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TOPSIS for Analyzing the Risk Factors of Suicidal Ideation Among University Students in Malaysia

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ABSTRACT

Globally, suicide is a major public health issue. Suicide is the first or second reason for death among college and university students. The suicide rate among university students is relatively high in Malaysia. Numerous risk factors exacerbate suicidal ideation. Therefore, it is critical to gain as much insight as possible into the risk factors for suicidal ideation among university students and prioritize them based on the importance level. Therefore, students with a high risk for suicide can be identified, and earlier precautions can be taken to assist the students. In this paper, 18 determinants of suicidal ideation were discovered through the systematic literature review, and these factors were then ranked according to the seriousness using the TOPSIS method. The results showed that *previous suicide attempts, mental disorder*s, and *negative life events* were the most influential factors leading to suicide. In contrast, *gender* and the *residential area* had the least impact. The result enables the government, relevant stakeholders, and policymakers to develop comprehensive multisectoral strategies that can prevent suicide effectively.

Keywords: Risk factors, suicide, suicidal ideation, TOPSIS, university students

INTRODUCTION

Suicide is a serious public health issue worldwide. Globally, more than 700 000 people die owing to suicide every year (World Health Organization, 2021). Suicide has been identified as one of the critical mental health problems that occur among university students in the world (World Health Organization, 2019). Apart from that,

studies stated that suicide is categorized as the first or second key reason for death among college and university students (Abdu et al., 2020).

In Malaysia, suicide rates increased steadily in recent years. Polis Diraja Malaysia (PDRM) (2021) reported that the number of suicide cases in Malaysia rose from 609 cases in 2019 to 613 cases in 2020, and there were 468 cases in the first five months of the year 2021. Based on the statistics, females were more likely to be involved in suicide cases. Besides, people aged between 15 to 18 had a high possibility of committing suicide compared to other populations.

In Malaysia, the suicide rate among university students is relatively high. News concerning university students committing suicide has been widely reported and published. For example, two university students from Selangor committed suicide within a week (NST, 2019). Besides that, a female university student from Melaka was found suicide by jumping from an apartment (Mamat, 2021). Apart from that, a Chinese female university student from Sarawak was also found suicide by hanging in her bedroom due to academic pressure (Chang, 2021).

Numerous risk factors exacerbate suicide ideation. Some studies claim that suicide is closely related to *mental disorder*s. Most of the people who commit suicide have suffered from mental disorder problems such as depression, eating disorders, and sleeping disorders, among others (Bilsen, 2018; Pillay, 2021; Shafiee & Mutalib, 2020). Not only that, but *hopelessness* also contributes to suicidal ideation. Losing passion for life will make a person tend to have suicidal thoughts (Primananda & Keliat, 2019).

Most university students feel *stress* when dealing with academic pressure, relationship problems, financial problems, and many other things (Pillay, 2021). Undeniably, these stressors are the main causes of mental health problems that result in suicidal thoughts (Jusnani et al., 2020; Pillay, 2021). *Society pressure* from peers, lecturers, social media, family, and roommates in university is also a critical reason for students to have suicidal thoughts (Jusnani et al., 2020). According to Bilsen (2018), *negative life events* such as relationship problems, sexual abuse, cyberbullying, and the death of the close one bring a huge impact on youth, and it may derive suicidal intention.

Poor social support is also an important factor that leads to suicidal ideation. Research stated that people who lack social assistance are more likely to have suicidal intentions than others (Abdu et al., 2020). Similarly, *interpersonal conflicts* may also bring suicidal ideation because they think that they are a burden to others (Jusnani et al., 2020).

Other than that, *family factors* such as child abuse, divorced parent, parents with alcohol and drugs addiction, and cold relationships among family members are closely linked to suicidal ideation (Bilsen, 2018; Costa et al., 2019; Abdu et al., 2020; Junior et al., 2020; Jusnani et al., 2020).

There are 25 to 33% of suicide cases occur in individuals who had a previous history of self-harming (Bilsen, 2018). Hence, it can be said that people who have *prior suicide attempts* are more probably to commit suicide again in the future (Olfson, 2018).

