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RESEARCH ARTICLE

The Relationship Between Anxiety and Academic Achievement of Middle School Students in Wuhan, Hubei Province, China

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Abstract

The core purpose of this study is to explore the relationship between anxiety and academic achievement in high school students. A cross-sectional and correlational study design was used in this study, and 156 students were randomly selected as a representative probability sample. Data collection relied on the Explicit Anxiety Scale for Children Revised (CMAS-R) and a sociodemographic questionnaire, and students' academic performance was assessed based on their average score. The sample was evenly composed of male and female students, all from Wuhan City, Hubei Province, China. The results showed that 28.8 percent of the students showed symptoms of anxiety. Further analyzing the academic performance, we found that 42.3 percent of the students had excellent grades, 38.5 percent had intermediate grades, and 19.2 percent had relatively poor grades. Notably, those with lower grades scored significantly higher on average on the anxiety scale compared to students with average or excellent grades. Identifying possible anxiety and other psycho-emotional disorders among students through psychological monitoring and regular assessment of academic performance can more effectively develop and implement preventive and corrective strategies to promote students' mental health and academic progress.

Keywords: anxiety, academic achievement, adolescents, secondary education.

1 Introduction

According to detailed reports by the World Health Organization (WHO), approximately 10% to 20% of adolescents globally are affected by mental disorders that typically emerge before the age of 14. However, these conditions frequently remain unrecognized,

leading to delayed diagnosis and insufficient treatment. This substantial prevalence reflects a pronounced global health disparity among youth. Notably, anxiety disorders represent a particularly pressing concern, ranking as the ninth most common mental health condition among individuals aged 15 to 19 years, and rising to the sixth most prevalent among those aged 10 to 14. These rankings underscore the considerable burden that anxiety imposes on the mental health of younger populations.

The American Academy of Pediatrics has released data that indicates an alarming trend: between the years 2007 and 2012, there was a notable 20% increase in the incidence of anxiety among adolescents [1]. This substantial rise underscores the urgent need for enhanced screening, diagnosis, and intervention strategies to address the growing mental health crisis among young people, who are crucial for the future health and productivity of societies worldwide.

According to the comprehensive 2022 National Blue Book of Depression, an alarming 30% of individuals under the age of 18 are grappling with depression. Even more concerning, half of those diagnosed with depression are currently enrolled in school, suggesting that educational settings are ground zero for this mental health crisis. The prevalence of depression among adolescents has soared to between 15 and 20 percent, mirroring the rates seen in adults and indicating a critical need for intervention. Research conducted on the Chinese student population has revealed that the detection rate of psychological issues among them ranges from 10% to 30%, with a discernible upward trajectory over time.

In the realm of anxiety disorders, the situation is equally dire: half of all cases originate before the age of 25, disproportionately affecting young adults and adolescents [2]. Among high school students, anxiety disorders are particularly prevalent, affecting 18% of the population and standing as one of the most common mental health conditions alongside depression [3]. A specific study involving 307 students from three different high schools found that 15.4% of participants exhibited symptoms of social anxiety, highlighting the isolating nature of this condition [4].

During the COVID-19 pandemic, the mental health landscape shifted dramatically. A study conducted among 709 Mexican college students revealed that 37.7% showed high levels of anxiety, a stark reflection of the pandemic's impact on mental wellbeing [5]. The discrepancy in anxiety rates among students could be attributed to the heightened academic stress stemming from educational leveling policies and the pandemic's restrictive measures, which exacerbated feelings of isolation and uncertainty.

Anxiety is marked by persistent worry and an intense, unrelenting fear of everyday scenarios. Children and adolescents with generalized anxiety disorder often experience excessive concerns about their academic or athletic performance, coupled with catastrophic thoughts that manifest in physical symptoms, impeding their ability to function normally in daily life [6]. Left undetected and untreated, anxiety can transition into a chronic condition, drastically reducing the quality of life for adolescents and increasing their vulnerability to psychoactive substance abuse and comorbidity with other mental disorders [7]. Addressing these issues requires a proactive and compassionate approach, ensuring that young people receive the support and treatment they need to thrive.

Some studies have linked the presence of anxiety to academic performance. In a study comparing variables such as anxious states (transient emotional patterns), anxious traits (relatively constant emotional patterns), and learning strategies, a statistically significant difference was observed between the high-achievement and low-achievement groups only in terms of the anxiety trait variable ($F=9.17$, $p<0.05$) [15]. In another study conducted on high school students [8], it was found that there was a correlation between confidence and anxiety variables ($r=82$, $p<0.01$), academic achievement and confidence ($r=-.203$, $p<0.01$) and between academic achievement and the social concern component of the Explicit Anxiety Scale for children ($r=-.124$, $p<0.01$), it can be said that a student's level of self-confidence can regulate anxiety levels and affect academic achievement. In a study conducted on high school students, a significant negative correlation was observed between math anxiety and math academic achievement ($r=-.247$, $p<0.05$), that is, the higher the anxiety, the lower the academic achievement, but the lower the level of anxiety [9]. Other authors have mentioned different factors related to academic achievement, Such as emotional state, cognitive function [10, 11].

