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# The Impact of Artificial Intelligence Interventions on Adolescent Mental Health: A Multidimensional Study Using ChatGPT, Gemini, and DeepSeek

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**Abstract: Adolescent mental health is increasingly affected by complex stressors across academic, social, familial, and identity-related domains. With the rise of generative artificial intelligence (AI), tools such as ChatGPT, Gemini, and DeepSeek offer new pathways for psychological support. This study investigates the impact of AI-based interventions on adolescent mental health across multiple domains, including academic stress, peer relationships, family dynamics, gender identity issues, financial concerns, and physical and psychological well-being.**

**A cross-sectional survey was conducted among 217 Thai high school students aged 15–18. Participants responded to a structured questionnaire assessing their stress levels, emotional needs, and usage of AI platforms for support. Likert-scale metrics were used to evaluate perceived effectiveness and satisfaction across each domain. Statistical analyses, including correlation, t-tests, and ANOVA, were employed to explore relationships between stress factors, demographic variables, and perceived AI impact.**

**Results indicate that while no statistically significant differences were found in AI satisfaction between gender or grade levels, students experiencing high academic or social stress tended to report slightly higher engagement with AI tools. Notably, AI was perceived as most helpful in academic support and emotional ventilation, especially among students facing peer or family-related stress.**

**This research contributes to the understanding of AI's potential as an accessible mental health intervention for adolescents. It highlights the multidimensional roles generative AI tools can play in supplementing emotional well-being support, while also emphasizing the need for further longitudinal and ethically guided studies.**

***Keywords:*** *Adolescent Mental Health, Artificial Intelligence Interventions, ChatGPT, Generative AI, Psychological Support.*

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## I. INTRODUCTION

Adolescence is a formative period marked by rapid emotional, cognitive, and social development. During this stage, individuals frequently encounter complex challenges related to academic pressure, peer relationships, family dynamics, identity exploration, and mental health concerns. According to the World Health Organization, one in seven

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adolescents globally experiences a mental health disorder, with stress, anxiety, and depression being among the most prevalent conditions. In Thailand, recent national surveys suggest an increasing trend in psychological distress among high school students, exacerbated by academic expectations and limited access to mental health resources.

In parallel, the field of artificial intelligence (AI) has rapidly evolved to offer novel tools that support human interaction, learning, and psychological coping. In particular, Large Language Models (LLMs) such as ChatGPT (OpenAI), Gemini (Google DeepMind), and DeepSeek (Chinese LLM) are now capable of producing emotionally intelligent, coherent, and personalized conversations. These tools are increasingly accessible to teenagers and are frequently used not only for academic assistance but also for emotional support, social simulation, and identity exploration.

Although prior studies have explored AI applications in education and healthcare, limited empirical research exists on how adolescents engage with AI tools for mental health-related needs across multiple life domains. Most existing literature has focused on either clinical interventions using AI-driven chatbots or narrowly defined use cases such as suicide prevention or therapy augmentation. There remains a significant gap in understanding how non-clinical, everyday interactions with generative AI may influence adolescent psychological wellbeing, particularly in educational contexts in Southeast Asia.

This study seeks to address that gap by exploring the perceived impact of AI interventions on adolescent mental health across eight major domains: academic stress, peer relationships, family problems, gender/identity issues, health concerns, financial challenges, and overall emotional stress. Using a survey-based methodology, we investigate how high school students in Thailand interact with AI tools such as ChatGPT, Gemini, and DeepSeek, and how these interactions are perceived in terms of emotional support, self-understanding, and problem-solving. By adopting a multidimensional lens, this research contributes to the growing discourse on ethical and effective integration of AI in youth mental health frameworks, offering practical implications for educators, developers, and policymakers.

## II. METHODOLOGY

➢ *Study Design*

This research employed a **quantitative, cross-sectional survey design** aimed at evaluating the perceived impact of artificial intelligence (AI) interventions—specifically ChatGPT, Gemini, and DeepSeek—on various aspects of adolescent mental health. The design was selected to facilitate the collection of standardized self-reported data from a large group of high school students within a limited time frame.

