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Factors Influencing Psychological Distress in Adolescents: A Cross-Sectional Study on Gender, Grade, and Family Structure

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Abstract: *This study investigates the current status of psychological pressure and psychological symptoms among Chinese primary and secondary school students, as well as the factors influencing these issues. Data from 190,513 students were analyzed using descriptive statistics to examine the effects of gender, grade level, family structure, and economic status on students' psychological pressure and symptoms. The results indicate that male students experience higher levels of psychological pressure and an increased risk of psychological symptoms compared to female students (OR = 1.176, 95% CI: 1.153 – 1.199, p < 0.0001). Regarding grade level, primary school students exhibit significantly higher psychological pressure and symptoms than high school students, with the risk of psychological symptoms being 4.468 times greater among primary school students (OR = 4.468, 95% CI: 4.353 – 4.586, p < 0.0001). Additionally, students from lower-income households (2.0% of the sample) demonstrate a reduced risk of psychological pressure and symptoms (OR = 0.499, 95% CI: 0.465 – 0.536, p < 0.0001), whereas students from wealthier households show similar levels of psychological pressure (OR = 1.842, 95% CI: 1.738 – 1.952, p < 0.0001). Multi-factor regression analysis confirms the significant impact of gender, grade level, and family economic status on students' mental health, emphasizing the importance of considering the combined effects of these factors over time. These findings provide empirical support for the development of school-based mental health education and policies, offering valuable insights, particularly in guiding interventions tailored to students of different grade levels and family backgrounds.*

Keywords: *Psychological Stress; Psychological Symptoms; Adolescents; Influencing Factors*

1. Introduction

Psychological well-being is a fundamental component of overall health, encompassing an individual's ability to manage life's challenges, fulfill their potential, maintain strong social connections, and contribute to their community[1]. Among school-aged children, mental health is not merely defined by the absence of mental disorders but by the presence of emotional resilience and psychological stability[2]. However, recent trends indicate a global decline in students' mental health[3]. Research suggests that schoolchildren face mounting psychological pressure due to academic demands, social expectations, and the challenges associated with transitioning between educational stages[4]. Such pressures are particularly pronounced among adolescents[5], where academic stress, peer relationships, and developmental changes often contribute to significant psychological distress. This distress not only undermines immediate well-being but also has long-term consequences for academic performance[6], social integration[7], and overall life satisfaction[8]. Adolescence is a crucial period for mental health development, as young individuals navigate a series of physical, emotional, and social transitions. Notably, the prevalence and severity of mental health issues—such as depression, anxiety, and stress—vary significantly across gender, age groups, and socioeconomic backgrounds[9]. Studies consistently report that adolescent girls are more likely to experience internalizing disorders, such as depression and anxiety, whereas boys tend to exhibit more externalizing behaviors[10]. The Gender Intensification Hypothesis posits that the onset of puberty and societal pressures to conform to gender roles contribute to these disparities in mental health outcomes, with early maturation in girls often associated with increased depressive symptoms[11]. Beyond gender differences, socioeconomic factors—such as family income and parental education—also significantly influence students' mental health[12]. Previous research indicates that children from lower-income families face unique stressors that heighten their vulnerability to mental health issues, whereas those from wealthier backgrounds

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may experience different forms of stress, including academic pressure and high parental expectations[13]. Despite growing awareness of these factors, comprehensive studies examining psychological pressure and mental health symptoms among primary and secondary school students remain limited. This study seeks to address this gap by analyzing data from 190,513 students to assess the prevalence and influencing factors of psychological pressure and mental health symptoms across different demographic groups. Through multi-factor regression analysis, we aim to elucidate the roles of gender, grade level, and socioeconomic background in shaping students' mental health and to provide evidence-based recommendations for targeted school-based mental health interventions.

2. Participants and Methods

2.1 Participants

The study sample comprised 190,513 students from 72 primary and secondary schools across five major regions of China: Central, East, North, South, and Southwest China. A comprehensive psychological assessment was conducted, and data were collected using a stratified random sampling method. The sample included 96,699 male students (50.8%) and 93,814 female students (49.2%). By educational level, 57,170 were primary school students (30.0%), 71,969 were middle school students (37.8%), and 61,374 were high school students (32.2%). This diverse and representative sample provides a strong basis for analyzing psychological pressure and mental health symptoms across different demographic and educational subgroups.

