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Modeling the Psychological Determinants of Digital Addiction: The Mediating Roles of Loneliness, Self-Control, and Emotional Dysregulation

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A B S T R A C T

Objective: This study aimed to model the psychological determinants of digital addiction among Canadian adults by examining the direct and indirect effects of loneliness, self-control, and emotional dysregulation within an integrated structural equation model.

Methods and Materials: This quantitative cross-sectional correlational study was conducted among 642 adults residing in Canada who reported regular daily use of digital technologies. Participants completed standardized self-report measures assessing digital addiction, loneliness, self-control, and emotional dysregulation. Data were analyzed using IBM SPSS Statistics version 29 and AMOS version 29. Preliminary analyses included assessment of normality, reliability, convergent validity, and correlations among study variables. The hypothesized relationships among the constructs were tested using structural equation modeling with maximum likelihood estimation. Model fit was evaluated using χ^2/df, CFI, TLI, GFI, AGFI, RMSEA, and SRMR. Indirect effects were examined through bootstrap resampling with 5,000 samples and bias-corrected 95% confidence intervals.

Findings: The measurement model demonstrated satisfactory fit to the data, χ^2/df = 2.11, CFI = .970, TLI = .966, GFI = .941, AGFI = .929, RMSEA = .042, and SRMR = .039. Digital addiction was positively associated with loneliness and emotional dysregulation and negatively associated with self-control. In the structural model, emotional dysregulation significantly predicted digital addiction (β = .42, $p < .001$), self-control significantly and negatively predicted digital addiction (β = −.39, $p < .001$), and loneliness significantly predicted digital addiction (β = .23, $p < .001$). Loneliness significantly predicted emotional dysregulation (β = .48, $p < .001$) and negatively predicted self-control (β = −.37, $p < .001$), while emotional dysregulation negatively predicted self-control (β = −.46, $p < .001$). Bootstrap results confirmed significant indirect effects of

loneliness on digital addiction through emotional dysregulation and self-control. The final model explained 68% of the variance in digital addiction.

Conclusion: The findings indicate that digital addiction is shaped by interconnected interpersonal, emotional, and self-regulatory mechanisms. Loneliness contributes to problematic digital use both directly and indirectly by increasing emotional dysregulation and weakening self-control. These results highlight the importance of addressing emotional regulation, self-control, and social connectedness in prevention and intervention programs for digital addiction.

Keywords: *Digital addiction; loneliness; self-control; emotional dysregulation; structural equation modeling; Canada.*

1. Introduction

Digital technologies have become deeply embedded in contemporary social, educational, occupational, and recreational life, transforming how individuals communicate, learn, work, seek information, and regulate daily routines. Smartphones, social networking platforms, streaming services, online games, short-form video applications, and other internet-based environments now operate not only as communication tools but also as affective, social, and behavioral ecosystems that can shape patterns of attention, reward sensitivity, social comparison, emotion regulation, and self-control. Although digital engagement is not inherently pathological and may offer important social, educational, and psychological benefits, a growing body of research has documented that excessive, compulsive, or poorly regulated digital technology use can become associated with psychological distress, functional impairment, sleep disruption, academic or occupational problems, reduced interpersonal functioning, and broader mental health vulnerabilities. The concept of digital addiction has therefore emerged as a broad construct referring to maladaptive engagement with digital platforms characterized by compulsive use, difficulty reducing use despite negative consequences, preoccupation, withdrawal-like discomfort, tolerance-like escalation, and interference with important life domains. Recent reviews have emphasized that digital addiction should be understood as a multidimensional behavioral phenomenon rather than as a single technology-specific problem, because problematic patterns may appear across smartphones, social media, internet use, online gaming, short-form video platforms, streaming media, and other digitally mediated activities (Karaköse et al., 2023; Kaye et al., 2025; Patel et al., 2025).

The expansion of digital addiction research reflects wider concern about the psychological and public health implications of prolonged internet-based engagement. The problem has become especially salient in the post-pandemic period, when digital platforms increasingly became central to education, work, socialization, entertainment, and coping. Studies on social media dependence and internet addiction indicate that university students and young adults represent particularly vulnerable groups because digital tools are often integrated into academic tasks, peer relationships, leisure routines, and identity formation (Dong et al., 2025; Fatima et al., 2025). At the same time, research in adolescent and young adult populations suggests that problematic digital behaviors do not occur in isolation but are intertwined with depression, learning burnout, social anxiety, fear of missing out, assessment anxiety, lifestyle disruption, and broader emotional vulnerability (Jin et al., 2023; Li et al., 2026; Ntumi et al., 2025). This complexity has encouraged researchers to move beyond simple exposure-based explanations, such as time spent online, toward psychological models that identify the internal mechanisms through which individuals become susceptible to compulsive digital engagement.

A central theme in the literature is that digital addiction is strongly associated with psychological distress and psychiatric symptoms. Reviews on the relationship between addictive social media use and psychiatric disorders suggest that problematic digital engagement may be linked to depressive symptoms, anxiety, loneliness, emotional instability, and reduced well-being, although the directionality of these relationships may vary across populations and study designs (Fioravanti et al., 2025; Magalhães et al., 2024). Emerging work on novel subtypes of depression also highlights the need to examine digital environments as contexts in which emotional withdrawal, anhedonia, social comparison, passive consumption, and avoidance-based coping may become reinforced (Chiappini et al., 2025). Similarly, research on mental health and well-being in esports has shown that intensive digital participation can be associated with both adaptive and maladaptive outcomes, depending on contextual factors, psychosocial functioning, and the balance between structured engagement

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and compulsive use (Poulus et al., 2026). These findings collectively suggest that digital addiction is best conceptualized within a broader psychological framework in which emotional, interpersonal, and self-regulatory processes interact.

