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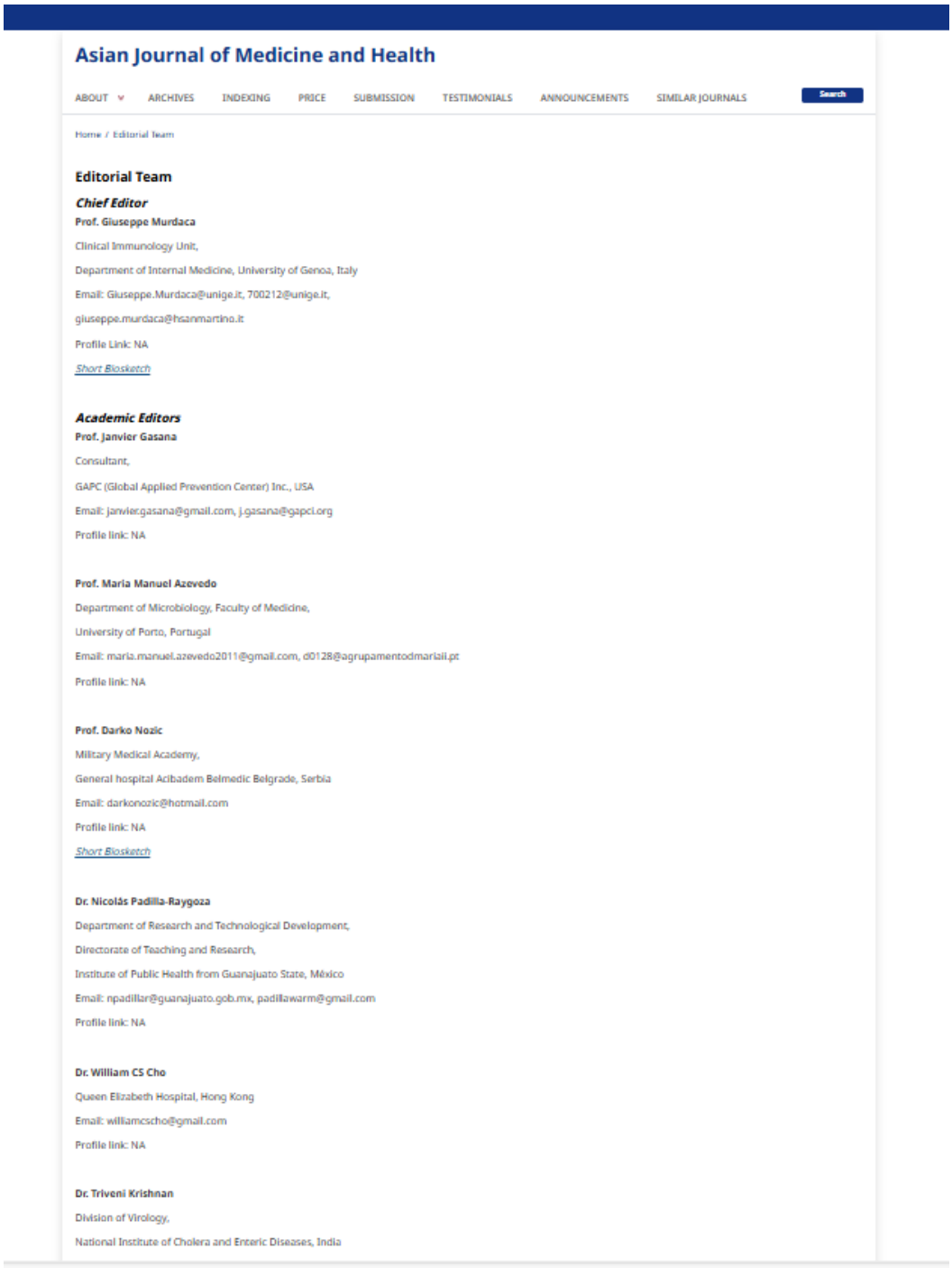

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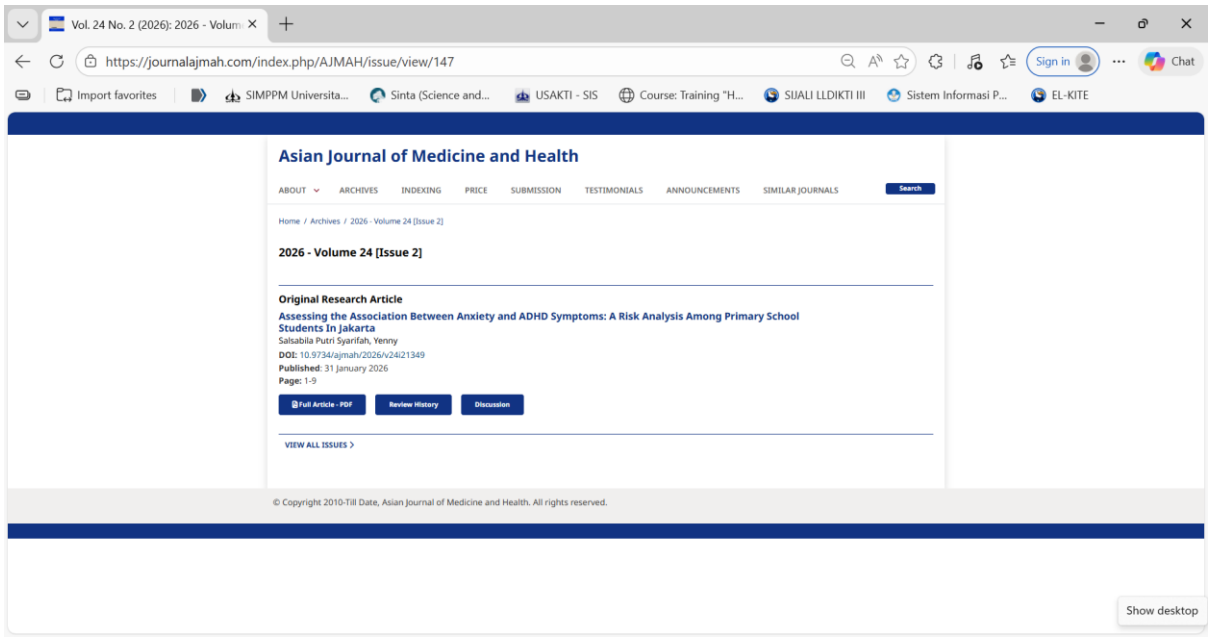

