



(RESEARCH ARTICLE)



## Predictors of an android-based suicide risk prevention program in higher education

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### Abstract

**Introduction:** The threat of suicide risk represents a serious psychiatric emergency within society. The implementation of digital-based suicide risk prevention behavior programs on university campuses has been suboptimal due to various factors, including the knowledge, attitudes, and self-efficacy of Gatekeepers. Therefore, this study aims to assess the determinants of knowledge, attitudes, and self-efficacy concerning suicide risk prevention behavior in higher education nursing institutions.

**Methods:** This quantitative study employed a cross-sectional approach through an online questionnaire administered to 150 Gatekeepers. The sample was proportionally randomized, including students, educational service staff, and lecturers within the campus environment. Data collection was conducted using an online questionnaire. A One-Way ANOVA probability test was utilized to evaluate differences in basic socio-demographic characteristics. Multiple linear regression models were used to assess the predictors of knowledge, attitudes, and self-efficacy concerning suicide prevention behavior. The scores for these three predictors were standardized based on data distribution, and the results were expressed as regression coefficients with a 95% confidence interval.

**Results:** This longitudinal survey involved 150 Gatekeepers, all of whom completed the survey. The model testing results demonstrated that the knowledge, attitudes, and self-efficacy of Gatekeepers are significant predictors of suicide risk prevention behavior. The variables of knowledge, attitudes, and self-efficacy collectively accounted for 68.5% of the variance in students' suicide risk prevention behavior ( $R^2 = 0.685$ ), with the remaining 31.5% influenced by other variables outside the model. Individually, knowledge ( $p = 0.037$ ), attitudes ( $p = 0.043$ ), and self-efficacy ( $p = 0.024$ ) were all significant contributors to suicide risk prevention behavior among students.

**Conclusion:** Gatekeepers in higher education health institutions still feel inadequately prepared to handle real-life suicide risk situations. This is mainly due to the fact that the majority of campus Gatekeepers have not entirely performed their roles, and no agreed-upon suicide risk prevention planning exists between primary healthcare providers, hospitals, and campuses. The levels of knowledge, attitudes, and self-efficacy of Gatekeepers are key predictors of their suicide risk prevention behavior.

**Keywords:** Suicide prevention; Knowledge; Attitudes; Self-efficacy; Gatekeeper

### 1. Introduction

Suicide is a severe psychiatric emergency in society. Globally, suicide risk is the second leading cause of death among individuals aged 10 to 34 and the fourth leading cause of death among individuals aged 35 to 44. A previous suicide attempt is the single most important risk factor for suicide risk in the general population. Common methods of suicide risk include pesticide ingestion, hanging, and the use of firearms, which are among the most frequent methods globally (WHO, 2021). The global suicide death toll is nearly 800,000 deaths per year, or approximately one death every 40

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seconds. For every individual who dies by suicide, it is estimated that there are 20 suicide attempts. Suicide is the second leading cause of death among the 15-29 age group, with 79% of cases occurring in low- and middle-income countries (Ministry of Health of the Republic of Indonesia, 2019). University students fall within the age category where suicide is the second leading cause of death. Several universities in Indonesia have experienced incidents of suicide risk, such as at a university in Bandung, where a student died by suicide on August 22, 2021 (Maulana Yudha, 2021). A study on first-year university students in Bandung found that 30.5% of students experienced depression, 20% seriously considered suicide, and 6% had attempted suicide with methods such as cutting, jumping from heights, and hanging (Susanti Reni, 2019).

In 2019, a student in Surakarta died by suicide in their dorm room (Ryantono, 2019). A preliminary study conducted in 2019 at a health university in Surakarta revealed that 32% of students had suicidal ideation. Following a spiritual problem-solving web intervention, the prevalence of positive suicide risk among Gatekeeper students was 16%, with the highest rates occurring among first-year students (Khadijah, 2020). Mental health screening results at a health university in Surakarta showed that 15.2% of first-year students across all departments had a high risk of suicide, with a standard deviation of 2.637 (Satino et al., 2021). A variety of factors influence the risk factors contributing to suicide risk among university students. These include emotional disorders related to heterosexual and homosexual relationships, smoking, drug abuse, hopelessness about the future, lack of interest in discipline, and psychiatric disorders (Poorolajal et al., 2017). Additionally, suicide risk among students is influenced by age, alexithymia, difficulty identifying emotions, motor impulsivity, and self-control (Loftis et al., 2019).

