

The Mediating Role of School Adaptation in the Impact of Adolescent Victimization from Bullying on Mental Health: A Gender Differences Perspective

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Purpose: The primary aim of this study is to investigate the mediating role of school adaptation in the impact of adolescent bullying victimization on mental health, as well as the gender differences therein. These findings offer a novel perspective for parents and educators, aiding bullied adolescents in managing and addressing mental health concerns.

Methods: The primary data source for this study was the 2020/2021 Adolescent Health Theme Database from the China Population Health Data Center (PHDA). The research sample consisted of high school students from 16 cities in Shandong Province. Descriptive statistics, reliability and validity testing, structural equation modeling, as well as mediation analysis and multiple group analysis were conducted using SPSS 26.0 and AMOS 26.0.

Results: School adaptation serves as a mediating variable between adolescent bullying and mental health. The model fit indices are as follows: GFI=0.946, AGFI=0.922, RMSEA=0.070, NFI=0.978, IFI=0.979, CFI=0.97. Even when considering gender, the model still demonstrates good fit. School bullying has significant negative effects on the mental health of both male and female victims ($p<0.05$). For female victims, the mitigating effect of school adaptation on mental health is slightly lower than that for males (-2.256). Regarding cyberbullying, male victims face a greater threat to mental health (-3.234), with an impact of -0.109 from cyberbullying on male mental health and -0.065 from school bullying on female mental health.

Conclusion: The school is found to mediate between school bullying, cyberbullying, and mental health. Schools may play a greater role in improving female mental health than male mental health. The impact of campus bullying on female mental health is greater than that of cyberbullying, whereas the opposite is true for males. Enhancing adolescents' school adaptation levels helps mitigate the adverse effects of school and cyberbullying on adolescent mental health.

Keywords: adolescents, bullying, school adjustment, mental health

Introduction

Supporting the positive psychological development of adolescents is a significant public health issue worldwide.¹ The "Outline for Child Development in China (2021–2030)" emphasizes the need to improve the mental health of children and adolescents.² Being subjected to bullying during adolescence can severely harm their physical, psychological, and social functioning, leading to anxiety, depression,³ suicidal behavior, or self-harm.⁴ Bullying can be defined as repeated aggressive behavior carried out by a group or individual,⁵ and it can manifest in traditional bullying or cyberbullying.² Traditional bullying encompasses four main types: physical, verbal, relational, and indirect. With the increase in internet and mobile phone usage, a new form of bullying has emerged, commonly known as "cyberbullying".⁶ In cyberbullying, attacks occur through electronic means.⁷ With the increasing exposure of individuals to the online environment, there has been a notable rise in the

prevalence of cyberbullying. The OECD (2017) reported bullying rates ranging from 9.3% to 30.6% among OECD countries,⁸ and in Turkey, the prevalence of bullying among adolescents varies from 22% to 91%.⁹ In China, 21.5% of high school students have been subjected to online insults, and 14.6% have received violent images or videos.¹⁰

This study, through a review of relevant literature, reveals the close relationship between school adaptation and mental health as highlighted by scholars. However, there is limited research exploring the possibility of the mediating role of school adaptation between bullying victimization and mental health. Studies examining the differential impact on mental health of adolescents experiencing school bullying versus cyberbullying are scarce, with little research identifying gender differences in the effects on mental health after experiencing bullying among adolescents through multi-group analysis.

Given that schools are places where adolescents spend a significant amount of time, the crucial role of school adaptation should not be overlooked. This study aims to explore the mechanisms of school adaptation in the relationship between adolescent bullying experiences and mental health, and to examine gender differences in the mediation model. The foundation has been laid for the development of specific intervention policies targeting diverse groups of adolescents. This study aims to provide a theoretical basis for enhancing the mental health of adolescents, effectively reducing bullying behavior, and promoting the holistic development of adolescents' physical and mental well-being.

School Bullying and Mental Health

Mental health is defined as a positive psychological state in which an individual can thrive.¹¹ School bullying refers to repeated and deliberate harmful behaviors inflicted on school members, mainly students, within the school setting.^{5,12} It encompasses behaviors such as teasing, spreading rumors, isolation, and physical violence.¹³ In a report by the World Health Organization, examining bullying and victimization among 10-, 13-, and 15-year-olds in 43 countries, rates of victimization varied from 2% to 32% across countries and rates of bullying varied from 1% to 36%.¹⁴ In response to the global phenomenon of school bullying, UNESCO has released the latest research report. The report indicates that all children and adolescents are at risk of being bullied on campus. China is a quintessential collectivist society deeply influenced by Confucian ideology. Confucianism emphasizes values of being esteemed and avoiding exclusion from the group. Consequently, experiences of bullying victimization may pose a significant threat to the cultural values and emotional well-being of Chinese adolescents.¹⁵ According to studies, underage victims of school bullying commonly experience issues such as insomnia, anxiety, depression, loneliness, and low self-esteem. Some psychological impacts may persist into adulthood, leading to severe problems like suicide and self-harm.¹⁶ Ossa et al found that approximately 20% of individuals have experienced severe school bullying during their academic years, with 50% developing Posttraumatic stress symptoms, which can last for many years.¹⁷ Based on Janoff-Bulman's shattered assumptions hypothesis,¹⁸ traumatic events can shatter an individual's beliefs about the world, perceiving it as dangerous and unsafe, consequently reducing their sense of security,¹⁹ initiative, and proactivity in interpersonal interactions. This impediment makes it challenging to establish healthy relationships, receive support from others, and hinder the ability to rely on others to alleviate psychological issues.²⁰ Mothers typically serve as the primary caregivers for adolescents, engaging with them frequently and fostering emotional connections.²¹ Hansol Park et al have identified that when enhancing the psychological well-being of adolescents in multicultural families, particular attention should be given to the potential risks of long-term victimization, especially concerning adolescent groups whose mothers originate from Southeast Asia.²² Bullying victimization is significantly associated with increased depressive symptoms, and it is critical to provide follow-up care and mental health support to adolescents from multicultural families who have experienced bullying.^{23,24}