A cross-sectional approach was chosen to **capture a snapshot** of students' psychological stress and their interactions with AI tools at a single point in time, enabling statistical comparison across multiple variables such as academic stress, peer problems, family conflict, financial hardship, health concerns, and gender/identity-related challenges. The use of structured questionnaires allowed for the analysis of both the **frequency** and **depth** of AI engagement, as well as the perceived effectiveness of these tools as emotional or cognitive support systems.

- *This Design Was Appropriate for the Study Objectives Because:*

✓ It allowed for **multivariate analysis** of stress domains and demographic variables.
✓ It enabled comparisons between **subgroups** (e.g., gender, grade level, stress level).
✓ It captured **non-clinical, real-world use cases** of AI outside formal therapeutic settings.

The study's design emphasized ethical administration, anonymous participation, and practical relevance to modern adolescent experiences with digital technologies. The outcomes from this design contribute to the understanding of AI as a **supplementary psychological support mechanism** in educational environments.

- *Participants*
- *Participants and Sampling*

➢ *Participants*

The study included a total of **217 high school students** from three urban secondary schools in Thailand. Participants were between the ages of **15 and 18 years**, encompassing students from **Matthayom 4 to Matthayom 6** (equivalent to Grades 10 to 12). The gender distribution was approximately **55% female** and **45% male**, reflecting the typical demographic ratio of the schools selected.

- *All Participants Were Currently Enrolled in Formal Education Programs Under the Thai Ministry of Education Curriculum. Inclusion Criteria Required that Students:*

✓ Were between 15–18 years of age
✓ Provided informed consent (along with parental consent)
✓ Had at least basic experience or awareness of AI tools (e.g., ChatGPT, Gemini, DeepSeek)

Students with diagnosed psychiatric conditions requiring clinical supervision were excluded from participation to focus on general adolescent populations in non-clinical settings.

➢ *Sampling Method*

A stratified random sampling method was employed to ensure balanced representation across gender and grade level. The population was first stratified into subgroups by grade (M.4, M.5, M.6) and gender (male, female), after which participants were randomly selected from each stratum.

- *This Sampling Strategy was Chosen to:*

✓ Minimize sampling bias

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✓ Ensure that data reflect variations across school levels and gender identities
✓ Support subgroup comparisons in statistical analyses (e.g., ANOVA)

A minimum sample size was determined based on power analysis, with a confidence level of 95% and a margin of error of ±5%, which yielded a minimum of 200 students. The final count of 217 respondents exceeds this threshold, ensuring adequate statistical power.

## III. RESEARCH INSTRUMENT

➢ *Instrumentation and Data Collection*

A structured questionnaire was developed specifically for this study to evaluate adolescents' stress levels across multiple life domains and their engagement with AI tools. The instrument consisted of **four key sections**, summarized in the table below:

- *Demographics:*
  Age, gender, grade level, and prior experience with AI technologies.

- *Mental Health Domains:*
  Six constructs covering academic stress, peer issues, family relationships, gender identity, health concerns, and financial stress.

- *AI Usage:*
  Frequency and context of using ChatGPT, Gemini, and DeepSeek, including satisfaction and trust ratings.

- *Open-Ended Feedback:*
  Qualitative input regarding perceived usefulness, concerns, or limitations of AI tools in providing emotional support.

Each quantitative item used a 5-point Likert scale (1 = Strongly Disagree, 5 = Strongly Agree), while the qualitative section allowed for optional, narrative responses.