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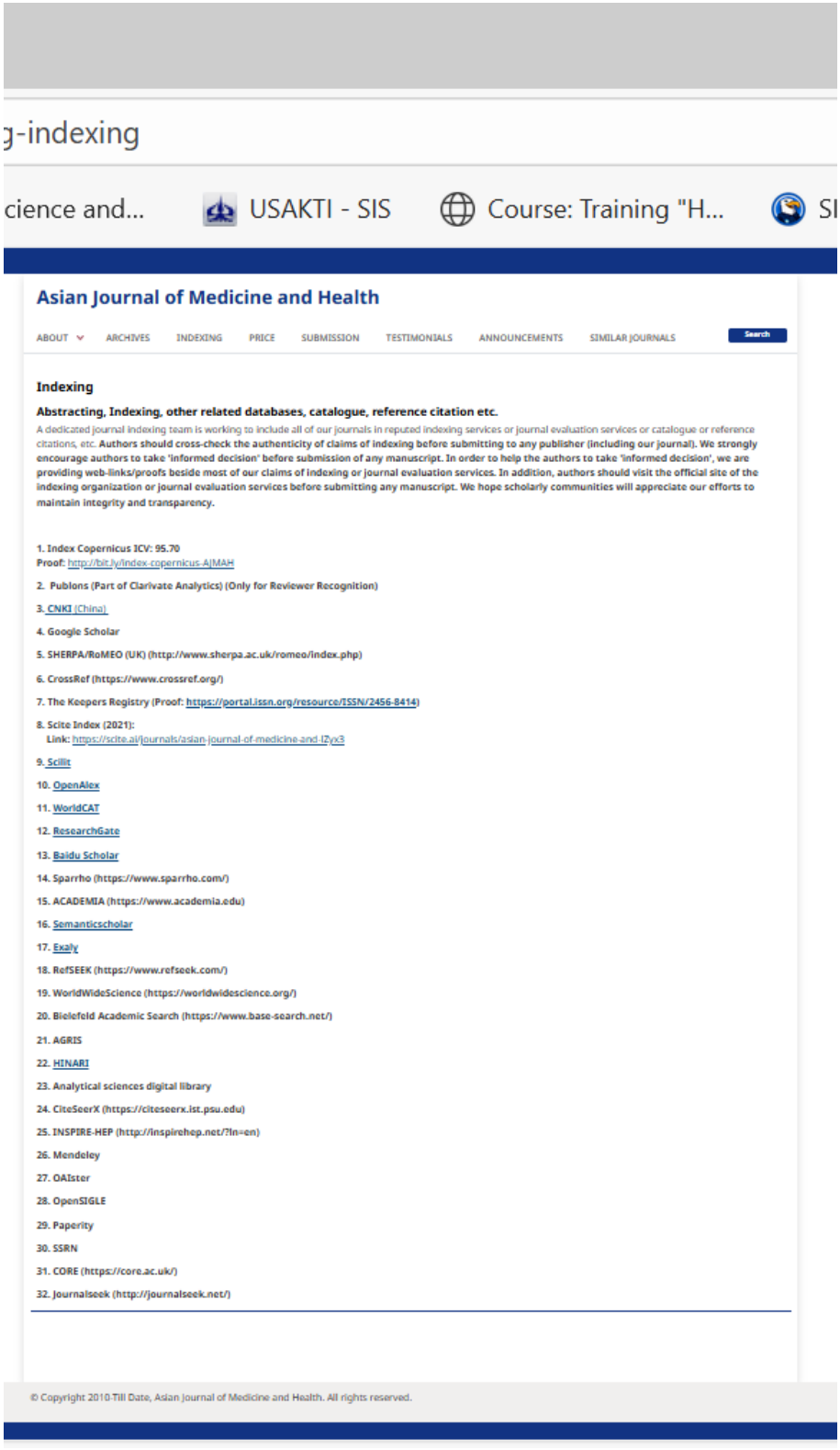

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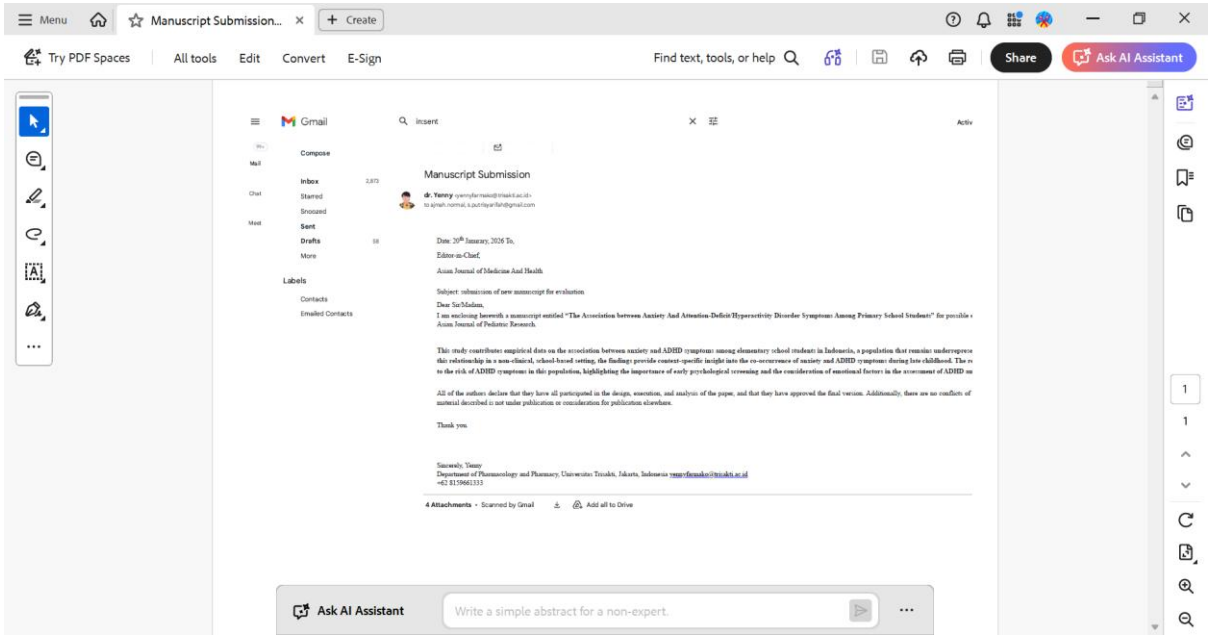

