Psychology Research and Behavior Management

Dovepress
Taylor & Francis Group

Open Access Full Text Article

ORIGINAL RESEARCH

Adolescent Addictive Behaviors and Subjective Well-Being: The Mediating Role of Mental Health Problems

Yuan Tian

School of Journalism & Communication, Southwest University of Political Science and Law, Chongqing, 401120, People's Republic of China

Correspondence: Yuan Tian, Email work2025x@163.com

Purpose: Increased subjective well-being (SWB) during adolescence significantly predicts higher levels of SWB, greater income, and more harmonious relationships in adulthood. However, addictive behaviors (including substance addictions and behavioral addictions) may trigger mental health problems, thereby adversely affecting adolescents' SWB. Therefore, this study aims to explore the mediating role of mental health problems in the process by which addictive behaviors affect adolescents' SWB.

Methods: We employed a cross - sectional study design, utilizing data from the 2017/18 Health Behavior in School-aged Children (HBSC) survey. The sample includes 76,261 adolescents aged 10 to 16 from multiple countries and regions in Europe and North America. In order to explore the relationship between addictive behaviors, mental health problems and SWB, the study used Pearson correlation analysis and structural equation modeling (SEM) for statistical analysis.

Results: Based on the hypothesis, SEM results showed that mental health problems partially mediated the relationship between substance addiction and SWB (β = −0.044, 95% CI: −0.046–−0.041). The mediation effect accounted for 59.46%. It also partially mediated the relationship between behavioral addiction and SWB (β = −0.362, 95% CI: −0.379–−0.347). The mediation effect accounted for 89.16%.

Conclusion: This study found that mental health problems mediate the effect of addictive behavior on SWB. The results reveal the mechanism by which addictive behavior reduces SWB through mental health problems, providing a scientific basis for targeted interventions. It is recommended that multi-level coordinated interventions, including early screening, health education, family support, and policy regulation, be implemented to improve overall well-being.

Keywords: adolescence, substance addictions, behavioral addictions, mediation mechanism, cross-sectional study

Introduction

Growing interest in adolescents' subjective well-being (SWB) has emerged alongside theoretical progress in developmental science, strengthened legal frameworks for youth rights, and advancements in positive psychology and social research.[1] SWB is a combination of an individual's subjective cognitive appraisal and affective experience of their quality of life.[2] Previous research indicates that Increased SWB during adolescence significantly predicts higher levels of SWB, greater income, and more harmonious relationships in adulthood.[3] The core question of this study is: How does addictive behavior (including substance addictions and behavioral addictions) affect adolescents' SWB through mental health problems?

Previous studies have shown that addictive behavior and mental health problems are key factors affecting adolescents' SWB.[4,5] To clarify the scope of this study, the core variables are defined as follows: Substance addiction is a neuropsychiatric disorder. Its core characteristics are: individuals develop an uncontrollable craving for and compulsive use of exogenous substances such as alcohol, nicotine, opiates, and stimulants. Even when such behavior has caused clear harmful consequences, it is difficult to stop or reduce use.[6] Behavioral addiction, on the other hand, refers to the development of behavioral patterns and psychological mechanisms similar to those seen in substance addictions, but

Received: 21 May 2025
Accepted: 21 August 2025
Published: 4 September 2025

without the ingestion of chemical substances. This paper uses social media addiction as a representative example of behavioral addiction.[7] Mental health problems refer to persistent or recurrent disorders in an individual's emotional regulation, cognitive function, behavioral control, or social adaptation. These problems may manifest as anxiety, depression, lack of concentration, impulsive behavior, or loss of reality, and in severe cases, can have a negative impact on an individual's learning, work, and interpersonal relationships.[8]

From the perspective of variable correlation, high SWB is usually associated with healthy psychological states such as positive coping methods, strong stress resistance, and good social relationships, while low SWB is often accompanied by mental health problems.[9] At the same time, a large number of empirical studies have pointed out that addictive behavior may induce mental health problems in adolescents through a variety of pathways. For example, it may interfere with brain development, weaken social support networks, and exacerbate loneliness and emotional distress. These factors may indirectly reduce adolescents' SWB.[10,11] Therefore, this study introduces mental health problems as a mediating variable to explore whether addictive behavior indirectly affects adolescents' SWB by inducing mental health problems. Compared with other potential mediating paths (such as family conflict or academic pressure), mental health problems are a concentrated manifestation of an individual's internal state. It has a key position in theory and has also shown a high explanatory power for SWB in existing literature, so it was given priority in the analysis framework of this study.

From a theoretical perspective, social cognitive theory emphasizes that individual behavior is the result of the interaction between environmental factors, cognitive processes, and psychological states.[12] This theory provides an important analytical framework for understanding how addictive behavior affects SWB through mental health problems. Addictive behaviors may indirectly reduce adolescents' SWB by weakening their self-efficacy and emotional regulation abilities.[13] At the same time, developmental psychology research indicates that adolescence is a critical window period for neural restructuring and the establishment of social functions, during which individuals exhibit significantly heightened sensitivity to environmental stimuli.[14] This means that addictive behavior can have a cumulative impact on mental health. Not only does it undermine adolescents' psychological resilience, but it can also weaken their ability to cope with stress by continuously interfering with neurodevelopment (such as the maturation of the prefrontal cortex), providing fertile ground for mental health problems.[15] Additionally, the hedonic deficiency theory further reveals the deep connection between addictive behaviors and adolescents' SWB.[16] This theory posits that prolonged addictive behaviors may reduce the brain's sensitivity to natural rewards (such as intimate relationships or goal achievement), leading to a decrease in positive emotional experiences and thereby impairing one's level of well-being.[17] In this process, mental health problems may play a mediating role and become an important pathway through which addictive behavior affects SWB.