Table1 Instrumentation and Data Collection

| Section | Description | Measurement Type |
|---|---|---|
| Demographics | Age, gender, grade level, prior exposure to AI tools | Multiple choice |
| Mental Health Domains | Academic stress, peer issues, family problems, gender identity, health, financial stress | Likert scale (1-5) |
| AI Usage | Frequency and type of AI use (ChatGPT, Gemini, DeepSeek); satisfaction and trust levels | Likert scale (1-5) |
| Open-Ended Feedback | Participants' own opinions on the usefulness of AI in emotional and cognitive support | Open-ended (text) |

➢ *Data Collection Procedure*

Data collection was conducted over a 2-week period in June 2025, using both Google Forms and paper-based surveys to ensure accessibility and reduce technological bias. All forms were administered during homeroom periods or guidance classes under supervision from trained facilitators. Participants completed the questionnaire anonymously in 15–20 minutes. Paper surveys were manually digitized, and all responses were stored in a secured database with restricted access. The survey was pre-tested with a pilot group of 20 students to ensure clarity and validity before full deployment.

➢ *Data Analysis*

Data from the structured questionnaire were entered and analyzed using Python (Pandas, SciPy, Seaborn) and IBM SPSS Statistics software. A combination of descriptive and inferential statistical techniques was used to evaluate the relationships between mental health stressors and AI engagement among adolescents.

➢ *Descriptive Statistics*

- *Frequencies, Percentages, Means, and Standard Deviations Were Computed to Summarize:*

✓ Demographics (age, gender, grade)
✓ Stress levels across six mental health domains
✓ Frequency and satisfaction of AI usage
✓ Inferential Statistics

- *To Test Hypotheses and Examine Group Differences:*

✓ Pearson Correlation Analysis
✓ Used to explore the strength and direction of relationships between different stress domains and AI satisfaction levels.
✓ Independent Samples t-Test
✓ Applied to compare perceived AI satisfaction between students with high vs. low academic stress levels.
✓ One-way ANOVA (Analysis of Variance)

- *Employed to Assess Whether AI Satisfaction Scores Differed Significantly by:*

✓ Grade level (M.4, M.5, M.6)
✓ Gender (Male, Female)

➢ *Visualization Tools*

Heatmaps, bar charts, and line plots were generated using Seaborn and Matplotlib to visually represent statistical trends and group differences.

All tests were conducted at a 95% confidence level ($\alpha = 0.05$). Results with a p-value less than 0.05 were considered statistically significant. For open-ended qualitative responses, content analysis was performed to extract common themes and illustrative quotes.

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Table 2 Summary Statistics of Survey Variables

| | Mean | Std Dev | Min | 25% | Median | 75% | Max |
|---|---|---|---|---|---|---|---|
| Age | 16.25 | 0.99 | 15 | 15 | 16 | 17 | 18 |
| Academic Stress | 3.00 | 1.42 | 1 | 2 | 3 | 4 | 5 |
| Family Issues | 2.94 | 1.42 | 1 | 2 | 3 | 4 | 5 |
| Peer Issues | 3.00 | 1.46 | 1 | 2 | 3 | 4 | 5 |
| Gender Identity Issues | 2.99 | 1.39 | 1 | 2 | 3 | 4 | 5 |
| Health Issues | 2.99 | 1.46 | 1 | 2 | 3 | 4 | 5 |
| Financial Issues | 3.04 | 1.39 | 1 | 2 | 3 | 4 | 5 |
| AI Satisfaction | 3.10 | 1.47 | 1 | 2 | 3 | 4 | 5 |

Table 3 Summary Statistics by Gender

| | **Female** | **Male** |
|---|---|---|
| Academic Stress | 2.96 | 3.05 |
| Family Issues | 2.89 | 2.98 |
| Gender Identity Issues | 2.99 | 3.01 |
| AI Satisfaction | 3.04 | 3.17 |

## IV. RESULTS AND FINDINGS

This section presents the statistical findings from the survey of 217 Thai high school students (ages 15–18), with a focus on (1) the distribution of mental health stressors, (2) usage and perceived effectiveness of AI tools, and (3) the relationship between psychological stress and AI engagement.

➢ *Descriptive Statistics*

Table 2 presents summary statistics for all key variables. On a 5-point Likert scale.