People with high self-esteem tend to accept themselves and always be satisfied with their life (Primananda & Keliat, 2019). In contrast, people with *low self-esteem* will always feel depressed and are more likely to have suicidal ideation in difficult times (Jusnani et al., 2020; Owusu-ansah et al., 2020).

Personality characteristic is also one of the reasons that lead to suicidal ideation. Personality characteristics such as a lack of ability to control emotions well and a lack of problem-solving skills are more likely to cause insecurity, low self-esteem, emotional issues, and even worse, suicide (Bilsen, 2018 & Wasserman et al., 2021).

People tend to *imitate* someone who has a similar background to them. Due to this, there are many suicide clusters formed from the news about suicide cases published frequently on social media (Bilsen, 2018). Durkee et al. (2011) also agreed that the internet and social media are the main medium for promoting suicidal behaviors.

Gender is one of the risk factors for suicidal ideation. Some studies stated that females have a higher possibility of suicidal intentions during the transition from school to university (Arafat et al., 2018; Shafiee & Mutalib, 2020). However, some researchers declared that male is more likely to have suicidal thoughts because they seldom seek help from others (Amini et al., 2016; Park et al., 2020; Wasserman et al., 2021; Pillay, 2021).

Another important risk factor that leads to suicidal ideation is *health problem*s (Lyu & Zhang, 2019). The research claimed that people with severe disabilities and serious physical health problems tend to end their life (Yu et al., 2021; Pillay, 2021). Besides, suicidal ideation is more likely to appear in people with *the financial problem* (Shafiee & Mutalib, 2020; Berkelmans et al., 2021). Lack of money to pay university fees and living costs puts the student at high risk for suicide (Jusnani et al., 2020).

Suicidal ideation is found more vulnerable to people who are involved in *substance abuse*. Smoking addiction and lifetime alcohol and drug use are the important reasons for suicidal thoughts (Costa et al., 2019; Abdu et al., 2020; Junior et al., 2020).

Religion is also among the risk factors for suicidal thoughts. Participating in religious activities can help people get rid of stress and anxiety; the most important thing is that it can help reduce the tendency to have suicidal intentions (Abdu et al., 2020). It is because suicide is highly prohibited in almost all religions (Gearing & Alonzo, 2018; Nguyen et al., 2020).

Finally, *the residential area* is found to be related to suicidal thoughts. The research illustrated that suicide case in rural areas was higher than in urban areas because of the lower accessibility of medical help as well as the violence and substance abuse issues in rural areas that may result in mental health issues and suicidal crisis (Junior et al., 2020; Yu et al., 2021).

LITERATURE REVIEW

Several studies have been done previously. For example, through a comprehensive literature review strategy, several studies discovered the risk factors for suicide in the general population, adolescents, higher education students, and severe suicide attempters (Bilsen, 2018; Lyu & Zhang, 2019; Junior et al., 2020; Shafiee & Mutalib, 2020; Pillay, 2021). Furthermore, Jusnani et al. (2020) also discovered some factors that lead to suicide through semi-structured interviews. Based on the articles, mental disorders, depression, and poor social support were among the key leading causes of suicidal ideation. Apart from that, the relationship between some risk factors and suicide has been studied in previous studies by using data mining techniques like a decision tree and logistic regression (Amini et al., 2016; Cho et al., 2021; Ishaq et al., 2021).

Despite the fact that some research has been done on the issue of suicide to find the major factors that may lead to suicide among adolescents, studies that explicitly focus on university students are still rare. However, due to suicide thoughts being fairly common among university students, it is vital to investigate further by prioritizing risk variables according to their level of risk. (Prihadi et al., 2020).