2.2 Instruments

2.2.1 General Information Questionnaire

A self-designed general information questionnaire was used to collect demographic data, including age, gender, grade level, only-child status, and family economic background. These variables were selected to provide a comprehensive understanding of the socio-demographic factors influencing students' psychological well-being. The questionnaire was designed based on existing psychological research and prior surveys in similar contexts, ensuring its relevance to the study's objectives.

2.2.2 Psychological Assessment Scales

The Youth Mental Health Assessment Scale, developed by Zheng Richang[14], is used to assess adolescent psychological health across two primary dimensions: psychological stress and psychological symptoms. Within the scope of this study, psychological stress and psychological symptoms are further delineated into twelve sub-dimensions, encompassing a total of 74 items. Respondents are required to evaluate each statement based on their personal experiences using a 5-point Likert scale, ranging from 1 (indicating "strongly disagree") to 5 (indicating "strongly agree"). The scores for each dimension are computed as the sum of item responses, and higher scores indicate a greater degree of psychological stress and symptoms. This scale has demonstrated robust reliability and validity in previous research, confirming its appropriateness for use in the current study.

2.3 Statistical Methods

Data were inputted using Microsoft Excel and analyzed using SPSS 25.0 for statistical evaluation. Quantitative data that followed a normal distribution were expressed as means±standard deviations ($x\pm s$), while categorical data were presented as frequencies and percentages (%). A p-value of <0.05 was considered statistically significant. Chi-square (χ^2) tests were employed to compare the levels of psychological stress and psychological symptoms among primary and secondary school students. Additionally, multivariate unconditional logistic regression analysis was conducted to explore the factors influencing the levels of psychological stress and symptoms. A significance level of $\alpha= 0.05$ was set for all statistical tests.

3. Results

3.1 Sample characteristics

The descriptive statistics in Table 1 provide a comprehensive summary of the study sample's

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demographic characteristics and associated levels of psychological stress and symptoms. The sample includes 190,513 participants. Regarding family structure, 23.2% were only children (n = 44,198), while 76.8% had siblings (n = 146,315), with a significant difference between the groups ($p < 0.0001$). Psychological stress levels were assessed across five domains: interpersonal pressure (M = 0.85, SD = 0.72), academic pressure (M = 1.06, SD = 1.13), punishment-related pressure (M = 0.54, SD = 0.30), loss-related pressure (M = 0.49, SD = 0.24), and adjustment-related pressure (M = 0.56, SD = 0.31). All domains showed statistically significant effects ($p < 0.0001$), highlighting their impact on students' psychological well-being. For psychological symptoms, participants reported significant levels of anxiety (M = 1.09, SD = 1.19), obsessive (M = 0.94, SD = 0.88), hostility (M = 0.88, SD = 0.78), paranoia (M = 0.73, SD = 0.53), interpersonal sensitivity (M = 0.91, SD = 0.83), all of which were statistically significant ($p < 0.0001$).

Table 1: Sample characteristics

Variable	Classification	N(%)	M±SD	p
Sex	Male	96699(50.8%)	1.49±0.50	0.000
	Female	93814(49.2%)		
Grade	Primary school	57170(30.0%)	7.98±2.42	0.000
	Middle school	71969(37.8%)		
	High school	61374(32.2%)		
Is the child an only child?	YES	44198(23.2%)	0.77±0.42	0.000
	NO	146315(76.8%)		
Family economic status	Rich	8571(4.5%)	2.20±1.15	0.000
	Relatively Rich	27089(14.2%)		
	Average	112337(59.0%)		
	Relatively Poor	20762(10.9%)		
	Poor	3834(2.0%)		
	Confidentiality	17920(9.4%)		
Psychological stress	Interpersonal pressure	190513(100%)	0.85+0.72	0.000
	Academic pressure	190513(100%)	1.06+1.13	0.000
	Punishment pressure	190513(100%)	0.54+0.30	0.000
	Loss pressure	190513(100%)	0.49+0.24	0.000
	adaptation pressure	190513(100%)	0.56+0.31	0.000
Psychological symptoms	Anxiety	190513(100%)	1.09+1.19	0.000
	Coercion	190513(100%)	0.94+0.88	0.000
	Hostility	190513(100%)	0.88+0.78	0.000
	Paranoia	190513(100%)	0.73+0.53	0.000
	Interpersonal sensitivity	190513(100%)	0.91+0.83	0.000
	Insomnia	190513(100%)	6.21+38.54	0.000
	Depression	190513(100%)	4.94+24.39	0.000

