



Artificial Intelligence-Based Detection of Suicidal Ideation among University Students: A Mixed Methods Approach

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Abstract

Objective: This study aimed to assess the prevalence of suicidal ideation among university students using the Beck Scale for Suicide Ideation (BSSI), evaluate the concordance of Beck suicide risk with three artificial intelligence platforms (DeepSeek, Gemini, and ChatGPT), and identify thematic drivers of suicidal ideation through qualitative analysis of free-text responses.

Methods: A descriptive cross-sectional study was conducted with 495 university students using a self-reported questionnaire that included sociodemographic variables, the Beck Scale for Suicide Ideation, and an open-ended question about current psychological state and stressors.

Results: Among participants, 52.93% were classified as low risk, 37.78% as moderate risk, and 5.26% as high and very high risk for suicidal ideation. Significant associations were observed between suicidal ideation and female gender and economic status, with students reporting insufficient income demonstrating the highest risk levels. Moreover, analysis of AI concordance revealed significant differences in BSSI scores across DeepSeek-derived risk categories ($F=39.251$, $p<0.0001$), with fair agreement with the BSSI (Quadratic Weighted Kappa (QWK)=0.248). In contrast, Gemini ($F=1.952$, $p=0.101$; QWK=0.231) and ChatGPT ($F=1.994$, $p=0.114$; QWK=0.119) demonstrated no statistically significant differences between risk groups, with Gemini showing fair and ChatGPT showing slight agreement, respectively. Thematic analysis of free-text responses identified academic pressure, particularly examination stress, workload, and fear of failure, as the primary contributing factors.

Conclusion: Suicidal ideation represents a critical mental health concern among university students. The concordance of AI platforms with BSSI remains varied, ranging from fair to slight, establishing them as decision-support platforms rather than alternatives for clinical assessment.

Keywords: Academic pressure, Artificial intelligence, Beck Scale, Students, Suicidal ideation,

Introduction

One of the most important social and psychological problems in the world is suicide. It is the deliberate end of an individual's life ([Organization, 2023](#)). Suicide can be caused by a variety of factors, such as psychological factors like personality disorders, depression, and anxiety ([Spytska, 2024](#)); economic factors like unemployment and poverty ; social factors like bullying, social isolation, and the death of a loved one; biological factors like dopamine and serotonin disorders; and factors related to drug and alcohol abuse ([Brandt et al., 2022](#)).

In 2021, according to National Survey on Drug Use and Health, 4.8% of adult Americans experienced serious suicidal thoughts, 1.4% formed a suicide plan, and 0.7% aged 18 and older attempted suicide in to United States ([Marco et al., 2025](#)). In 2023, there were 8.5% suicides in Europe or ([Marco et al., 2025](#)). In the Middle East, the World Health Organization reports that suicide rates in Bahrain, Morocco, and Djibouti range from 1.5% to 9.8% in recent years; lower rates were noted in Lebanon, Kuwait, and Jordan ([Erlangsen et al., 2024](#)). In Iraq, where this study was conducted, the suicide crude rate (excluding Kurdistan) rose from 1.09% to 1.31% between 2015 and 2016, while Kurdistan had an estimated rate of 3.83% during the same period ([Ahmed & Heun, 2024](#)). Limited data in Iraq on reference group sizes and population figures make specific rate calculations challenging, however, the Iraqi Ministry of Health indicated a rise in suicides reaching 406 cases in 2021, rising to 511 cases in 2022, and reaching 730 cases in 2023 ([Randa Nasser, 2025](#)).

A Meta-analyses indicate that approximately 22.3% of university students annually experience suicidal thoughts, 6.1% make a suicide plan, and 3.2% attempt suicide ([Mortier et al., 2018](#)). Suicidal ideation in university students can take many forms, including withdrawal from friends and family, abrupt behavioral changes, abandoning personal belongings, discussing death, or using phrases like "I have no reason to live" or "I wish I would disappear".