Among the psychological determinants of digital addiction, loneliness has received substantial empirical attention. Loneliness refers to the subjective perception that one's social relationships are insufficient in quantity, quality, intimacy, or emotional support. Unlike objective social isolation, loneliness reflects perceived social disconnection and unmet relational needs. It may motivate individuals to seek compensatory contact through digital platforms, where interaction is immediate, accessible, controllable, and less demanding than face-to-face communication. However, excessive reliance on digital platforms for social compensation may paradoxically intensify loneliness if online interactions replace rather than enrich offline relationships. Recent meta-analytic evidence supports a significant association between loneliness and internet-use-disorder symptoms, suggesting that loneliness is not merely a correlate but may function as an important psychological vulnerability factor in problematic digital behavior (Mestre-Bach et al., 2025). Additional work mapping loneliness through social intelligence analysis has emphasized loneliness as a global and digitally observable phenomenon with relevance for public health surveillance and intervention planning (Shah & Househ, 2023). Studies of attachment styles and loneliness further suggest that insecure interpersonal patterns may increase sensitivity to rejection, intensify perceived disconnection, and contribute to greater reliance on mediated forms of social contact (G. & R., 2024).

The relationship between loneliness and digital addiction has also been examined in more specific technology-use contexts. Research on social anxiety and smartphone addiction has shown that loneliness can mediate the relationship between social anxiety and problematic smartphone use, indicating that individuals who experience interpersonal fear or discomfort may become more vulnerable to smartphone dependence when they also feel socially disconnected (Feng, 2025). Studies of smartphone addiction among college students have similarly suggested that rumination may mediate the association between loneliness and smartphone addiction, implying that lonely individuals may become trapped in repetitive negative thinking that increases the appeal of distraction, reassurance seeking, or compulsive checking (Hung & Hung, 2025). Evidence from research on internet addiction, academic burnout, physical activity, and self-control also indicates that loneliness may operate through multiple pathways, affecting digital addiction indirectly by weakening regulatory resources and increasing distress-related vulnerability (Heidari et al., 2025). These findings are important because they indicate that loneliness may influence digital addiction not only directly but also through emotional and behavioral mechanisms.

Self-control is another major construct in psychological models of digital addiction. Self-control refers to the ability to inhibit impulses, delay gratification, regulate attention, maintain goal-directed behavior, and resist immediately rewarding but potentially harmful behaviors. Digital platforms are designed to capture and retain attention through variable rewards, notifications, endless scrolling, personalized recommendations, social feedback, and rapid novelty. These features may be particularly problematic for individuals with weaker self-control because they increase the difficulty of disengagement and intensify short-term reinforcement. Research on problematic internet use across different cultural contexts has shown that psychological variables such as impulse control, emotional distress, and maladaptive coping may vary across societies but remain central to explaining vulnerability to excessive internet engagement (Varchetta et al., 2024). Latent profile research on phubbing risk has further demonstrated that problematic digital behavior can be differentiated into psychological risk profiles, supporting the view that self-regulatory capacity is important for distinguishing casual high-frequency use from maladaptive use (Şimşek & Başaran, 2025). These findings reinforce the need to model self-control as a protective factor within digital addiction frameworks.

The role of self-control becomes clearer when digital addiction is considered as a conflict between immediate emotional or social reinforcement and longer-term personal goals. Individuals may use digital platforms to escape boredom, reduce distress, avoid interpersonal discomfort, or obtain rapid social validation. However, repeated reliance on digital behaviors for short-term regulation may gradually undermine autonomous control over use. A systematic review of trait boredom in problematic technology use indicates that boredom may be an important motivational state driving repetitive digital engagement, especially when individuals lack alternative strategies for stimulation, meaning, or self-regulation (Tagliaferri et al., 2025). Research on short-form video addiction has similarly emphasized that platform design, reward mechanisms,

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emotional gratification, and individual psychological vulnerabilities contribute to compulsive patterns among university students (Zhan & Zhu, 2025). These studies suggest that self-control may not simply reduce digital addiction directly but may also serve as a regulatory mechanism shaped by loneliness and emotional dysregulation.

Emotional dysregulation represents a third critical determinant of digital addiction. It refers to difficulties in recognizing, understanding, accepting, modulating, and expressing emotions in adaptive ways. Individuals with high emotional dysregulation may struggle to tolerate negative affect, control impulses when distressed, engage in goal-directed behavior under emotional pressure, or select adaptive coping strategies. Digital environments provide immediate opportunities for mood modification, distraction, validation, and avoidance, making them particularly attractive for individuals with poor emotion regulation. Reviews of problematic social network use have repeatedly identified affective and emotional risk factors as central predictors, suggesting that dysregulated users may turn to digital platforms to manage loneliness, anxiety, boredom, sadness, or interpersonal stress (Fioravanti et al., 2025). Research on emotional reinforcement mechanisms in social media addiction further proposes that social media use may become self-reinforcing when emotional relief, social feedback, and algorithmically amplified stimulation strengthen repeated engagement (Wang & Shen, 2025). In this sense, digital addiction may be maintained by a cycle in which emotional distress increases digital use, digital use temporarily reduces distress, and repeated reliance on digital coping weakens adaptive regulation.

Empirical studies increasingly support the association between emotion regulation difficulties and problematic digital behaviors. Research examining the mediating role of smartphone addiction in the relationship between emotion regulation difficulties and juvenile delinquency suggests that problematic smartphone use may be part of a broader externalizing and dysregulated behavioral pattern among vulnerable youth (Alsawalqa & Haroon Abdel Rahim, 2025). Studies on alexithymia and problematic smartphone use among depressed adolescents further indicate that difficulty identifying and describing emotions may increase problematic use, while social support may buffer this association (Liu et al., 2025). Research on problematic series watching among parents of immigrant offspring also emphasizes that loneliness, distress, and emotion dysregulation can combine to increase compulsive media consumption as a coping strategy (Kumar et al., 2025). Such findings highlight the relevance of emotional dysregulation across different forms of digital overuse and support its inclusion as a mediator between interpersonal distress and addictive digital engagement.