3.2 Multivariate Logistic Regression Analysis of Factors Influencing Psychological Stress Levels

A multivariate logistic regression analysis was performed to examine the factors influencing psychological stress levels, with psychological stress scores as the dependent variable (0 = low psychological stress, 1 = high psychological stress). Independent variables were selected based on

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statistically significant results from the univariate analysis. As shown in Table 2, male students were at a higher risk for psychological stress compared to female students, with an odds ratio (OR) of 1.176 (95% CI: 1.153 – 1.199, $p < 0.0001$). Additionally, grade level was positively associated with higher psychological stress, with higher grade students reporting greater stress. Specifically, primary school students exhibited significantly lower stress levels compared to high school students (OR = 1.708, 95% CI: 1.665 – 1.752, $p < 0.0001$). Regarding family structure, only children had a lower risk of psychological stress than those with siblings, with an OR of 0.965 the (95% CI: 0.943 – 0.988, $p = 0.003$). Family economic status had a significant impact on psychological stress, with students from lower socioeconomic backgrounds, particularly those from impoverished families, experiencing notably higher levels of stress. Students in the poorest category had an OR of 0.499 (95% CI: 0.465 – 0.536, $p < 0.0001$), indicating a substantial increase in stress risk. Conversely, students from wealthier families, particularly those from affluent backgrounds, reported lower levels of stress, with students in the wealthiest group showing an OR of 1.842, suggesting a protective effect against stress.

Table 2: Multivariate Logistic Regression Analysis of Students' Psychological Stress

Factor	β	S.E.	Waldχ2	p	OR	95%CL
Constant	0.095	0.018	28.532	0.000		
Sex						
Male	0.162	0.010	266.003	0.000	1.176	1.153–1.199
Female*	Reference					
Grade						
Primary school	0.535	0.013	1707.174	0.000	1.708	1.665–1.752
Middle school	0.212	0.012	334.468	0.000	1.237	1.209–1.265
High school*	Reference					
Is the child an only child?						
YES	-0.035	0.012	9.002	0.003	0.965	0.943–0.988
NO*	Reference					
Family economic status						
Rich	0.611	0.030	423.100	0.000	1.842	1.738–1.952
Relatively Rich	0.353	0.020	300.583	0.000	1.423	1.367–1.481
Average	0.445	0.017	710.755	0.000	0.748	0.718–0.779
Relatively Poor	-0.290	0.021	194.795	0.000	0.748	0.718–0.779
Poor	-0.695	0.036	364.978	0.000	0.499	0.465–0.536
Confidentiality*	Reference					

Note: * is reference group

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3.3 Multivariate Logistic Regression Analysis of Psychological Symptoms Levels

Table 3: Multivariate logistic regression analysis of students' psychological symptoms

Factor	β	S.E.	Waldχ2	p	OR	95%CL
Constant	-0.614	0.018	1138.507	0.000		
Sex						
Male	0.268	0.010	720.716	0.000	1.307	1.282–1.333
Female *	Reference					
Grade						
Elementary school	1.497	0.013	12668.379	0.000	4.468	4.353–4.586
Junior high school	0.807	0.011	5003.221	0.000	2.240	2.191–2.291
High school *	Reference					
Is the child an only child?						
YES	-0.214	0.012	336.129	0.000	0.807	0.789–0.826
NO *	Reference					
Family economic status						
Rich	0.611	0.030	409.250	0.000	1.843	1.332–1.444
Relatively Rich	0.327	0.021	250.209	0.000	1.387	1.436–1.535
Average	0.395	0.017	542.277	0.000	1.485	0.783–0.851
Relatively Poor	-0.203	0.021	89.757	0.000	0.816	0.577–0.669
Poor	-0.476	0.038	158.397	0.000	0.807	0.789–0.826
Confidentiality *	Reference					