Numerous studies have shown that medical students, in particular, put in a lot of emotional and academic work and frequently experience high levels of stress, fatigue, and melancholy, which can lead to suicide ideation ([Nair et al., 2023](#); [Mateen et al., 2024](#); [Koushik et al., 2025](#)). Additionally, compared to students in other academic fields and their peers of the same age in the general population, recent systematic research have shown that the prevalence of suicidal thoughts varies among medical students, even when adjusted for other demographic variables ([M. Rahman et al., 2025](#)).

Machine learning algorithms or natural language processing in open artificial intelligence (AI) platforms have demonstrated promising accuracy in identifying suicidal tendencies, thoughts, and plans, given the growing potential of AI in mental health assessments and early detection of suicidal thoughts and tendencies through various textual data posted on social media and responses to mental health surveys ([Aldhyani et al., 2022](#); [Ehtemam et al., 2024](#); [Somé et al., 2024](#); [Spittal et al., 2025](#)).

This study aims to assess the prevalence of suicidal ideation among university students using the Beck Scale for Suicide Ideation (BSSI), evaluate the concordance of Beck suicide risk with three artificial intelligence platforms (DeepSeek, Gemini, and ChatGPT), and identify thematic drivers of suicidal ideation through qualitative analysis of free-text responses

Materials and Methods

1. Study Design and Subjects

The current descriptive, cross-sectional study was conducted at Al-Najaf, Iraq, during the academic year 2025-2026. A convenience sample of 495 students was collected from medical and non-medical faculties across the universities in Al-Najaf. To ensure a representative cross-section of the student population, no exclusion criteria were employed. Inclusion criteria involved students being currently enrolled and aged 18 years or older.

2. Ethical Considerations

Ethical approval was obtained from the Ethics Committee of the Faculty of Nursing, University of Kufa (approval number 3170 in 26, Oct. 2025). Participation was entirely voluntary, and informed consent was obtained. Anonymity and confidentiality were strictly maintained; no personal identifiers were linked to the data.

3. Data Collection Instruments

Data were collected using a structured, self-reported questionnaire consisted of three parts:

- A. Socio-demographic Part: Items collected included age, gender, marital status, faculty (medical vs. non-medical), class of the faculty, study type (day/night), smoking status, residence (rural/urban), and monthly income (rated as "not enough," "somewhat enough," or "enough").
- B. Beck Scale for Suicide Ideation (BSSI): The Arabic-validated version of the adopted BSSI by six experts from different Iraqi Universities was used as the reference standard. The scale consists of 25 items across five domains: cognitive (suicidal thoughts), intention/planning, emotional (motivations/feelings), digital/behavioral, and preventive/protective factors. Each item was scored on a 5-point Likert scale (Never, Rarely, Sometimes, Often and Always). Sum scores were categorized as: Very Low Risk (≤ 40), Low Risk (41–60), Moderate Risk (61–85), High Risk (86–105), and Very High Risk (≥ 106).
- C. Free-Text Response part: Participants were prompted to describe their current psychological state and stressors in an open-ended format. These responses were used for thematic analysis.

4. Procedures

The self-reported questionnaire was piloted on 50 students (not included in the final sample) to verify clarity and internal consistency, yielding a Cronbach's alpha of 0.89. Data collection occurred over a four-week period. Simultaneously, a research assistant (blinded to the BSSI results) inputted anonymized textual responses from participants were formatted into standardized prompts and subsequently submitted to three artificial intelligence platforms: DeepSeek (Version: DeepSeek-V3-0324), Gemini (Version: Gemini 3 Flash), and ChatGPT (Version: GPT-5.3). Each AI platform was instructed to classify participants' suicide risk into one of five ordinal levels based on the following clinical criteria:

- (1) Very Low Risk: no psychological pressures and no suicidal ideation;
- (2) Low Risk: presence of psychological pressures without suicidal thoughts;
- (3) Moderate Risk: psychological distress manifesting as fatigue and sadness, without active suicidal ideation;
- (4) High Risk: thoughts of suicide in the absence of a specific plan; and
- (5) Very High Risk : thoughts of suicide accompanied by a formulated plan.

