



Social anxiety and adolescent students' internet fiction reading: Self-esteem mediation and school grade moderation

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Abstract: We investigated the relationship between social anxiety on adolescent students' internet fiction reading and mediation by self-esteem. A total of 774 adolescent students (female = 48.9%; mean age 13.39 ± 1.46) completed surveys on internet fiction addiction, social anxiety and self-esteem. Mediation analysis results indicated a significant school grade placement effect in internet fiction reading to be lower. The self-esteem of adolescent students plays a mediating role between social anxiety and internet fiction reading for higher internet fiction reading with higher self-esteem. This mediating effect accounts for about two-thirds of the total effect. This study suggests personal factors like self-esteem are important to how adolescent student's navigate internet fiction reading. Student counselling and development services should pay attention to adolescent students' social anxiety and improve their self-esteem, to reduce the tendency of adolescent students' internet fiction addiction.

Keywords: Social anxiety; internet fiction reading; self-esteem; adolescent students

Introduction

With the rapid development of digital times, internet fiction has spread rapidly through electronic devices such as mobile phones and computers. As an important reading resource in digital times, internet fiction had an impact on teenagers' reading life. At present, with the increasing popularity of the internet, the influence of internet fiction has penetrated all aspects of social life. Adolescent students, as one of the main consumer groups of internet fiction, are gradually adapting to the popular network culture, which is represented by internet fiction (Wu, 2023). The adolescent period is a critical stage for physical and mental health development, especially for early adolescents aged 10 to 14 (Jiang et al., 2025). Regrettably, internet fiction reading may come at a cost of social anxieties from, difficulty controlling reading time, increased tolerance, withdrawal reaction and disruption of daily life activities (Yang et al., 2023). Social anxiety refers to the intense fear triggered by other people's comments during social interactions (Tan et al., 2025). Much would depend on the person's self-esteem or individual's thoughts and feelings about his or her own importance and value in managing the internet reading demands and challenges, of which there is limited evidence.

Social anxiety and internet fiction

Social anxiety is one of the important factors affecting internet addiction in adolescent students. Studies have shown that high levels of social anxiety may lead to increased use of electronic devices such as mobile phones to reduce anxiety and fear (Meshi & Ellithorpe, 2021). Thus, social anxiety is associated with high risk for internet addiction (Miao et al., 2018). When reading internet fiction, due to their inability to control their emotions well,

students with social anxiety may also become addicted to the novel's plot (Grünthal et al., 2025). However, previous studies focused less on the relationship between social anxiety and internet fiction reading in adolescents. Therefore, this study hypothesizes a significant correlation between internet reading and social anxiety in adolescents.

The mediating role of self-esteem

Self-esteem refers bridges interpersonal relationships by prompting people to take action to maintain and restore the harmony. Empirical studies confirmed that individuals with high social anxiety are more likely to exhibit lower levels of self-esteem (Sella et al., 2024; Kong et al., 2022). Regarding the relationship between self-esteem and internet fiction reading, Liu et al. (2016) proposed the internet satisfaction compensation model and suggested that the internet use of adolescent students is driven by psychological needs. The internet plays a psychological compensation role for students. When students rely too much on the role of compensation, it may lead to addiction. Studies have shown that adolescent students with low self-esteem are more likely to vent their emotions and find self-worth through the internet (Chen et al., 2020; Lai et al., 2023). Adolescent students are prone to losing themselves in reading novels, seeking self-confidence and a sense of value from them. Therefore, the present study hypothesizes that self-esteem may play a mediating role between social anxiety and internet fiction reading in adolescent students.

Few studies explore multiple variables relationships in internet fiction reading such as the relationship between internet fiction reading, social anxiety, and self-esteem.