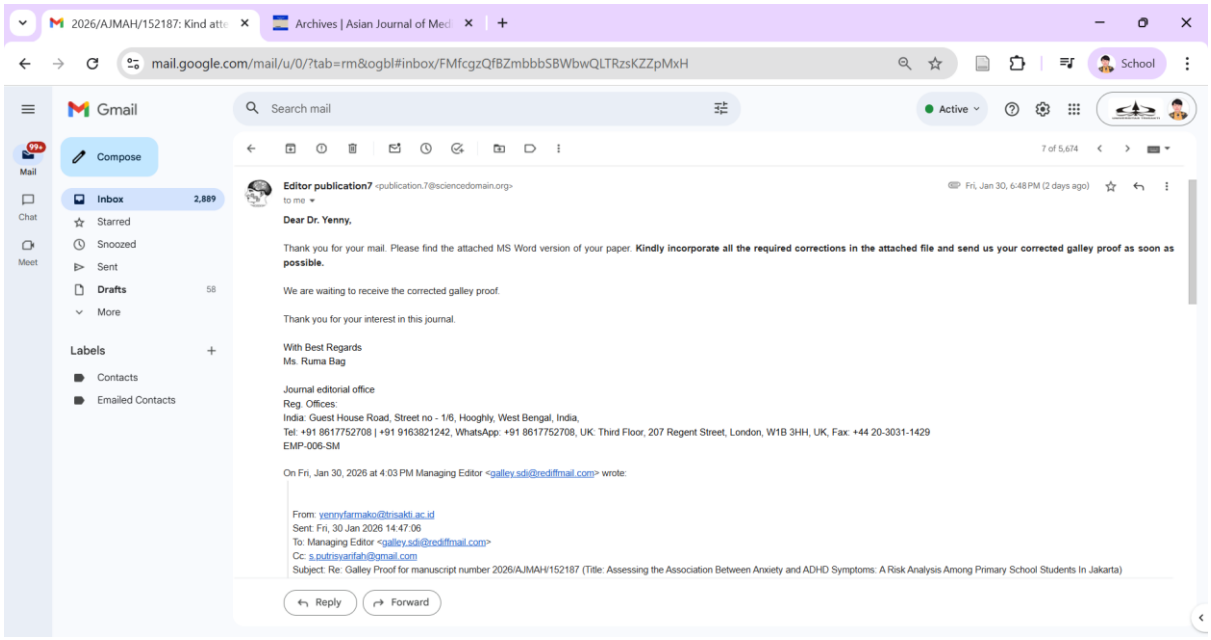

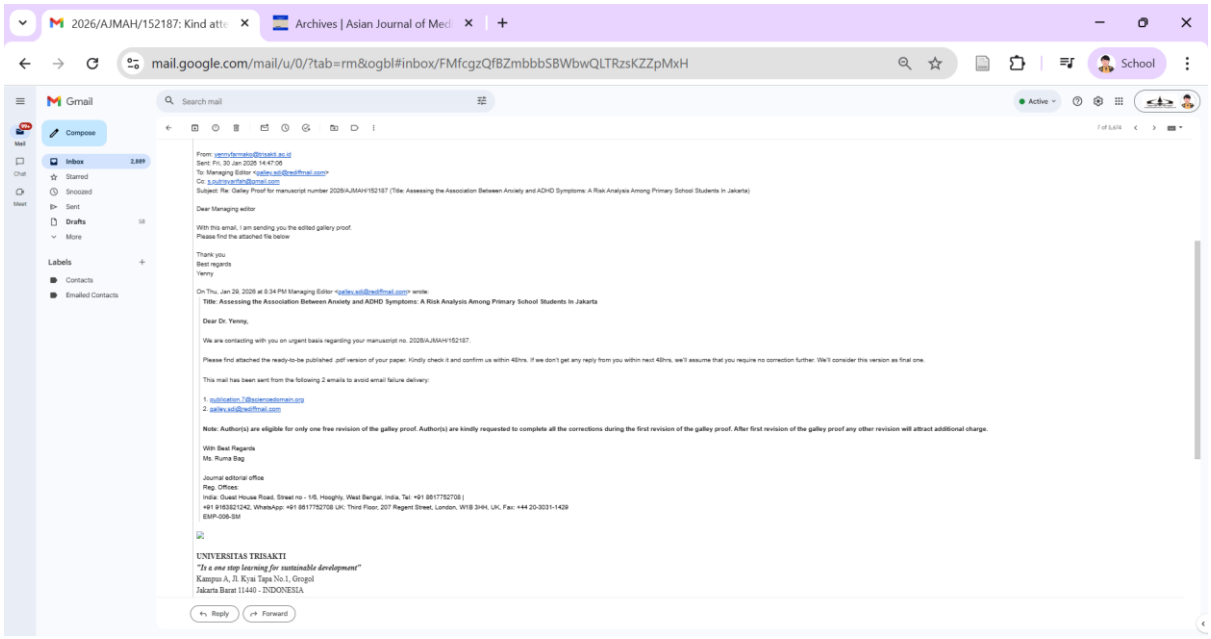
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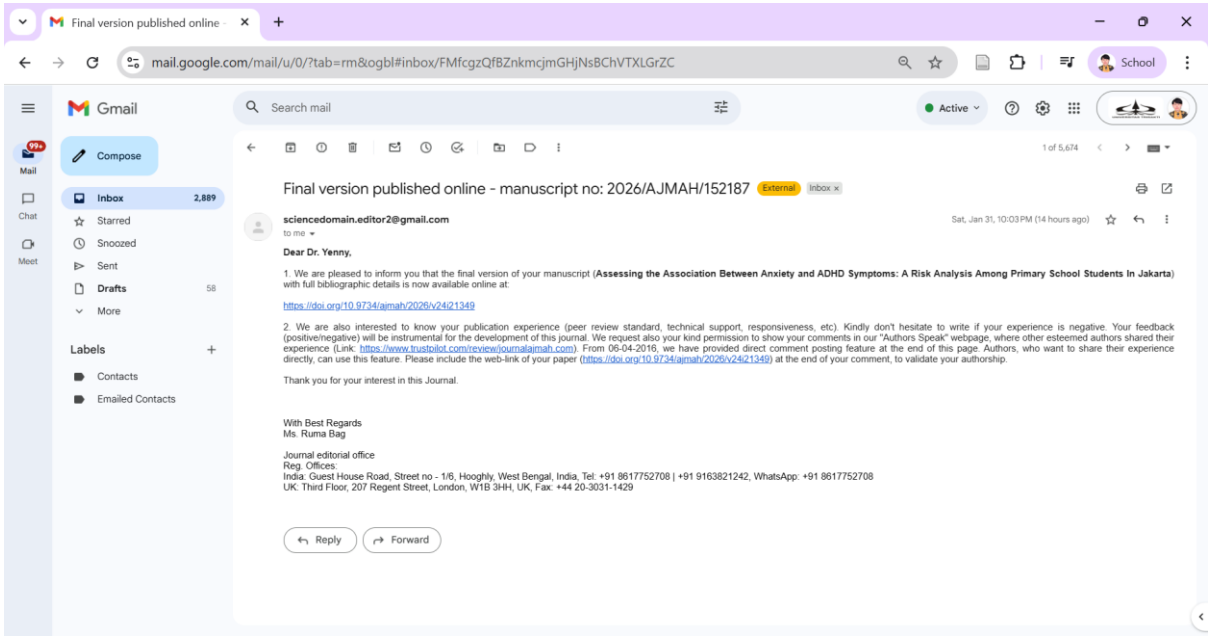
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Assessing the Association Between Anxiety and ADHD Symptoms: A Risk Analysis Among Primary School Students In Jakarta

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Abstract

Aims: Anxiety frequently co-occurs with Attention-Deficit/Hyperactivity Disorder (ADHD) and may exacerbate core ADHD symptoms such as inattention, hyperactivity, and impulsivity. This study aimed to evaluate the association and risk of anxiety with ADHD symptoms among primary school students.

Study Design: An analytical observational study with a quantitative cross-sectional design to assess the association between anxiety and ADHD symptoms.

Place and Duration of Study: This study was conducted at a public elementary school in Jakarta from November 10 to 28, 2025.

Methodology: A total of 120 students aged 10–12 years participated in this study, selected using consecutive non-random sampling. Sociodemographic data were collected using a structured questionnaire. ADHD symptoms were assessed using the Indonesian Hyperactive Child Behavior Rating Scale (SPPHAI). Anxiety levels were measured using the Revised Children's Manifest Anxiety Scale (RCMAS). Odds ratio (OR) was used to determine risk. The association between anxiety and ADHD symptoms was analyzed using the chi-square test, with a *P*-value <0.05 considered statistically significant.

Results: Most participants were female (59.2%), aged 11 years old (51.7%), and in fifth grade (53.3%). Parental characteristics were relatively homogeneous, with most parents being adults and having a secondary level of education. Low-risk ADHD was observed in (74.2%) of participants, while (67.5%) showed typical anxiety levels. A significant association was found between high anxiety and ADHD symptoms (p = 0.028; OR = 2.539; 95% CI = 1.090–5.916).

Conclusion: This research found a significant association between anxiety and ADHD symptoms; students with higher anxiety levels were more likely to exhibit ADHD symptoms. These results underscore the need for early detection and mental health education, involving families, schools, and healthcare professionals, to address anxiety's potential impact on ADHD in children, though further validation of these predictors is necessary.

Keywords: Anxiety, attention-deficit/hyperactivity disorder, ADHD symptoms, primary school students

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Assessing the Association Between Anxiety and ADHD Symptoms: A Risk Analysis Among Primary School Students In Jakarta

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Authors' contributions

This work was carried out in collaboration between both authors. Both authors read and approved the final manuscript.

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Abstract

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Conclusion: This research found a significant association between anxiety and ADHD symptoms; students with higher anxiety levels were more likely to exhibit ADHD symptoms. These results underscore the need for early detection and mental health education, involving families, schools, and healthcare professionals, to address anxiety's potential impact on ADHD in children, though further validation of these predictors is necessary.

Keywords: Anxiety; attention-deficit/hyperactivity disorder; ADHD symptoms; primary school students.