In fact, most addictive behaviors begin during adolescence. This is the time when experimentation with addictive substances such as alcohol, tobacco, and cannabis occurs at a high rate, as well as the vulnerability to behavioral addictions.[18] According to the 2021/2022 Health Behavior in School-aged Children survey. Over half (57%) of 15-year-olds have had an encounter with alcohol at least once. Twenty-five percent of 15-year-olds have ever smoked cigarettes, and Twelve percent have reported using cannabis. In addition, the percentage of teens categorized as problematic social media users increased significantly from 7% in 2018 to 11% in 2022.[19,20] Further research suggests that addictive behaviors during adolescence may trigger more serious mental health problems and negatively impact adolescents' SWB.[21]

The relationship between substance addiction and SWB and mental health problems has also been preliminarily verified by a number of empirical studies. On the one hand, substance addiction has an important influence on SWB. A study conducted among adolescents in the UK showed that high levels of well-being were positively correlated with sustained abstinence from smoking and drinking among adolescents.[22] In a survey of California adolescents, cannabis use was found to be negatively associated with SWB.[23] On the other hand, adolescents with substance addictions experience more mental health problems than their peers. A Canadian study showed that mental health problems and high-risk behaviors are associated with substance addictions in adolescents.[24] Another study also revealed that alcohol, nicotine, and drug abuse were associated with increased risks of depression and suicidal behavior in adolescents.[25] In addition, a California study revealed that increased cannabis and alcohol use exacerbated loneliness, anxiety, and depression as a way to decrease SWB.[26] It can thus be seen that mental health problems may play an important role

between substance addictions and SWB, becoming a potential mediating variable. However, research on the specific manifestations and operational pathways of this mediating mechanism in adolescent groups is still limited, and further in-depth exploration is urgently needed.

Similarly, behavioral addiction, as represented by social media addiction, has become an increasingly prominent psychological and social concern among contemporary adolescents. Its correlation with SWB and mental health problems has also been preliminarily verified in a number of empirical studies. The main representative of behavioral addiction is social media addiction. With the popularization of the Internet and the development of mobile communication devices, social media addiction rates are on the rise.[27] Adolescent depression, anxiety, and suicidal ideation have increased dramatically over the past decade, with a concomitant decline in SWB.[28] Research has shown that social media use and mental health problems/low SWB in adolescents are consistent.[29] A previous study revealed that adolescents with behavioral addictions were more likely to have mental health problems, dissatisfaction with school life, and a lack of support from family and friends, which were significantly and negatively correlated with adolescent SWB.[30] In addition, a study on social media use among Canadian teens noted that social media addiction can be detrimental to people's physical and mental health. It has a negative effect on adolescents' positive mental health. High-intensity use of social media is associated with lower SWB.[31] In addition, many studies have highlighted the links among behavioral addictions, mental health problems and SWB.[32,33] A Turkish survey showed that addictive tendencies related to Facebook had a significant effect on SWB, with shying and loneliness acting as mediators.[34] An Austrian study showed that social comparison-induced negative emotions and fear of missing out jointly mediated the relationship between SWB and social media addiction.[35] Thus, mental health problems may mediate the relationship between behavioral addiction and SWB.

The core question of this study is whether and how substance addictions and behavioral addictions affect adolescents' SWB through mental health problems. Existing studies have shown that addictive behaviors may weaken an individual's SWB by inducing mental health problems such as anxiety and depression. However, existing literature has primarily focused on a single type of addictive behavior (eg, alcohol abuse or social media addiction). The lack of systematic comparisons and integrated analyses of the influence pathways of different types of addictive behaviors limits our comprehensive understanding of their underlying mechanisms.

Against this backdrop, the main objective of this study is to explore the mediating role of mental health problems between adolescent addictive behavior and SWB. Compared with existing studies, this study makes unique contributions in two aspects. First, it integrates the two dimensions of substance addictions and behavioral addictions to construct a more comprehensive and systematic measurement framework for adolescent addictive behavior. Second, based on large-sample survey data, it systematically assesses the indirect impact of these two types of addictive behavior on SWB through mental health problems. It reveals the complex interaction mechanism between the physical and mental health of adolescents from a holistic perspective.

As shown in Figure 1, based on the above research objectives and theoretical mechanisms, this study proposes two hypotheses to construct a hypothetical model. First, mental health problems were hypothesized to play a mediating role between substance addiction and adolescents' SWB (H1). Second, mental health problems were hypothesized to play a mediating role between behavioral addictions and adolescents' SWB (H2).

Methods

Study Design and Participants

This is a cross-sectional study with data from the 2017/2018 Health Behavior Survey of School-age Children (HBSC) (https://hbsc.org/data/). The study subjects included 76,261 adolescents aged 10 to 16. The HBSC is a unique cross-national research program designed to investigate the health and well-being of adolescents in Europe, Central Asia and North America. The 2017/2018 survey report provides data on over 220,000 adolescents from 45 countries and territories across Europe and Canada. The data focus on social environments, health outcomes, health behaviors, and risk behaviors that are relevant to young people's health and well-being.[36,37] The data analysis process is based on strict ethical standards to ensure the anonymity and confidentiality of personal information.[38]

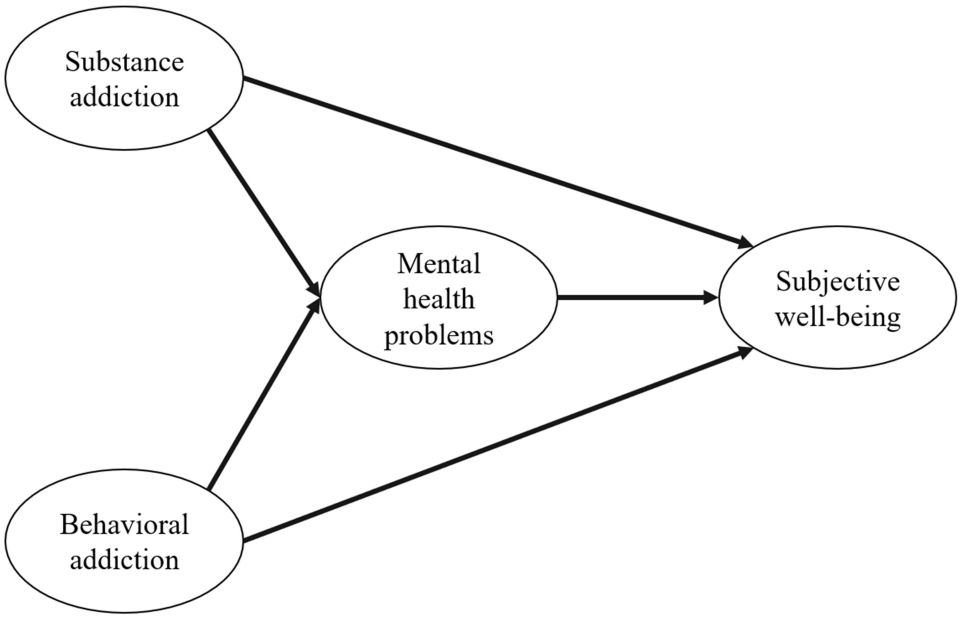

Figure 1 Model of mental health problems as mediators between addictive behavior and adolescents' SWB. This figure presents the hypothesized mediation framework, proposing that mental health problems mediate the relationship between substance addiction, behavioral addiction, and adolescents' SWB. Two indirect pathways are specified: (1) substance addiction affects SWB through mental health problems, and (2) behavioral addiction affects SWB through mental health problems.

