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ORIGINAL RESEARCH

The Association Between AI Chatbot Use and Anxiety Among High School Adolescents in Yogyakarta

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ABSTRACT

Introduction: Adolescents are particularly vulnerable to anxiety due to developmental demands, academic pressure, and social dynamics. Digital technologies such as artificial intelligence (AI) chatbots are increasingly used as alternative tools to support mental health. Although AI chatbots are widely used, empirical evidence regarding their association with adolescent anxiety especially in Indonesia remains limited. This study aimed to examine the relationship between AI chatbot use and anxiety among high school adolescents in Yogyakarta. **Methods:** This study employed a descriptive correlational design with a cross-sectional approach. Consecutive sampling was used to recruit 233 adolescents from several high schools in Yogyakarta. Research instruments included an AI chatbot use questionnaire and the Revised Children's Manifest Anxiety Scale (RCMAS). Data were analyzed using the Chi-square test. **Results:** Of all respondents, 53.21% reported using AI chatbots, while the prevalence of anxiety was 21.45%. Chi-square analysis showed a significant association between AI chatbot use and anxiety ($p < 0.001$).**Conclusion:** There is a significant association between AI chatbot use and anxiety among adolescents; however, causality cannot be established due to the study design. Further longitudinal research is needed to clarify the direction of this relationship and to better inform the development of safe and effective digital mental health interventions.

Keywords: AI chatbot, anxiety, adolescents

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INTRODUCTION

According to the Indonesia National Adolescent Mental Health Survey (I-NAMHS), mental health problems affect one in three (34.9%) Indonesian adolescents, with anxiety being the most common condition (26.7%). Unfortunately, only 2.6% of adolescents with mental health problems access counseling services.[1]

In the current digital era, chatbots have become an important medium for communication and rapid access to information. Chatbots can operate 24 hours a day to provide services to users. A chatbot is a computer program designed to communicate with humans through text or voice and to generate timely responses regardless of time constraints.[2]

Previous studies have shown that perceptions of AI chatbots strongly influence users' openness in disclosing emotional concerns. Respondents who believed that chatbots can understand human emotions reported a reduction in anxiety symptoms after interaction[3] While chatbots may improve users' mental health, scientific evidence regarding their effectiveness and safety remains limited and inconsistent. This is attributed to a lack of high-quality studies, conflicting findings, and insufficient evidence of consistent clinically significant effects[4]

Chatbots have been introduced into mental health interventions for counseling, text- based therapy, and emotional support due to their potential to enhance access in a flexible, real- time, and anonymous manner, thereby reducing stigma. Some studies have reported improvements in psychological symptoms such as depression and anxiety, although evidence remains limited and heterogeneous[3,5] Given the growing use of AI chatbots and the limited empirical evidence in Indonesian adolescents, this study aimed to examine the association between AI chatbot use and anxiety among high school adolescents in Yogyakarta.

METHODS & MATERIALS

This study used a descriptive correlational design with a cross-sectional approach to examine the relationship between AI chatbot use and anxiety levels among high school adolescents. A total of 233 students from several high schools in Yogyakarta were recruited using consecutive sampling. Inclusion criteria were students in grades X–XI who agreed to participate, had school permission, and had access to AI chatbots. Exclusion criteria included students with severe mental disorders, those currently receiving psychiatric treatment, refusal to participate, and incomplete questionnaire responses.

Research instruments consisted of an AI chatbot use questionnaire and the Revised Children's Manifest Anxiety Scale (RCMAS). The independent variable was AI chatbot use, and the dependent variable was anxiety as measured by the RCMAS. Data collection was conducted via a Google Form distributed to respondents with researcher supervision during completion. Data were analyzed using the Chi-square test.

RESULTS

This study involved 233 high school students from several schools in Yogyakarta. Most respondents were female (63.09%), while males accounted for 36.9%. The 14–16-year age group was more prevalent (56.22%) than the 17–19-year group (43.77%).

Regarding chatbot use, more than half of respondents reported using AI chatbots (53.21%), and the most common duration per session was 5–15 minutes (43%). In terms of perceptions, most chatbot users (73.38%) believed that AI chatbots can provide useful advice. Additionally, 56.45% reported feeling safe and free to express themselves to the chatbot, 54.03% perceived the chatbot as a supportive virtual friend, and 50% stated that the chatbot helps calm their thoughts when stressed.

The prevalence of anxiety was 21.45%, while the majority (78.54%) were categorized as not anxious. The distribution of anxiety domains indicated that symptoms related to worry and oversensitivity were the most prominent among participants. This was followed by social concerns and concentration-related difficulties, while physiological manifestations of anxiety were comparatively less dominant.

Among 124 adolescents who used AI chatbots, 37 (29.8%) were classified as anxious, whereas among 109 adolescents who did not use AI chatbots, 13 (11.9%) were classified as anxious. The Chi-square test indicated a statistically significant association between AI chatbot use and anxiety ($p < 0.001$). The Phi coefficient was -0.218, suggesting a weak association with a negative direction.