1. Introduction

Attention-Deficit/Hyperactivity Disorder (ADHD) is a persistent neurodevelopmental disorder characterized by inattention, hyperactivity, and impulsivity (Juniar & Setiawati, 2014). These symptoms generally appear in childhood and often continue into adulthood. According to the DSM-V, ADHD must begin before the age of 12, persist for at least six months, and occur in at least two separate settings, such as home and school (American Psychiatric Association, 2022). The exact cause of ADHD is still unknown; however, various risk factors have been identified, including genetics, environment, parental socioeconomic status, parental education level, parental age, exposure to secondhand smoke, and complications during pregnancy and childbirth (Adiputra et al. 2015).

Centers for Disease Control (CDC) estimated that around 7 million children in the United States aged 3–17 had been diagnosed with ADHD in 2022 (Centers for Disease Control and Prevention (CDC), 2022). Data from the National Statistics Agency in 2007 showed that one in five children and adolescents under the age of 18 faced mental health issues, with 16 million of them experiencing mental health problems that include ADHD (Dahlan et al. 2022). A limited study conducted in 2010 in Jakarta showed an ADHD prevalence of 4.2%, most commonly found in school-aged children, particularly in boys (Adiputra et al. 2015).

Anxiety or anxiety disorders are comorbidities that are commonly found and thought to play a role in influencing or exacerbating ADHD symptoms (Centers for Disease Control and Prevention (CDC), 2022). The Centers for Disease Control and Prevention (CDC) states that about 4 out of 10 children with ADHD experience anxiety. One theory that explains how anxiety can affect ADHD is the dual-pathway theory. This theory posits that there is dysfunction in the frontal executive system and dysfunction in the brain systems related to emotion and motivation (Bob & Privara, 2025). Research related to the relationship between anxiety and ADHD still shows varied findings—a study conducted by Oh et al. (2018) showed significant results (*P*<0.0001), while a study by Gair et al. indicated that anxiety symptoms do not predict ADHD symptoms later on in preschool-aged subjects (Gair, Brown, Kang, Grabell, & Harvey, 2021).

ADHD can affect multiple areas of life, including academic achievement, social interactions, and job performance. Students with ADHD may face a reduction in executive function and difficulties in sensory and cognitive processing related to perception and motor skills. Kids with ADHD often find it difficult to stay engaged in tasks or activities that demand attention and concentration (Kóbor et al., 2015). Qualitative evidence from Kwon et al. indicates that individuals with ADHD experience ongoing worry and self-distrust, irregular routines, and dissatisfaction with academic performance (Kwon, Kim, & Kwak, 2018). Thus, identifying the connection between anxiety and ADHD in school-aged children is essential to inform parents and educators that additional factors impact the child's quality and potential. The study

aims to analyze the relationship between anxiety and ADHD symptoms in elementary school students.

2. Methods

This research is an analytical observational study using a cross-sectional design. The research was conducted at an Elementary School in West Jakarta from November 10 to 28, 2025. This study included adolescents aged 10-12 years old who were willing to participate in the research and whose parents or guardians signed informed consent, and excluded adolescents with a history of neurodevelopmental disorder and students who were taking psychotherapeutic medication. Students were recruited by consecutive non-random sampling.

The number of study subjects (sample size) was calculated by using (1) the formula for an infinite (unknown) population and (2) the formula for a finite (known) population:

$$n_0 = \frac{Za^2 \times p \times q}{d^2}$$

Where n_0: required optimal sample size; Za: 1.96; p: prevalence of ADHD in Jakarta = 0.042 (Adiputra, Sutarga, & Pinatih, 2015); q: (1− p) = 0.958. Accuracy of measured prevalence p = <10% equals ½ p, resulting in n_0 = 350.

$$n = \frac{n_0}{(1 + \frac{n_0}{N})}$$

There were 140 students at the research location; therefore, N = 140. From formula (2) with the addition of 15 percent of N to compensate for potential dropouts, the final sample size was 115.

Data was collected by some questionnaire. The sociodemographic questionnaire is used to collect information on the respondent's personal data, including name, age, gender, medical history, medications taken, parents' ages, and level of education. ADHD symptoms were detected using the Indonesian Hyperactive Child Behavior Rating Scale (SPPAHI) questionnaire. This questionnaire assesses child's behavior over the past 6 months and was categorized into numerical scores arranged on a ratio scale. Scores on this questionnaire indicate a high risk of ADHD, with a cut-off score of more than 30 if completed by parents, more than 29 if completed by teachers, and more than 22 if completed by doctors. This questionnaire has been tested for its validity and reliability, with the lowest value 0,5174 and the highest value 0,9101 for each item (Muna et al. 2023). The anxiety level was assessed with the Revised Children's Manifest Anxiety Scale (RCMAS). RCMAS has often been used in Indonesia both as a screening tool and as a tool for detecting anxiety levels. This questionnaire can be used to assess anxiety in children between the ages of 6 and 19 years old, consisting of 28 questions with a "Yes" answer scored as 1 and "No" counted as 0. Scores of 20-28 indicate anxiety, while the normal range is 0-19. RCMAS has high validity and a good reliability with α=0,822 (Yunita et al. 2025).

Data was analyzed using SPSS version 27. Categorical data were summarized as frequencies and percentages, while numeric data were summarized as median and min-max. Chi-square was used to determine the relationship and risk between anxiety and ADHD with a statistically significant threshold of *P*<.05.

3. Results

Table 1 shows the distribution of respondents, with the majority of the study subjects being females, 71 respondents (59,2%). Most respondents were 11 years old, consisting of 62 respondents (51,7%), and were in the 5th grade 64 respondents (53,3%). The characteristics of respondents are divided by age and level of education. The majority of respondents' parents were adults, 117 respondents (97,5%), and had a secondary level of education, 83 respondents (69,2%). The ADHD variable: most respondents were in the low-risk category, 89 respondents (74,2%), while the majority of respondents showed a normal anxiety level, 81 respondents (67,5%).

Referring to Table 2, ADHD symptoms were commonly found in respondents with high levels of anxiety, totaling 15 respondents (38,5%). This data indicates a significant difference, evidenced by statistical testing with a result of *P* = 0.028. Statistical results also show that subjects with high anxiety have a risk 2,539 times more vulnerable to experiencing ADHD symptoms, with a significant outcome (OR = 2,539; 95% CI = 1,090 – 5,916).

Table 1. Distribution of subject characteristics (n=120)

Variable	Median (min-max)	Frequency (n)	Percentage (%)
Age (year)	11 (10-12)		
10		14	11.7
11		62	51.7
12		44	36.7
Gender			
Boys		49	40.8
Girls		71	59.2
Grade			
5th		64	53.3
6th		56	46.7
Parents' Age (years)			
Adults (18-59)		117	97.5
Elderly (60-65)		3	2.5
Parents' Education Level			
Primary education (Elementary school or no formal education)		11	9.2
Secondary Education (Junior high – Senior high school		83	69.2
Higher Education (Bachelor's degree or higher)		26	21.7
ADHD Symptoms			
Low Ris		89	74.2
High Ri		31	25.8
Anxiety			
Normal		81	67.5
High		39	32.5

Description: Symptoms of ADHD were measured using the Indonesian Hyperactive Child Behavior Rating Scale (SPPAHI) questionnaire categorized as: low risk (score 0-30), risk (31-105). Anxiety is measured using the Revised Children's Manifest Anxiety Scale questionnaire, categorized as: normal (0-19), high (20-28).