The issues that lead students to develop suicidal ideation include health problems, psychological disorders, family factors, sexual abuse, juvenile delinquency, friendship problems, economic difficulties, academic challenges, and personality issues (Mukaromah I, 2020). Risk factors for suicidal thoughts among students in Surakarta often involve multiple and simultaneous problems, such as a lack of interest in attending university, difficulties in keeping up with lectures, disappointing academic performance, family instability, relationship issues, financial problems, sadness, and feelings of disappointment in God (Khadijah et al., 2021). As university students represent the future generation, higher education institutions need to implement prevention and intervention programs within campus communities (Tsong et al., 2018). University students are individuals pursuing education at tertiary institutions, whether public or private (Siswoyo Dwi, 2007). Students at risk of suicide often receive little help or treatment (Czyz et al., 2013). The stigma surrounding mental health issues affects their willingness to seek mental health support (Coates et al., 2019). If students are unwilling to seek help, efforts to provide mental health assistance must be made.

Prevention strategies for suicidal ideation, threats, and attempts can involve problem-solving at the individual, interpersonal, community, and social levels. At the system level, Gatekeepers evaluate and ensure environmental safety, enhance protocols, policies, and practices aligned with a zero-suicide risk standard, and collaborate on training for all campus staff (Wayne, 2022). Suicide risk prevention programs on campus can be developed through psychoeducation, skill training programs, Gatekeeper initiatives, and screening programs (Dumon & Portzky, 2014). Technology-based suicide prevention interventions are more effective for younger individuals as they have higher acceptance and familiarity with technology (Franco-Martín et al., 2018). Online Gatekeeper training has been proven effective in enhancing knowledge, attitudes, and helping behaviors in adults with mental health problems (Hadlaczky et al., 2014). The Question, Persuade, and Refer (QPR) Gatekeeper training is designed to help individuals recognize warning signs of a suicidal crisis and teaches how to question, persuade, and refer individuals for assistance (Aldrich et al., 2018). The implementation of digital-based suicide risk prevention behavior programs on campus has been suboptimal due to various factors, including the knowledge, attitudes, and self-efficacy of Gatekeepers. Therefore, this study aims to assess the determinants of knowledge, attitudes, and self-efficacy with suicide risk prevention behavior in higher education nursing institutions.

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## 2. Methods

### 2.1. Study Design and Patient Selection

This study employs a longitudinal survey involving 150 gatekeepers to predict behaviors related to suicide prevention using an Android-based application on campus. The e-SIGAP BUDI application, an Android-based model, is designed to evaluate the management capabilities of suicide risk, encompassing knowledge, attitudes, self-efficacy, and preventive behaviors related to suicide on campus.

## 2.2. Sample and Setting

The sample comprises 150 gatekeepers selected randomly from the campus community, including students, educational staff, and faculty members. Gatekeepers (faculty, educational staff, students) are individuals who have participated in the campus suicide prevention program. All gatekeepers participated by completing an online questionnaire developed and validated for this study. Inclusion criteria required gatekeepers to agree to participate and to be registered as part of the academic community at Politeknik Kesehatan Surakarta.

## 2.3. Research Instruments

Data were collected using an online survey questionnaire that was self-developed and validated. The questionnaire is an evaluative tool designed to measure four variables: (1) knowledge, (2) attitudes, (3) self-efficacy, and (4) the Android-based preventive behavior model. It consists of 46 favorable and unfavorable questions rated on a Likert scale from 1 to 5. Scoring for favorable questions is as follows: Strongly Agree (5), Agree (4), Neutral (3), Disagree (2), and Strongly Disagree (1). Unfavorable questions are scored inversely. The Intraclass Correlation Coefficients (ICC) results show consistency with values ranging from  $0 \leq \text{ICC} \leq 1$ : e-SIGAP BUDI (ICC = 0.352), knowledge (ICC = 0.113), attitudes (ICC = 0.174), and self-efficacy (ICC = 0.295).

## 2.4. Statistical Testing

All statistical analyses were conducted using SPSS. Data were summarized using frequencies and percentages. One-way ANOVA was used to assess baseline differences in socio-demographic characteristics. Multiple linear regression models were employed to evaluate predictors of knowledge, attitudes, and self-efficacy on suicide prevention behaviors. Scores for the three predictors were standardized based on data distribution, and results were expressed as regression coefficients with a 95% confidence level. The data were normally distributed (knowledge:  $p = 0.057$ , attitudes:  $p = 0.145$ , and self-efficacy:  $p = 0.257$ ), with no correlation (Pearson  $p$ -value = 0.469) and no multicollinearity detected (VIF for knowledge: 1.007; attitudes: 1.005; and self-efficacy: 1.005).