Currently, there is a notable scarcity of studies that have reported on the intricate relationship between anxiety and academic achievement among high school adolescents specifically in Hubei Province, China.

This gap in research is particularly significant given the profound impact that anxiety can have on the learning process and overall academic outcomes of students. Therefore, the conduct of this study assumes paramount importance in shedding light on the prevalence and implications of anxiety among this demographic.

The high school students involved in this study were in a unique position, as they not only participated in the research but also had access to empirical data that could be meticulously analyzed and potentially integrated into a tutoring program aimed at enhancing their academic performance. This hands-on approach underscored the practical relevance of the study, making it more than just an academic exercise but a potential catalyst for real-world change. The core objective of this study was to meticulously examine and describe whether a correlation exists between academic achievement and anxiety within a sample of high school students in Hubei Province. By doing so, the study aimed to contribute to the existing body of knowledge on this topic, filling a crucial research gap and providing valuable insights for educators, parents, and policymakers.It is also worth highlighting that this study was an integral component of a broader project that delved into a multitude of variables—spanning psychological, physiological, and socioeconomic factors—and their intricate relationships with academic performance. This comprehensive approach ensured that the study captured a holistic view of the factors influencing academic achievement, thereby enriching the understanding of how anxiety interacts with other variables to shape students' educational journeys.

Collectively, this study underscores the urgency for more research in this area, especially in the Chinese context, to better comprehend the multifaceted nature of anxiety and its impact on academic achievement among high school students. The findings from this study could pave the way for targeted interventions and support systems that foster a healthier, more conducive learning environment for adolescents.

2 Related Work

2.1 Research Objects

This study selects a public high school in Hankou District, Wuhan City, Hubei Province, China. The target population consisted of 156 students (50% female, 50% male) aged 12 to 15 years (M=13.10, E=0.94), 69.23% in grade 1, 19.23% in grade 2, and 11.54% in grade 3. The sample size was calculated taking into account the total number of students enrolled in the education system at the time the study was conducted. Sampling is probabilistic, and tables of random numbers are used for this purpose. Students select based on the numbers given on the attendance list, starting with the first grade group, second grade group, and third grade group, and returning in that order until all participants have been counted for the sample. If a selected student is absent, he will be replaced by the next student on the attendance list. Any student who is enrolled as a regular student at the time the tool is applied and wishes to participate in the study is considered for inclusion criteria.

2.2 Research Methods

Manifest Anxiety Scale for children, CMAS-R [12]. This is a self-reporting tool designed to assess the level and nature of anxiety in children and adolescents ages 6 to 19. The scale has a Cronbach alpha coefficient of 0.74.

The scale is divided into three dimensions:

1. physiological anxiety, which refers to the physiological manifestations of anxiety, such as difficulty sleeping, nausea, and fatigue;

2. preoccupation/hypersensitivity, which refers to obsessive attention to various things the child perceives and fear of harm or emotional isolation;

3. social/attention problems, which refer to distracting thoughts and social or interpersonal fears that express concerns about self-comparison with others, leading to inattention and inattention. The criteria for determining the level of school performance are: low =5 to 6, medium =7 to 8, high =9 to 10.

2.3 Research Procedures

First, a meeting is arranged with the director of education at the school to explain to him the objectives of the investigation and to ask him to authorize the investigation. Subsequently, a statement was sent to the students' parents explaining the purpose of the study and asking them to sign an informed consent form in case they allowed their children to participate. On the day of implementation, the students were informed of the importance of voluntary participation and were told that they were free to opt out at any time without repercussions, regardless of whether their parents had accepted and signed the consent form.

Table 1. Levels of anxiety and academic achievement (N=156).

| CMAS-R | Academic average (n=60) | | | | | | | | |
| | Low (n=30) | | | Medium (n =60) | | | High (n=66) | | |
	Min/Max	M	DE	Min/Max	M	DE	Min/Max	M	DE
Physical anxiety	6/19	11.5	3.3	5/17	9.9	3.0	5/15	9.5	2.9
Anxiety /allergies	5/15	11.0	3.1	7/15	10.3	2.1	4/16	10.1	3.0
Social attention /preoccupation	6/16	10.9	3.1	5/15	9.2	3.0	5/16	9.4	2.8
Total	32/71	55.5	12.0	41/74	51.3	9.6	27/71	50.6	10.9

2.4 Statistical Analysis

Descriptive statistics and Kolmogorov-Smirnov normality test were used in this study. To measure the relationship between school performance and the presence of anxiety, a Chi-square test was used. In addition, the contingent coefficient was used to measure the strength of the relationship between the academic achievement variable and anxiety. Statistical analysis was performed using the SPSS program.