Table 2. Distribution of subject characteristics (n=120)

Variable	ADHD Symptoms		OR Value	95% CI	*P* Value
	Low Risk, n (%)	High Risk, n (%)			
Anxiety					
Normal	65 (80,2%)	16 (19,8%)	2,539	1,090-5,916	0.028*
High	24 (61,5%)	15 (38,5%)	1		

**P-value <.0.05 indicates a significant relationship (Chi-square test).*

4. Discussion

Our research study classified 5th and 6th grade students into 3 groups based on age, with an adolescent age range of 10 to 12 years, predominantly at age 11, with 62 (51.7%) respondents. The age distribution of the subjects in this study is consistent with the age ranges designated for 5th and 6th graders by international institutions (UNESCO Institute for Statistics (UIS), 2025). The age of the subjects in this study also aligns with the ADHD diagnosis criteria according to DSM V, which states that ADHD can be diagnosed in children under the age of 12 (American Psychiatric Association, 2022). A study by Ayano et al. indicates that ADHD symptoms are difficult to detect before a child reaches the age of four and are most commonly found in children at the elementary school level (Ayano et al. 2023).

These study results show that the majority of subjects were female, totalling 71 (59.2%) respondents. Epidemiologically, ADHD is more commonly found in males compared to females, with the ratio of boys diagnosed with ADHD being three times higher than that of girls (Ayano et al., 2023). The presence of differing symptoms of ADHD in males and females often leads to underdiagnosis in females. Symptoms of ADHD in females are often atypical, predominantly featuring inattention, daydreaming, and lack of focus. In contrast, in males, hyperactivity and impulsivity symptoms are more pronounced and disruptive (Williams et al., 2025). Females with ADHD are also more likely to experience higher

levels of anxiety compared to males. This condition may exacerbate inattention and emotional dysregulation, also potentially amplifying the functional impact of ADHD (Nelson & Liebel, 2018). This study found a dominance among fifth-grade students, aged 11, and among female subjects, which was influenced by the distribution of subjects at the research site.

The majority of parents in our research subjects are in the adult age group, with 171 (97.5%) respondents. According to a study conducted by Nomaguchi et al., parents within the adult age range tend to have emotional readiness, more mature psychosocial relationships, and more stable economic stability, which can be protective factors for children during their developmental period (Nomaguchi & Milkie, 2020).

The educational level of our research subjects' parents is dominated by those with secondary education, accounting for 69.2% of participants. The level of education of the parents is said to influence the family's socioeconomic status and tends to impact parenting styles, understanding of child development, and problem-solving abilities (Hoff & Laursen, 2019). Parents with higher levels of education are more likely to apply a warm parenting style while still providing clear boundaries that support good emotional regulation in children (Pinquart, 2017). These findings illustrate the backgrounds of the subjects' parents in the research location.

Our study shows that the majority of our subjects have a low risk of ADHD symptoms, totaling 89 (74.2%) respondents. According to a study conducted by Wimbarti et al. in Yogyakarta, it was found that 45.85% of children experienced ADHD symptoms (Wimbarti, 2023). There is a difference in results, as 31 (25.8%) subjects exhibited ADHD symptoms in our research. This difference is caused by variations in the questionnaires used, who completed them, and the number of respondents participating in the study. That research utilized the Conners 3 Teacher Rating Scale questionnaire completed by teachers and involved students aged 6-12 years (Wimbarti, 2023). Our study only involved respondents aged 10-12 years, which led to a significant difference in results.

Our research found that the majority of subjects in our study had a normal level of anxiety, with 81 (67.5%) respondents. Based on research conducted on students aged 10 and 11, it was found that 79.3% of respondents experienced anxiety. In our study, there were 39 (32.5%) subjects who experienced high anxiety. This difference is due to the use of different instruments and a broader subject coverage in the previous research. That study used the Screen for Child Anxiety Related Disorders (SCARED) questionnaire, which categorizes anxiety into several types. It also included a larger number of respondents, totaling 135, all from the same grade level (Niman et al. 2021). Furthermore, a study conducted among school-aged adolescents in East Jakarta during the COVID-19 pandemic reported an anxiety prevalence of 79.3%, indicating a substantially higher burden of anxiety during the pandemic period. Notably, the prevalence of anxiety observed in our study (39.5%) was higher than that reported among adolescents in Indonesia during the COVID-19 pandemic, which was 19.4%, suggesting variability in anxiety prevalence across populations and study contexts (Akbar & Yenny, 2022).

Our statistical test showed a significant relationship between anxiety and ADHD symptoms in primary school students ($P < 0.028$). The significance of the results from this study aligns with previous research that states anxiety can exacerbate or cause ADHD symptoms. Several previous studies have shown similar results. The study conducted by Oh et al. 2018 indicated that anxiety is significantly related to the severity of ADHD symptoms, such as inattention, hyperactivity, impulsivity, and functional impairment ($P<0.001$) (Oh et al., 2018). Furthermore, the study by Van de Meer et al. stated that the severity level of anxiety can influence the relationship between ADHD and cerebellar activity (van der Meer et al., 2018). Research conducted by Gair et al. showed different statistical results, indicating that anxiety did not predict ADHD ($P=0.865$). This study stated that subjects with anxiety did not experience significant changes in ADHD symptoms and tended to remain the same over the 3-year study period. This difference in results could be due to age differences among subjects, as that research used subjects who were 3 years old, which may have led to variation in questionnaire responses. That study used the BASC-PRS and the NIMH Diagnostic Interview Schedule for Children-IV to assess ADHD, completed by the subjects' parents. The results indicated that ADHD significantly affects anxiety, but anxiety did not significantly affect ADHD (Gair et al., 2021). Anxiety may interact with ADHD

symptoms by impairing attention regulation and increasing emotional reactivity, which can intensify behavioral difficulties.

Our study shows that respondents with high anxiety are 2.539 times more vulnerable to experiencing ADHD symptoms with statistically significant results (OR = 2.539; 95%CI = 1.090 - 5.916 ; *P = 0.028*). Previous studies have largely described the relationship between anxiety, ADHD, and factors or conditions that may arise among them (Schein et al., 2023). Farchakh et al. 2022 found that higher anxiety due to social media use is significantly associated with a higher risk of ADHD (OR = 1.043; 95%CI = 1.013 - 1.075; *P*<0.005) (Farchakh et al., 2022). A study conducted by Schein et al. indicates that anxiety is a comorbid factor that poses a risk for ADHD symptoms with an OR value of 1.24. Respondents with anxiety are said to have a 24% increased risk of being diagnosed with ADHD, while those receiving anxiety treatment also have a risk of up to 40%, which is suspected to be caused by medication side effects (Schein et al., 2023). A longitudinal study conducted over 2 years by Overgaard et al. showed different statistical results with a statistical value of (OR = 1.08; 95%CI = 1.090 - 5.916) (Overgaard et al., 2014). Statistical tests in the study indicated that children with anxiety do not have a significantly higher risk of experiencing ADHD. The difference in results between our study and Overgaard et al. may be due to the considerable age difference in subjects, as the study used children aged 18 months to assess anxiety and ADHD with a questionnaire that evaluated child behavior and was monitored until the children were three and a half years old. The influence of anxiety on ADHD symptoms may become more apparent as cognitive and emotional demands increase, leading anxiety to play a more noticeable role in the manifestation of ADHD symptoms.

This study provides critical evidence regarding the comorbid relationship between anxiety and ADHD symptoms in the primary school setting, a developmental period in which academic and social demands intensify. The finding that children with high anxiety levels were more than twice as likely to exhibit ADHD symptoms (OR = 2.539) reinforces the importance of considering anxiety as a significant contributing factor rather than a separate or secondary condition. These results support the growing body of literature advocating for integrated mental health screening approaches in school-aged children, as evaluating ADHD symptoms in isolation may overlook underlying emotional difficulties that exacerbate behavioral manifestations. Moreover, the use of culturally adapted and age-validated instruments in this study strengthens the relevance of the findings within the local educational context, underscoring the need for early identification and intervention strategies that address both anxiety and ADHD to optimize children's academic functioning and psychosocial well-being.