The main function of MCDM is to rank several alternatives or variables. Some MCDM methods have been used in the field of psychiatry. For instance, Analytic Hierarchy Process (AHP) method was utilized to prioritize the stress factors of police officers (Öneren et al., 2016). Besides, Benfares et al. (2019) used the AHP method to predict depression among cancer patients. In addition, the Technique for Order Preference by Similarity to Ideal Solution (TOPSIS) was also used previously in this related aspect. Chauhan et al. (2021) implemented the TOPSIS approach in prioritizing the mental stress factors of farmers. Besides that, Pal et al. (2019) utilized the TOPSIS method to diagnose vector-borne diseases. The TOPSIS method was also used to assess the stress level in an urban area during the COVID-19 outbreak Gupta et al. (2021). Generally, both methods were the common methods employed in the psychiatry area. However, the TOPSIS method was chosen in this study due to its simplicity, ease of understanding, efficient computation, and the ability to measure the relative performance of each alternative (Rahim et al., 2018). Other than that, a pairwise comparison that is required in the AHP method is avoided in TOPSIS. Hence, this method is suitable for cases with numerous alternatives. Plus, TOPSIS can include an unlimited range of alternatives and has the fewest rank reversals compared with other MCDM techniques (Mukherjee, 2014).

MATERIALS AND METHOD

The formulation of this research involved five design thinking phases (Table 1).

Table 1

Design thinking process of the research

Phases	Process
Empathize	Discover that the suicide rate among university students in Malaysia has been getting higher in recent years.
Define	Determine the risk factors associated with suicide.
Ideate	Critically review the literature and determine the research gaps. Several MCDM methods have been determined to prioritize suicidal ideation.
Prototype	Select and implement the TOPSIS method to prioritize the risk factors for suicidal ideation.
Test	Run the analysis, and the order of each factor is recorded.

Data Collection Process

In this study, primary data was collected through a questionnaire. The questionnaire was distributed to the respondents randomly through social media, including WhatsApp and Facebook, using online Google Forms. The study sample only included university students in public universities in Malaysia. In order to ensure that there is no bias issue, the respondents were selected randomly from 13 states of Malaysia. The respondents were required to compare the importance of the risk factor over other risk factors.

The questionnaire consisted of 18 risk factors for suicide attempts which were *hopelessness, mental disorder, substance abuse, stress, previous suicide attempts, family factor, poor social support, negative life events, personality characteristic, health problem, low self-esteem, residential area, gender, imitation, society pressure, financial problem, religion, and interpersonal conflicts* that were discussed in the introduction section.

Sixty students received the questionnaire. However, 15 did not respond, while ten respondents were unsuitable for this study. This study only included university students under 26 who are experiencing pressure in life and are willing to participate in this survey. In order to ensure that they were suitable for the study, the respondents were required to answer some questions in the first section of the questionnaire, such as "Do you feel stress in your daily life?" "Are you facing financial pressure," "Do you feel dissatisfied with your current life?" "Do you think you need to meet counselors?" and "Do you intend to suicide before?" Only the students who answered more than two "yes" from the five questions will be taken as samples. The willingness to answer the questionnaire was also asked. In the end, a total of 35 samples were received. According to Saaty (1980) and Kusnadi & Kurniawan (2017), there are no general rules for the sample size; however, it should be greater than five samples to run a valid analysis. Melillo and Pecchia (2016) indicated that at least 19 samples are considered appropriate and sufficient to run the analysis.

Table 2 illustrates the socio-demographics of the participants.

Table 2

Socio-demographics of the respondents

Category	Frequency	Percentage
Gender		
Male	17	48.57%
Female	18	51.43%
State		
Perlis	2	5.71%
Kedah	2	5.71%
Pulau Pinang	5	14.29%
Perak	2	5.71%
Selangor	5	14.29%
Negeri Sembilan	2	5.71%
Melaka	2	5.71%
Johor	5	14.29%
Pahang	2	5.71%
Terengganu	2	5.71%
Kelantan	2	5.71%
Sabah	2	5.71%
Sarawak	2	5.71%
Feeling stress in their life		
Yes	30	85.71%
No	5	14.29%
Facing financial pressure		
Yes	25	71.43%
No	10	28.57%
Dissatisfied with life		
Yes	20	57.14%
No	15	42.86%
Need to meet a counselor		
Yes	25	71.43%
No	10	28.57%
Intent to suicide before		
Yes	19	54.29%
No	16	45.71%

The measurement scale utilized in the questionnaire was the Likert scale, which ranges from 1 to 5 (Shirouyehzad & Dabestani, 2011). In order to compare the importance of the risk factors for suicidal ideation, respondents were asked to rate on a five-point Likert scale varying from "equally important" (1), "moderately important" (2), "strongly important" (3), "very strongly important" (4) to "extremely important" (5). Below are the samples of scales of the factors.