Measurement of Variables

In this study, the variables used were assessed based on specific questions in the HBSC questionnaire (https://data-browser.hbsc.org/). The variables covered multiple dimensions, such as mental health status and addictive behavior, and relevant information was collected through the options in the questionnaire. To ensure consistency and interpretability in statistical analysis, all items were positively coded, meaning that higher scores indicate more severe psychological issues, higher SWB, and more severe addictive behaviors.

SWB is assessed using two items: life satisfaction and health. Life satisfaction was assessed using a revised version of Cantril's ladder.[39] Participants are asked to rate their "current life situation" on a scale ranging from 0 ("Worst possible life") to 10 ("Best possible life"), with higher scores indicating greater life satisfaction. Cantril's ladder has been widely used in studies across different countries and cultures and has demonstrated good reliability in multiple measures of well-being.[40] It also shows good convergent validity with other subjective well-being indicators, such as happiness and KIDSCREEN-10.[41] Health is assessed using self-rated health items from the HBSC questionnaire. The scale uses a four-point rating system, ranging from 1 ("Poor") to 4 ("Excellent"), reflecting respondents' subjective assessment of their own health. Higher scores indicate higher levels of health. Although health is not a core measure of SWB, research has shown that it is significantly correlated with adolescents' well-being, mental health problems, and life satisfaction.[42,43] Therefore, incorporating health status as a supplementary measure for SWB can enhance the coverage and explanatory power of well-being assessments. Due to data availability, the SWB dimension in this sample was measured using only two items, resulting in a Cronbach's alpha of 0.42.

Mental health problems are reflected by the measurement of nonclinical indicators of problematic mental health.[44] Using four items related to mental health from the HBSC questionnaire, students were asked about the frequency of four psychological symptoms ("Feeling low", "Irritability or bad temper", "Feeling nervous", and "Difficulties in getting to sleep") in the past six months. Each item uses a 5-point scale ranging from 1 ("Rarely or never") to 5 ("About every day"), with higher scores indicating greater symptom frequency. The test-retest reliability of individual items has been shown to range from 0.60 to 0.70 (Brunborg et al, 2013), indicating sufficient internal consistency.[45] The internal consistency test for the present study sample was similarly favorable (Cronbach's alpha = 0.77).

Addictive behaviors are categorized into two dimensions: substance addictions and behavioral addictions, both measured through specific items in the HBSC questionnaire. Participants are required to select options that align with their actual circumstances to describe their level of involvement in various addictive behaviors.[46] Substance addictions

include tobacco, alcohol, and cannabis use, comprising four items, each scored on a 7-point scale. The items for smoking, drinking, and cannabis use measure "lifetime days of use", ranging from 1 ("Never") to 7 ("30 days (or more)"). The item for drunkenness experiences measures "lifetime number of times drunk", ranging from 1 ("No, never") to 7 ("More than 10 times"). Behavioral addiction primarily assesses social media addiction behavior using the validated 9-item social media disorder scale from the HBSC.[47] Each item is scored on a dichotomous scale (1 = no, 2 = yes), with all items coded positively. A higher total score indicates a more severe level of addiction. The Cronbach's alpha coefficient for the substance addiction dimension was 0.76, and that for the behavioral addiction dimension was 0.77. These results are consistent with existing literature (Cronbach's alpha = 0.75)[48] and indicate sufficient internal consistency.

Statistical Analysis

Data analysis was conducted via R (version 4.4.0) and SPSS version 19.0. First, all samples with missing key variables were excluded to ensure data integrity. Four latent variables were constructed: substance addiction, behavioral addiction, mental health problems, and SWB.

Subsequently, descriptive statistical analyses of substance addiction, behavioral addiction, mental health problems, and SWB among the subjects were performed via SPSS. The relationships among these variables were elucidated via Pearson correlation analysis.

Next, use the laavan package in R to construct the mediating effect and test the hypothesized structural equation model(SEM). The maximum likelihood estimation method was adopted to evaluate the goodness-of-fit of the hypothesized model. Several model fit indices were employed to evaluate the adequacy of the model. Bootstrap analysis (with 5000 resampling iterations) was used to test the total effect, indirect effect, and direct effect of the model. If the 95% confidence interval (CI) did not contain zero, the indirect effect (ie, the mediating effect in this study) was considered statistically significant. A significance level of $P \leq 0.05$ was considered statistically significant.

Results

Correlation Between Variables and Descriptive Statistical Analysis

Table 1 presents the demographic characteristics of the study sample. The study sample consisted of individuals aged 10–16 years, with a mean age of 14.27 ± 1.33 years. The highest proportion of participants were 15 years old (58.20%), while the lowest proportion were 10 years old (0.20%). In terms of gender distribution, females accounted for 52.86%, and males accounted for 47.14%, with an average of 1.53 ± 0.5. The gender distribution was generally balanced.

Table 2 shows the correlation matrix of the main study variables. All the independent variables were significantly correlated with SWB. Specifically, mental health problems ($r = -0.345$, $P < 0.001$), substance addiction ($r = -0.141$, $P < 0.001$), and behavioral addiction ($r = -0.142$, $P < 0.001$) were negatively correlated with the degree of SWB. Table 1 also presents the means and standard deviations of the main variables. The mean and standard deviation of SWB were 1.805 ± 0.529, while the corresponding values for mental health problems, substance addiction, and behavioral addiction were 2.424 ± 1.063, 1.761 ± 1.144, and 1.216 ± 0.240, respectively.

