the author to ensure accuracy, completeness, and alignment with the study's original content. The author assumes full responsibility and accountability for the integrity of the work, including its analysis, interpretation, and conclusions. AI tools were not used for data generation, data analysis, or as a substitute for scholarly judgment, and are not listed as authors or co-authors of this study.

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