Cyberbullying and Mental Health

Excessive internet usage is now recognized as a global public health challenge; with over 90% of adolescents in the United States and Japan using the internet daily, while in India and Iran, the rate of excessive internet use among high school students exceeds 20%.²⁵ Particularly, pop-lations in Asia exhibit more extreme internet usage compared to those in Europe, the United States, or Africa.²⁶ A study in Southeast Asia revealed that over 90% of students reported using mobile phones and other internet-connected devices, with the majority spending at least one hour online daily.²⁷ According to the "2021 National Survey on Internet Use among Minors in China", the

number of underage internet users in China reached 191 million in 2021, with an internet penetration rate of 96.8%, significantly increasing the risk of cyberbullying among adolescents, with 4% to 70% of them experiencing cyberbullying within a year.²⁸ During the COVID-19 pandemic, online learning has contributed to an increase in cyberbullying incidents.²⁹ Cyber-bullying, as a new dimension of bullying, involves intentional and hostile behavior by individuals or groups that harm others using information and communication technology.³⁰ It possesses unique characteristics distinct from traditional bullying, such as anonymity, faster dissemination, and wider reach, potentially causing more serious harm to adolescents. Cyberbullying can take two main forms, namely text-based cyberbullying (manifested as verbal abuse) and visual cyberbullying (involving defamatory videos and photos).³¹ Individuals who experience cyberbullying may suffer a range of negative consequences, including anxiety, depression, substance abuse, sleep difficulties, increased physical symptoms, decreased academic performance, truancy, dropouts, homicide, or suicide.³² Diverse cultural backgrounds may contribute to variations in disease prevalence. For instance, in the United States, individuals may be more inclined to disclose their feelings and experiences, leading to a greater willingness to report incidents of cyberbullying. In contrast, individuals in China tend to internalize their experiences, with some even perceiving the act of sharing such feelings as shameful.³³

School Adjustment and Mental Health

During adolescence, schools serve as crucial environments for youth activities. A favorable school environment enables students to achieve the fundamental objectives of education, complete their studies successfully, engage in effective communication, and develop proper life values.³⁴ The interpersonal relationships at school, including peer and teacher relationships, are essential sources of adolescents' sense of well-being.³⁵ Positive peer relationships, such as peer acceptance, can reduce feelings of loneliness and negative emotions in adolescents, enhancing their academic adaptability.³⁶ Conversely, negative peer relationships like peer rejection and bullying can lead to increased negative emotional experiences for individuals.³⁷ Well-adapted adolescents are more likely to integrate into the school environment, adhere to rules, and achieve academic success. They typically exhibit higher levels of confidence and self-esteem, lower psychological stress, optimistic attitudes, and increased happiness indices, allowing them to better confront life challenges and pressures. Chinese society places a strong emphasis on collectivist culture, which contrasts with that of their American counterparts.³⁸ Chinese students experience a more favorable school environment, feeling safer within their educational institutions. These cultural values play a significant role in the socialization objectives and practices of schools, contributing to the cultivation of a more positive school atmosphere and a reduction in bullying and victimization rates.³⁹

High School Students of Different Genders Suffer from Bullying and Mental Health

The correlation between bullying and mental health issues differs among males and females. From the perspective of bullying perpetrators, the exposure risk varies across different geo-graphical regions. In some Asian countries, male students are more likely than females to be victims or perpetrators of bullying; whereas in some Western countries,⁴⁰ female students are more likely to be bullied than male students.⁴¹

An analysis of gender differences in Vietnamese youth regarding bullying types indicates that female students with mental health issues are more vulnerable to harm, while male victims tend to externalize and exhibit aggression towards others.⁴² Physical bullying and cyberbullying are more common among male students,^{43,44} while relational bullying is more prevalent among female students.⁴⁵ With the advancement of social media, it is anticipated that both genders will experience an increase in cyberbullying behaviors.

In terms of the consequences of bullying, female and male students who have been verbally bullied exhibit higher rates of depression compared to those who have not been bullied. Female victims of cyberbullying experience higher levels of depression than male victims.⁴⁶ Studies by Klomek et al suggest that female bullying victims are more prone to suicidal ideation and depression, while male victims are mainly affected by frequent bullying.⁴⁷

Based on the aforementioned analysis, the following hypotheses are posited:

H1: There is a correlation between mental health, school adaptation, and adolescents' exposure to school and cyberbullying.

H2: School adaptation mediates the relationship between adolescents' exposure to school and cyberbullying and mental health.

H3: The impact of experiencing different types of bullying on mental health varies by gender.

Material and Methods

Subjects

The data for this study were sourced from the Population Health Data Archive (PHDA) Adolescent Health Theme Database, which is a periodically updated data collection. Data were collected for the academic years 2015/2016, 2016/2017, 2017/2018, and 2020/2021 using a longitudinal research design to conduct multiple waves of surveys on the health status and health-related behaviors of the sampled students. The present study utilized data from the academic year 2020/2021. The study sample consisted of high school students from 16 cities in Shandong Province, including Jinan, Qingdao, and Zibo. Participants were informed that all data collection was voluntary, anonymous, and confidential, stored securely on a password-protected website accessible only to the designated researchers for evaluation and analysis. Both parents and students provided informed consent. This research was approved by the Ethics Committee of Shandong University in China. Individuals with inconsistencies in questionnaire responses and missing data were excluded from the analysis. The issue of missing data was addressed through the implementation of listwise deletion, a method aimed at mitigating the presence of spurious data. After processing, the final effective sample size consisted of 9398 individuals (comprising 4524 males and 4874 females) with an average age of 16.34 years ($SD = 0.96$, range 15–20).

Investigation Tools

The basic personal information was primarily assessed through questionnaire surveys to evaluate students' demographic characteristics. Key elements encompassed gender, only-child status, parental relationship assessment, and smoking habits.

The school adaptation was measured using the School Social Behavior Scale (SSBS-2), developed by Merrell in 1993, to screen and assess social abilities of students from grades 1 to 12. Each scale consists of 32 items rated on a 5-point Likert scale. In this study, the social abilities scale from the SSBS-2 was utilized to measure adolescents' adaptive school behaviors, encompassing three dimensions: peer relationships, self-management, and learning behaviors. Higher scores indicate better school adaptation. The scale demonstrated good reliability and validity with Cronbach's $\alpha = 0.968$ and Kaiser-Meyer-Olkin (KMO) = 0.981.

The mental health status of a certain high school student was assessed using the Chinese version of Symptom Checklist-90 (SCL-90).⁴⁸ The SCL-90 comprises 90 items, each rated on a scale from "not at all" (0) to "severe" (5), quantifying psychopathology using nine primary symptom dimensions: somatization, obsessive-compulsive symptoms, interpersonal sensitivity, depression, anxiety, hostility, phobic anxiety, paranoid ideation, and psychoticism. The reliability and validity of the Chinese version have been tested,⁴⁹ showing good reliability (Cronbach's $\alpha = 0.987$) and validity (KMO = 0.993).