Table 1 Age and Gender Distribution Characteristics of Research Subjects

Variables	Characteristics	Total	Percent	Mean	SD
Age	10 years old	138	0.20%	14.27	1.33
	11 years old	5619	7.40%		
	12 years old	2091	2.70%		
	13 years old	12953	17.00%		
	14 years old	5683	7.50%		
	15 years old	44366	58.20%		
	16 years old	5411	7.10%		
Sex	Male (coded as 1)	35,952	47.14%	1.53	0.50
	Female (coded as 2)	40,309	52.86%		

https://doi.org/10.2147/PRBM.S536362

Table 2 Descriptive and Correlation Analysis (n = 76,261)

	Mean	SD	Subjective Well-Being	Mental Health Problems	Substance Addiction	Behavioral Addiction
Subjective well-being	1.805	0.529	1			
Mental health problems	2.424	1.063	−0.345 ***	1		
Substance addiction	1.761	1.144	−0.141***	0.221***	1	
Behavioral addiction	1.216	0.240	−0.142***	0.293***	0.166***	1

Note: *p < 0.05, **p < 0.01, ***p< 0.001.
Abbreviation: SD, standard deviation.

Analysis of Intermediation Effects

Table 3 shows the fit indices of the hypothesized models. The fit indices indicate that the model fits well (CFI = 0.945, TLI = 0.936, NFI = 0.945, IFI = 0.945, GFI = 0.973, AGFI = 0.964, RMSEA = 0.042, SRMR = 0.032). These results indicate that the hypothesized model is consistent with the empirical data.

As shown in Figure 2. Substance addiction ($\beta = -0.090$, $p < 0.001$), behavioral addiction ($\beta = -0.026$, $p < 0.001$), and mental health problems ($\beta = -0.665$, $p < 0.001$) significantly and negatively affected adolescent SWB. Substance addiction ($\beta = 0.197$, $p < 0.001$) and behavioral addiction ($\beta = 0.320$, $p < 0.001$) both significantly and positively influence adolescent mental health problems.

In light of this information, a mediating effect was established, with mental health problems mediating the effect of addictive behaviors on SWB. Substance addiction and behavioral addiction indirectly decrease SWB by increasing mental health problems.

Table 4 shows the total effects, direct effects, and indirect effects of each path. Based on the purpose of this study, two structural hypotheses were proposed and a hypothetical model was constructed accordingly. The following is a report on each research hypothesis.

Hypothesis 1 (H1) states that mental health problems mediate the relationship between substance addictions and adolescent SWB. The analysis results show that the unstandardized coefficient of the total effect of substance addictions on SWB is −0.074, of which the indirect effect coefficient through mental health problems is −0.044, accounting for 59.46% of the total effect. The 95% confidence interval (CI) of this indirect path does not include zero, indicating that the mediating effect is significant. Therefore, Hypothesis 1 is supported.

Hypothesis 2 (H2) posits that mental health problems mediate the relationship between behavioral addiction and adolescent SWB. The results show that the unstandardized coefficient of the total effect of behavioral addiction on SWB is −0.406, and the indirect effect coefficient through mental health problems is −0.362, accounting for 89.16% of the total effect. Similarly, the 95% CI does not include zero, indicating that the mediating effect is significant. Thus, hypothesis 2 is also verified.

In summary, mental health problems play a significant mediating role in both paths.

Table 3 Fitness Indexes of the Model

	χ^2	df	χ^2/df	CFI	TLI	NFI	IFI	GFI	AGFI	RMSEA	SRMR
Standard			≤5	≥0.9	≥0.9	≥0.9	≥0.9	≥0.9	≥0.9	≤0.05	≤0.08
Actual value	19231	145	132.628	0.945	0.936	0.945	0.945	0.973	0.964	0.042	0.032

Notes: All pathway coefficients were significant.
Abbreviations: χ^2, chi-square; DF, degrees of freedom; GFI, goodness-of-fit index; AGFI, adjusted goodness-of-fit index; IFI, incremental fit index; CFI, comparative fit index; RMSEA, root mean square error of approximation.

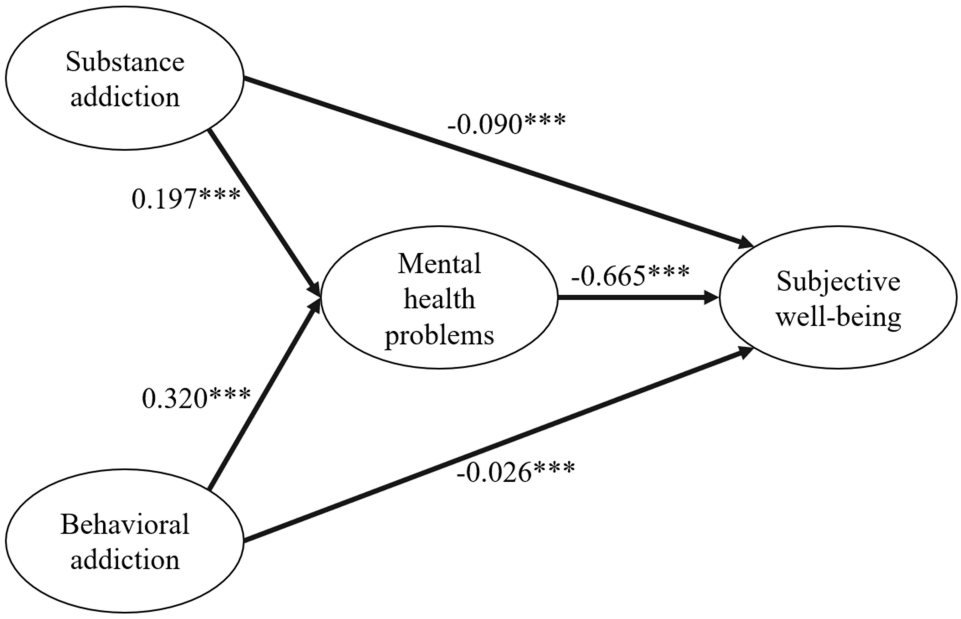

Figure 2 Standardized path coefficients for the mediated models. This figure illustrates the empirical results of the structural equation model. Substance addiction (β = 0.197***) and behavioral addiction (β = 0.320***) significantly and positively influence mental health problems, which in turn negatively impacts SWB (β = −0.665***). Additionally, direct negative effects of substance addiction (β = −0.090***) and behavioral addiction (β = −0.026***) on SWB are also shown.
Notes: *p < 0.05, **p < 0.01, ***p < 0.001.

Discussion

The purpose of this study was to examine the mediating role of mental health problems in the relationship between addictive behaviors and SWB in adolescents. These findings suggest that addictive behaviors not only have a direct effect on SWB, but also have an indirect effect on SWB through mental health problems. The mediating effect of mental health problems in the pathway through which substance addiction affects SWB was 59.46%. It indicates that mental health problems play an important role in the pathway through which substance addiction affects SWB. The mediating effect in the pathway of behavioral addiction affecting SWB is 89.16%. It indicates that mental health problems play a key role in explaining the relationship between behavioral addiction and SWB.