5. Statistical Analysis

Data were analyzed using SPSS version 26. Descriptive statistics (frequencies, percentages, means, standard deviations) were calculated for socio-demographic variables and BSS scores. Inferential statistics (Independent t-test and one-way ANOVA) were used to compare mean BSS scores by sex and across income groups and AI classifications respectively. Post hoc Bonferroni tests were applied where appropriate. Additionally, Quadratic Weighted Kappa (QWK) was calculated to measure the level of concordance between each AI platforms risk classification and the BSS reference standard. Kappa values were interpreted as: 0.00–0.20 (slight), 0.21–0.40 (fair), 0.41–0.60 (moderate), 0.61–0.80 (substantial), and 0.81–1.00 (almost perfect). Finally, free-text responses were analyzed using thematic analysis by two researchers independently coded the data, identified recurring themes, and resolved discrepancies through discussion. The final themes and subthemes were quantified by frequency of mention.

Results

Table (1) shows the socio-demographic details of the studied university students. With a mean age of 20.7 ± 1.9 years (range: 18–26), the majority of students (36.16%) were between the ages of 20 and 21. Compared to men (33.33%), women constituted the majority of the sample (66.67%). The majority of participants (92.53%) were single. In terms of academic specialization, non-medical faculties accounted for more than two-thirds of the student body (66.26%), with nearly equal representation in the second and fourth academic years. The vast majority of participants resided in cities (84.85%), enrolled in day study programs (87.88%), and abstained from smoking (87.08%). Finally, over half of the students (52.32%) reported that their family income was “somewhat enough”.

Table (1): The socio-demographic details of the studied university students.

Socio-Demographic Characteristics	Rating and Intervals	<i>n</i> (%)
Age Groups (Years)	≤ 19	159 (32.12)
	20 - 21	179 (36.16)
	22 - 23	108 (21.82)
	24 and More	49 (9.90)
	Mean $\pm$ SD (Min-Max)	20.7 ± 1.9 (18-26)
Sex	Males	165 (33.33)
	Females	330 (66.67)
Marital Status	Single	458 (92.53)
	Married	31 (6.26)
	Separated	5 (1.01)
	Widow	1 (0.20)
Faculty	Medical Faculty	167 (33.74)
	None Medical Faculty	328 (66.26)
Class of the faculty	One class	132 (26.67)
	Two class	136 (27.47)
	Three class	85 (17.17)
	Four class	142 (28.69)
Type of the study	Day	435 (87.88)
	Night	60 (12.12)
Smoking	No	436 (88.08)

	Yes	59 (11.92)
Residence	Rural	75 (15.15)
	Urban	420 (84.85)
Monthly Income	Not Enough	82 (16.57)
	Somewhat Enough	259 (52.32)
	Enough	154 (31.11)
Total		495(100%)

Abbreviations: SD=Standard deviation, Min=Minimum, Max=Maximum.

Table (2) shows the assessment of students' suicidal ideation risk according to the Beck Suicide Scale. The findings showed that 37.78% of the students are categorized as moderate risk, while more than half (52.93%) fall into the low-risk category. Only 4.04% of students were classified as very low risk, while a lower percentage of students were classified as high risk (4.65%) and very high risk (0.61%). The total mean of the scores was 59 ± 12 , which is considered low-risk.

Table (2): assessment of students' suicidal ideation risk according to the Beck Suicide Ideation Scale.

Beck Scale (Overall 25 Items)		n (%)	Mean of Scores $\pm$ SD	Assessment
Suicidal Ideation Risk	Very Low Risk	20 (4.04)	59 ± 12	Low Risk
	Low Risk	262 (52.93)		
	Moderate Risk	187 (37.78)		
	High Risk	23 (4.65)		
	Very High Risk	3 (0.61)		
Total		495 (100%)		

Note: Sum of Scores ≤ 40 : Very low risk, 41-60: Low risk, 61-85: Moderate risk, 86-105: High risk, 106 and more: Very high risk.

Table (3) shows the association between students' socio-demographic characteristics and their suicidal ideation risk.

A statistically significant difference was observed in relation to sex (P-value = 0.05). Females reported a higher mean of scores (60.7 ± 12.4) compared to males (58.4 ± 13.9). Moreover, a highly significant association was found with monthly income (P-value < 0.0001). Students who reported that their income was "not enough" had the highest mean sum of scores (65.1 ± 16.5), compared to those with "somewhat enough" (59.5 ± 11.9) and "enough" income (58.1 ± 11.9). Post hoc analysis confirmed that students with insufficient income had significantly higher suicidal ideation scores than both other groups. All other studied variables had no significant associations (all P-values were > 0.05).