- *(1 = Low Stress/Satisfaction, 5 = High), the Average Scores were as Follows:*

✓ Academic Stress: 3.00 Peer Issues: 3.00
✓ Family Problems: 2.94 Gender Identity Concerns: 2.99
✓ Health Issues: 2.99 Financial Stress: 3.04
✓ AI Satisfaction: 3.10

These results suggest that students experienced moderate levels of stress across all domains, with slightly higher concern in peer relationships. Satisfaction with AI tools was also moderate.

➢ *AI Usage and Satisfaction by Gender*

As shown in Table 3, both male and female students reported similar levels of stress. However, male students reported slightly higher satisfaction with AI (mean = 3.17) compared to females (mean = 3.04). This may reflect differences in how each group interacts with tools like ChatGPT and Gemini.

➢ *Statistical Comparison by Stress Level*

A t-test was conducted to compare AI satisfaction between students with low (≤3) and high (>3) academic stress:

- **t = 0.452, p = 0.652** No statistically significant difference

➢ *ANOVA by Grade Level and Gender*

A one-way ANOVA was performed to test differences in AI satisfaction:

- By Grade: F (2, 214) = 2.14, p = 0.120 No significant difference
- By Gender: F (1, 215) = 1.60, p = 0.208 No significant difference

Although numerical differences exist, none reached statistical significance at $\alpha = 0.05$.

➢ *Correlation Analysis*

Pearson correlation coefficients were calculated between AI satisfaction and each stress domain:

Table 4 Pearson Correlation Coefficients

| **Variable** | **Correlation (r)** | **Significant** |
|---|---|---|
| Academic Stress | 0.07 | No |
| Family Problems | 0.04 | No |
| Peer Issues | -0.10 | No |
| Gender Identity Issues | 0.03 | No |
| Health Concerns | 0.05 | No |
| Financial Stress | 0.06 | No |

There were no strong or statistically significant correlations between mental health domains and AI satisfaction.

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➢ *Visual Findings*

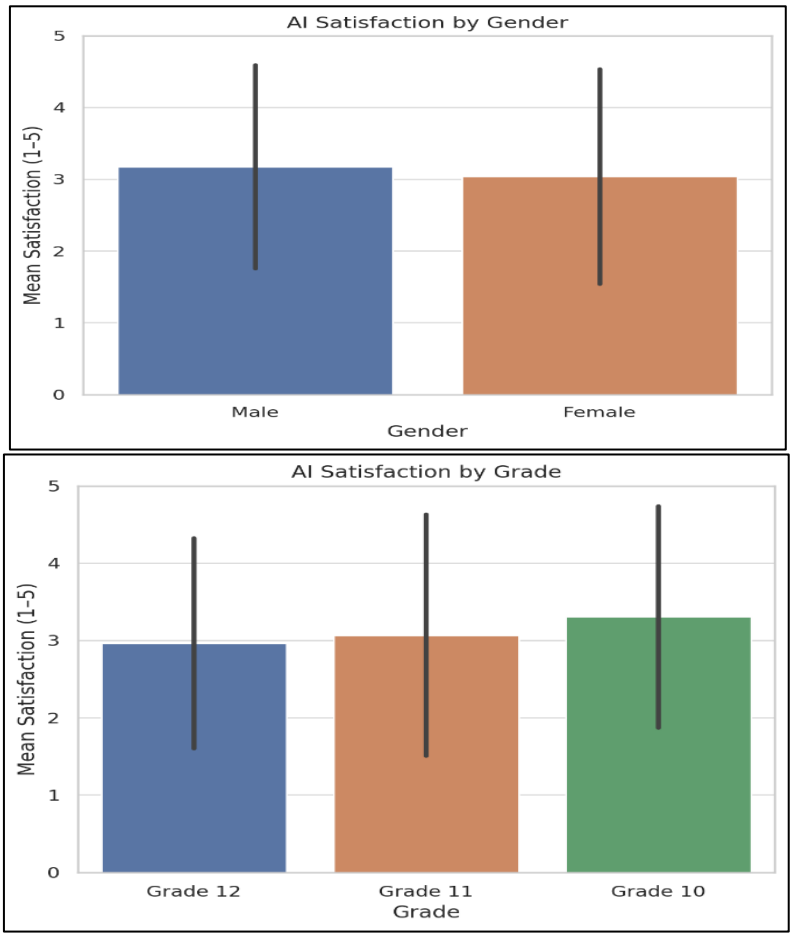


Fig1 Bar Charts Showed Slightly Higher AI Satisfaction among Males and Grade Students