The measurement of school bullying and cyberbullying issues utilized the methods outlined in the "2017 State and Local Youth Risk Behavior Survey", which has been revised, modified, and translated into Chinese in 8 iterations.⁵⁰ The Cronbach's α value was calculated to be 0.694, the Kaiser-Meyer-Olkin (KMO) measure was 0.766, and the Bartlett's test of sphericity yielded a p-value less than 0.01, indicating good reliability and validity. When addressing the matter of school bullying, participants were asked, "During the past 12 months, have you ever been bullied on school property?" Similarly, inquiring about cyberbullying, the question posed was, "During the past 12 months, have you ever been electronically bullied? (Count being bullied through texting, Instagram, Facebook, or other social media)". Respondents were given the options "Yes" and "No", which were assigned numerical codes of 2 and 1.

Procedure

This study utilized SPSS 26.0 software for statistical analysis of the data, employing statistical methods such as Harman single-factor test, one-way analysis of variance, *t*-test, and Pearson correlation analysis. The analysis involved examining the

mean and standard deviation of continuous variables, as well as the quantity, proportion, and differences of categorical variables to explore the correlation between adolescents' experiences of bullying, psychological well-being, and school adaptation. Finally, using AMOS (version 26.0) software, standardized regression weights were estimated to identify significant pathways and examine the mediating effect of school adaptation on adolescents' experiences of school and cyberbullying, and psychological well-being, along with conducting mul-ti-group analyses based on different genders.

In a model with a good fit, it is best to meet the following criteria: (1) the Goodness-of-Fit Index (GFI) should be greater than or equal to 0.90; (2) the Comparative Fit Index (CFI) should be greater than or equal to 0.90; (3) the Incremental Fit Index (IFI) should be greater than 0.90; (4) the Adjusted Goodness-of-Fit Index (AGFI) should be greater than or equal to 0.80; (5) the root-mean-square error of approximation (RMSEA) of <0.08 means that the model is acceptable; (6) Normed Fit Index (NFI) should be greater than or equal to 0.80.⁵¹

Results

Common Method Deviation Test

Using the Harman single-factor test method, the findings reveal that there are a total of 13 factors with eigenvalues greater than 1, with the largest eigenvalue being 36.555. The first common factor accounts for 36.555% of the variance (below the critical threshold of 40%), indicating the absence of significant common method bias in this research study.

A Situation in Which Teenagers are Subject to Bullying

Adolescents' exposure to school and cyberbullying incidences and their respective percentages are illustrated in [Table 1](#). Among them, 871 high school students, accounting for 9.30%, reported experiencing school bullying, while 811 high school students, representing 8.60%, reported encountering cyberbullying.

The Subject's Demographics

This research incorporated data from high school students in 16 cities of Shandong Province, China in 2021. Among the participants, females accounted for 51.90%; 30.00% of high school students were only children; the smoking rate among high school students was 11.30%; and 9.10% of high school students reported that their parents frequently argued. Statistical significance was found in the differences of adolescent experiences of school bullying and cyberbullying based on gender, being an only child, smoking habits, and parental arguments. School adaptation showed statistically significant differences based on gender, being an only child, and smoking habits. Discrepancies in mental health were found based on smoking habits and parental arguments, with [Table 2](#) providing detailed data on significant findings.

Study the Correlation Analysis of Variables

Adolescents' experiences of bullying, quality of life, and psychological well-being were examined using descriptive statistics and correlation analysis within the model. The results in [Table 3](#) indicate that the average score for adolescent school adaptation was 102.75 ± 20.945 , while the average score for individual psychological well-being was 402.37 ± 53.386 . Significant negative correlations were found between experiences of school and cyber bullying with psychological well-being and school adaptation. Psychological well-being was significantly positively correlated with school adaptation, confirming Hypothesis 1 and meeting the prerequisites for mediating effects.

Table 1 Outcome Data on Bullying Among Adolescents

Variables	Category	N	Percentage (%)
School bullying	Yes	871	9.30%
	No	8527	90.70%
Cyberbullying	Yes	811	8.60%
	No	8587	91.40%

Table 2 Analysis of Demographic Differences in Adolescents' Exposure to Bullying, School Adjustment, and Mental Health

Variables	Category	N	School bullying	Cyberbullying	School adaptation	Mental health
Gender	Men	4524(48.1)	1.11±0.309	1.10±0.300	101.62±22.612	405.33±53.726
	Women	4874(51.9)	1.08±0.270	1.07±0.262	103.79±19.212	399.62±52.926
	T		4.684	4.460	-5.027	5.186
	P		<0.001	<0.001	<0.001	0.908
Only child	Yes	2820(30.0)	1.12±0.329	1.12±0.327	100.80±23.498	404.97±54.720
	No	6578(70.0)	1.08±0.271	1.07±0.257	103.59±19.693	401.26±52.769
	T		6.663	8.095	-5.918	3.089
	P		<0.001	<0.001	<0.001	0.096
Smoking	Yes	1063(11.3)	1.28±0.449	1.28±0.447	90.92±23.612	369.43±70.849
	No	8335(88.7)	1.07±0.253	1.06±0.241	104.26±20.087	406.57±49.172
	T		23.025	24.049	-19.956	-21.901
	P		<0.001	<0.001	<0.001	<0.001
Parental relationships	Yes	852(9.1)	1.08±0.277	1.08±0.268	103.68±20.638	367.41±66.033
	No	8546(90.9)	1.18±0.388	1.17±0.376	93.44±21.725	405.85±50.656
	T		-9.716	-9.185	13.742	20.485
	P		<0.001	<0.001	0.059	<0.001

Table 3 Means, Standard Deviations, and Correlations of the Study Variables (n = 9398)

Variables	1	2	3	4
School bullying	1			
Cyberbullying	0.532**	1		
School adaptation	-0.210**	-0.211**	1	
Mental health	-0.173**	-0.182**	0.308**	1
M	1.09	1.09	102.75	402.37
SD	0.290	0.281	20.945	53.386

Note: **p < 0.01.

The Role of School Adjustment in Mediating the Effects of Bullying on Mental Health

Bootstrap method was employed for 5000 iterations to analyze the 95% confidence interval of the mediating effect. A mediation model was established for all participants' data samples (referred to as Model 1), followed by the construction of a mediation model after categorizing by gender (referred to as Model 2). The results are detailed in Table 4 and Figure 1. In assessing the goodness of fit of the model, X² was calculated as 3437.552 (df=73, p=0.000). Given the large sample size in this study (n=9398), the chi-square value easily reaches a significant level in this scenario. Additionally, absolute fit statistics were as follows: GFI=0.946, AGFI=0.922, RMSEA=0.070, NFI=0.978, IFI=0.979, CFI=0.979, indicating a good model fit based on these metrics.