Theoretical foundations. Davis' cognitive-behavioral addiction theory model proposed that social anxiety is



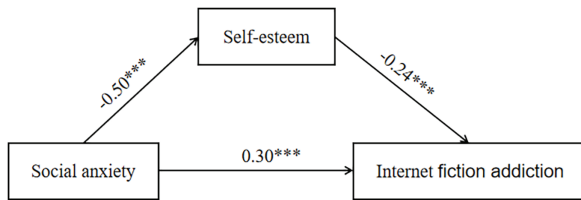


Figure 1. The mediation model of social anxiety, self-esteem, and internet fiction addiction. *Note.* *** $p < 0.001$

an initial and distal factor in the development of internet addiction (Davis, 2001). Zhu et al. (2025) suggested that individuals with social anxiety are more likely to feel loneliness and turn to the internet to alleviate social anxiety in real society. As a result, they may spend increasing amounts of time online to alleviate their social anxiety. Elrewany et al. (2025) tested adolescent students from the Eastern Mediterranean Region and found a close relationship between social anxiety and internet addiction.

The China context. According to the research of Chi et al. (2020), the incidence of internet addiction among adolescents in China reaches 9.6%~24.0%. A study of Zhu et al. (2025) enrolled 10,158 adolescent students and found the sample comprised 89.6% adolescents with normal internet usage, 10.2% adolescents with mild internet addiction, and 0.2% adolescents with severe internet addiction. A study of Bao et al. (2025) found a more common problematic gaming in male Chinese adolescents. This indicates that many adolescents including Chinese adolescents have issues with internet use. However, current research on internet fiction is insufficient. Therefore, this study focuses on exploring the situation of Chinese adolescents' internet fiction reading.

Goal of the study

This study examined the relationship between social anxiety and internet fiction reading, and the mediating role of self-esteem in adolescent students. We tested a mediated structural model (see Figure 1) and the following hypotheses:

H1: Social anxiety is associated with higher internet fiction reading in adolescent students.

H2: Self-esteem mediates the relationship between social anxiety and internet fiction reading in adolescent students to be lower among those with higher self-esteem.

H3: School grade placement moderated the social anxiety and internet fiction reading in adolescent students to be lower among those in higher grades.

Method

Participants and setting

A total of 774 students school students in Shaoxing city, China were participants (females = 48.87%, age range is 10–14 years old, $Mean = 13.39$, $SD = 1.46$). A total of 160 students (21.2% of the total) were in the fifth grade, 171 (22.6% of the total) were in the sixth grade, 130 (17.2% of the total) were in the seventh grade, 159 (21.1% of the total) were in the eighth grade, and 135 (17.9% of the total) were in the ninth grade.

Measures

The students self-reported their demographics of gender, grade, family background, father's level of education, mother's educational level, father's occupation, and mother's occupation (see Table 1 for demographics). They then completed the following measures.

Internet fiction reading

The present study adapted 23 item Song et al. (2013)'s Internet Fiction Addiction Questionnaire (IFAQ). The IFAQ comprises five factors including withdrawal reactions and tolerance, with a total of 23 items. Items are on a 5-point Likert scale ranging from 1 to 5 is used for scoring, from "completely inconsistent" to "completely consistent". The higher total score means a more serious addiction to internet fiction. In this study, the Cronbach's coefficient is 0.933, and the Guttman split-half reliability is 0.894, which means a high confidence Table 2.

Social anxiety scale

The present study used 6-item Scheier and Carver's Social Anxiety Subscale of the self-consciousness scale (SASS) (Scheier & Carver, 1985). The scale is on a 4-point Likert scoring ranging from 0 to 3, from "Not at all like me" to "Very much like me". The higher scores indicate greater anxiety. The scale had a Cronbach's coefficient of 0.79 in this study.

The self-esteem scale

The study used the 10-item Self-Esteem Scale (SES) (Winch, 1965). The scale uses a 1-4 Likert scoring method, ranging from "strongly disagree" to "strongly agree". Items 3, 5, 9, and 10 are reverse-scored. The higher scores indicate higher levels of self-esteem. The Cronbach's coefficient scores from the scale was 0.85 in this study.