Table (3): Association between students' socio-demographic characteristics and their suicidal ideation risk.

Socio-Demographic Characteristics		n.	Mean of Scores $\pm$ SD	P-value (Sig.)
Age Groups (Years)	≤ 19	159	61.2 ± 12.8	0.097 (NS)
	20 - 21	179	59 ± 12.5	
	22 - 23	108	58.5 ± 13.1	
	24 and More	49	63 ± 14.1	
Sex	Males	165	58.4 ± 13.9	0.05

	Females	330	60.7±12.4	(S)
Marital Status	Single	458	60.1±13.0	0.809 (NS)
	Married	31	58.3±10.8	
	Separated	5	62.6±22.3	
	Widow	1	66±0	
Faculty	Medical Faculty	167	59.3±13.5	0.411 (NS)
	None Medical Faculty	328	60.3±12.6	
Class of the faculty	One class	132	58.6±12.3	0.140 (NS)
	Two class	136	62±13.4	
	Three class	85	59±12.5	
	Four class	142	60±13.1	
Type of the study	Day	435	60.1±12.8	0.472 (NS)
	Night	60	58.8±13.7	
Smoking	No	436	59.7±12.4	0.159 (NS)
	Yes	59	62.2±15.9	
Residence	Rural	75	58.5±11.9	0.298 (NS)
	Urban	420	60.2±13.1	
Monthly Income	Not Enough	82	65.1±16.5	<0.0001 (HS) ^ψ
	Somewhat Enough	259	59.5±11.9	
	Enough	154	58.1±11.9	

Abbreviations: SD=Standard deviation, NS=Not significant, S=Significant, HS=Highly significant at p -value <0.01 . ψ =Post hoc analysis was (Not Enough>Somewhat Enough, Enough). Statistics were done using one-way ANOVA if the variable has two categories and an independent t -test if the variable contains more than two.

Table (4) shows descriptive statistics, ANOVA comparison, and agreement analysis (Quadratic Weighted Kappa) between AI-based risk classifications and Beck Suicide Ideation Scale (reference standard) among university students. The Beck Suicide Ideation Scale mean scores for DeepSeek vary significantly across AI-derived risk categories ($F = 39.251$, $p < 0.0001$), and a clear ordered pattern (Very Low < Low < Moderate, High, Very High) is confirmed by Bonferroni post-hoc analysis. The Beck Scale and DeepSeek showed a fair degree of agreement (QWK = 0.248).

In contrast, Gemini showed no statistically significant differences between risk groups ($F = 1.952$, $p = 0.101$), although a fair level of agreement was observed (QWK = 0.231), suggesting limited discrimination between severity levels. Similarly, ChatGPT also showed non-significant differences ($F = 1.994$, $p = 0.114$) and demonstrated only slight agreement with the Beck Scale (QWK = 0.119), indicating weaker alignment with the reference standard compared to the other models.

Table (4): Descriptive statistics, ANOVA comparison, and agreement (Quadratic Weighted Kappa) between AI models and Beck Scale classifications (reference standard) among university students (N=495)

AI-based Risk levels		n (%)	Mean of Beck Scale ±SD	F test	P-value (Sig.)	Post Hoc analyses (Bonferroni)	QWK
DeepSeek	Very Low Risk	184 (37.17)	53.67±10.27	39.251	<0.0001 (HS)	Very Low Risk< Low Risk< Moderate Risk, High Risk,Very High Risk	0.248 (Fair agreement)
	Low Risk	277 (55.96)	62.35±11.57				
	Moderate Risk	23 (4.65)	75.32±14.22				
	High Risk	9 (1.82)	85.00±15.63				
	Very High Risk	2 (0.40)	87.00±5.66				
Gemini	Very Low Risk	209 (42.22)	59.86±13.25	1.952	0.101 (NS)	-	0.231 (Fair agreement)
	Low Risk	264 (53.33)	59.94±12.46				
	Moderate Risk	18 (3.64)	66.67±16.60				
	High Risk	3 (0.61)	60.67±8.96				
	Very High Risk	1 (0.20)	83.00				
ChatGPT	Very Low Risk	410 (82.83)	59.96±13.37	1.994	0.114 (NS)	-	0.119 (Slight agreement)
	Low Risk	82 (16.57)	61.55±10.78				
	Moderate Risk	2 (0.40)	47.50±13.44				
	High Risk	0	-				
	Very High Risk	1 (0.20)	83.00				