The total effects of experiencing school bullying and cyberbullying on mental health were -2.226 and -2.781, respectively. The impact of cyberbullying on mental health showed the greatest total effect. The mediating effect of school adaptation effectively mitigated the influence on mental health from experiencing school and cyberbullying. Hypothesis 2 was confirmed, specifically, the indirect effects transmitted through school adaptation from experiencing school bullying and cyberbullying were -0.855 and -0.929, respectively, accounting for 38.4% and 34.1% of the total effects, respectively. In these analyses, each pathway reached a significant level (confidence intervals did not include 0), indicating the statistical significance of the mediating effects.

Table 4 Analysis of Mediation Effects

Paths	Bootstrapping			95% CI	
	Std.	Boot se	Z	Lower	Upper
School bullying→School adaptation→Mental health					
Total effect	-2.226**	0.348	-6.396	-2.884	-1.534
Direct effect	-1.370**	0.339	-4.041	-2.007	-0.745
Indirect effect	-0.855**	0.094	-9.095	-1.041	-0.677
Cyberbullying→School adaptation→Mental health					
Total effect	-2.718**	0.359	-7.571	-3.425	-2.023
Direct effect	-1.788**	0.346	-5.167	-2.484	-1.137
Indirect effect	-0.929**	0.099	-9.383	-1.13	-0.745

Note: **p < 0.01.

Multi-Group Analysis of Adolescent Gender in Mediation Model

The study conducted multiple-group comparison analysis on male and female adolescents using AMOS. The results indicated that the P values of the comparisons between the unconstrained model, measurement weighted model, structural weighted model, and structural covariance model were all <0.05, suggesting significant differences in the path coefficients of the measurement model.

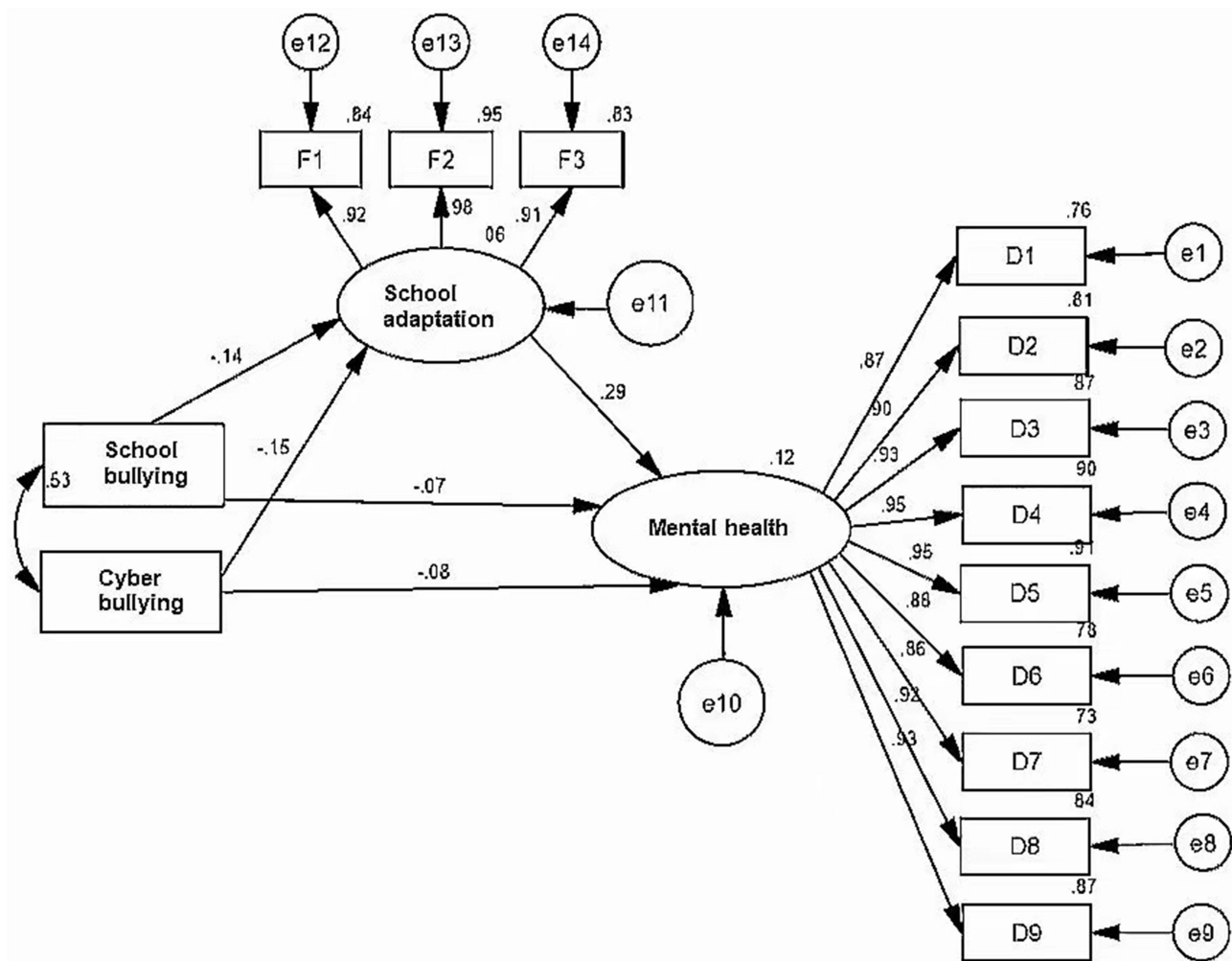


Figure 1 illustrates the standardized pathway diagram.

Before analyzing the differences in the mediating effects of psychological health and school adaptation in male and female high school students after experiencing school and cyberbullying using a multiple-group structural equation model, it is essential to first test the fit of the unconstrained model (baseline model) among different gender groups of high school students. Subsequently, the fit of the model where all structural path coefficients are constrained to be equal among different gender groups in terms of the effects of school and cyberbullying on psychological health and school adaptation as mediators needs to be assessed. This involves analyzing whether the structural path coefficients are equal across different groups under the conditions permitted by the model fit indices.