Both diseases share a common underlying mechanism. This statement is in line with the cross-lagged analysis conducted by Murray et al., 2022 which shows that an increase in ADHD symptoms when respondents were aged 13 to 15 resulted in relatively higher levels of anxiety. The study on respondents continued until they were 17 years old, and the results indicated that high levels of anxiety at age 15 led to an increase in ADHD symptoms by age 17 (Murray et al., 2022). Excessive anxiety or worry symptoms can lead to ADHD symptoms, such as inattention or hyperactivity, in children. There is still not much statistical evidence and strong theory to prove the unidirectional relationship between anxiety and ADHD; there are still many differing opinions on whether anxiety affects the symptoms of ADHD.

It is important to note that, as this study employed a cross-sectional design, the findings indicate associations rather than causal relationships. While anxiety is statistically linked with ADHD symptoms, this study cannot confirm that anxiety causes ADHD. The temporal relationship between anxiety and ADHD cannot be determined from the current data, and the observed association may reflect bidirectional or shared underlying mechanisms.

According to the WHO Guidance for Mental Health, ADHD is part of child and adolescent mental and neurodevelopmental disorders that require attention within mental health systems and public policy. ADHD is presented within the broader framework of mental health conditions that can affect children's functioning, including learning, behavior, and social participation. WHO emphasizes that mental health conditions require an integrated service approach. This approach includes early detection and identification within primary health care and school settings, as well as function-based assessments that extend beyond medical diagnosis alone. The guidance

highlights the importance of non-pharmacological interventions, including psychosocial support, family education, and school-based interventions, to address the functional impact of ADHD. In addition, WHO underscores the need for cross-sectoral collaboration among health services, educational institutions, and social support systems to ensure comprehensive care. The document further affirms that children with mental health conditions, including ADHD, have the right to equitable, inclusive, and stigma-free access to mental health services (World Health Organization, 2025). Increasing educational awareness among families regarding anxiety and ADHD so that any minor symptoms observed in children can be reported immediately. The sooner they are detected, the better the outcomes will be. There'll be a need for collaboration among schools, families, and the surrounding community to create a healthy, supportive learning environment that enables children to develop optimally, both psychologically and academically.

5. Conclusion

This study showed that anxiety was significantly associated with ADHD symptoms among elementary school students, with anxious children having more than a twofold increased risk of developing ADHD symptoms. These findings indicate the need for early mental health screening, increased attention from healthcare professionals, and supportive involvement of families and schools to reduce anxiety and prevent its impact on ADHD symptoms in children.

Consent

As per international standards, parental written consent has been collected and preserved by the author(s).

Ethical Approval

It is not applicable.

Disclaimer (Artificial Intelligence)

The author (s) hereby declare that no generative AI technologies such as Large Language Models (ChatGPT, COPILOT, etc.) and text-to-image generators have been used during the writing or editing of this manuscript.

Competing Interests

The authors have declared that no competing interests exist.

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THE ASSOCIATION BETWEEN ANXIETY AND ATTENTION-DEFICIT/HYPERACTIVITY DISORDER SYMPTOMS AMONG PRIMARY SCHOOL STUDENTS

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ABSTRACT

Aims: Anxiety frequently co-occurs with Attention-Deficit/Hyperactivity Disorder (ADHD) and may influence its manifestation in children. This study aimed to evaluate the association and risk of anxiety with ADHD symptoms among elementary school students.
Study design: An analytical observational study with a quantitative cross-sectional approach.
Place and Duration of Study: This study was conducted at Tanjung Duren Selatan 01 Pagi Public Elementary School, Jakarta, from November 10 to 28, 2025.
Methodology: A total of 120 students aged 10–12 years participated in this study. Sociodemographic data were collected using a structured questionnaire. ADHD symptoms were assessed using the Indonesian Hyperactive Child Behavior Rating Scale (SPPHAI) with a cut-off score >30. Anxiety levels were measured using the Revised Children's Manifest Anxiety Scale (RCMAS), with scores of 20–28 indicating high anxiety. The association between anxiety and ADHD symptoms was analyzed using the chi-square test, with a *P*-value <0.05 considered statistically significant. Odds ratios were calculated to determine risk.
Results: Most participants were female (59.2%), 11 years old (51.7%), and in fifth grade (53.3%), with parents mostly adults (97.5%) and having secondary education (69.2%). Low-risk ADHD was present in (74.2%), while (67.5%) displayed typical anxiety levels. A significant link between high anxiety and ADHD symptoms was identified ($P = 0.028$), with elevated anxiety increasing ADHD risk by 2.539 times (OR = 2.539; 95% CI = 1.090–5.916).
Conclusion: This research found a significant correlation between anxiety and ADHD symptoms, with anxious students more than twice as likely to exhibit ADHD symptoms. These results underscore the need for early detection and mental health education, involving families, schools, and healthcare professionals, to address anxiety's potential impact on ADHD in children,though further validation of these predictors is necessary.

Keywords: Anxiety; Attention-Deficit/Hyperactivity Disorder; ADHD symptoms; Primary school students

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1. INTRODUCTION

Attention-Deficit/Hyperactivity Disorder (ADHD) is a persistent neurodevelopmental disorder characterized by inattention, hyperactivity, and impulsivity (Juniar & Setiawati, 2014). These symptoms generally appear in childhood and often continue into adulthood. According to the DSM-V, ADHD must begin before the age of 12, persist for at least six months, and occur in at least two separate settings, such as home and school (American Psychiatric Association, 2022). The exact cause of ADHD is still unknown; however, various risk factors have been identified, including genetics, environment, parental socioeconomic status, parental education level, parental age, exposure to secondhand smoke, and complications during pregnancy and childbirth (Adiputra, Sutarga, & Pinatih, 2015).

Centers for Disease Control (CDC) estimated that around 7 million children in the United States aged 3–17 had been diagnosed with ADHD in 2022 (Centers For Disease Control And Prevention(CDC), 2022). Data from the National Statistics Agency in 2007 showed that one in five children and adolescents under the age of 18 faced mental health issues, with 16 million of them experiencing mental health problems that include ADHD (Dahlan, Nabila, Rahmani, Kusumawicitra, & Karyani, 2022). A limited study conducted in 2010 in Jakarta showed an ADHD prevalence of 4.2%, most commonly found in school-aged children, particularly in boys (Adiputra, Sutarga, & Pinatih, 2015).

Anxiety or anxiety disorders are comorbidities that are commonly found and thought to play a role in influencing or exacerbating ADHD symptoms (Centers For Disease Control And Prevention(CDC), 2022). The Centers for Disease Control and Prevention (CDC) states that about 4 out of 10 children with ADHD experience anxiety. One theory that explains how anxiety can affect ADHD is the dual-pathway theory. This theory posits that there is dysfunction in the frontal executive system and dysfunction in the brain systems related to emotion and motivation (Bob & Privara, 2025). Research related to the relationship between anxiety and ADHD still shows varied findings—a study conducted by Oh et al.(Oh, Yoon, Kim, & Joung, 2018) showed significant results (P<0.0001), while a study by Gair et al. indicated that anxiety symptoms do not predict ADHD symptoms later on in preschool-aged subjects (Gair, Brown, Kang, Grabell, & Harvey, 2021).

ADHD can affect multiple areas of life, including academic achievement, social interactions, and job performance. Students with ADHD may face a reduction in executive function and difficulties in sensory and cognitive processing related to perception and motor skills. Kids with ADHD often find it difficult to stay engaged in tasks or activities that demand attention and concentration(Kóbor et al., 2015). Thus, identifying the connection between anxiety and ADHD in school-aged children is essential to inform parents and educators that additional factors impact the child's quality and potential.