Note: Risk levels were derived from AI-based analysis of participants' textual responses. Beck Scale classifications were used as the reference standard. Quadratic Weighted Kappa (QWK) was interpreted according to standard agreement thresholds.

Table (5) shows a thematic analysis of university students' written responses to the open question: 'How Would You Describe Your Psychological State?' Please speak freely about your thoughts, feelings, and recent daily behavior. It reveals that psychological stress and daily strain, especially academic pressure (37.4%), were the most prevalent themes. Life and contextual difficulties were 17.8%, such as financial and familial stressors. On the other hand, 24.04% report overall psychological stability, and 2.8% say they are satisfied with their accomplishments or significant life events.

Overthinking and rumination were prevalent, with future-related worry accounting for 13.3% and general overthinking for 10.3%. Emotional swings (12.3%), ruminating on the past (5.3%), and impatience or rage (4.4%) were also indicative of mood instability.

Psychological stress was further underscored by the theme of emotional and motivational tiredness, with 11.5% experiencing indifference or loss of purpose, 8.1% describing social retreat, and 4.4% showing poor motivation and energy.

With 5.8% reporting active suicide ideation, 3.8% passive suicidal ideas, and 0.8% self-harm acts, the theme of suicidal thoughts and self-harm was concerning.

Table (5): Thematic analysis of university students' written responses to the open question: 'How Would You Describe Your Psychological State?' Please Speak Freely about Your Thoughts, Feelings, and Recent Daily Behavior.

Theme	Sub-theme	Description	Example (Student Multi-Response)	n (%)
Psychological Stress and Daily Pressure	Academic Pressure	Stress related to exams, and study workload	"Academic and life pressure, exam stress, lack of sleep and food..."	185 (37.4)
	Life and Circumstantial Pressure	Stress caused by family problems, financial issues, and social environment.	"Continuous family problems...", "I live in a country with an uncertain future..."	88 (17.8)
Relative Stability and Satisfaction	General Psychological Stability	Reporting stable, good, or acceptable mental state.	"Stable", "Psychologically fine", "Good"	119 (24.04)
	Specific Life Satisfaction	Positive feelings associated with specific achievements or events such as graduation.	"Good because I achieved a long-awaited dream..."	14 (2.8)
Overthinking and Rumination	Future-related Worry	Persistent anxiety about the future, career, and uncertainty.	"Fear of the future...", "Thinking about tomorrow is in God's hands"	65 (13.3)

	General Overthinking	Excessive thinking without specific focus.	“Excessive thinking”, “My thoughts are unstable and scattered”	51 (10.3)
Mood Instability	Rumination on Past Events	Recurrent thinking about experiences or memories.	“Thinking about the past...”, “Past memories during high school”	26 (5.3)
	Emotional Fluctuation	Alternation between sadness, happiness, anxiety, and calmness.	“Mood swings between sadness, hope, and confusion”, “Fluctuating mood”	61 (12.3)
	Irritability and Anger	Increased emotional reactivity and poor anger control.	“Excessive nervousness... cannot control it”	22 (4.4)
Emotional and Motivational Exhaustion	Apathy and Loss of Meaning	Loss of interest and feeling that life lacks meaning.	“Nothing brings me happiness anymore”, “Life feels meaningless”	57 (11.5)
	Social Withdrawal and Isolation	Preference for being alone and avoiding social interaction.	“I tend to isolate myself”, “Completely isolated from society”	40 (8.1)
	Low Motivation and Energy	Laziness, procrastination, and lack of drive to perform tasks.	“Postponing work”, “Feeling somewhat lazy”	22 (4.4)
Suicidal Thoughts and Self-Harm	Active Suicidal Ideation	Thinking about or planning suicide.	“I think about suicide...”, “I attempted suicide twice”	29 (5.8)
	Passive Suicidal Ideation	Wish for death without specific action plan.	“I wish my life would end peacefully...”	19 (3.8)
	Self-harm Behavior	Thoughts or actions of injuring oneself.	“I harm myself using sharp objects...”	4 (0.8)