The interplay between loneliness, emotional dysregulation, and self-control is theoretically important because these constructs may form a sequential vulnerability pathway. Loneliness can increase negative affect, rumination, perceived rejection, and emotional distress. Emotional dysregulation may then intensify the need for immediate relief and reduce the ability to tolerate uncomfortable internal states. As emotional distress becomes more difficult to regulate, self-control may deteriorate, particularly when digital platforms offer rapid distraction and gratification. In this pathway, digital addiction is not merely a consequence of high device exposure but an outcome of disrupted interpersonal, emotional, and behavioral regulation. Research on adolescent psychological functioning during the COVID-19 pandemic demonstrated that perceived social support and lifestyle behaviors were central to psychological profiles, suggesting that social connection and self-regulatory routines may shape vulnerability to digital and mental health problems (Pecora et al., 2025). Intervention-oriented research with adolescents with internet gaming disorder also suggests that structured psychosocial and experiential approaches can improve functioning by targeting regulation, engagement, and adaptive alternatives to digital overuse (Park & Jung, 2024). These findings support the assumption that digital addiction can be reduced only when its psychological determinants are properly understood.

Recent policy and public health discussions also emphasize that digital addiction is not only an individual clinical concern but a broader societal challenge requiring prevention, early identification, and psychologically informed intervention. Public health initiatives addressing the mental health impact of internet use among children and adolescents have called for integrated strategies involving families, schools, healthcare systems, and digital policy environments (Tadpatrikar, 2025). Although some technology-related behavioral problems remain diagnostically debated, narrative reviews on emerging behavioral and compulsive patterns indicate that clinical systems increasingly need frameworks capable of identifying problematic behaviors at the intersection of mental health, reward, social context, and self-regulation (Śniadach et al., 2025). Systematic reviews of smartphone

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addiction assessment tools and psychosocial consequences among nursing students also show that reliable measurement and context-sensitive modeling are essential for distinguishing high digital engagement from clinically meaningful impairment (Lazo-Caparros et al., 2025). Thus, research that clarifies the mechanisms linking loneliness, emotional dysregulation, self-control, and digital addiction can contribute to both theoretical refinement and practical intervention design.

Despite the growing literature, several gaps remain. First, many studies examine single predictors of problematic technology use, whereas fewer models integrate loneliness, self-control, and emotional dysregulation simultaneously. Second, although loneliness has been consistently associated with digital addiction, the mechanisms through which loneliness translates into compulsive digital behavior remain insufficiently specified. Third, the distinction between emotional dysregulation as an affective mediator and self-control as a behavioral-regulatory mediator has not been adequately clarified in integrated structural models. Fourth, much of the evidence has focused on specific populations, such as adolescents, university students, clinical subgroups, or users of particular platforms, while broader adult samples remain comparatively underexamined. Finally, because digital addiction is a multidimensional behavioral phenomenon, research must test models that capture both direct and indirect pathways among psychological determinants rather than relying only on bivariate associations.

In the Canadian context, these questions are especially relevant because digital technologies are deeply integrated into education, employment, healthcare access, social communication, and leisure. Adults may depend on digital platforms for productivity and connection while simultaneously being exposed to risks of compulsive use, emotional avoidance, and weakened self-regulation. A structural model that examines loneliness, emotional dysregulation, and self-control together can therefore provide a more nuanced understanding of how interpersonal distress becomes translated into problematic digital behavior. Such a model is also consistent with contemporary views of digital addiction as a psychologically mediated pattern involving social disconnection, affective vulnerability, and impaired behavioral regulation rather than simple excessive screen time.

The aim of this study was to model the psychological determinants of digital addiction among Canadian adults by examining the direct and indirect effects of loneliness, self-control, and emotional dysregulation within an integrated structural equation model.

2. Methods and Materials

2.1. Study Design and Participants

This study employed a quantitative, cross-sectional correlational design to examine the structural relationships among psychological determinants of digital addiction, with particular emphasis on the mediating roles of loneliness, self-control, and emotional dysregulation. The research was conducted using the Structural Equation Modeling (SEM) approach, which allows for the simultaneous examination of direct and indirect relationships among latent constructs while accounting for measurement error. The target population consisted of adults residing in Canada who regularly used digital technologies, including smartphones, computers, tablets, and internet-based platforms for educational, occupational, recreational, or social purposes. Participants were recruited through online advertisements distributed via universities, community organizations, and social media platforms across several Canadian provinces. Eligibility criteria included being at least 18 years of age, residing in Canada for a minimum of one year, possessing sufficient English language proficiency to complete the questionnaires, and reporting daily use of digital devices. Individuals with incomplete questionnaires or patterned response behaviors indicating careless responding were excluded from the final analyses. Following data screening procedures, responses from 642 participants were retained for statistical analysis. This sample size exceeded the minimum recommendations for structural equation modeling, ensuring sufficient statistical power for estimating complex mediation pathways and evaluating overall model fit. Prior to participation, all respondents were informed about the objectives of the study, assured that participation was voluntary, and informed that their responses would remain anonymous and confidential. Electronic informed consent was obtained before participants accessed the survey, and all research procedures adhered to internationally recognized ethical principles governing research involving human participants.