To achieve this, we utilized the AMOS 26.0 software to calculate the baseline model (unconstrained model) representing the differences in the effects of school and cyberbullying on psychological health and school adaptation as mediators among male and female high school student groups. The fit indices for this model were as follows: $\chi^2=3568.751$, ($df=146$, $p=0.000$). Given the large sample size in this study ($n=9398$), the chi-square value easily reaches significance in such circumstances. The fit indices were CFI=0.978, GFI=0.944, IFI=0.978, TLI=0.974, RMSEA=0.050 < 0.08, AGFI=0.920. These results indicate that the fit of the baseline model assessing the effects of school and cyberbullying on psychological health and school adaptation as mediators among different gender high school student groups is good, making the model acceptable for these groups. Hypothesis 3 was validated.

Figures 2 and 3 present the results of the structural equation model analyses on the effects of school and cyberbullying on psychological health and the mediating role of school adaptation among male ($n=4524$) and female ($n=4874$)

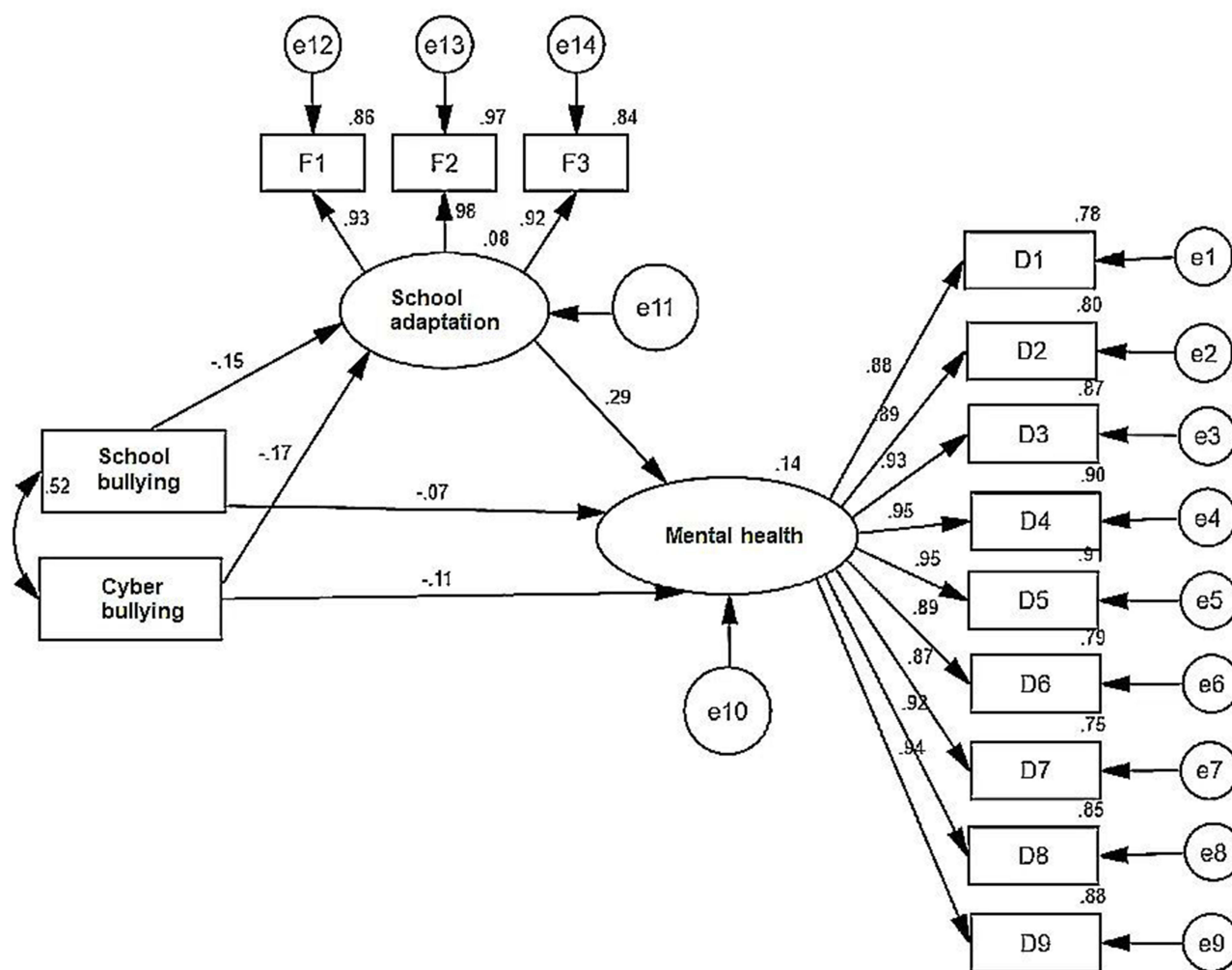


Figure 2 Standardized Pathway for Adolescent Males.