Mental Health Problems and their Relationship with SWB

Consistent with previous research, mental health problems were negatively associated with SWB.[9] A clinical study also found that individuals with mental health problems typically exhibit lower levels of neurotransmitters and lack effective

Table 4 The Total, Direct, and Indirect Effects of Substance Addiction and Behavioral Addiction on Subjective Well-Being, with Mental Health Problems as the Mediator

Pathway	Direct Effect			Indirect Effect			Total Effect			Percentage of Indirect Effects (%)
	Effect (SE)	95% CI		Effect (SE)	95% CI		Effect (SE)	95% CI		
		LLCL	ULCL		LLCL	ULCL		LLCL	ULCL	
Substance addiction→ Mental health problems→ Subjective well-being	−0.030 (0.002)	−0.033	−0.026	−0.044 (0.001)	−0.046	−0.041	−0.074 (0.002)	−0.078	−0.070	59.46%
Behavioral addiction→ Mental health problems→ Subjective well-being	−0.043 (0.010)	−0.063	−0.025	−0.362 (0.008)	−0.379	−0.347	−0.406 (0.011)	−0.429	−0.385	89.16%

Abbreviations: SE, standard error; CI, confidence interval; LLCL, lower limits confidence interval; ULCL, upper limits confidence interval.

https://doi.org/10.2147/PRBM.S536362

coping mechanisms for negative emotions, which together reduce their SWB.[49] On the contrary, adolescents with better mental health have more positive expectations for the future. This optimism activates their convergent motivational system, making it easier for them to focus on positive information and experience more positive emotions, which in turn increases SWB.[50] In addition, research has also shown that positive psychological interventions can help enhance adolescents' SWB. For example, interventions that foster positive psychological traits have been shown to be effective in enhancing adolescents' SWB and social adjustment.[51] The discussion of the relationship between mental health problems and SWB provides theoretical support for the possibility that addictive behaviors influence SWB through the mediating role of mental health problems, a mechanism that will be discussed further below.

Substance Addiction: Direct Impact on SWB and Mediated Pathways

Modeling outcomes revealed a negative correlation between substance addiction and SWB, suggesting that adolescents with greater degrees of substance addiction generally exhibit lower SWB. This finding aligns with earlier research results.[23,52] This finding suggests that interventions to limit adolescents' substance use can help to increase their SWB. A study of adolescents in England found that as adolescents' drinking behavior decreased, their well-being rose accordingly.[53] Another clinical trial of quitters in the United States revealed that successful quitters reported higher SWB over a three-year period.[54]

This study verified the mediating role of mental health problems between substance addictions and SWB. The study found that substance addictions significantly increase the risk of mental health problems, while mental health problems significantly reduce SWB. This chain of relationships is consistent with the conclusions of previous studies.[55,56]

From a mechanistic perspective, the mediating role of mental health problems in substance addictions affecting SWB is mainly reflected at the biological mechanism level. Biologically, adolescents' brains are in a critical period of development, and addictive substances such as alcohol and cannabis can directly damage the functions of the prefrontal cortex and limbic system.[57] This can lead to emotional regulation disorders, cognitive decline, and subsequently symptoms such as depression and anxiety,[24] thereby reducing SWB. Such biological damage is cumulative and may have irreversible effects on mental health. For example, cannabis use is associated with a reduction in the volume of the adolescent hippocampus, which directly weakens their ability to cope with stress, triggers mental health problems, and further reduces SWB.[58]

In addition to biological pathways, substance addictions may also influence mental health and SWB through social mechanisms. Substance addictions are often accompanied by social isolation, family conflicts, parental abuse, and other family environment problems, as well as social consequences such as academic failure. These further induce mental health problems,[25] which in turn reduce SWB. Therefore, substance addictions not only directly induce mental health problems in adolescents, but also reduce their SWB through the combined effects of biological and social mechanisms.

Behavioral Addiction: Direct Impact on SWB and Mediating Pathways

This study further confirmed the strong negative correlation between behavioral addiction and SWB.[29] That is, the higher the level of behavioral addiction among adolescents is, the lower their SWB. This finding is consistent with the results of a study covering adolescents in 29 countries, where social media addiction was negatively associated with all domains of well-being in all countries.[30] In addition, a study of Chinese adolescents also found that social media addiction may cause individuals to neglect real-life relationships and daily activities, thereby reducing their SWB.[59]

This study verified the mediating role of mental health problems between behavioral addiction and SWB. The findings showed that behavioral addiction may not only directly reduce adolescents' SWB, but also indirectly affect SWB by inducing mental health problems, which is consistent with previous studies.[34]

Compared with substance addictions, the mediating effect of mental health problems on the influence of behavioral addiction on SWB is mainly reflected at the level of social environmental mechanisms. Among them, behavioral addiction, represented by social media addiction, reflects an individual's excessive dependence on highly rewarding behaviors in a specific sociocultural context. On one hand, the idealized self-presentation and frequent social comparisons on social media may erode adolescents' sense of self-identity and self-esteem, triggering anxiety and depressive emotions, and thereby reducing SWB.[36] On the other hand, sleep deprivation and distraction caused by long-term

excessive use of social media may further induce mental health problems through social isolation and increased academic pressure, thereby reducing SWB.[60] In addition, negative social experiences such as rejection, neglect, or cyberbullying encountered in online interactions can activate the stress response system in the adolescent brain, triggering intense emotional fluctuations and physiological stress responses, which in turn damage SWB.[61]

Implications

Theoretical Significance

Based on social cognitive theory, developmental psychology theory, and hedonic deficiency theory, this study systematically explored the mediating role of mental health problems in adolescent addictive behavior and SWB. Unlike previous studies that focused on a single type of addiction (such as smoking, drinking, or social media), this paper innovatively integrated the two dimensions of substance addictions and behavioral addiction. A more comprehensive analytical framework was constructed and empirically tested based on large sample data. The study found that both substance addictions and behavioral addictions indirectly affect adolescents' SWB through mental health problems. This finding provides a theoretical basis for understanding the path through which addictive behavior affects SWB via mental health problems, enriching the theoretical perspective of adolescent well-being research. It provides solid empirical support for the formulation of targeted intervention policies focused on reducing addictive behavior and improving mental health problems among adolescents.