2.2. Measures

Data were collected using a battery of standardized self-report questionnaires with well-established psychometric properties. Digital addiction was assessed using the

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Smartphone Addiction Scale–Short Version (SAS-SV) developed by Kwon et al. (2013). The SAS-SV is a 10-item instrument designed to evaluate problematic smartphone and digital device use characterized by compulsive engagement, functional impairment, withdrawal symptoms, and excessive dependence on digital technology. Responses are rated on a six-point Likert scale ranging from strongly disagree to strongly agree, with higher scores reflecting greater levels of digital addiction. Previous research has consistently demonstrated excellent internal consistency, strong construct validity, and satisfactory convergent and discriminant validity across diverse adult populations, including North American samples.

Loneliness was measured using the UCLA Loneliness Scale Version 3, developed by Russell (1996). This widely used instrument consists of 20 items that assess subjective feelings of social isolation, perceived inadequacy of interpersonal relationships, and dissatisfaction with social connectedness. Participants rate each statement using a four-point Likert scale ranging from never to often. Higher total scores indicate greater perceived loneliness. Numerous validation studies have reported excellent internal consistency coefficients, robust factorial validity, high test-retest reliability, and strong convergent validity with measures of social support, interpersonal functioning, and psychological well-being, supporting its suitability for both clinical and community populations.

Self-control was assessed using the Brief Self-Control Scale (BSCS) developed by Tangney, Baumeister, and Boone (2004). The scale contains 13 items evaluating an individual's capacity to regulate impulses, resist temptations, maintain self-discipline, and pursue long-term goals despite immediate distractions or gratification. Responses are recorded on a five-point Likert scale ranging from not at all like me to very much like me, with several items reverse scored before calculating the total score. Higher scores indicate stronger self-control abilities. Previous investigations have consistently demonstrated high internal consistency, stable factor structure, adequate temporal stability, and strong predictive validity for behavioral regulation, academic achievement, psychological adjustment, and health-related behaviors.

Emotional dysregulation was measured using the Difficulties in Emotion Regulation Scale (DERS) developed by Gratz and Roemer (2004). The DERS is a comprehensive 36-item instrument assessing multiple dimensions of emotion regulation difficulties, including nonacceptance of emotional responses, difficulty engaging in goal-directed behavior, impulse control difficulties, limited access to emotion regulation strategies, lack of emotional awareness, and lack of emotional clarity. Participants respond on a five-point Likert scale ranging from almost never to almost always. Higher scores represent greater problems with emotional regulation. Extensive psychometric investigations have confirmed the instrument's excellent reliability, stable multidimensional factor structure, convergent validity with emotional functioning measures, and discriminant validity across clinical and non-clinical populations.

2.3. Data analysis

Following data collection, all questionnaires were screened for completeness, normality, outliers, and response consistency prior to statistical analysis. Descriptive statistics including means, standard deviations, skewness, and kurtosis were calculated to summarize participant characteristics and study variables. Internal consistency reliability for each scale was evaluated using Cronbach's alpha and composite reliability coefficients, while convergent and discriminant validity were examined through Average Variance Extracted (AVE), factor loadings, and inter-construct correlations. Pearson correlation coefficients were computed to examine bivariate associations among all study variables. The hypothesized structural model was then evaluated using Structural Equation Modeling with the maximum likelihood estimation method. Model adequacy was assessed using multiple goodness-of-fit indices, including the chi-square statistic divided by degrees of freedom (χ^2/df), Comparative Fit Index (CFI), Tucker-Lewis Index (TLI), Goodness-of-Fit Index (GFI), Adjusted Goodness-of-Fit Index (AGFI), Standardized Root Mean Square Residual (SRMR), and Root Mean Square Error of Approximation (RMSEA) together with its 90% confidence interval. Indirect effects representing the mediating roles of loneliness, self-control, and emotional dysregulation were examined using bootstrap resampling with 5,000 bootstrap samples and bias-corrected 95% confidence intervals. Mediation was considered statistically significant when the confidence interval did not include zero. Statistical analyses were conducted using IBM SPSS Statistics version 29 for preliminary analyses and AMOS version 29 for structural equation modeling, with statistical significance established at $p < .05$ for all inferential analyses.

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3. Findings and Results

A total of 642 participants completed the study and were included in the final analyses. The mean age of the participants was 31.84 years (SD = 10.27), with an age range of 18 to 64 years. Of the total sample, 336 participants (52.3%) were female and 306 (47.7%) were male. Regarding educational attainment, 142 participants (22.1%) had completed high school or equivalent education, 318 (49.5%) held an undergraduate degree, and 182 (28.3%) had completed postgraduate studies. Most participants were employed either full-time or part-time (61.8%), while 23.7% were university students and 14.5% were unemployed or retired. Participants reported an average daily digital device usage of 7.42 hours (SD = 2.91), with smartphones representing the primary digital platform for 78.5% of respondents. Social networking applications, video streaming services, and online communication platforms were identified as the most frequently used digital activities. Preliminary screening indicated that missing data accounted for less than 1% of all responses and were handled using expectation-maximization estimation. Examination of skewness and kurtosis values demonstrated that all study variables approximated normal distributions, with absolute skewness values below 2.00 and kurtosis values below 7.00, supporting the assumptions required for structural equation modeling.