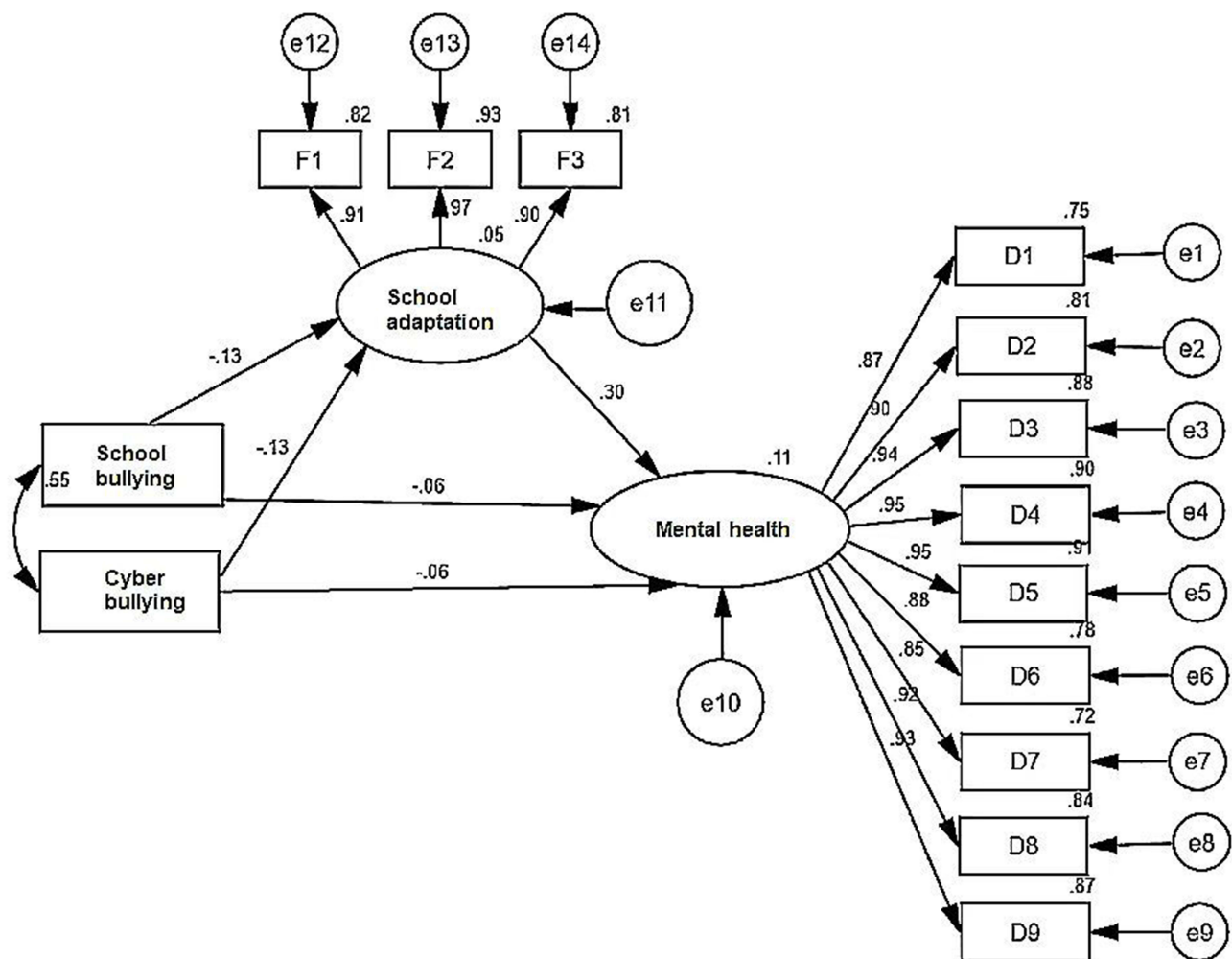


Figure 3 Standardized Pathway Model for Adolescent Females.

high school student gender groups constructed based on the validated model. The standardized regression coefficients of the structural paths were all significant (refer to Table 5).

The path of school bullying: Male victims demonstrate a total effect of -2.308 on the psychological health impact of school bullying through school adaptation, while the corresponding effect for female victims is -2.256 . Both show significant negative effects ($p < 0.05$), with confidence intervals not including 0. However, the effect value for female victims is slightly smaller, which may indicate that females are able to mitigate the damage to psychological health caused by school bullying more effectively through school adaptation to some extent.

Table 5 The Goodness-of-Fit Statistics of Gender-Based Multiple Analyses in Model 1 and Model 2 Fitting Indicators

Models		p	GFI	AGFI	IFI	TLI	CFI	RMSEA
Model 1	Total	<0.001	0.946	0.922	0.979	0.973	0.979	0.070
Model 2	Unconstrained	<0.001	0.944	0.920	0.978	0.974	0.978	0.050
	Measurement weights	<0.001	0.943	0.923	0.977	0.974	0.977	0.049
	Structural weights	<0.001	0.942	0.925	0.976	0.973	0.977	0.048
	Structural covariances	<0.001	0.940	0.923	0.975	0.974	0.976	0.049

Table 6 Standardized Effects and 95% CI

Grouping situation	Paths	Estimate	p	95% CI	
				Lower	Upper
Total	School bullying→School adaptation	−0.142	0.000	−0.168	−0.114
	Cyberbullying→School adaptation	−0.149	0.000	−0.177	−0.121
	School adaptation→Mental health	0.290	0.000	0.266	0.312
	School bullying→Mental health	−0.066	0.001	−0.096	−0.034
	Cyberbullying→Mental health	−0.083	0.000	−0.115	−0.052
Men	School bullying→School adaptation	−0.150	0.000	−0.186	−0.113
	Cyberbullying→School adaptation	−0.165	0.000	−0.204	0.129
	School adaptation→Mental health	0.291	0.000	0.256	0.324
	School bullying→Mental health	−0.072	0.002	−0.116	−0.290
	Cyberbullying→Mental health	−0.109	0.001	−0.151	−0.064
Women	School bullying→School adaptation	−0.129	0.000	−0.170	0.087
	Cyberbullying→School adaptation	−0.127	0.000	−0.171	−0.086
	School adaptation→Mental health	0.296	0.000	0.265	0.328
	School bullying→Mental health	−0.065	0.006	−0.112	−0.018
	Cyberbullying→Mental health	−0.060	0.011	−0.108	0.013

The path of cyberbullying: In terms of cyberbullying, male victims exhibit a total effect of −3.234 on psychological health through school adaptation, significantly higher than the −2.198 seen in female victims. This finding emphasizes the greater threat of cyberbullying to the psychological health of male victims, while also suggesting that the beneficial effect of school adaptation on the psychological health of females after experiencing cyberbullying may be far greater than for males.

Among male adolescents, the impact on psychological health after experiencing cyberbullying is greater than that of school bullying. Conversely, the impact of school bullying on psychological health is greater for female adolescents than cyberbullying (Table 6).

Discussion

The Incidence of School Bullying and Cyberbullying

The findings of this study indicate that 9.30% of high school students have experienced school bullying, while 8.60% have been victims of cyberbullying. Research by Vieno revealed that the prevalence of school bullying among Italian adolescents is 11.6%, with cyberbullying at 19.4%.⁵² Modecki's study found that the prevalence rates of traditional bullying and cyberbullying among adolescents are 36% and 15%, respectively.⁵³ A study on English adolescents found that experiences of school bullying are more common than experiences of cyberbullying.⁵⁴ In consideration of the underaged anti-addiction systems implemented for minors in China in terms of school, parental education, and gaming, strict control over adolescents' internet usage has led to a decrease in the prevalence of cyberbullying. Traditional bullying typically occurs at school, ensuring victims are at least safe at home; however, with cyberbullying, victims are exposed to the risk 24 hours a day, 7 days a week. Due to the unique nature of the internet, most individuals are unaware of how to stop online victimization. The online space possesses characteristics of concealment and arbitrariness, leading some users to irrationally express emotions, potentially disregarding their true social identity. If there is no direct real-world feedback, the chances of bystanders feeling sympathy or regret may decrease, consequently reducing opportunities for intervention.³²