Procedure

This study was approved by the Research Ethics Committee of Shaoxing University and by the principals of the participating schools. The parents/guardians of the students consented to the study, and the students assented to the study.

Data was collected during normal class time.

Data analysis

Data analysis used SPSS 26.0 and AMOS 24.0 statistical software. In the current study, SPSS 26.0 was used for describing statistical analysis, correlation analysis, repeated measures ANOVA and so on. Amos 24.0 was used to establish a mediation model to analyze the relationship between self-esteem, social anxiety and internet fiction reading in adolescent students. The Bootstrap method with 5000 repeated sampling was used to test the mediating effect and estimate the confidence interval. We used χ^2/df , GFI, CFI, RMSEA, IFI and TLI as the fitting indexes of the model. When χ^2/df was less than 5, GFI, CFI, IFI and TLI were greater than 0.9, and RMSEA was less than 0.08, the model fit was reasonable (Sahoo, 2019).

This study used Hearman's single factor test method to conduct an unrotated principal component analysis for variables' items. The results showed that there were 7

Table 1. Descriptive statistics analysis of population variables (n = 755)

Item	Category	Number	Percentage (%)
Gender	Boy	386	51.13
	Girl	369	48.87
Grade	Grade 5	160	21.19
	Grade 6	171	22.65
	Grade 7	130	17.22
	Grade 8	159	21.06
	Grade 9	135	17.88
Family background	Countryside	106	14.04
	City	649	85.96
Father's level of education	Primary school	24	3.18
	Middle school	225	29.80
	High school	214	28.34
	Bachelor's degree or above	292	38.68
Mother's educational level	Primary school	38	5.03
	Middle school	230	30.46
	High school	217	28.74
	Bachelor's degree or above	270	35.76
Father's occupation	Worker	157	20.79
	Merchant	144	19.07
	Specialist	160	21.19
	Civil servant	47	6.23
	Other	247	32.72
Mother's occupation	Worker	123	16.29
	Merchant	113	14.97
	Specialist	162	21.46
	Civil servant	37	4.90
	Other	320	42.38

factors with eigenvalues greater than 1. The first factor explained that the variation is 28.21%, which is lower than the critical standard of 40%.

Results

Descriptive statistics

As Table 3 showed, this study presents the descriptive statistical analysis of the study variables. The results found that different grades of adolescents perform differently from grade five to nine.

Social anxiety effects on internet reading

Amos software was used to analyze the direct effect of social anxiety on internet fiction addiction. The results showed that the direct effects model fit well, $\chi^2/df = 3.775$, GFI = 0.990, CFI = 0.992, IFI = 0.992, TLI = 0.979, RMSEA = 0.068. There was a significant path coefficient between the social anxiety score and the internet fiction addiction score ($\beta = 0.42$, $p < 0.001$), which supported the first hypothesis. As shown in Table 4, correlation analysis found that the scores of internet fiction addiction and its dimensions were positively correlated with the social anxiety scores ($p < 0.01$). The scores of internet fiction addiction and its dimensions were negatively correlated with the self-esteem score ($p < 0.01$). The

score of social anxiety was negatively correlated with the score of self-esteem ($p < 0.01$).

Self-esteem mediation

Based on the results of correlation analysis, the present study further explored the relationship between internet fiction reading, self-esteem, and social anxiety by model construction. We added self-esteem as a mediating variable to construct a mediating model of social anxiety and internet fiction addiction. The results showed that the model fit well, $\chi^2/df = 4.522$, GFI = 0.983, CFI = 0.984, IFI = 0.984, TLI = 0.966, RMSEA = 0.062. The path analysis results in the model (as shown in Figure 1) showed that after adding self-esteem as a mediating variable, the path coefficients of social anxiety score predicting internet fiction addiction score is 0.30 ($p < 0.001$), social anxiety score predicting self-esteem score is -0.50 ($p < 0.001$), and self-esteem score predicting internet fiction addiction score is -0.24 ($p < 0.001$).