Public Policy Implications

Based on the empirical findings of this study, mental health problems play a mediating role between addictive behavior and SWB. This suggests that when intervening in adolescent addiction problems, we should not only control their behavioral manifestations, but also pay attention to improving their mental health problems. Therefore, the government, schools, and families need to work together to build a multi-level intervention system.

Specifically, schools and communities should establish a normalized early screening and psychological assessment mechanism. Regular monitoring and identification of high-risk behaviors such as social media addiction and substance use, as well as related mental health problems, should be carried out to enable accurate intervention. At the same time, emotional management, psychological resilience, stress adaptation, and media literacy should be incorporated into the health education system. This will help adolescents improve their awareness of the risks of addictive behaviors and their self-regulation abilities, thereby enhancing their psychological resilience. At the family level, parents should increase their attention to adolescents' mental health and media use. They should create an open and supportive family communication environment, actively participate in relevant educational training, and enhance their ability to identify and respond to their children's abnormal behaviors. Additionally, policymakers should strengthen restrictions on access to addictive substances, establish minimum purchase ages, and enhance sales regulation. They should also improve usage guidelines and content regulation for social media platforms to reduce adolescents' exposure to high-risk environments and addictive triggers.

Strengths

The data in this study have the following advantages. First, this study uses HBSC data covering 76,261 adolescents in more than twenty countries and regions, which ensures the reliability and broad representativeness of the sample. Second, this paper examined the complex relationship between variables through structural equation modeling, which both analyzed the direct impact of addictive behaviors on SWB and explored the mediating role of mental health problems, deepening the understanding of the mechanism of their impact. Finally, this study has important practical significance. It provides strong empirical support for the formulation of targeted intervention policies focused on reducing addictive behavior and improving mental health problems among adolescents. It will help to effectively improve the overall well-being of adolescents.

Limitations and Further Directions

First, the study utilized cross-sectional data and Structural Equation Modeling (SEM). While SEM is effective in identifying potential path relationships between variables, cross-sectional designs cannot establish causality, and the

results may be influenced by reverse causality. For example, lower SWB may increase the risk of addictive behavior. Future studies may consider using longitudinal data designs to more effectively identify causal relationships between variables. Second, the study relies on self-reports from adolescents, which are susceptible to social desirability bias. Substance use is often viewed as undesirable behavior in sociocultural contexts, and adolescents may underreport actual rates of behavior in order to conform to social expectations. In the future, multiple sources of data, such as reports from parents or teachers, could be incorporated to enhance the objectivity and accuracy of the data. Third, the study mainly focused on the mediating role of mental health problems and did not comprehensively explore other potential mechanisms. For example, identity may play a key role between addictive behavior and SWB. Future studies may introduce the dimension of identity (such as using the AIQ-IV scale) to expand the theoretical model. Lastly, this study utilized HBSC data from the 2017/18 cycle and was unable to incorporate the most up-to-date data. This limitation arises because the original international data from the 2021/22 HBSC survey is currently under confidentiality (embargoed) until October 2026. Consequently, future research may validate the findings using updated data to enhance the generalizability and timeliness of the results.

Conclusion

This study found that mental health problems play a mediating role in the process of addictive behavior affecting SWB. The results clearly reveal the core mechanism by which addictive behavior leads to a decline in SWB through mental health problems. This provides a scientific basis for the development of targeted intervention strategies that focus on reducing addictive behavior and improving mental health problems. Based on this, a multi-level collaborative intervention system covering early screening, health education, family support, and policy regulation should be established to improve SWB.

Data Sharing Statement

The data that support the findings of this study are openly available at http://www.hbsc.org.

Ethics Approval and Consent to Participate

This study was conducted in accordance with the Declaration of Helsinki and approved by the Ethics Review Committee of the School of Journalism and Communication, Southwest University of Political Science and Law (2025010201).

Acknowledgments

HBSC is an international study carried out in collaboration with WHO/EURO. The International Coordinator of the 2017/18 survey was Dr. Joanna Inchley and the Data Bank Manager was Prof. Oddrun Samdal. For details, see http://www.hbsc.org.

Author Contributions

All authors made a significant contribution to the work reported, whether that is in the conception, study design, execution, acquisition of data, analysis and interpretation, or in all these areas; took part in drafting, revising or critically reviewing the article; gave final approval of the version to be published; have agreed on the journal to which the article has been submitted; and agree to be accountable for all aspects of the work.

Funding

This research was funded by the Key Projects of Chongqing Social Science Planning (Grant No. 2023NDZD08).

Disclosure

The author declares that there are no competing interests.

References

1. Steinmayr R, Wirthwein L, Modler L, Barry MM. Development of subjective well-being in adolescence. *Int J Environ Res Public Health*. 2019;16(19):3690. doi:10.3390/ijerph16193690
2. Diener E. Subjective well-being. *Psychol Bull*. 1984;95(3):542. doi:10.1037/0033-2909.95.3.542