Analysis of Demographic Differences in Research Variables

Research has indicated that male, only-child, smoking high school students whose parents frequently argue are more susceptible to school and cyberbullying. Data from the China Education Panel Survey (CEPS) reveals that the proportion of male students who have experienced bullying in primary and middle school is 81.8%, while for female students it is 70.9%. Studies by Razjouyan suggest that males are more prone to bullying than females,⁵⁵ a finding consistent with the

present research. In the traditional Chinese context, some families may overly focus on the needs and feelings of only-child, providing excessive protection and catering to their demands, which results in a lack of independence in problem-solving and critical thinking skills.⁵⁶ This may lead to a deficiency in self-protection capabilities when facing bullying. Furthermore, children tend to mimic the behavior of their parents, so frequent parental arguments can influence children to adopt hostile and aggressive ways of dealing with issues,⁵⁷ potentially contributing to their vulnerability to school and cyberbullying. Adolescents in their puberty stage may engage in smoking out of curiosity or to demonstrate maturity, displaying rebellious behavior against rules prohibiting smoking. By interacting frequently with various individuals in and out of school for social needs, they might engage in smoking at an earlier age, consequently increasing the risk of being bullied at school. Reports have shown that male and female adolescents who are victims of bullying also engage in illicit drug use and risky sexual behaviors. Additionally, Sherill et al have found a correlation between increased online victimization and more frequent smoking and alcohol consumption.^{58,59}

Female, non-only child, non-smoking high school students exhibit a higher level of school adaptation. Research has also indicated that an increase in the proportion of female students in a class can reduce instances of class violence, improve relationships between classmates and teachers.⁶⁰ Females are more likely to receive praise from teachers, have better interactions with classmates, feel a positive classroom learning environment, and develop a stronger sense of belonging to the school.⁵⁶ Under the ethical standard that prohibits smoking among minors, it is observed that non-smoking adolescents achieve higher academic performance and experience a more harmonious school adaptation environment compared to smoking adolescents.⁶¹ These factors may contribute to the increased risk of poor school adjustment among adolescent smokers.

Non-smoking and well-adjusted adolescents tend to have better levels of psychological health. Research indicates a strong correlation between adolescent smoking experiences and high levels of depression, anxiety, alcohol consumption, and suicidal thoughts.⁶² The findings align with the research conducted by Meg Fluharty et al, which revealed that smokers exhibit more severe symptoms of depression and anxiety.⁶³ The high school period is a critical stage for the rapid psychological and physiological development of adolescents. Negative family events resulting from parents' frequent conflicts, verbal abuse, and physical altercations create an unstable and insecure family atmosphere for adolescents,⁶⁴ ultimately leading to issues like depression, anxiety, and emotional instability.⁶⁵ Shek's study emphasizes that parental conflicts can serve as an indicator of adolescent psychological health.⁶⁶ Gerard's research also suggests that marital conflicts can lead to conflicts between parents and adolescents, ultimately affecting the psychological health of adolescents.⁶⁷ Parental conflicts can trigger negative emotions in children such as anxiety, depression, and decreased self-esteem.

School Bullying and Mental Health

Adolescents who experience bullying at school can significantly impact their mental health. Victims of school bullying often suffer both physically and mentally, especially for an extended period after the bullying incidents. It is common for victims to experience feelings of inferiority, failure, and low self-worth, which can have long-term effects on their academic performance and interpersonal relationships. Schools serve as the second home for adolescents, providing education and guidance in their socialization process. Bullying incidents disrupt the school environment, and as the scope of bullying widens, it has severe negative consequences on the healthy development of contemporary adolescents. According to general stress theory, adolescents facing school bullying may experience stress, leading to a range of negative emotions such as depression, anger, anxiety, and fear, all of which can harm their mental health.⁶⁸ In reality, many Chinese adolescent students who are bullied do not seek help from schools or legal avenues but choose to endure or resolve the situation themselves. Prolonged self-restraint may lead to feelings of suppression and even depression, affecting self-evaluation and self-worth, leading to timidity, inferiority, and in severe cases, personality disorders.

Cyberbullying and Mental Health

Adolescents experiencing cyberbullying can significantly impact an individual's psychological well-being. Zhu et al's study similarly indicates that Chinese adolescents who experience harm from online bullying may exhibit health and psychological issues akin to those of adolescents in Western countries.⁶⁹ With the prevalence of the Internet and social media, adolescents are increasingly exposed to cyberbullying. While using the Internet and social media, they may

encounter harmful information, rumors, defamation, malicious comments, etc., all of which could lead to instances of cyberbullying. Once cyberbullying actions occur, related posts, comments, etc., remain publicly available online and continue for a long period of time.⁷⁰ This can continuously incite unknowing individuals to join in cyberbullying, causing sustained and uninterrupted harm to the victims. Adolescents are in a stage of self-identity and identity construction, and being subjected to cyberbullying may make it more difficult for them to accept their true selves, leading to self-doubt. Dominated by negative emotions, they may feel inferior, anxious, lonely, etc., which can significantly affect their academic performance, family relationships, lifestyle behaviors, personality development, and social integration.

The Role of School Adjustment in Mediating the Effects of Bullying on Mental Health

The study elucidated the role of school adaptation in the relationship between adolescent bullying victimization and mental health, whereby experiencing bullying can lead to a deterioration in the mental health of adolescents, while school adaptation can mitigate the adverse effects on adolescents' mental health post-bullying. Xie et al' research revealed a significant positive correlation between school adaptation and psychological well-being.⁷¹ The impact of cyberbullying on mental health outweighs that of school bullying. Adolescents who have experienced bullying in school and online may feel excluded, unwelcomed by others or groups, and in severe cases, this may lead to depressive symptoms in adolescents, hindering the establishment of normal interpersonal relationships, resulting in a sense of alienation. Han et al also found in their study of rural Chinese adolescents that victims of cyberbullying experience higher levels of alienation and loneliness.⁷² A positive school atmosphere and establishing good interpersonal relationships with peers can provide emotional support and comfort, helping victims cope with bullying behavior, alleviate negative emotions, and shift their focus.⁷³ A plethora of domestic and international studies in the field of educational economics have also confirmed the critical impact of peer groups on students' individual academic development, known as peer effects.^{74,75} Adhering to school rules and interpersonal communication norms can help adolescents form more friendships, and good peer relationships are beneficial for children and adolescents to acquire social values, develop social skills, successfully complete their studies, and promote healthy cognitive and personality development. The stress buffer hypothesis suggests that perceived social support can moderate the relationship between sources of stress and negative outcomes.⁷⁶ From a socio-ecological perspective, during early adolescence, specific sources of support may reflect support from family, friends, peers, and teachers. These individuals are all part of the microsystem of adolescents and may have significant impacts on their development.^{77,78} Adolescents spend a considerable amount of time with peers at school as they develop greater independence and autonomy, increasing the importance of peer relationships.⁷⁹ Research indicates that cyberbullying through images or video clips and phone calls is considered to have more negative effects compared to traditional bullying.⁸⁰ Victims of cyberbullying often have low self-esteem and feelings of insecurity.⁸¹ The widespread dissemination of cyberbullying may subject victims to more rejection and discrimination, leading to social and academic isolation. However, with proper school adaptation, victims can receive care from classmates, more support, and assistance, fostering a positive mindset to mitigate the negative effects of bullying. Eastern cultures, such as Chinese culture, promote interdependent self-construction. In comparison to other students, Chinese students are more likely to believe that adults in school will help protect them from the risks of cyberbullying.⁸² In a collectivist background like China, fostering a positive school atmosphere, particularly cultivating positive teacher-student relationships, setting clear expectations for student behavior, establishing fair rules, and creating an environment that respects and values individual differences may help reduce bullying and enhance students' psychological well-being and educational outcomes. Ding et al found that secure peer relationships decrease the risk of becoming a victim of cyberbullying.⁸³ This finding aligns with our research results.⁸⁴ Therefore, in preventing bullying, it is crucial to address the importance of timely school adaptation interventions. Providing necessary psychological support to adolescents after experiencing bullying may effectively prevent the deterioration of their mental health and avoid tragic outcomes.