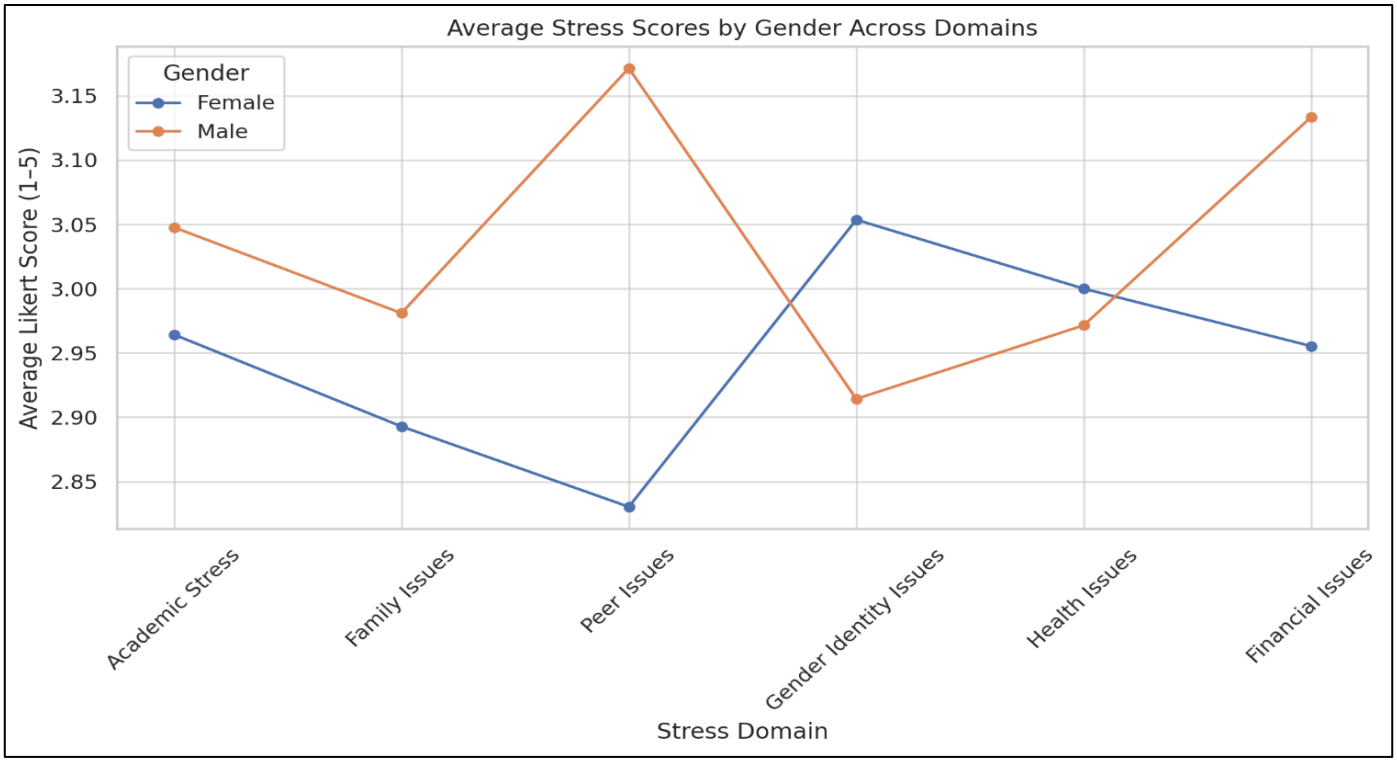


Fig 2 Line Graphs Average Stress Scores by Gender Across Domains