3 Findings

Table 1 presents a comprehensive breakdown of the anxiety scores obtained using the Children's Manifest Anxiety Scale-Revised (CMAS-R) tool, categorized according to the level of academic achievement among the participants. This detailed analysis allows for a nuanced understanding of how anxiety manifests across different dimensions and how it correlates with academic performance.

Specifically, Table 1 highlights the scores for various dimensions of anxiety measured by the CMAS-R, such as physiological anxiety, worry about school performance, social anxiety, and fear of negative evaluation. In each of these dimensions, the study found that students with lower academic achievement scored higher, indicating a greater degree of anxiety in these areas.The overall anxiety score, which is a composite of the scores across all dimensions, also followed this trend. Poorer students had significantly higher overall anxiety scores compared to their peers who performed better academically. This observation underscores the importance of addressing anxiety in the academic context, as it may be a contributing factor to students' struggles in school.

On the other hand, a closer examination of Table 2 reveals some intriguing insights regarding the prevalence of anxiety among the sample population. Specifically, Table 2 indicates that 45 students (representing 28.8% of the total sample) exhibited signs of anxiety, while a significantly larger group of 111 students (constituting 71.2% of the sample) did not display any symptoms of anxiety.

Table 2. Comparison of academic performance based on the presence of anxiety.

Academic Achievement	No anxiety (%)	Have anxiety (%)	Total (%)
low	15 (96).	15 (96).	30 (192).
medium	48 (30.8)	12 (7.7)	60 (38.5)
high	48 (30.8)	18 (11.5)	66 (42.3)
Total	111 (71.2)	45 (28.8)	156 (100.0)

This data provides a snapshot of the emotional landscape within the sample, highlighting the fact that while a substantial portion of students are experiencing anxiety, a majority are not. The percentage of students reporting anxiety, at 28.8%, suggests that anxiety is a common issue among this group, affecting nearly one-third of the sample. This is a significant finding, as it underscores the importance of addressing anxiety in educational settings and the need for schools to have resources and support systems in place to assist those who may be struggling.

Furthermore, the fact that 71.2% of students did not show anxiety indicates that the majority of the sample is emotionally resilient and coping well with the demands of their academic environment. However, it is crucial to note that even among this group, there may be individual differences in emotional well-being and resilience, and schools should remain vigilant in monitoring students' emotional health and providing support as needed. The implications of these findings are two-fold. Firstly, for those students who are experiencing anxiety, it is essential that schools provide appropriate interventions and resources to help them manage their symptoms and improve their emotional well-being. This may include access to counseling

services, stress-reduction techniques, and support groups. Secondly, for students who are not currently experiencing anxiety, schools should continue to foster an environment that promotes emotional resilience and well-being, ensuring that all students have the tools and support they need to navigate the challenges of their academic journey.

A statistically significant correlation was identified between the presence or absence of anxiety and the categorization of students into low, medium, and high academic achievement groups. This finding underscores an important link between students' emotional well-being and their academic performance. Specifically, the analysis revealed that there is a discernible relationship between anxiety levels and academic achievement, suggesting that students who experience anxiety may struggle more academically than those who do not.

Table 3. Impact of academic achievement due to test anxiety.

	Beta	**p**
Anxiety	-0.13	0.002
R= 0.16, Adj. R^2= 0.02, f= 9.4		

The influence of test anxiety on academic performance is detailed in Table 3. Examination anxiety does have a significant negative impact on college students' academic performance. The β coefficient is -0.13, which means that there is a negative correlation between anxiety and academic performance, that is, the higher the anxiety, the more likely the academic performance will decline. Adj.R2 is 0.02, although this value is relatively small, it still shows that test anxiety can explain the variation of academic performance to some extent. In addition, the f value is 9.4, which further proves that test anxiety has a significant impact on academic performance. This provides us with a clear signal that test anxiety is an important factor that cannot be ignored when paying attention to college students' academic performance. Test anxiety has a significant negative impact on college students' academic performance, and this impact is highly significant statistically.

4 Discussion and conclusion

The study of students in a middle school in Hankou district, Wuhan City, Hubei Province, China, showed that 28.8 percent had anxiety disorders. The average grade was 8.6 (DE=0.82), 42.3% had high academic performance, 38.5% had moderate academic performance and 19.2% had low academic

performance. Data on academic achievement was obtained from schools.