Multi-Group Analysis of Adolescent Gender in Mediation Model

School bullying is a global phenomenon that has destructive psychological and physical impacts on both victims and bullies. With the rapid development of internet technology,⁸⁵ adolescents not only face a range of health issues but also experience an increase in cyberbullying rates.⁸⁶ Those subjected to cyberbullying not only suffer academically but also

encounter certain social barriers. However, there is a lack of research examining the differences in the impact of gender on these two types of bullying and mental health. Therefore, this study utilizes multigroup analysis to address this gap. Findings reveal that the model with school adaptation as a mediating variable fits well with high school students of different genders. Experiencing school bullying and cyberbullying, the potential impact of school adaptation on the psychological well-being of females may far exceed that of males.⁸⁷⁻⁸⁹ There exist differences in the impact of school and cyberbullying on mental health based on adolescent gender. Female adolescents are more affected by school bullying than cyberbullying in terms of mental health. Conversely, among male adolescents, the impact on mental health is greater after experiencing cyberbullying than school bullying.

Research indicates that girls are more susceptible to bullying in school and cyberbullying compared to boys. Females are also more prone to depression and related anxiety disorders, leading to feelings of sadness or despair.⁹⁰ Conversely, studies have shown that boys are more likely to become either perpetrators or victims of cyberbullying, with male students reporting higher rates of criminal activities and victimization than their female counterparts.^{91,92} These findings suggest a possible influence of cultural differences.⁹³ In traditional Chinese culture, girls are nurtured to be gentle, polite, and kind, while boys are encouraged to be proactive, brave, and independent. Boys are taught that being aggressive towards or bullying girls is not courageous. This could result in fewer girls being involved in bullying incidents, whether offline or online.⁹⁴ Numerous studies have indicated that women tend to place a greater emphasis on companion relationships and interpersonal connections.⁹⁵ Girls receive more support from friends, peers, parents, and teachers, and are more likely to ruminate when faced with interpersonal stress or other challenging life events.⁹⁶ Females are particularly prone to experiencing distress and symptoms of depression from early adolescence to adulthood.⁹⁷ Peer support indirectly influences the direct relationship between being bullied and one's psychological well-being, with a more pronounced effect among female students.⁹⁸ These findings align closely with our own results.

Compared to girls, boys generally report engaging in more gaming activities, while girls report using social media more frequently.⁹⁹ Research also indicates that boys are more likely to experience bullying in the context of online gaming.¹⁰⁰ Shongwei et al discovered that both boys and girls feel lonely and fearful of being victimized again after being bullied.¹⁰¹ Sharing traumatic experiences and related emotions with others is a constructive process that helps individuals reframe their experiences and emotions from a positive perspective.¹⁰² In contrast to girls, boys are less likely to seek intimacy in relationships and spend time nurturing them,¹⁰³ and they also express fewer worries and concerns.¹⁰⁴ These factors may contribute to the greater impact of cyberbullying on the mental health of teenage boys compared to traditional school bullying.

Regardless of gender, individuals who have been subjected to bullying are prone to experiencing adverse psychological issues, often feeling helpless in the face of difficulties and crises, leading to the development of negative feelings of helplessness and self-evaluation. This may even lead the victims of bullying to transition into perpetrators out of a sense of retaliation, perpetuating a vicious cycle. Schools, as primary settings for adolescent activities, should place greater emphasis on their pivotal role in student adaptation, guiding students to enhance their level of school adaptation, creating a positive school atmosphere, thereby sustaining the psychological well-being of high school students.

Study Limitations

It must be acknowledged that this study still has certain limitations. The study initially employed a cross-sectional design, which did not elucidate causal relationships, while also acknowledging the potential for reverse causality in this study. Furthermore, all measurements of variables in this study relied on self-reports from adolescents, thus introducing the possibility of recall bias. Additionally, the study selected high school students from Shandong Province as the sample, hence readers should exercise caution when generalizing the results to other contexts. The relatively limited availability of social demographic variables may also constrain the comprehensiveness of certain results.

Conclusion

The primary conclusions of this study are as follows: (1) There is a correlation between mental health, school adaptation, adolescent school bullying, and cyberbullying. (2) School adaptation plays an intermediary role between adolescent

experiences of school bullying, cyberbullying, and mental health. (3) Gender differences exist in the intermediary role of school adaptation between adolescent experiences of school bullying, cyberbullying, and mental health.

Based on these findings, it is suggested that the government should prioritize preventive measures and provide more targeted psychological support and intervention strategies for bullying victims. Schools should adjust educational policies and curriculum, provide professional training for teachers, and offer timely support and guidance to bullying victims. Parents should modify their parenting styles and communication methods. By implementing positive changes on multiple levels for adolescents who experience bullying and cyberbullying, their mental health and overall development can be promoted.

Data Sharing Statement

The data are available online at <http://www.ncmi.cn> (accessed on November 1, 2023).

Ethics Statement

The collection and investigation of the datasets used in this study were approved by the Ethics Committee of Shandong University, China, and all surveys adhered to the principles of informed consent anonymity, and confidential collection. The research has confirmed to abide by the guiding principles outlined in the Declaration of Helsinki. The study has also obtained approval from the Ethics Committee of Harbin Medical University (No. HMUIRB2023037).

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The authors report no conflicts of interest in this work.

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