Discussion

According to the results of the current study, it was noted that most collegiate aged individuals were classified as being low risk with regards to suicidal ideation; however, just over 1/3rd of them were determined to be at moderate risk, and a smaller but clinically relevant number have been identified as at high or very high risk as related to an attempt of suicide. The existing literature has shown that there are

significantly more recorded instances of collegiate aged individuals with ideations than there are attempted suicides by collegiate aged individuals (Mortier et al., 2018; Mortier, 2018; Ludwig et al., 2024; Koushik et al., 2025). The World Health Organization (2023) has classified suicide as the primary way people aged 15-29 die in the world today. Recent meta-analytic studies have demonstrated an increase in suicidality among higher education students following the COVID-19 pandemic (Karlayle de OM et al., 2022; Teixeira et al., 2022; Sousa Leite et al., 2023; M. Rahman et al., 2025). Therefore, the major moderate risk category will provide opportunities for early intervention services delivered through community-based programs. Moderate-risk students can be identified by fewer observable warning signs; therefore, they are more likely to go untreated as patients than higher-risk students who may exhibit multiple warning signs. Additionally, moderate-risk students may represent an ideal candidate to benefit from the delivery of preventative services, including the use digital screens (Sherekar & Mehta, 2025). Gender and income level have both been identified as having a substantial impact on suicidality. Previous research has discovered elevated levels of suicidal ideation (SI) among female students, which is similar to many studies indicating that women experience more psychological distress than men while simultaneously having more episodes of SI. This is in spite of the fact that men have higher rates of completed suicide than women (Jimenez-Feo et al., 2026; Marionneau et al., 2026). There may be gender differences in emotional expression, coping, and help-seeking behaviours that may also contribute to these gender disparities. There appears to be a strong correlation between low income or limited resources and self-reported rates of SI. Evidence indicates that the impact of financial stress on mental well-being is very clear and is particularly evident in LMICs (McCloud & Bann, 2019). Financial insecurity can lead to increased hopelessness, feelings of lack of control, and uncertainty about the future – these are all factors that contribute to SI (O'Connor & Kirtley, 2018) and the relationship between financial problems and declining mental health is becoming more evident.

This research study may be the first to evaluate three different types of AI platforms (DeepSeek, Gemini, ChatGPT) to assess college students' suicidal ideation (SI) by using the Beck Scale of Suicidal Ideation (BSSI) (see Table 4). The results indicate a very strong statistically significant finding for DeepSeek ($F = 39.251, p < 0.0001$), and the post hoc tests demonstrated a perceptually incremental increase in mean BSSI scores across each risk category (e.g. very low risk = 53.67 ± 10.27 ; low risk = 62.35 ± 11.57 ; moderate risk = 75.32 ± 14.22 ; high risk = 85.00 ± 15.63 ; and very high risk = 87.00 ± 5.66). Therefore, there is an obvious progression in BSSI scores from the least to the most at-risk groups, showing that DeepSeek's risk classifications can be used to assist in defining individuals' level of risk for SI. (Gaur et al., 2024) On the Lower Beck Scale of Severity Index (BSSI), neither of the AI generated significant F with a $p < 0.05$ meaning that the majority of categories were statistically indistinguishable ($F = 1.952, p = 0.101$) or significantly distinct from one another ($F = 1.994, p = 0.114$). The means for moderate to high risk scores (66.67 ± 16.60 Beat II; 60.67 ± 8.96 ChatGPT) were both nearly identical and therefore the majority of AI generated categories matched very similar BSSI assessments (82.83% of all categories determined “none” to be at low risk). In contrast, two additional AI assessments returned values of (0.4% and 0.2%) classified as moderate-high and “very low” risk respectively indicate that Chat GPT likely underestimates severity related to responder or defaulter based on the results of similar BSSI assessments within the same timeframe of analytics (Rahman et al. 2025). In addition, both the Gemini and DeepSeek systems generated equivalent objective reliability measurements that were comparable to the Beck (standard) assessment (QWK=0.248 & 0.231 respectively). However, the ChatGPT system had an approximate