3. Xu Y, Xie L, Bao M, Yang X, Chen S, Gao Z. Exploring subjective well-being in adolescents: the role of mental health and addictive behaviors through machine learning. *IJMHP*. 2025;27(5):667–682. doi:10.32604/ijmhp.2025.062808
4. Derdikman-Eiron R, Indredavik MS, Bratberg GH, Taraldsen G, Bakken IJ, Colton M. Gender differences in subjective well-being, self-esteem and psychosocial functioning in adolescents with symptoms of anxiety and depression: findings from the Nord-Trøndelag health study. *Scand J Psychol*. 2011;52(3):261–267. doi:10.1111/j.1467-9450.2010.00859.x
5. Laakso M, Fagerlund Å, Lagerström M. Increasing student well-being through a positive psychology intervention: changes in salivary cortisol, depression, psychological well-being, and hope. *Appl Psychol Health Well-Being*. 2025;17(1):e12616. doi:10.1111/aphw.12616
6. Zou Z, Wang H, d'Oleire Uquillas F, Wang X, Ding J, Chen H. Definition of substance and non-substance addiction. *Adv Exp Med Biol*. 2017;1010:21–41. doi:10.1007/978-981-10-5562-1_2
7. Grant JE, Potenza MN, Weinstein A, Gorelick DA. Introduction to Behavioral Addictions. *Am J Drug Alcohol Abuse*. 2010;36(5):233–241. doi:10.3109/00952990.2010.491884
8. World Health Organization. *World Mental Health Report: Transforming Mental Health for All*. World Health Organization; 2022.
9. Park N. The role of subjective well-being in positive youth development. *ANNALS Am Acad Political Social Sci*. 2004;591(1):25–39. doi:10.1177/0002716203260078
10. Frobel W, Grafe N, Meigen C, et al. Substance use in childhood and adolescence and its associations with quality of life and behavioral strengths and difficulties. *BMC Public Health*. 2022;22(1):275. doi:10.1186/s12889-022-12586-2
11. Soriano-Molina E, Limiñana-Gras RM, Patró-Hernández RM, Rubio-Aparicio M. The association between internet addiction and adolescents' mental health: a meta-analytic review. *Behav Sci*. 2025;15(2):116. doi:10.3390/bs15020116
12. Bandura A. *Social Foundations of Thought and Action: A Social Cognitive Theory*. Prentice-Hall, Inc; 1986:xiii,617.
13. Winer JM, Yule AM, Hadland SE, Bagley SM. Addressing adolescent substance use with a public health prevention framework: the case for harm reduction. *Annals of Medicine*. 2022;54(1):2123–2136. doi:10.1080/07853890.2022.2104922
14. Casey BJ, Jones RM, Hare TA. The adolescent brain. *Ann N Y Acad Sci*. 2008;1124(1):111–126. doi:10.1196/annals.1440.010
15. Flannery JS, Burnell K, Kwon SJ, et al. Developmental changes in brain function linked with addiction-like social media use two years later. *Soc Cogn Affect Neurosci*. 2024;19(1). doi:10.1093/scan/nsae008
16. Koob GF. A role for brain stress systems in addiction. *Neuron*. 2008;59(1):11–34. doi:10.1016/j.neuron.2008.06.012
17. Wang Y, Li Y, Liu B, et al. Adolescent internet gaming disorder and sensitivity to money and social rewards. *Acta Psychologica*. 2024;248:104431. doi:10.1016/j.actpsy.2024.104431
18. Gladwin TE, Figner B, Crone EA, Wiers RW. Substance use in childhood and adolescence and its associations with quality of life and behavioral strengths and difficulties. *Dev Cogn Neurosci*. 2011;1(4):364–376. doi:10.1016/j.dcn.2011.06.008
19. Boniel-Nissim M, Marino C, Galeotti T, et al. *A Focus on Adolescent Social Media Use and Gaming in Europe, Central Asia and Canada: Health Behaviour in School-Aged Children International Report From the 2021/2022 Survey*. World Health Organization, Regional Office for Europe; 2024.
20. Charrier L, van Dorsselaer S, Canale N, et al. *A Focus on Adolescent Substance Use in Europe, Central Asia and Canada. Health Behaviour in School-Aged Children International Report From the 2021/2022 Survey*. Vol. 3. World Health Organization. Regional Office for Europe; 2024.
21. Volkow ND, Blanco C. Substance use disorders: a comprehensive update of classification, epidemiology, neurobiology, clinical aspects, treatment and prevention. *World Psychiatry*. 2023;22(2):203–229. doi:10.1002/wps.21073
22. Cable N, Roman Mella MF, Kelly Y. What could keep young people away from alcohol and cigarettes? Findings from the UK household longitudinal study. *BMC Public Health*. 2017;17(1):371. doi:10.1186/s12889-017-4284-x
23. Donaldson SI, Beard TA, Soto D, Lee R, Leventhal AM, Unger JB. Validating the satisfaction with life scale among early adolescents: psychometric assessment using item response theory. *Curr Psychol*. 2025;44(7):5821–5829. doi:10.1007/s12144-025-07518-3
24. Esmaeelzadeh S, Moraros J, Thorpe L, Bird Y. Examining the association and directionality between mental health disorders and substance use among adolescents and young adults in the U.S. and canada—a systematic review and meta-analysis. *J Clin Med*. 2018;7(12):543. doi:10.3390/jcm7120543
25. Grossberg A, Rice T. Depression and suicidal behavior in adolescents. *Med Clin North Am*. 2023;107(1):169–182. doi:10.1016/j.mcna.2022.04.005
26. Fedorova EV, Wong CF, Conn BM, Ataiants J, Iverson E, Lankenau SE. COVID-19's impact on substance use and well-being of younger adult cannabis users in California: a mixed methods inquiry. *J Drug Issues*. 2022;52(2):207–224. doi:10.1177/00220426211052673
27. Marengo D, Angelo Fabris M, Longobardi C, Settanni M. Smartphone and social media use contributed to individual tendencies towards social media addiction in Italian adolescents during the COVID-19 pandemic. *Addict Behav*. 2022;126:107204. doi:10.1016/j.addbeh.2021.107204
28. Orben A, Blakemore SJ. How social media affects teen mental health: a missing link. *Nature*. 2023;614(7948):410–412. doi:10.1038/d41586-023-00402-9
29. Mader S, Costantini D, Fahr A, Jordan MD. The effect of social media use on adolescents' subjective well-being: longitudinal evidence from Switzerland. *Soc sci med*. 2025;365:117595. doi:10.1016/j.socscimed.2024.117595
30. Boer M, Van Den Eijnden RJJM, Boniel-Nissim M, et al. Adolescents' intense and problematic social media use and their well-being in 29 countries. *J Adolesc Health*. 2020;66(6):S89–S99. doi:10.1016/j.jadohealth.2020.02.014
31. Clayborne ZM, Wong SL, Roberts KC, et al. Associations between social media use and positive mental health among adolescents: findings from the Canadian health behaviour in school-aged children study. *J Psychiatr Res*. 2025;181:333–339. doi:10.1016/j.jpsychires.2024.11.071
32. Young L, Kolubinski DC, Frings D. Attachment style moderates the relationship between social media use and user mental health and wellbeing. *Heliyon*. 2020;6(6):e04056. doi:10.1016/j.heliyon.2020.e04056
33. Zhang C, Tang L, Liu Z. How social media usage affects psychological and subjective well-being: testing a moderated mediation model. *BMC Psychol*. 2023;11(1):286. doi:10.1186/s40359-023-01311-2
34. Satici SA. Facebook addiction and subjective well-being: a study of the mediating role of shyness and loneliness. *Int J Ment Health Addict*. 2019;17(1):41–55. doi:10.1007/s11469-017-9862-8
35. Steinberger P, Kim H. Social comparison of ability and fear of missing out mediate the relationship between subjective well-being and social network site addiction. *Front Psychol*. 2023;14. doi:10.3389/fpsyg.2023.1157489
36. Mojtabai R. Problematic social media use and psychological symptoms in adolescents. *Soc Psychiatry Psychiatr Epidemiol*. 2024;59(12):2271–2278. doi:10.1007/s00127-024-02657-7