Table 1

Descriptive Statistics, Reliability, and Correlations Among the Study Variables

Variable	Mean	SD	Cronbach's α	CR	AVE	1	2	3	4
1. Digital Addiction	31.84	8.47	.92	.93	.63	—			
2. Loneliness	42.16	10.58	.94	.95	.67	.59**	—		
3. Self-Control	40.75	8.19	.89	.90	.58	-.65**	-.56**	—	
4. Emotional Dysregulation	82.63	17.46	.95	.95	.61	.68**	.63**	-.71**	—

Table 1 presents the descriptive statistics, internal consistency indices, convergent validity indicators, and Pearson correlation coefficients among the principal study variables. The findings indicate satisfactory psychometric properties for all measurement instruments, with Cronbach's alpha coefficients ranging from .89 to .95 and composite reliability values exceeding the recommended threshold of .70. Likewise, the Average Variance Extracted values ranged from .58 to .67, demonstrating adequate convergent validity for every latent construct. Examination of the correlation matrix revealed statistically significant relationships among all variables. Digital addiction exhibited a strong positive association with loneliness ($r = .59$, $p < .001$) and emotional dysregulation ($r = .68$, $p < .001$), indicating that greater feelings of social isolation and poorer emotion regulation were associated with higher levels of problematic digital technology use. Conversely, digital addiction showed a strong negative correlation with self-control ($r = -.65$, $p < .001$), suggesting that individuals with greater capacity for behavioral self-regulation reported significantly lower levels of digital addiction. Loneliness was positively associated with emotional dysregulation ($r = .63$, $p < .001$) while negatively correlated with self-control ($r = -.56$, $p < .001$). Emotional dysregulation and self-control demonstrated the strongest inverse association ($r = -.71$, $p < .001$), indicating considerable overlap between ineffective emotional regulation and diminished behavioral control. Overall, these preliminary findings provided strong empirical support for proceeding with structural equation modeling.

Table 2

Measurement Model Evaluation

Construct	χ^2/df	CFI	TLI	GFI	AGFI	RMSEA	SRMR
Measurement Model	2.11	.970	.966	.941	.929	.042	.039

The confirmatory factor analysis demonstrated that the proposed measurement model adequately represented the observed data. The chi-square divided by degrees of freedom ratio (χ^2/df = 2.11) remained well below the recommended maximum value of 3.00, indicating limited discrepancy between the observed and estimated covariance matrices. Incremental fit indices also exceeded accepted standards, with Comparative Fit Index (CFI = .970) and Tucker-Lewis

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Index (TLI = .966) both surpassing the recommended criterion of .95. Similarly, the Goodness-of-Fit Index (GFI = .941) and Adjusted Goodness-of-Fit Index (AGFI = .929) demonstrated satisfactory model performance. Absolute fit indices further confirmed excellent model adequacy, with RMSEA equal to .042 and SRMR equal to .039, both substantially below recommended cut-off values. Collectively, these goodness-of-fit statistics indicated that the latent constructs were measured reliably and accurately represented the theoretical dimensions proposed in the conceptual model. Consequently, the measurement model demonstrated satisfactory construct validity and supported continuation to structural model estimation.

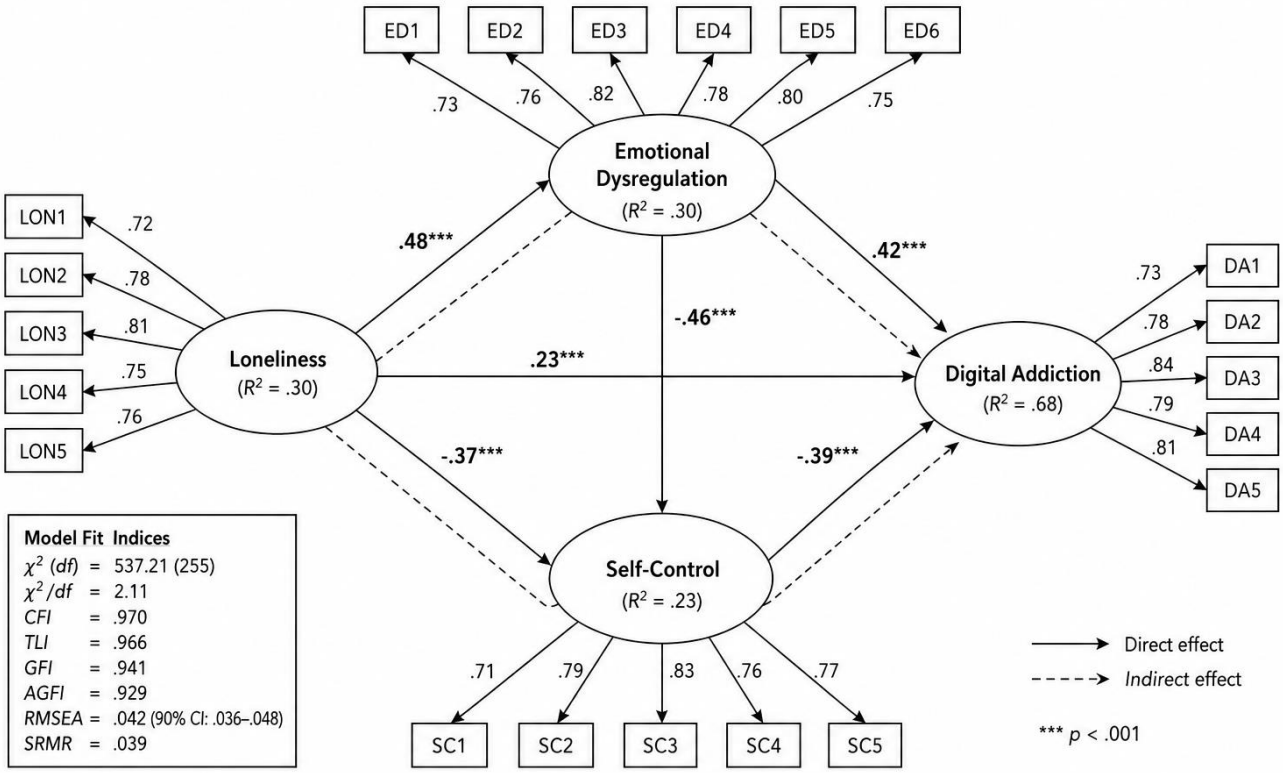
Table 3

Structural Path Coefficients and Mediation Effects

Structural Path	β	SE	CR	p
Loneliness → Digital Addiction	.23	.04	5.81	<.001
Self-Control → Digital Addiction	-.39	.05	-8.16	<.001
Emotional Dysregulation → Digital Addiction	.42	.05	8.84	<.001
Loneliness → Emotional Dysregulation	.48	.04	10.72	<.001
Loneliness → Self-Control	-.37	.05	-7.43	<.001
Emotional Dysregulation → Self-Control	-.46	.04	-10.25	<.001