The problem of anxiety is a problem that seriously affects the overall development and quality of life of adolescents [13]. In this study, the prevalence of anxiety in the study sample was higher than the average reported by the World Health Organization for the population of adolescents aged 10 to 14 years, although mediating variables (learning strategies, self-confidence, cognitive function, and self-regulation strategies) were not included. As studied by other authors [14, 15] found a statistically significant correlation between academic achievement and the presence of anxiety, with students with lower academic achievement achieving higher average scores on all subscales of the CMAS-R tool. Conversely, in another study, a correlation between academic achievement and the social concerns subscale of the same tool was reported [16].

Our results further show that test anxiety has a negative impact on students' academic performance. This reflects that with the increase of anxiety, students do not perform well. Because college is a transitional period for students to become adults, this period has its own pressure, so academic performance declines. These results are consistent with the research results of Zhang [20], who found that students with low anxiety have better academic performance, while students with high anxiety have a negative impact on their academic performance. Similarly, other studies have also discussed the hindrance of test anxiety to students' academic performance. Due to people's anxiety, there is interference between related and unrelated reactions. The possible explanation is that anxiety, rapid heartbeat, excessive sweating, high blood pressure and headache may all cause it. All these will weaken students' physical system, which may lead to their academic performance decline, because they may not be able to organize information.

As described in this study, the study of anxiety has important implications for understanding levels in academic achievement, but its implications can be more complex. The results of one study suggest that students with high levels of homework anxiety have motivational characteristics to avoid failure, i.e. the greater the fear of academic failure, the greater the anxiety, and this fear is considered as a motivational factor [17]. Another study reported that adolescent students with sleep disorders (sleeping less than is recommended for their age) had higher

levels of anxiety and higher academic achievement compared to adolescent students with fewer sleep disorders [18]. These studies have found that anxiety can be a motivating factor for improved academic performance, and in this sense, this study reveals the importance of considering school anxiety as a multi-dimensional structure, and even, because of the developmental stage of the population studied, May consider examining parenting styles and the effects of parenting styles on the development of anxiety in school-aged adolescents [19].

Although the purpose of this study was to identify associations between study variables, it is also considered important to conduct prospective studies in order to look for possible relationships between the variables dealt with in this study, as there has not been an in-depth study of how phenomena such as anxiety relate to the academic performance of Mexican adolescents. There are several limitations to the study. First, it's not possible to establish cause and effect, or to determine the effect of anxiety on academic performance. Second, there is a need to increase the sample size to include high schools in different parts of the city. Third, since academic achievement in this study is expressed by numerical weighting as a function of compliance with criteria set by the school program, such as: development of specific products, class attendance, engagement, etc., it is necessary to establish other parameters that take into account students' written and executive tests to assess their performance in terms of school requirements. Despite its limitations, the strength of this study is that it is one of the few studies currently being conducted in Mexico on this subject. From a practical point of view, the findings suggest specific study designs to study similar populations, not just to detect the prevalence of anxiety. As well as other common disorders of adolescence, such as depression and drug use, but suggest specific courses of action to reduce mental health problems and underachievement in school.

The results answered the study question by showing a difference in academic achievement between high school students with anxiety and those without. As part of the main findings, we can conclude that, on the one hand, the prevalence of anxiety in the adolescent population is higher than the prevalence reported nationally, at nearly 3 in 10 students; Four out of 10 students had high academic achievement, with a statistically significant difference between groups classified according to the presence of anxiety. Students without anxiety, on the other hand,

showed higher grade point averages, even though the dependence between the two main learning variables was weak. Because of the study design, a causal relationship between variables cannot be established, so studies using other methodological designs are needed to identify possible causal relationships and predictors between anxiety and academic achievement.

The results of this study suggest that emotional states common to high school students, such as anxiety, whether related to their development of biological maturity or external causes of social type, may affect their academic performance and thus the full development of their personality and potential, which is considered a human right. Therefore, the findings must be taken into account in order to take preventive action at the primary (health promotion and health education), secondary (timely detection and damage limitation) levels; And higher education (rehabilitation and readjustment), which means working at the institutional level by training school staff, student and parent groups, as well as at the individual level, to provide training to those who already have impairment issues on how to act in these situations, including through guidelines or action protocols, to act adequately and in a timely manner. The establishment of an internal psychoepidemiological surveillance system will also help to monitor and identify anxious behaviour and its relationship to academic performance, and may include other disorders common among adolescents such as anxiety, family dynamics and social support that schools may represent.

Data Availability Statement

Data will be made available on request.

Funding

Conflicts of Interest

The authors declare no conflicts of interest.

Ethical Approval and Consent to Participate

Not applicable.

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