37. Moor I, Winter K, Bilz L, et al. The 2017/18 Health Behaviour in School-aged Children (HBSC) study–methodology of the World Health Organization's child and adolescent health study. *J Health Monit*. 2020;5(3):88. doi:10.25646/6904
38. American Psychological Association. Ethical principles of psychologists and code of conduct. In: *Methodological Issues and Strategies in Clinical Research, 4th Ed*. American Psychological Association; 2016: 495–512. doi:10.1037/14805-030
39. Cantril H. *The Pattern of Human Concerns*. Rutgers University Press; 1965.
40. Corell M, Friberg P, Petzold M, Löfstedt P. Socioeconomic inequalities in adolescent mental health in the Nordic countries in the 2000s - A study using cross-sectional data from the health behaviour in school-aged children study. *Arch Public Health*. 2024;82(1):20. doi:10.1186/s13690-024-01240-5
41. Levin KA, Currie C. Reliability and validity of an adapted version of the cantril ladder for use with adolescent samples. *Soc Indic Res*. 2014;119 (2):1047–1063. doi:10.1007/s11205-013-0507-4
42. Åvitsland A, Leibinger E, Haugen T, et al. The association between physical fitness and mental health in Norwegian adolescents. *BMC Public Health*. 2020;20(1):776. doi:10.1186/s12889-020-08936-7
43. Mathentamo Q, Lawana N, Hlafa B. Interrelationship between subjective wellbeing and health. *BMC Public Health*. 2024;24(1):2213. doi:10.1186/s12889-024-19676-3
44. Eriksson C, Stattin H. Mental health profiles of 15-year-old adolescents in the Nordic Countries from 2002 to 2022: person-oriented analyses. *BMC Public Health*. 2024;24(1):2358. doi:10.1186/s12889-024-19822-x
45. Brunborg GS, Mentzoni RA, Melkevik OR, et al. Gaming addiction, gaming engagement, and psychological health complaints among norwegian adolescents. *Media Psychology*. 2013;16(1):115–128. doi:10.1080/15213269.2012.756374
46. Bartlett S, Bataineh J, Thompson W, Pickett W. Correlations between weight perception and overt risk-taking among Canadian adolescents. *Can J Public Health*. 2023;114(6):1019–1028. doi:10.17269/s41997-023-00778-1
47. van den Eijnden RJJM, Lemmens JS, Valkenburg PM. The social media disorder scale. *Comput Human Behav*. 2016;61:478–487. doi:10.1016/j.chb.2016.03.038
48. King N, Davison CM, Pickett W. Development of a dual-factor measure of adolescent mental health: an analysis of cross-sectional data from the 2014 Canadian Health Behaviour in School-aged Children (HBSC) study. *BMJ Open*. 2021;11(9):e041489. doi:10.1136/bmjopen-2020-041489
49. Gargiulo RA, Stokes MA. Subjective well-being as an indicator for clinical depression. *Soc Indic Res*. 2009;92(3):517–527. doi:10.1007/s11205-008-9301-0
50. Zou R, Hong X, Wei G, Xu X, Yuan J. Differential effects of optimism and pessimism on adolescents' subjective well-being: mediating roles of reappraisal and acceptance. *Int J Environ Res Public Health*. 2022;19(12):7067. doi:10.3390/ijerph19127067
51. Lou X, Ng TK, Siu O. Investigating the effects of psycho-behavioral interventions on healthy adolescents' subjective well-being: a three-level meta-analysis. *J Positive Psychol*. 2023;19:1–14. doi:10.1080/17439760.2023.2179934
52. Brook DW, Rubenstone E, Zhang C, Morojele NK, Brook JS. Environmental stressors, low well-being, smoking, and alcohol use among South African adolescents. *Soc sci med*. 2011;72(9):1447–1453. doi:10.1016/j.socscimed.2011.02.041
53. Stevely AK, Gray LA, Fairbrother H, Fenton L, Henney M, Holmes J. A latent class analysis of change and continuity in adolescent health and wellbeing in England during the decline in youth alcohol consumption: a repeat cross-sectional study. *Prevent Med Rep*. 2023;36:102481. doi:10.1016/j.pmedr.2023.102481
54. Piper ME, Kenford S, Fiore MC, Baker TB. Smoking cessation and quality of life: changes in life satisfaction over 3 years following a quit attempt. *Ann Behav Med*. 2012;43(2):262–270. doi:10.1007/s12160-011-9329-2
55. Jumbe S, Mwenda Kamninga T, Kalu UG, et al. A systematic review and meta-analysis of factors associated with adolescent substance use in Africa, 2000 to 2020. *Addiction*. 2025;120(6):1127–1142. doi:10.1111/add.70023
56. Piumatti G, Lietz F, Aresi G, Bjegovic-Mikanovic V. Alcohol use, psychological distress, and subjective well-being among young adult university students: a cross-national study between Serbia and Italy. *J Ethn Subst Abuse*. 2019;18(4):511–529. doi:10.1080/15332640.2017.1417186
57. Steinfeld MR, Torregrossa MM. Consequences of adolescent drug use. *Transl Psychiatry*. 2023;13(1):1–22. doi:10.1038/s41398-023-02590-4
58. Ashtari M, Avants B, Cyckowski L, et al. Medial temporal structures and memory functions in adolescents with heavy cannabis use. *J Psychiatr Res*. 2011;45(8):1055–1066. doi:10.1016/j.jpsychires.2011.01.004
59. Zhou K, Zhu X, Chen BB. Understanding the link between social relationships and adolescent Internet addiction: perspectives from two approaches to well-being. *Comput Human Behav*. 2024;151:107995. doi:10.1016/j.chb.2023.107995
60. Marciano L, Viswanath K. Social media use and adolescents' well-being: a note on flourishing. *Front Psychol*. 2023;14. doi:10.3389/fpsyg.2023.1092109
61. Orben A, Meier A, Dalgleish T, Blakemore SJ. Mechanisms linking social media use to adolescent mental health vulnerability. *Nat Rev Psychol*. 2024;3(6):407–423. doi:10.1038/s44159-024-00307-y