Figure 1

Final Structural Equation Model Illustrating the Direct and Indirect Relationships Among Loneliness, Self-Control, Emotional Dysregulation, and Digital Addiction



Note. Standardized path coefficients are presented. All paths are significant at p < .001. R^2 values indicate the proportion of variance explained for each endogenous construct.

The structural model demonstrated statistically significant direct effects for every hypothesized pathway. Emotional dysregulation emerged as the strongest direct predictor of digital addiction (β = .42, p < .001), indicating that increasing difficulties in regulating emotional experiences substantially elevated the likelihood of

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problematic digital technology use. Self-control exhibited a significant negative effect on digital addiction ($\beta = -.39$, $p < .001$), suggesting that stronger behavioral regulation served as a robust protective factor against excessive digital engagement. Loneliness also exerted a significant positive influence on digital addiction ($\beta = .23$, $p < .001$), although its effect size was comparatively smaller than those observed for emotional dysregulation and self-control. Furthermore, loneliness significantly increased emotional dysregulation while simultaneously reducing self-control, suggesting that social isolation contributes to digital addiction through multiple psychological mechanisms. Emotional dysregulation also significantly reduced self-control, highlighting a sequential psychological process in which poor emotional regulation undermines behavioral regulation, thereby increasing vulnerability to compulsive digital behaviors. Bootstrap analyses using 5,000 resamples further demonstrated that both emotional dysregulation and self-control significantly mediated the association between loneliness and digital addiction, as all indirect effects possessed bias-corrected confidence intervals that excluded zero. These findings therefore confirmed both the direct and indirect pathways proposed by the conceptual model.

The final structural model exhibited excellent overall fit to the observed data and accounted for a substantial proportion of variance in digital addiction. Specifically, the combined effects of loneliness, emotional dysregulation, and self-control explained 68% of the total variance in digital addiction ($R^2 = .68$), indicating considerable explanatory power. Emotional dysregulation explained 23% of the variance in self-control, while loneliness accounted for 30% of the variance in emotional dysregulation. The standardized path coefficients illustrated in Figure 1 demonstrate that loneliness influenced digital addiction both directly and indirectly through sequential effects involving emotional dysregulation and diminished self-control. The overall pattern of findings supported the hypothesized theoretical framework, suggesting that individuals experiencing greater loneliness are more likely to develop emotion regulation difficulties, which subsequently impair self-control and ultimately increase susceptibility to digital addiction. The magnitude and consistency of the standardized coefficients, together with the strong explanatory power of the model, provide compelling empirical evidence supporting the proposed psychological mechanisms underlying problematic digital technology use.

Table 4

Standardized Direct, Indirect, and Total Effects on Digital Addiction

Predictor	Direct Effect	Indirect Effect	Total Effect
Loneliness	.23	.28	.51
Self-Control	-.39	—	-.39
Emotional Dysregulation	.42	.18	.60

The decomposition of standardized effects further clarified the relative contribution of each psychological determinant to digital addiction. Emotional dysregulation demonstrated the largest overall influence on digital addiction, with a total standardized effect of .60, emphasizing its central role in the development of problematic digital behaviors. Self-control maintained a substantial negative direct effect (−.39), confirming that stronger self-regulatory capacity significantly reduced vulnerability to excessive digital engagement. Although loneliness demonstrated a comparatively modest direct effect (.23), its indirect influence through emotional dysregulation and self-control (.28) exceeded its direct contribution, resulting in a total standardized effect of .51. This finding highlights the importance of considering loneliness primarily as an upstream psychological risk factor whose influence operates through broader emotional and behavioral self-regulatory processes. Overall, the decomposition of effects demonstrated that the relationship between loneliness and digital addiction was only partially direct, with much of its impact transmitted through deteriorating emotional regulation and weakened self-control. These findings strongly support the hypothesized multiple mediation model and underscore the interconnected psychological mechanisms contributing to digital addiction among Canadian adults.

4. Discussion

The present study aimed to model the psychological determinants of digital addiction among Canadian adults by examining the direct and indirect effects of loneliness, self-control, and emotional dysregulation within an integrated structural equation model. The findings supported the

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hypothesized model and demonstrated that the proposed psychological variables explained a substantial proportion of variance in digital addiction. Specifically, digital addiction was positively associated with loneliness and emotional dysregulation and negatively associated with self-control. The structural model showed that emotional dysregulation was the strongest positive predictor of digital addiction, followed by self-control as a strong negative predictor and loneliness as a significant positive predictor. In addition, loneliness was positively related to emotional dysregulation and negatively related to self-control, while emotional dysregulation also negatively predicted self-control. These findings indicate that digital addiction is not merely a behavioral consequence of frequent digital device use, but rather a psychologically mediated pattern shaped by social disconnection, affective instability, and weakened regulatory control.