2. METHODS

This research is an analytical observational study using a quantitative approach and a cross-sectional method to analyze the relationship between anxiety and ADHD symptoms in elementary school students. The research was conducted at Tanjung Duren Selatan 01 Pagi State Elementary School in West Jakarta from November 10 to 28, 2025. This study included adolescents aged 10-12 years old who were willing to participate in the research and whose parents or guardians signed informed consent, and excluded adolescents with a history of neurodevelopmental disorder and students who were taking psychotherapeutic medication. Students were recruited by consecutive non-random sampling.

The number of study subjects (sample size) was calculated by using (1) the formula for an infinite (unknown) population and (2) the formula for a finite (known) population:

$$n_0 = \frac{Za^2 \times p \times q}{d^2}$$

Where n_0: required optimal sample size; Za: 1.96; p: prevalence of ADHD in Jakarta = 0.042 (Adiputra, Sutarga, & Pinatih, 2015); q: (1− p) = 0.958. Accuracy of measured prevalence p= <10% equals ½ p, resulting in n_0 = 350

$$n = \frac{n_0}{(1 + \frac{n_0}{N})}$$

There were 140 students at Tanjung Duren Selatan 01 Pagi State Elementary School in West Jakarta; therefore, N = 140. From formula (2) with the addition of 15 percent of N to compensate for potential dropouts, the final sample size was 115.

Data was collected by some questionnaire. The sociodemographic questionnaire is used to collect information on the respondent's personal data, including name, age, gender, medical history, medications taken, parents' ages, and level of education. ADHD symptoms were detected using the Indonesian Hyperactive Child Behavior Rating Scale (SPPAHI) questionnaire. This questionnaire assesses child's behavior over the past 6 months and was categorized into numerical scores arranged on a ratio scale. Scores on this questionnaire indicate a high risk of ADHD, with a cut-off score of more than 30 if completed by parents, more than 29 if completed by teachers, and more than 22 if completed by doctors. This questionnaire has been tested for its validity and reliability, with the lowest value 0,5174 and the highest value 0,9101 for each item (Muna, Jatnika, Purwono, & Siregar, 2023). The anxiety level was assessed with the Revised Children's Manifest Anxiety Scale (RCMAS). RCMAS has often been used in Indonesia both as a screening tool and as a tool for detecting anxiety levels. This questionnaire can be used to assess anxiety in children between the ages of 6 to 19 years old, consisting of 28 questions with a "Yes" answer scored as 1 and "No" counted as 0. Scores of 20-28 indicate anxiety, while the normal range is 0-19. RCMAS has high validity and a good reliability with α=0,822 (Yunita, Cahyaningsih, Ariyanti, & Sofyana, 2025).

Data was analyzed using SPPS version 27. Categorical data was summarized as frequencies and percentages, while numeric data was summarized as median min-max. Chi-square was used to determine the relationship and risk between anxiety and ADHD with a statistical significant threshold of *P*<.05.

3. RESULTS

Table 3 shows the distribution of respondents, with the majority of the study subjects were females 71 respondents (59,2%). Most respondents were 11 years old, consisting of 62 respondents (51,7%), and were in the 5th grade 64 respondents (53,3%). The characteristics of respondents are divided by age and level of education. The majority of respondents' parents were adults 117 respondents (97,5%), and had a secondary level of education 83 respondents (69,2%). The ADHD variable: most respondents were in the low-risk category 89 respondents (74,2%), while the majority of respondents showed a normal anxiety level 81 respondents (67,5%).

Table 1. Distribution of subject characteristics (n=120)

Variable	Mean ± SD/ median (min-max)	Frequency (n)	Percentage (%)
Age (year)	11 (10-12)		
10		14	11.7
11		62	51.7
12		44	36.7
Gender			
Boys		49	40.8
Girls		71	59.2
Grade			
5th		64	53.3
6th		56	46.7
Parents' Age			
Adults: 18-59 years		117	97.5
Elderly: 60-65 years		3	2.5
Parents' Education Level			
Primary education: Elementary school or no formal education		11	9.2
Secondary Education: Junior high school – Senior high school		83	69.2
Higher Education: Bachelor's degree or higher		26	21.7
ADHD Symptoms			
Low Risk: 0-30		89	74.2
High Risk: 31-105		31	25.8
Anxiety			
Normal: 0-19		81	67.5
High: 20-28		39	32.5

Description: Symptoms of ADHD were measured using the Indonesian Hyperactive Child Behavior Rating Scale (SPPAHI) questionnaire categorized as: low risk (score 0-30), risk (31-105). Anxiety is measured using the Revised Children's Manifest Anxiety Scale questionnaire, categorized as: normal (0-19), high (20-28).

Referring to table 2, ADHD symptoms were commonly found in respondents with high levels of anxiety, totaling 15 respondents (38,5%). This data indicates significant difference, evidenced by statistical testing with a result of *P* = 0.028. Statistical result also shows that subjects with high anxiety have a risk 2,539 times more vulnerable of experiencing ADHD symptoms, with a significant outcome (OR = 2,539; 95% CI = 1,090 – 5,916).

Table 2. Distribution of subject characteristics (n=120)

Variable	ADHD Symptoms		OR Value	95% CI	*P* Value
	Low Risk,n(%)	High Risk,n(%)			
Anxiety					
Normal	65 (80,2%)	16 (19,8%)	2,539	1,090-5,916	0.028*
High	24 (61,5%)	15 (38,5%)	1		

**P-value <.0.05 indicates a significant relationship (Chi-square test).*

4. DISCUSSION

Our research study classified 5th and 6th grade students into 3 groups based on age, with an adolescent age range of 10 to 12 years, predominantly at age 11, with 62 (51.7%) respondents. The age distribution of the subjects in this study is consistent with the age ranges designated for 5th and 6th graders by international institutions (UNESCO Institute for Statistics (UIS), 2025). The age of the subjects in this study also aligns with the ADHD diagnosis criteria according to DSM V, which states that ADHD can be diagnosed in children under the age of 12 (American Psychiatric Association, 2022). A study by Ayano et al. indicates that ADHD symptoms are difficult to detect before a child reaches the age of four and are most commonly found in children at the elementary school level (Ayano, Demelash, Gizachew, Tsegay, & Alati, 2023).

These study results show that the majority of subjects were female, totalling 71 (59.2%) respondents. Epidemiologically, ADHD is more commonly found in males compared to females, with the ratio of boys diagnosed with ADHD being three times higher than that of girls (Ayano et al., 2023). The presence of differing symptoms of ADHD in males and females often leads to underdiagnosis in females. Symptoms of ADHD in females are often atypical, predominantly featuring inattention, daydreaming, and lack of focus. In contrast, in males, hyperactivity and impulsivity symptoms are more pronounced and disruptive (Williams et al., 2025). This study found a dominance among fifth-grade students, aged 11, and among female subjects, which was influenced by the distribution of subjects at the research site.

The majority of parents in our research subjects are in the adult age group, with 171 (97.5%) respondents. According to a study conducted by Nomaguchi et al., parents within the adult age range tend to have emotional readiness, more mature psychosocial relationships, and more stable economic stability, which can be protective factors for children during their developmental period (Nomaguchi & Milkie, 2020).

The educational level of our research subjects' parents is dominated by those with secondary education, accounting for 69.2% of participants. The level of education of the parents is said to influence the family's socioeconomic status and tends to impact parenting styles, understanding of child development, and problem-solving abilities (Hoff & Laursen, 2019). Parents with higher levels of education are more likely to apply a warm parenting style while still providing clear boundaries that support good emotional regulation in children (Pinquart, 2017). These findings illustrate the backgrounds of the subjects' parents in the research location.