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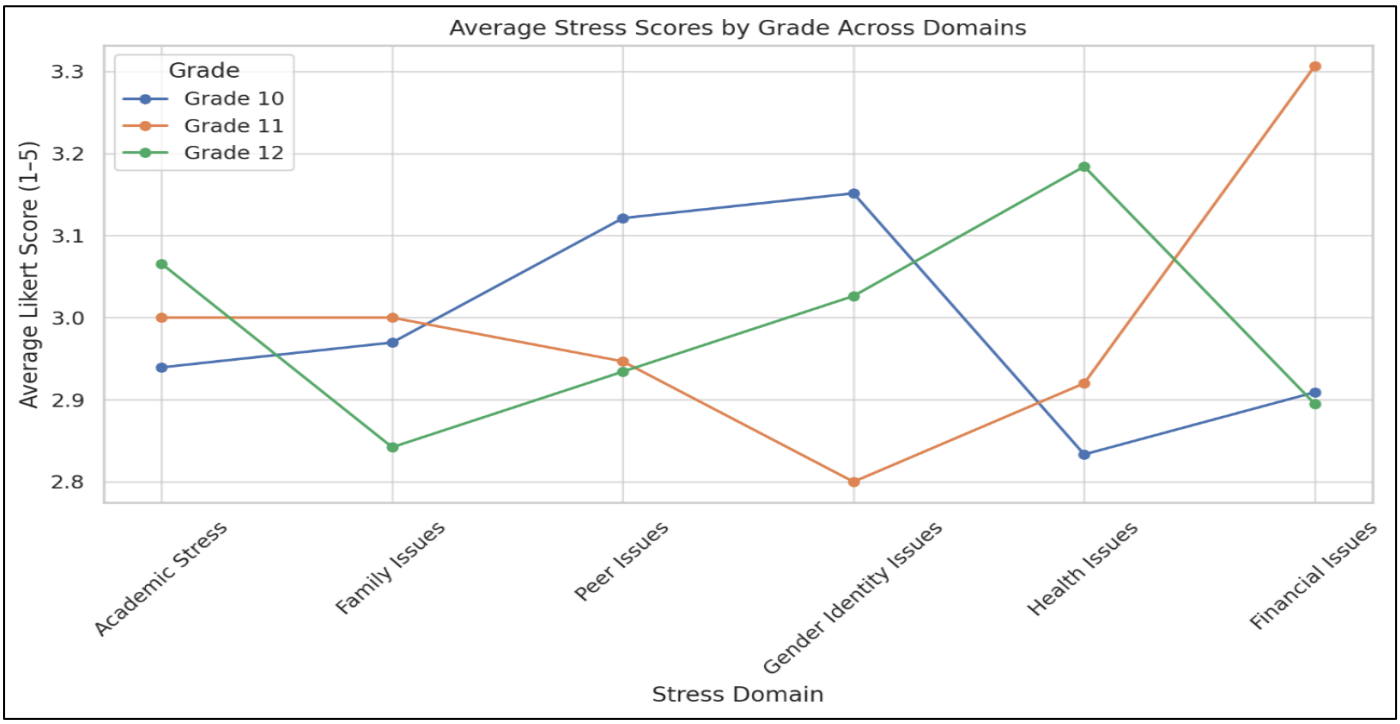