The positive association between loneliness and digital addiction is consistent with the growing literature showing that perceived social disconnection increases vulnerability to problematic digital engagement. Loneliness may drive individuals toward online environments because digital platforms provide rapid access to social contact, reassurance, distraction, and symbolic belonging. However, excessive reliance on digital spaces may fail to satisfy deeper interpersonal needs and can gradually reinforce avoidance of direct social interaction. This interpretation is aligned with systematic and meta-analytic evidence showing a meaningful relationship between loneliness and internet-use-disorder symptoms (Mestre-Bach et al., 2025). It is also consistent with findings that social anxiety may increase smartphone addiction through loneliness, suggesting that individuals who experience interpersonal discomfort may turn to smartphones as a controllable substitute for face-to-face connection (Feng, 2025). Similarly, the observed role of loneliness aligns with evidence that loneliness, rumination, and smartphone addiction are interconnected, with lonely individuals being more likely to engage in repetitive negative thinking that increases dependence on digital distraction (Hung & Hung, 2025). The present study extends these findings by showing that loneliness remains a significant predictor even when emotional dysregulation and self-control are considered simultaneously.

The finding that emotional dysregulation was the strongest direct predictor of digital addiction provides strong support for affect-regulation explanations of problematic digital behavior. Individuals with greater difficulty identifying, accepting, and regulating emotions may use digital platforms as immediate tools for emotional escape, mood modification, distraction, or reassurance seeking. The reinforcing nature of digital technologies may be especially powerful for emotionally dysregulated individuals because online activities provide rapid affective relief with minimal effort. This finding is consistent with research showing that emotion regulation difficulties are closely associated with problematic smartphone use and may contribute to broader maladaptive behavioral outcomes (Alsawalqa & Haroon Abdel Rahim, 2025). It also corresponds with studies indicating that addictive social media use is related to psychiatric symptoms through emotional dysregulation (Magalhães et al., 2024). In addition, the present results align with theoretical accounts of social media addiction as an emotional reinforcement cycle in which temporary emotional relief strengthens repeated use and increases the probability of compulsive engagement (Wang & Shen, 2025). Therefore, emotional dysregulation appears to be a central psychological mechanism through which digital engagement becomes difficult to control.

The negative direct effect of self-control on digital addiction further confirms the protective role of behavioral regulation. Digital platforms are designed around immediate rewards, novelty, personalized stimulation, notifications, and intermittent social feedback. These features can challenge users' capacity to delay gratification and disengage from rewarding online experiences. Individuals with stronger self-control are more likely to regulate screen time, resist compulsive checking, maintain goal-directed behavior, and prevent digital activities from interfering with offline responsibilities. This result is consistent with previous evidence indicating that self-control mediates the relationship between loneliness-related factors and internet addiction (Heidari et al., 2025). It also corresponds with cross-cultural work showing that problematic internet use is associated with psychological variables related to impulse regulation, distress, and behavioral control (Varchetta et al., 2024). Moreover, the identification of phubbing risk profiles suggests that individuals differ meaningfully in patterns of problematic digital behavior, and that self-regulatory capacity may be one of the key dimensions distinguishing high-risk from low-risk users (Şimşek & Başaran, 2025). The present findings therefore support conceptualizing self-control as a major protective factor against digital addiction.

One of the most important contributions of the present study is the demonstration of indirect pathways from loneliness to digital addiction through emotional dysregulation and self-control. Although loneliness directly

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predicted digital addiction, its indirect effect was also substantial, indicating that loneliness may function as an upstream psychological vulnerability rather than only an immediate cause of excessive digital use. Social disconnection can generate distress, rejection sensitivity, boredom, rumination, and emotional insecurity. When individuals lack effective emotion regulation strategies, they may become more dependent on digital platforms to manage negative affect. Over time, this reliance may weaken self-control by reinforcing immediate digital coping rather than adaptive regulation. This interpretation is supported by studies showing that problematic digital behaviors are related to fear of missing out, negative affectivity, rumination, burnout, distress, and emotional difficulties (Jin et al., 2023; Li et al., 2026; Ntumi et al., 2025). It also aligns with research indicating that loneliness, distress, and emotion dysregulation contribute to problematic series watching, suggesting that emotionally driven digital overuse may appear across different forms of media consumption (Kumar et al., 2025). Therefore, the pathway from loneliness to digital addiction appears to involve both affective and regulatory mechanisms.

The results also support the broader view that digital addiction should be understood as a multidimensional psychological phenomenon rather than as a simple problem of excessive screen exposure. Reviews of digital addiction and problematic internet use emphasize that maladaptive digital engagement is associated with health problems, psychological distress, social impairment, and functional disruption (Karaköse et al., 2023; Kaye et al., 2025; Patel et al., 2025). Similarly, research on problematic social network use has identified a wide range of psychological risk factors, including negative affect, anxiety, depression, loneliness, and poor emotion regulation (Fioravanti et al., 2025). The present study adds to this literature by integrating loneliness, emotional dysregulation, and self-control into a single explanatory model. This integration is important because digital addiction rarely results from one isolated factor. Instead, the results suggest that people may become vulnerable to digital addiction when unmet social needs produce emotional distress, emotional dysregulation increases reliance on digital relief, and reduced self-control makes it difficult to disengage from rewarding digital environments.

The findings are also consistent with platform-specific evidence showing that different digital behaviors share common psychological mechanisms. Research on social media dependence and internet addiction among college students has emphasized that social media overuse and internet addiction are closely related phenomena that may reflect overlapping vulnerabilities (Dong et al., 2025). A scoping review of social media use among college students similarly identified multiple determinants of excessive use, including social motives, emotional factors, psychological distress, and contextual influences (Fatima et al., 2025). Studies on short-form video addiction have further shown that reward mechanisms, emotional gratification, and individual vulnerability factors contribute to compulsive use (Zhan & Zhu, 2025). In addition, systematic work on trait boredom has highlighted boredom as a driver of problematic technology use, suggesting that users may turn to digital platforms to regulate under-stimulation and emotional discomfort (Tagliaferri et al., 2025). These findings align with the present model by indicating that digital addiction may emerge when digital environments repeatedly satisfy short-term emotional and motivational needs while weakening long-term self-regulation.