Our study shows that the majority of our subjects have a low risk of ADHD symptoms, totaling 89 (74.2%) respondents. According to a study conducted by Wimbarti et al. in Yogyakarta, it was found that 45.85% of children experienced ADHD symptoms (Wimbarti, 2023). There is a difference in results, as 31 (25.8%) subjects exhibited ADHD symptoms in our research. This difference is caused by variations in the questionnaires used, who completed them out, and the number of respondents participating in the study. That research utilized The Conners 3 Teacher Rating Scale questionnaire completed by teachers and involved students aged 6-12 years (Wimbarti, 2023). Our study only involved respondents aged 10-12 years, which led to a significant difference in results.

Our research found that the majority of subjects in our study had a normal level of anxiety, with 81 (67.5%) respondents. Based on research conducted on students aged 10 and 11, it was found that 79.3% of respondents experienced anxiety. In our study, there were 39 (32.5%) subjects who experienced high anxiety. This difference is due to the use of different

instruments and a broader subject coverage in the previous research. That study used the Screen for Child Anxiety Related Disorders (SCARED) questionnaire, which categorizes anxiety into several types. It also included a larger number of respondents, totaling 135, all from the same grade level (Niman, Kumala Dewa, & Yunita Indriarini, 2021). Furthermore, a study conducted among school-aged adolescents in East Jakarta during the COVID-19 pandemic reported an anxiety prevalence of 79.3%, indicating a substantially higher burden of anxiety during the pandemic period. Notably, the prevalence of anxiety observed in our study (39.5%) was higher than that reported among adolescents in Indonesia during the COVID-19 pandemic, which was 19.4%, suggesting variability in anxiety prevalence across populations and study contexts (Akbar & Yenny, 2022).

Our statistical test showed a significant relationship between anxiety and ADHD symptoms in primary school students ($P < 0.028$). The significance of the results from this study aligns with previous research that states anxiety can exacerbate or cause ADHD symptoms. Several previous studies have shown similar results. The study conducted by Oh et al. indicated that anxiety is significantly related to the severity of ADHD symptoms, such as inattention, hyperactivity, impulsivity, and functional impairment, ($P<0.001$) (Oh et al., 2018). Furthermore, the study by Van de Meer et al. stated that the severity level of anxiety can influence the relationship between ADHD and cerebellar activity (van der Meer et al., 2018). Research conducted by Gair et al. showed different statistical results, indicating that anxiety did not predict ADHD ($P=0.865$). This study stated that subjects with anxiety did not experience significant changes in ADHD symptoms and tended to remain the same over the 3-year study period. This difference in results could be due to age differences among subjects, as that research used subjects who were 3 years old, which may have led to variation in questionnaire responses. That study used the BASC-PRS and the NIMH Diagnostic Interview Schedule for Children-IV to assess ADHD, completed by the subjects' parents. The results indicated that ADHD significantly affects anxiety, but anxiety did not significantly affect ADHD (Gair et al., 2021). Anxiety may interact with ADHD symptoms by impairing attention regulation and increasing emotional reactivity, which can intensify behavioral difficulties.

Our study shows that respondents with high anxiety are 2.539 times more vulnerable to experiencing ADHD symptoms with statistically significant results (OR = 2.539; 95%CI = 1.090 - 5.916 ; $P = 0.028$). Previous studies have largely described the relationship between anxiety, ADHD, and factors or conditions that may arise among them (Schein et al., 2023). Farchakh et al. found that higher anxiety due to social media use is significantly associated with a higher risk of ADHD (OR = 1.043; 95%CI = 1.013 - 1.075; $P<0.005$) (Farchakh et al., 2022). A study conducted by Schein et al. indicates that anxiety is a comorbid factor that poses a risk for ADHD symptoms with an OR value of 1.24. Respondents with anxiety are said to have a 24% increased risk of being diagnosed with ADHD, while those receiving anxiety treatment also have a risk of up to 40%, which is suspected to be caused by medication side effects (Schein et al., 2023). A longitudinal study conducted over 2 years by Overgaard et al. showed different statistical results with a statistical value of (OR = 1.08; 95%CI = 1.090 - 5.916) (Overgaard et al., 2014). Statistical tests in the study indicated that children with anxiety do not have a significantly higher risk of experiencing ADHD. The difference in results between our study and Overgaard et al. may be due to the considerable age difference in subjects, as the study used children aged 18 months to assess anxiety and ADHD with a questionnaire that evaluated child behavior and was monitored until the children were three and a half years old. The influence of anxiety on ADHD symptoms may become more apparent as cognitive and emotional demands increase, leading anxiety to play a more noticeable role in the manifestation of ADHD symptoms.

Both diseases share a common underlying mechanism. This statement is in line with the cross-lagged analysis conducted by Murray et al., which shows that an increase in ADHD

symptoms when respondents were aged 13 to 15 resulted in relatively higher levels of anxiety. The study on respondents continued until they were 17 years old, and the results indicated that high levels of anxiety at age 15 led to an increase in ADHD symptoms by age 17 (Murray et al., 2022). Excessive anxiety or worry symptoms can lead to ADHD symptoms, such as inattention or hyperactivity, in children. There is still not much statistical evidence and strong theory to prove the unidirectional relationship between anxiety and ADHD; there are still many differing opinions on whether anxiety affects the symptoms of ADHD.

According to the WHO Guidance for Mental Health, ADHD is part of child and adolescent mental and neurodevelopmental disorders that require attention within mental health systems and public policy. ADHD is presented within the broader framework of mental health conditions that can affect children's functioning, including learning, behavior, and social participation. WHO emphasizes that mental health conditions require an integrated service approach. This approach includes early detection and identification within primary health care and school settings, as well as functional-based assessments that extend beyond medical diagnosis alone. The guidance highlights the importance of non-pharmacological interventions, including psychosocial support, family education, and school-based interventions, to address the functional impact of ADHD. In addition, WHO underscores the need for cross-sectoral collaboration among health services, educational institutions, and social support systems to ensure comprehensive care. The document further affirms that children with mental health conditions, including ADHD, have the right to equitable, inclusive, and stigma-free access to mental health services (World Health Organization, 2025). Increasing educational awareness among families regarding anxiety and ADHD so that any minor symptoms observed in children can be reported immediately. The sooner they are detected, the better the outcomes will be. There'll be a need for collaboration among schools, families, and the surrounding community to create a healthy, supportive learning environment that enables children to develop optimally, both psychologically and academically.

5. CONCLUSION

This study showed that anxiety was significantly associated with ADHD symptoms among elementary school students, with anxious children having more than a twofold increased risk of developing ADHD symptoms. These findings indicate the need for early mental health screening, increased attention from healthcare professionals, and supportive involvement of families and schools to reduce anxiety and prevent its impact on ADHD symptoms in children.

6. LIMITATIONS

This study has several limitations. The cross-sectional design limits the ability to infer temporal or causal relationships between anxiety and Attention-Deficit/Hyperactivity Disorder (ADHD) symptoms. Anxiety levels and ADHD manifestations may fluctuate over time and across different contexts, which were not captured by single-time-point measurements. Furthermore, the reliance on questionnaire-based assessments may have introduced reporting and response biases, potentially affecting the accuracy of symptom classification and the strength of the estimated risk. However, these potential biases were minimized by using standardized questionnaires that have been previously validated and demonstrated good reliability, thereby enhancing measurement consistency and credibility. The questionnaires used in this study functioned as screening tools rather than diagnostic instruments. The identified anxiety levels and ADHD symptoms require confirmation through comprehensive clinical evaluation by qualified healthcare professionals.

ETHICAL APPROVAL

This study was approved for ethical clearance by the Research Ethics Committee of the Faculty of Medicine, Universitas Trisakti (006/KER/FK/10/2025).

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