The present study used the 5000 times bootstrap estimation method for bias-correction and 95% confidence interval method judgment. As shown in Table 5, the mediating effect size of self-esteem was 0.300 ($p < 0.001$), and the 95% confidence interval was [0.193, 0.415], excluding 0.

Table 2. Exploratory factor analysis of the internet fiction addiction scale

Item	Factor loading				
	1	2	3	4	5
v19	0.73				
v21	0.72				
v14	0.70				
v15	0.67				
v22	0.66				
v18	0.65				
v17	0.44				
v11		0.73			
v2		0.71			
v3		0.71			
v12		0.66			
v7		0.53			
v10			0.74		
v23			0.73		
v9			0.69		
v13			0.56		
v20			0.49		
v1				0.71	
v8				0.61	
v6				0.56	
v16				0.54	
v4					0.81
v5					0.45
Eigenvalue	9.59	2.04	1.22	0.986	0.81
Factor contribution rate (%)	19.36	14.47	13.19	11.251	5.41
Cumulative contribution rate (%)	19.36	33.84	47.03	58.275	63.68

School grade placement moderation

Repeated measures ANOVA indicated that there were significant differences in internet fiction addiction across grades ($F_{(4, 742)} = 642.72, p < 0.001, \eta^2 = 0.78$), and significant differences were observed for internet fiction addiction in the interaction between gender and grade. Through simple effect analysis, it was found that there was no significant simple effect of gender on five dimensions of internet fiction addiction ($p > 0.05$). However, as shown in Figure 2, there was significant simple effect of grade in five dimensions of internet fiction addiction ($p < 0.05$) secondary school. Specifically, the scores of withdrawal response and time management dimensions were from high to low in the same order of the seventh grade, ninth grade, eighth grade, sixth grade to fifth grade. In terms of tolerability, the score of six grade was the lowest. In the interpersonal academic dimension, the scores of high-grade primary school students and secondary school students were lower with grade growth. While in the work and rest health dimension, students got the highest score in the ninth grade and the lowest score in the eighth grade.

Discussion

This study found that social anxiety positively predicted adolescent students' internet fiction reading, and self-esteem played a mediating role between social anxiety and internet fiction reading. The findings are consistent with other types of internet studies. First, previous studies have

shown that social anxiety can predict internet addiction (Kavici & Ayaz-Alkaya, 2024; Miao et al., 2018). During adolescence, the severity of social anxiety, which as an emotional indicator of individuals, leads to behavior deterioration (Tras & Gökçen, 2020). Internet fiction could create a virtual space and provide readers with a rich emotional experience (Kartol & Peker, 2020). When adolescent students with high social anxiety read internet fiction, they experience various emotions due to the novel's storyline. If they only feel pleasure from internet fiction for a long time, they may gradually become addicted to internet fiction.

Higher self-esteem is significantly negatively correlated with social anxiety (Lai et al., 2023; Kong et al., 2022). Adolescent students with low self-esteem are more likely to feel social anxiety. Although few studies directly confirmed the relationship between self-esteem and adolescent students' internet fiction reading, there is indirect evidence from other types of internet use. For example, studies suggested that adolescent students with low self-esteem are more likely to become addicted to the internet (Charmaraman et al., 2025; Chen et al., 2021). As a subcategory of internet addiction, internet fiction addiction not only contains the characteristics of internet addiction, but also has its own characteristics, such as the highly interactive, customized, and self-substituent, which are more in line with the personal myth of adolescence (Peng et al., 2019). To satisfy the needs of self-esteem, individuals with low self-esteem will become addicted to