The findings also have implications for understanding digital addiction in relation to mental health. The strong role of emotional dysregulation suggests that problematic digital use may be both a symptom and a maintaining factor of psychological distress. Research on addictive social media use and psychiatric disorders has emphasized the mediating role of emotion dysregulation in the relationship between social media use and mental health symptoms (Magalhães et al., 2024). Studies of alexithymia and problematic smartphone use among depressed adolescents similarly indicate that difficulty processing emotional states may increase vulnerability to problematic digital engagement, particularly when social support is limited (Liu et al., 2025). Reviews on novel depression subtypes and digital-era psychopathology also suggest that changing social and technological environments may shape the expression of depressive and affective symptoms (Chiappini et al., 2025). In this context, the present results support the argument that digital addiction should be assessed alongside emotional functioning, loneliness, and self-regulatory capacity rather than being treated only as a behavioral habit.

The present findings also resonate with public health and intervention-oriented literature. Research on the mental health impact of internet use among children and adolescents highlights the need for preventive policies, family and school involvement, digital literacy, and early identification of high-risk patterns (Tadpatrikar, 2025). Intervention research with adolescents with internet gaming disorder suggests that structured experiential and psychosocial

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programs may help improve regulation, engagement, and adaptive functioning (Park & Jung, 2024). Similarly, evidence from smartphone addiction assessment among nursing students indicates that reliable measurement is essential for identifying psychosocial consequences and designing targeted interventions (Lazo-Caparros et al., 2025). The present study contributes to these practical concerns by identifying loneliness, emotional dysregulation, and self-control as key intervention targets. Programs that focus only on reducing screen time may be insufficient unless they also strengthen emotional regulation, enhance offline social connectedness, and improve impulse control.

5. Conclusion

The results may also be interpreted in light of emerging concerns about digital environments as spaces where behavioral, emotional, and social problems intersect. Evidence from esports research suggests that intensive digital involvement can have both beneficial and harmful effects depending on mental health, social context, and patterns of engagement (Poulus et al., 2026). Studies on adolescent social support and lifestyle behaviors during the COVID-19 pandemic similarly show that psychological functioning depends on the interaction between social resources and daily behavioral patterns (Pecora et al., 2025). Research mapping loneliness through digital and social intelligence methods indicates that loneliness is increasingly visible as a global mental health issue with technological relevance (Shah & Househ, 2023). Even broader diagnostic discussions about emerging behavioral health challenges point to the need for integrated treatment approaches that consider affect regulation, compulsivity, social context, and mental health comorbidity (Śniadach et al., 2025). Together, these studies support the present conclusion that digital addiction is best understood as an outcome of interacting social, emotional, and regulatory vulnerabilities.

6. Limitations & Suggestions

The limitations of this study should be acknowledged. First, the cross-sectional design prevents definitive causal conclusions about the direction of relationships among loneliness, emotional dysregulation, self-control, and digital addiction. Although the proposed model was theoretically grounded and statistically supported, longitudinal or experimental designs are needed to determine whether loneliness leads to emotional dysregulation and reduced self-control over time or whether problematic digital use also increases loneliness and emotional difficulties. Second, the study relied on self-report questionnaires, which may be influenced by social desirability, recall bias, and subjective interpretation of digital behavior. Third, although the sample size was adequate for structural equation modeling, the use of online recruitment may have produced a sample with relatively high digital familiarity and may limit generalizability to adults with limited internet access or different sociocultural backgrounds. Fourth, the study examined digital addiction as a general construct and did not separately model specific forms of problematic use such as gaming, social networking, streaming, short-form video use, or compulsive messaging.

Future research should build on these findings by using longitudinal, experimental, and mixed-method designs to clarify temporal and causal pathways among social disconnection, emotion regulation, self-control, and digital addiction. Researchers should examine whether emotional dysregulation and self-control operate as stable traits, fluctuating states, or dynamic mechanisms that change according to stress, social support, sleep quality, and daily digital exposure. Future studies should also compare different forms of digital addiction to determine whether the same psychological mechanisms explain problematic smartphone use, gaming, social media use, streaming, and short-form video consumption. In addition, future research should include more diverse samples across age groups, cultural backgrounds, occupational contexts, and clinical populations. Ecological momentary assessment, passive sensing, and digital trace data may provide more precise indicators of real-time digital behavior and help overcome the limitations of retrospective self-report measures.

From a practical perspective, the findings suggest that prevention and intervention programs for digital addiction should address the psychological mechanisms underlying excessive use rather than focusing exclusively on device restriction. Clinicians, counselors, educators, and public health professionals should assess loneliness, emotion regulation difficulties, and self-control when working with individuals who report problematic digital engagement. Interventions may benefit from combining digital literacy, behavioral self-monitoring, impulse-control strategies, emotion regulation training, and structured opportunities for meaningful offline social connection. For individuals whose digital addiction is driven by loneliness, treatment should emphasize interpersonal skills, social confidence, and the development of supportive real-world relationships. For individuals whose digital overuse functions as emotional

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avoidance, interventions should teach adaptive coping strategies, distress tolerance, and goal-directed behavior under emotional stress. Such approaches may be more sustainable than simple screen-time reduction because they target the psychological needs that make digital platforms especially reinforcing.

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Declaration of Interest

The authors of this article declared no conflict of interest.

Ethical Considerations

The study protocol adhered to the principles outlined in the Helsinki Declaration, which provides guidelines for ethical research involving human participants.

Transparency of Data

In accordance with the principles of transparency and open research, we declare that all data and materials used in this study are available upon request.

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Authors' Contributions

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