## 2.5. Ethical Considerations

To address ethical considerations, participants were informed that all survey information would be kept confidential and used solely for scientific purposes. Participation was voluntary, with no penalties for non-participation. Returning the completed survey via the e-SIGAP BUDI application was considered consent to participate

## 3. Results

### 3.1. Demographic Characteristics

Of the 150 respondents, most gatekeepers were female, comprising 69.3% of the sample. The largest age group was 17-25, representing 96% of the respondents. Most gatekeepers had an educational background at the Diploma IV level, accounting for 66.6% of the sample. The majority of gatekeepers, 70.7%, were students. Additionally, 52.7% of gatekeepers had not yet undergone emergency training. Knowledge levels were moderate for 50% of the respondents, 66% had less favorable attitudes, 80% had low self-efficacy, and 84% displayed inadequate preventive behaviors.

**Table 1** Demographic Characteristics

Characteristics	n	%
<b>Gender</b>		
a. Man	46	30.7
b. Woman	104	69.3
<b>Age</b>		
17-25 years old	144	96
26-35 years old	3	2
36-45 years old	3	2
<b>Education</b>		

Senior High School	22	14.7
Diploma III	28	18.7
Diploma IV	100	66.6
<b>Gatekeeper Status</b>		
School Staff	37	24.6
Lecturer	7	4.7
Student	106	70.7
<b>Emergency training experience</b>		
Yes	71	47.3
No	79	52.7
<b>Knowledge</b>		
Low	63	42
Moderate	75	50
High	12	8.0
<b>Attitudes</b>		
Low	99	66
Moderate	40	26.7
High	11	7.3
<b>Self-efficacy</b>		
Low	120	80
Moderate	25	16.7
High	5	3.3
<b>Preventive behaviors</b>		
Low	126	84
Moderate	20	13.3
High	4	2.7
n =	150	100

### 3.2. Differences in Suicide Risk Prevention Behaviors Among Students Based on Demographic Factors

According to the One-way ANOVA results presented in Table 2, factors such as gender, age, educational level, and gatekeeper status did not show significant differences in suicide risk prevention behaviors. However, prior experience with emergency training among gatekeepers did lead to differences in suicide risk prevention behaviors ( $p = 0.043$ ).

**Table 2** Differences in Suicide Risk Prevention Behaviors Based on Gender, Age, Education, Status, and Training Experience

Field	Sum of Squares	df	Mean Square	F	Sig.
<b>Gender * Prevention</b>					
Between Groups	3.153	7	0.450	0.373	0.519
Within Groups	32.420	142	0.228		
Total	35.573	149			
<b>Age * Prevention</b>					
Between Groups	0.100	1	0.100	0.418	0.632
Within Groups	35.473	148	0.240		
Total	35.573	149			
<b>Education * Prevention</b>					
Between Groups	0.446	3	0.149	0.618	0.605
Within Groups	35.128	146	0.241		
Total	35.573	149			
<b>Gatekeeper status * Prevention</b>					
Between Groups	0.017	1	0.017	0.071	0.791
Within Groups	35.556	148	0.240		
Total	35.573	149			
<b>Training experience * Prevention</b>					
Between Groups	863.673	1	863.673	4.152	<b>0.043</b>
Within Groups	39520.993	190	208.005		
Total	40384.667	191			

**3.3. Predictors of Knowledge, Attitudes, and Self-Efficacy**

**Table 3** Predictors of Knowledge, Attitudes, and Self-Efficacy on Prevention Behavior

Variable	Regression Coefficient	t <sub>value</sub>	p
Knowledge (X <sub>1</sub> )	0,266	4,473	0.037
Attitudes (X <sub>2</sub> )	0,241	3,797	0,043
Self-efficacy (X <sub>3</sub> )	0,398	5,678	0,024
Constant	36,210	6,337	0,000
F	11,073		0,000
R	0,431		
R <sup>2</sup>	0,685		

According to the regression analysis results shown in Table 3, the regression model effectively predicts Android-based suicide risk prevention behaviors (p = 0.000). The regression equation used is  $Y = 36,210 + 0,246 \text{ Knowledge} + 0,413 \text{ Attitudes} + 0,398 \text{ Self-efficacy}$ . Simultaneously, the variables of knowledge, attitudes, and self-efficacy account for 68.5% of the variance in students' suicide risk prevention behaviors ( $R^2 = 0.685$ ). The remaining 31.5% is influenced by

variables not included in the model. Individually, knowledge ( $p = 0.037$ ), attitudes ( $p = 0.043$ ), and self-efficacy ( $p = 0.024$ ) significantly contribute to the prediction of students' suicide risk prevention behaviors.