Table 3. Grade effect in adolescent's internet fiction reading

	<i>M</i> ± <i>SD</i>	Grade different (<i>M</i> ± <i>SD</i>)					<i>F</i>	<i>p</i>	Post hoc test
		Grade 5 (<i>n</i> = 160)	Grade 6 (<i>n</i> = 171)	Grade 7 (<i>n</i> = 130)	Grade 8 (<i>n</i> = 159)	Grade 9 (<i>n</i> = 135)			
Withdrawal response	11.9 ± 6.65	10.21 ± 4.85	10.47 ± 5.3	13.67 ± 7.86	12.53 ± 7.13	13.28 ± 7.40	9.33	0.00	7 > 9 > 8 > 6 > 5
Tolerance	9.74 ± 5.21	9.70 ± 4.91	8.77 ± 4.48	10.47 ± 5.71	9.91 ± 5.40	10.12 ± 5.55	2.44	0.05	7 > 9 > 8 > 5 > 6
Work and rest health	6.45 ± 3.02	6.08 ± 2.44	5.77 ± 2.34	6.81 ± 3.20	6.72 ± 3.33	7.06 ± 3.63	5.10	0.00	9 > 7 > 8 > 5 > 6
Time management	5.39 ± 2.66	4.72 ± 1.45	4.83 ± 1.74	6.00 ± 3.40	5.66 ± 2.80	6.02 ± 3.37	9.33	0.00	7 > 9 > 8 > 6 > 5
Interpersonal and academic problems	2.82 ± 1.50	2.62 ± 1.27	2.50 ± 1.08	3.10 ± 1.74	3.00 ± 1.66	2.98 ± 1.69	4.91	0.001	7 > 8 > 9 > 5 > 6
Internet fiction addiction total score	36.30 ± 15.99	33.34 ± 11.31	32.34 ± 12.5	40.05 ± 18.41	37.82 ± 17.35	39.46 ± 18.71	7.72	0.00	
Social anxiety	6.71 ± 4.52	5.27 ± 3.72	5.37 ± 4.10	6.44 ± 4.33	7.90 ± 4.96	8.97 ± 4.29	21.21	0.00	
Self-esteem	32.53 ± 5.51	33.04 ± 4.63	34.41 ± 4.42	31.27 ± 6.31	32.22 ± 6.15	31.15 ± 5.43	8.75	0.00	

Table 4. Correlation analysis between variables in adolescents

	1	2	3	4	5	6	7	8
1Withdrawal response	1							
2Tolerance	0.42**	1						
3Work and rest health	0.97**	0.41**	1					
4Time management	0.67**	0.59**	0.64**	1				
5Interpersonal and academic problems	0.54**	0.52**	0.41**	0.55**	1			
6Internet fiction addiction total score	0.93**	0.86**	0.72**	0.81**	0.66**	1		
7Social anxiety	0.31**	0.20**	0.19**	0.27**	0.22**	0.30**	1	
8Self-esteem	-0.27**	-0.20**	-0.25**	-0.32**	-0.26**	-0.30**	-0.41**	1

Note. ** $p < 0.01$.

Table 5. Analysis of mediating effect and its effect size

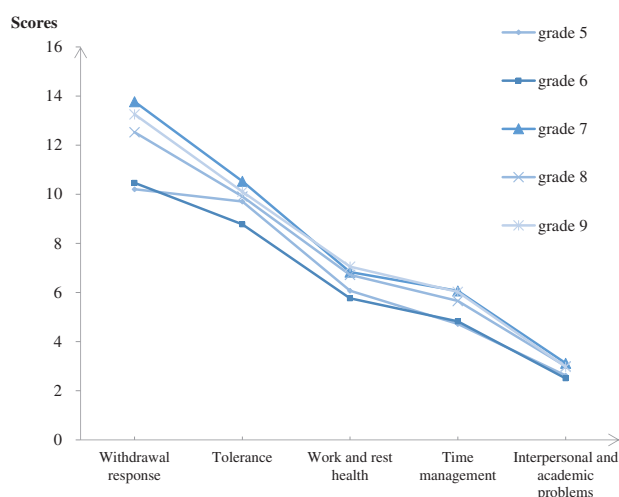
Effect	Path	Effect size	95% confidence interval		The amount of the effect
			Lower	Upper	
Direct effects	Social anxiety → internet fiction addiction	0.12	0.07	0.18	28.57%
Mediation effect	Social anxiety → self-esteem → internet fiction addiction	0.30	0.19	0.42	71.43%
Total effect		0.42	0.32	0.53	