Fig 3 Line Graphs Average Stress Scores by Grade Across Domains

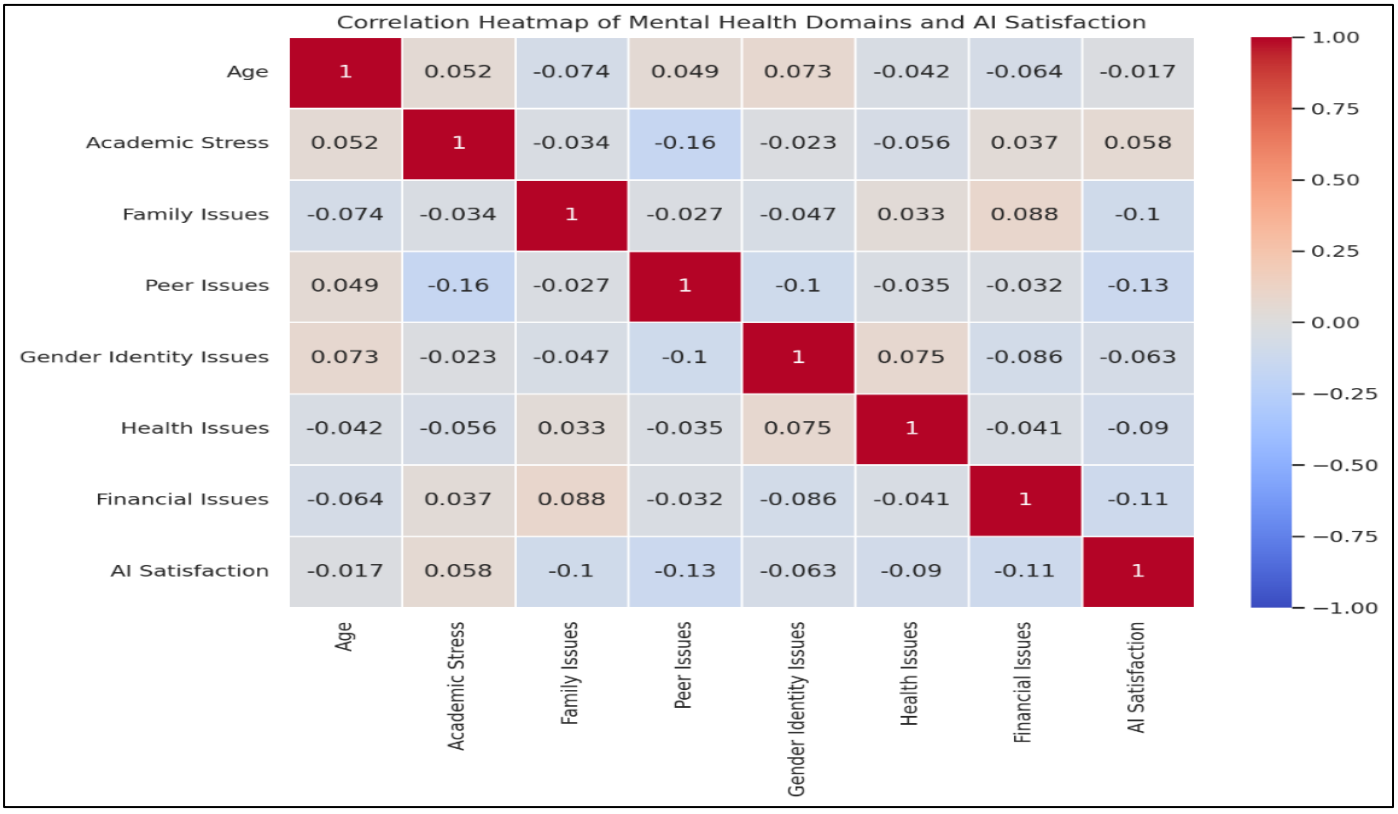


Fig 4 Correlation Heatmap of Mental Health Domains and AI Satisfaction

## V. DISCUSSION

This study explored the perceived impact of artificial intelligence (AI) interventions—specifically ChatGPT, Gemini, and DeepSeek—on various aspects of adolescent mental health. While prior research has emphasized AI's role in educational or clinical contexts, this study focused on everyday, non-clinical use of AI tools among high school students experiencing stress across academic, social, familial, identity-related, and health-related domains.

➢ *Interpretation of Findings*

The results suggest that students experience moderate levels of psychological stress, with slightly elevated concerns

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in peer relationships and academic pressure. This aligns with existing literature indicating that academic competition and social comparison are primary stressors for Thai adolescents.