Note: * Reference group

To examine the factors influencing psychological symptoms, a multivariate logistic regression analysis was conducted, with psychological symptom scores as the dependent variable (0 = low psychological symptoms, 1 = high psychological symptoms). Independent variables were selected based on statistically significant results from the univariate analysis. As shown in Table 3, male students exhibited a higher risk of psychological symptoms compared to female students, with an (OR) of 1.307 (95% CI: 1.282 – 1.333, $p < 0.0001$). Grade level was also a significant predictor of psychological symptoms, with the risk increasing with each grade level. Notably, elementary school students had markedly higher odds of experiencing psychological symptoms compared to high school students (OR = 4.468, 95% CI: 4.353 – 4.586, $p < 0.0001$). Junior high school students also displayed an elevated risk relative to high school students (OR = 2.240, 95% CI: 2.191 – 2.291, $p < 0.0001$). Family structure played a significant role, with only children showing a lower risk of psychological symptoms compared to students with siblings (OR = 0.807, 95% CI: 0.789 – 0.826, $p < 0.0001$). Regarding family economic status, students from wealthier families were more likely to report psychological symptoms, with students from the wealthiest category showing a significantly higher risk

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(OR = 1.843, 95% CI: 1.332 – 1.444). In contrast, students from lower socioeconomic backgrounds, particularly those from impoverished families, had a lower risk of psychological symptoms.

4. Discussion

4.1 Current Status of Psychological Stress and Psychological Symptoms Among Students

The descriptive statistics presented in Table 1 highlight significant differences in psychological stress and symptoms among Chinese primary and secondary school students, providing a solid foundation for psychological health interventions. First, the gender variable shows statistically significant differences between male and female students across all dimensions of psychological stress and symptoms ($p < 0.0001$). Males and females exhibit distinct patterns of stress, particularly in interpersonal and academic pressures, which may reflect the influence of gender role expectations and the broader socio-cultural context on students' mental health. This finding aligns with Yang's research results[15]. Academic stress scores were notably high (M = 1.06, SD = 1.13), which can be attributed to the competitive academic environment within Asian's education system. Additionally, grade level differences revealed significant changes in both psychological stress and symptoms as students advanced through school ($p < 0.0001$). Primary school students reported lower stress levels compared to junior and senior high school students, suggesting that as students age, pressures related to academic expectations, social interactions, and adaptation challenges intensify, thus increasing their psychological burden. This trend reflects the developmental challenges students face at different educational stages. Family structure and economic status were identified as key determinants of psychological stress. Only children (n = 44,198, 23.2%) exhibited higher levels of stress, particularly in interpersonal and adaptation stress, compared to students with siblings. This may be linked to the heightened familial expectations and socialization pressures placed on only children[16]. Furthermore, students from lower economic backgrounds (i.e., the poor and relatively poor groups) reported significantly higher psychological stress scores, suggesting that economic hardship exacerbates stress, especially in terms of academic and social adaptation pressures. In terms of psychological symptoms, students showed varying scores across different symptom categories. Anxiety (M = 1.09, SD = 1.19) and depression (M = 4.94, SD = 24.39) exhibited higher scores, highlighting the widespread nature of emotional issues within the student population. These symptoms are particularly pronounced under the dual pressures of academic and social adaptation stress, potentially increasing the risk of anxiety and depression. Variables such as gender, grade level, family structure, and economic status play significant roles in shaping psychological stress and symptoms among Chinese primary and secondary school students. These factors interact in complex ways to influence students' mental health.