the virtual world in internet fiction by imagining emotional and cognitive connections with the characters (Zhao et al., 2023). Therefore, adolescent students with low self-esteem are prone to find self-worth in internet fiction, become too dependent on internet fiction, and form an internet fiction addiction. Improving the self-esteem of adolescent students could weaken the internet fiction addiction of adolescent students caused by social anxiety.

The school grade effect was more pronounced for secondary school than for primary school students. Specifically, the level of internet fiction addiction among secondary school students from 7–9 grades was higher than that of primary school students in 5–6 grades. This result is consistent with the study of Wang et al. (2017), which showed that the degree of internet addiction in secondary school students was higher than that in primary school students. A possible explanation is that secondary school students have more opportunities to contact and use the internet than primary school students (Chen et al., 2020). When students gradually start to break away from parents' control, their internet literacy involves knowledge, emotion, intention and behavior begin to change (Li et al., 2022). Internet addiction significantly positively correlated with time spent on the internet (Chemnad et al., 2025). Studies also suggested that secondary school students have worse self-control ability in internet use (Liu et al., 2023; Vazsonyi & Cho, 2022). Therefore, secondary school students are more likely to be addicted to internet fiction than primary school students.

Implications for research and practice

This study has several theoretical implications for the literature on adolescents' internet fiction reading. First, the results revealed the characteristics of adolescents' internet fiction reading. Social anxiety is significantly correlated with adolescents' internet fiction reading. Parents and

**Figure 2.** Grade effect in dimensions of internet fiction addiction score

teachers should consciously cultivate the social skills of adolescents. Effective social activities may reduce adolescents' addiction to internet fiction (Erbaş & Gümüş, 2020; Wang et al., 2025). Second, this study found support for self-esteem as a critical mediator between social anxiety and adolescents' internet fiction reading. Student counselling and development services should pay attention to adolescent students' self-esteem, especially in social activities. The setbacks in real-life social activities may lead adolescents to escape to the virtual world of the internet, and the world in internet fiction is one of them (Dao & Alexandrovna, 2025).

Strengths, limitations, and future recommendations

The present study has several limitations. First, we only employ research design of cross-sectional research. On this

basis, future research can further carry out longitudinal research on adolescent's internet fiction reading to explore the development trajectory of adolescent's internet fiction reading and the influencing effect of other factors. Second, this study only explored the influence of social anxiety and self-esteem. Future study could consider other influencing factors such as personality traits on adolescent's internet fiction reading. Third, the current study has limits in subject representation. It is necessary to carefully consider the generalizability of the results. Future research could recruit adolescents from different regions to participate in study.

Conclusion

The present study found that adolescent students' internet fiction reading has its own developmental characteristics, and social anxiety affects adolescent students' internet fiction reading through self-esteem. The results indicate that social anxiety positively predicts internet fiction reading, and adolescents' self-esteem plays a mediating role. The findings theoretically enrich studies of adolescents' internet fiction reading and clarify the influences of social anxiety and self-esteem on adolescents' internet fiction reading. Findings suggest the need for student counseling and development services to pay more attention to adolescent's internet fiction reading for preventing adolescents from addicting to internet fiction reading.

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Availability of Data and Materials: The data that support the findings of this study are available from the Corresponding Author Hui Zhou, upon reasonable request.

Ethics Approval: This study was approved by the Research Ethics Committee of Shaoxing University and by the principals of the participating schools. Informed consent was obtained from children and parents to allow their child to participate in the study.

Conflicts of Interest: The authors declare no conflicts of interest.

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