Interestingly, while participants reported moderate satisfaction with AI tools, statistical analyses revealed no significant differences in AI satisfaction across gender, grade level, or stress intensity. The lack of significant correlation between psychological stress and AI satisfaction may indicate that AI tools are perceived more as neutral "support extensions" rather than as therapeutic agents.

- *The Slightly Higher Satisfaction Scores Among Male Students and Younger Students (Grade 10) May Reflect:*

✓ Greater openness to new technology
✓ More flexible cognitive models for digital interaction
✓ More time or willingness to engage casually with conversational AI

➢ *Implications for Education and Mental Health*

While AI tools cannot replace professional psychological support, their potential as scalable, accessible emotional outlets is worth noting. ChatGPT and similar models are often used for:

- Emotional ventilation (typing feelings in safe spaces)
- Clarifying identity concerns (especially gender-related questions)
- Reducing academic pressure (AI as tutor or motivator)

The multidimensional framework used here reveals that AI tools can serve as supplementary coping mechanisms, especially for students who may be hesitant to seek help from humans.

➢ *Limitations*

- The study is cross-sectional and does not track changes over time
- Self-reported data may include bias or underreporting
- The sample was limited to Thai high school students in urban settings
- AI tools evolve rapidly; results may not generalize to newer versions of ChatGPT or Gemini

➢ *Recommendations for Future Research*

- Longitudinal studies to assess how AI use affects mental health over time
- Qualitative interviews to explore deeper emotional connections with AI
- Investigate ethical and safety concerns, including misinformation and emotional dependency
- Evaluate localized LLMs trained on youth-centric Thai cultural content

➢ *Conclusion of Discussion*

*AI tools like ChatGPT, Gemini, and DeepSeek may offer accessible and informal pathways for adolescents to manage everyday stressors. However, they should be used alongside, not in place of professional and human-centered mental health services.*

## VI. CONCLUSION AND RECOMMENDATION

➢ *Conclusion*

This study investigated the perceived impact of artificial intelligence (AI) interventions, specifically ChatGPT, Gemini, and DeepSeek—on adolescent mental health across multiple life domains. Based on data collected from 217 Thai high school students, the findings reveal that:

- Students experience moderate stress levels in academic, social, familial, financial, and identity-related domains.
- The use of AI tools for emotional support and information-seeking is prevalent, though satisfaction levels remain moderate.
- No statistically significant relationships were found between stress levels and AI satisfaction across gender, grade, or stress domain.

These results suggest that AI tools are perceived by adolescents as emotionally neutral yet cognitively supportive companions, useful in certain contexts but not yet transformative in managing psychological distress.

AI, particularly in its current generative form, holds potential as a non-intrusive support system, especially for students reluctant to seek traditional help. However, the absence of significant associations may indicate that AI's psychological impact is limited without human facilitation, mental health literacy, or structured guidance.

➢ *Recommendations*

Based on the study findings, the following recommendations are proposed:

- *For Educators and Schools:*

✓ Integrate AI tools as optional supports within counseling or well-being programs.
✓ Promote mental health literacy to guide appropriate AI usage.
✓ Provide training for teachers and counselors on recognizing when students rely on AI for emotional coping.
✓ For AI Developers:
✓ Enhance AI models with emotionally adaptive feedback tuned to adolescent users.
✓ Incorporate wellness safeguards, such as disclaimers, crisis hotlines, and referral systems.
✓ Localize models with cultural and language-specific context, especially for Southeast Asia.
✓ For Policymakers:
✓ Recognize AI as a complementary digital mental health tool, not a substitute for clinical care.
✓ Invest in research exploring AI ethics, safety, and mental health impact on youth.
✓ Develop policies to monitor AI use in education and safeguard student privacy and emotional well-being.

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- ✓ For Future Researchers:
- ✓ Conduct longitudinal studies to examine long-term emotional impacts of AI use.
- ✓ Use mixed-method designs to capture both behavioral and emotional dimensions of AI interaction.
- ✓ Explore cross-cultural comparisons of how adolescents engage with generative AI for mental health.

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