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## 4. Discussion

### 4.1. Demographic Characteristics

The findings indicate that gender, age, education, and gatekeeper status do not significantly impact Android-based suicide risk prevention behaviors. This result aligns with previous studies suggesting that demographic factors (gender, age, and education level) do not significantly influence preparedness for suicide risk prevention (Huang et al., 2017). Similarly, other research has reported no negative correlation between age and suicide risk prevention behaviors (Sadanand et al., 2021). However, experience with emergency training did show a significant effect on prevention behaviors related to suicide risk. This finding is consistent with earlier studies that reported a relationship between training experience and enhanced knowledge and skills for suicide risk prevention (DeCou et al., 2020).

### 4.2. Predictors of Suicide Risk Prevention Behavior

The study findings indicate that knowledge, attitudes, and self-efficacy are direct predictors and contribute positively to suicide risk prevention behaviors. Knowledge, in particular, has a significant impact on these behaviors. This result aligns with previous research demonstrating that health knowledge plays a crucial role in applying health behaviors and attitudes (Souza et al., 2021). The influence of knowledge about suicide among gatekeepers has been acquired through prior emergency response training at their workplaces. Additionally, gatekeepers have gained learning experience by integrating suicide management content within the e-SIGAP BUDI application. Such learning experiences enhance positive knowledge regarding suicide risk prevention behaviors. This finding is consistent with earlier research showing that inadequate knowledge of potential warning signs and risk factors negatively affects gatekeepers' professional ability to recognize suicide risks diri (Erbutto et al., 2021).

The study results indicate that attitudes have a significant impact on suicide risk prevention behavior. Expressing gatekeepers' attitudes is crucial for obtaining feedback from participants regarding the Android-based training/learning process. Active attitudes among gatekeepers can mitigate learning difficulties; when they find the material easy to understand, it can encourage or motivate them to adopt positive behaviors in preventing suicide risks. This finding is consistent with previous research, which explains that a spectrum of health attitudes and behaviors is important for motivating individuals to make beneficial changes and to implement safety procedures within the community (Fava et al., 2022). Additionally, this result aligns with earlier studies that describe how preventive behavior is indirectly influenced by knowledge, attitudes, perceived threats, subjective norms, and perceived behavioral control (Afifi et al., 2023). Nevertheless, gatekeepers in higher health education still feel inadequately prepared to handle actual suicide risk situations. This is partly because many campus gatekeepers have not fully executed their roles, and there is a lack of a coordinated suicide risk prevention plan involving primary health care centers, hospitals, and campuses. Despite the fact that most gatekeepers have previously received training in managing suicide risk, these challenges persist.

In this study, self-efficacy also significantly influences suicide risk prevention behavior. This study's effect of self-efficacy on health behavior arises from the benefits of gatekeepers exhibiting health-related behaviors. This includes expressing opinions that reflect their true selves, which allows individuals to manage their problems or conflicts more effectively. Such outcomes are attributed to the confidence that gatekeepers possess. Gatekeepers with self-confidence in their health behaviors are those who trust in their own abilities, maintain an optimistic attitude, view situations objectively, take responsibility for their decisions, and adopt rational and realistic thinking. These findings align with previous research indicating that self-efficacy can serve as an effective theory-based intervention to improve behaviors related to preventing urinary tract infections (UTIs) and reduce recurrent UTIs and their complications (Belin et al., 2024). Self-efficacy is an important psychosocial construct that can directly or indirectly influence health behavior for disease management. It also acts as a bridge between effective health promotion, educational interventions, and behavioral changes for disease control (Affendi et al., 2018).

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## 5. Conclusion

Half of the gatekeepers possess moderate knowledge about suicide management. However, their attitudes and self-efficacy regarding prevention behaviors related to suicide risk are low. Knowledge, attitudes, and self-efficacy among gatekeepers are predictors of their prevention behaviors in facing suicide risks. These findings suggest that gatekeepers in higher health education institutions still feel inadequately prepared to handle actual suicide risk situations. This

inadequacy is because many campus gatekeepers have not fully embraced their roles, and there is a lack of comprehensive suicide prevention planning agreed upon by health centers, hospitals, and academic institutions. It is crucial to instill positive attitudes and self-efficacy toward suicide prevention by implementing programs that include simulation training for handling suicide crises. Additionally, the placement of gatekeepers in campus areas should be considered to enhance readiness. Ongoing training for gatekeepers in higher education institutions and cross-sector collaboration with government, private sector, and community organizations is essential for improving their roles and effectiveness in suicide risk prevention.

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## Compliance with ethical standards

### *Disclosure of conflict of interest*

No conflict of interest to be disclosed.

### *Statement of informed consent*

Informed consent was obtained from all individual participants included in the study.

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