Table 1. Respondent Demographic Characteristics

Respondent Characteristics	Category	Frequency (n)	Percentage (%)
Sex	Male	86	36.9
	Female	147	63.09
Age	14–16 years old	131	56.22
	17–19 years old	102	43.77
AI Chatbot Use	User	124	53.21
	Non user	109	46.78
Duration of AI Chatbot Use per Session	< 5 minutes	30	24
	5–15 minutes	53	43
Perception of AI Chatbot Use	AI chatbots help calm thoughts during stress	62	50
	Feeling safe and free to express oneself to AI chatbots	70	56.45
	Trust that AI chatbots can provide useful advice	91	73.38
	Feeling that AI chatbots are like supportive virtual friends	67	54.03
Anxiety	Yes	50	21.45
	No	183	78.54

Table 2. Distribution of Anxiety Domains

Anxiety Domain	Frequency (n)	Percentage (%)
Physiological Anxiety	15	30
Worry/ Oversensitivity	45	90
Social Concerns/ Concentration	40	80

Table 3. Association Between AI Chatbot Use and Anxiety

AI Chatbot Use	Non-anxious n (%)	Anxious n (%)	Total n (%)	χ^2 (df)	p-value	Phi (φ)
User (n=124)	87 (70,2%)	37 (29,8%)	124 (100%)			
Non user (n=109)	96 (88,1%)	13 (11,9%)	109 (100%)	12,34 (1)	<0,001*	-0,218
Total (N=233)	183 (78,5%)	50 (21,5%)	233 (100%)			

Note: Chi Square test, *p-value <0,05: significance

DISCUSSION

This study found that 53.21% of adolescents used AI chatbots, with most perceiving them as providing useful advice. This is consistent with previous literature suggesting that perceived usefulness and parasocial interaction increase the intention to use chatbots, potentially contributing to perceived psychological benefits.[6] AI chatbots have also demonstrated potential effectiveness in mental health contexts. A meta-analysis by Zhong reported that chatbots can reduce symptoms of depression and anxiety, particularly in short- term interventions, through emotional support, structured psychoeducation, and the provision of a safe space for expression.[7] In line with this, Satyafebrianti highlighted the role of chatbots in health promotion due to their interactivity, accessibility, and ability to reach broad populations, including adolescents.[8] Fernández-Batanero further emphasized adolescents' close engagement with technology, supporting the feasibility of digital interventions such as chatbots as developmentally appropriate tools for psychological support.[9]

The analysis demonstrated a significant negative association between AI chatbot use and anxiety ($p < 0.001$; $\varphi = -0.218$). However, this finding should be interpreted with caution, as the cross-sectional design precludes causal inference. It is possible that adolescents experiencing higher levels of anxiety are more likely to seek support through AI chatbots, suggesting their potential role as an alternative coping mechanism. Nevertheless, the weak strength of the association indicates that AI chatbot use is not the sole determinant of anxiety, and the direction of this relationship remains unclear. Further longitudinal or experimental studies are therefore needed to clarify potential causal pathways.

Adolescent anxiety is influenced by multiple biological, psychological, social, academic, and environmental factors.[10,14] The predominance of worry and oversensitivity observed in this study is consistent with contemporary developmental models, which describe heightened emotional reactivity, sensitivity to uncertainty, and increased reliance on cognitive emotional regulation during adolescence due to ongoing fronto-limbic system maturation.[23,24] In the present findings, anxiety was primarily expressed through internalized cognitive- emotional domains rather than physiological symptoms. Within this context, the observed pattern of AI chatbot use and perceived usefulness appears to align with adolescents' tendency to express distress cognitively and emotionally. The prominence of social concerns and concentration difficulties further reflects the role of peer-related stress and academic demands as key contributors to adolescent anxiety. Previous studies have similarly shown that digital mental health tools, including AI-based chatbots, are more frequently used for emotional expression and cognitive support rather than for somatic complaints.[5,19] Taken together, these findings suggest a potential alignment between patterns of anxiety expression and the perceived utility of AI chatbots among adolescents.

AI chatbots may offer emotional support, help regulate thoughts, and foster a sense of safety.[18,19] Adolescents who experience difficulty sharing with others may feel more comfortable expressing themselves to chatbots perceived as neutral and nonjudgmental. In this regard, chatbots may function as a virtual companion, a self-soothing tool, or a safe space for disclosure, potentially serving as a bridge for adolescents who are reluctant to seek formal help.[15]

However, the use of AI chatbots is not without potential risks. Excessive reliance may contribute to digital dependence, social isolation, and reduced opportunities for real-life interpersonal interactions that are essential for healthy psychosocial development.[14,20] While chatbot use may serve as an alternative coping strategy, it may also exacerbate anxiety if used without

appropriate guidance.[16] Nonetheless, current evidence regarding these negative effects remains inconclusive, and chatbots may still offer benefits when used appropriately as supportive tools.[21] Recent findings further indicate that adolescents use AI chatbots not only for information seeking, academic assistance, and entertainment, but also for emotional support and personal expression.[22]

Several limitations should be acknowledged in this study. The dichotomous classification of AI chatbot use (user vs non-user) may oversimplify usage patterns and fail to capture important variations in frequency, duration, and purpose of use, which were observed among participants in this study. Furthermore, the reliance on bivariate analysis without adjustment for potential confounders such as gender, academic stress, and social environment may have influenced the observed association.

Nevertheless, this study contributes to the limited body of evidence on AI chatbot use and adolescent mental health in Indonesia, particularly in the context of emerging digital mental health practices among high school populations.

CONCLUSION

There is a significant association between AI chatbot use and anxiety among high school adolescents in Yogyakarta, with most users perceiving AI chatbots as providing useful advice. These findings emphasize the need for further evaluation of chatbots roles in adolescent mental health support and may inform the development of safer and more effective digital interventions.

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