4.2 Factors Influencing Psychological Stress Among Primary and Secondary School Students

A multivariate logistic regression analysis was conducted to explore the factors influencing the psychological stress levels of primary and secondary school students. The results revealed that gender, grade level, family structure, and family economic status significantly affect students' psychological stress levels. Regarding gender, male students exhibited a significantly higher risk of experiencing high psychological stress compared to female students (OR = 1.176, 95% CI: 1.153–1.199, $p < 0.0001$). This suggests that males are more likely to experience heightened psychological stress, which may be attributed to a combination of sociocultural factors, educational pressures, and gender role expectations[17]. In terms of grade level, younger students, particularly those in elementary school, reported significantly higher levels of psychological stress compared to high school students (OR = 1.708, 95% CI: 1.665–1.752, $p < 0.0001$). This trend reflects the accumulation of academic and social adaptation pressures as students progress through their schooling years. The comparatively lower stress levels in elementary school students can be attributed to less intense academic demands, which increase substantially as students advance in their education. Regarding family structure, no significant difference in psychological stress was found between only children and students with siblings (OR = 0.965, 95% CI: 0.943–0.988). This suggests that although only children may face higher familial expectations in social and domestic spheres, their psychological stress levels do not differ markedly from those of students with siblings. This could be due to other compensatory factors, such as parental involvement or social support networks, that help mitigate potential stress associated with being an only child[18]. Family economic status, however, played a crucial role in determining psychological stress levels. Students from economically disadvantaged backgrounds (including the poor and relatively poor groups) exhibited significantly higher psychological stress, with students from impoverished

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households showing a notably higher risk of psychological distress (OR = 0.499, 95% CI: 0.465–0.536). This suggests that economic hardship, particularly due to family income constraints, has a profound negative impact on students' mental health, contributing to increased stress levels. Conversely, students from wealthier families (i.e., those classified as affluent or relatively affluent) reported lower levels of psychological stress (OR = 1.842, 95% CI: 1.738–1.952, $p < 0.0001$). This lower stress level may be attributed to the psychological security and resource support provided by higher economic status, which helps buffer against some of the external pressures students face[19].

4.3 Factors Influencing Psychological Symptoms in Primary and Secondary School Students

Gender is a significant factor influencing the manifestation of psychological symptoms. Male students, compared to female students, exhibit a notably higher risk of developing psychological symptoms (OR = 1.307, 95% CI: 1.282–1.333). This suggests that gender may be associated with the expression of psychological symptoms, potentially reflecting the influence of gender roles and societal expectations on emotional expression in males[20]. In many cultures, emotional expression is often restrained among males, which may contribute to the increased psychological vulnerability observed in this group[21]. Regarding academic grade, the risk of psychological symptoms increases significantly as students progress through school[22]. Specifically, the transition from primary to high school shows a dramatic rise in the risk of psychological symptoms (OR = 4.468, 95% CI: 4.353–4.586). This may be due to the lighter academic burden in primary school, which intensifies as students advance through the grades. The increased pressure from academic demands, social interactions, and other stressors in secondary school likely exacerbates the prevalence of psychological symptoms. The impact of family structure on psychological symptoms is more complex. Students from single-child families demonstrate a lower risk of psychological symptoms (OR = 0.807, 95% CI: 0.789–0.826) compared to those with siblings. This may be linked to the environment of single-child families[23], where there is typically less sibling conflict, potentially resulting in more stable familial relationships and stronger perceived social support, which may in turn reduce the likelihood of psychological distress[24]. Family socioeconomic status also plays a significant role in the development of psychological symptoms. Students from wealthier families (OR = 1.843, 95% CI: 1.332–1.444) show a higher risk of psychological symptoms, potentially due to the pressures of social expectations and complex relational dynamics associated with affluence. Conversely, students from relatively poorer families (OR = 0.807, 95% CI: 0.789–0.826) exhibit lower rates of psychological symptoms. This suggests that economic hardship may, in some cases, trigger adaptive coping mechanisms, potentially mitigating the occurrence of psychological distress[25].

To summarize, gender, grade level, family structure, and socioeconomic status are critical factors influencing the prevalence of psychological symptoms among primary and secondary school students. These factors are interrelated and collectively shape students' psychological well-being. Future interventions aimed at promoting psychological health should consider these multifaceted influences, interconnected psychological support and counseling services are essential to addressing the mental health challenges faced by these groups.

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