QWK value that was 3.5 times lower than either assessment tool (QWK=0.119). These values, according to Landis and Koch's (1977) standard of agreement, demonstrate that the Gemini and DeepSeek assessments cannot replace traditional clinical evaluations; however, these systems may be useful as preassessments for locating students who may need subsequent evaluations (Horowitz et al., 2023; Rus Prelog et al., 2026). The results using ANOVA from Gemini and ChatGPT indicate no significance, which indicates that while both sources had a fair to slightly acceptable level of agreement, the overall agreement statistics alone do not suggest anything about the manner in which the outcome produced has been calibrated along the risk severity continuum.

Also, analyses found that students have been experiencing stress as a result of pressure placed on them to perform well academically, through tests and assignments. Other studies have confirmed that students who attend competitive and resource-limited institutions experience extreme levels of psychological distress (Barbayannis et al., 2022; Okechukwu et al., 2022; Hasan & Tamanna, 2025). Other than academic stress, there were numerous emotional characteristics which included hopelessness, social isolation and lack of purpose, that were identified as major sources of stress. Approximately 50% of all study participants indicated they do not have purpose in their lives, which is concerning, given the strong correlation between existential suffering and suicidal ideation (Madeira & Miranda, 2021; Morneau-Valiancourt et al., 2025). A large amount of people have reported being socially withdrawn indicating there is also inadequate emotional support systems which are a known modifiable risk factor (Vu, 2024). Using a software-based AI platform such as DeepSeek to implement the integration of artificial intelligence (AI) in college/university mental health care systems can provide numerous benefits such as: the early reduction of stigma through anonymous access to support services; the early identification and engagement of at-risk students; and the ability to monitor behaviors of students using digital technology (Ludwig et al., 2024; Madrid-Cagigal et al., 2025). There are ethical concerns to be considered, including, but not limited to, privacy of data, informed consent, algorithmic bias, and over-dependence of automated systems (Saeidnia et al., 2024; Pham, 2025). Due to the research suggesting different amounts of concordance amongst studies on the usefulness of AI to support the mental health of students, the primary use of AI should be for assistive purposes to help triage an individual into more robust evaluations, with defined routes of verification through human involvement in the overall disposition of the individual.

There are also limitations and issues with the study that must be recognized, including: First, the "convenience sample" limits the study's generalizability to other types of students or learning environments. Secondly, since the issue being studied (i.e., suicidal behaviours) is highly sensitive, reported data are vulnerable to both recall and social bias. Thirdly, the evaluation of AI systems (i.e. Gemini and ChatGPT) using structured input/input forms and using real time behaviour will yield different results for those AI systems in terms of their practicality. Lastly, due to the small number of high/very high risk ratings generated by Gemini and ChatGPT, the stability of their performance estimates is a concern.

There is a need for future research to analyze performance on Emotional Intelligence Interval (EII) in different cultural or linguistic settings (Coutts et al., 2026) as well as evaluating how long AI-based interventions last and how far back longitudinal studies can extend to validate the effectiveness of AI-based interventions. Furthermore, accessing social media, smartphone application data, sensor data, and wearable technology to obtain real-time data will probably enhance prediction accuracy for AI-based interventions (Coppersmith et al., 2023). Finally, evaluation with regard to implementation science should

be conducted in order to determine a means of implementing AI platforms into existing university mental health services without creating disparities in service quality between groups..

Conclusion

The prevalence of suicidal ideation is high among university students, identifying female gender, economic instability, academic strain, hopelessness, and existential loss of purpose as important contributing factors. The level of concordance of AI platforms with the Beck Scale for Suicide Ideation remains varied, ranging from fair to slight, establishing them as decision-support platforms rather than alternatives for clinical assessment. Future research must turn toward longitudinal, multimodal frameworks that combine real-time physiological data from wearables with language sentiment analysis to boost accuracy.

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Ethical approval

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