Figure 1. Sample of scale

Figure 1 illustrates that hopelessness and mental disorder are equally important.

Figure 2. Sample of Scale

Figure 2 shows that hopelessness is strongly important compared to mental disorders.

Process of Development of TOPSIS Method

Technique for Order Preference by Similarity to Ideal Solution (TOPSIS) is one of the multiple criteria decision-making approaches introduced by Hwang and Yoon in 1981 (Hwang & Yoon 1981). The principle of the method is to rank the alternatives by comparing them with the best and farthest solutions (Balioti et al., 2018). The best solution has the shortest distance from the positive ideal solution and the farthest from the negative ideal solution from the geometrical point. TOPSIS method was selected for this study because it is simple, easily understood, and can measure the relative performance of the alternatives. (Rahim et al., 2018). Moreover, the TOPSIS method has not been used in the suicide topic.

Figure 3 below illustrates the process flow of the TOPSIS method:
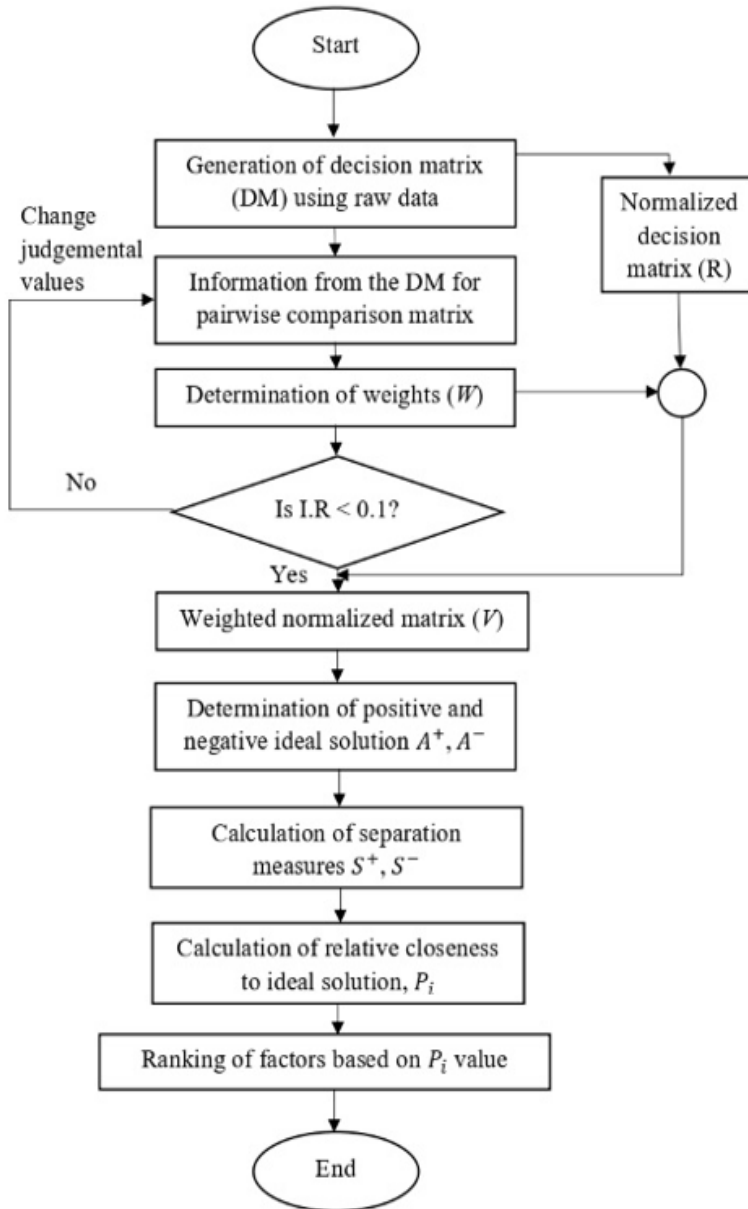

Figure 3. Process flow diagram

The steps for the TOPSIS method are as follows:

Construct the normalized decision matrix (Equation 1):

$$r_{ij} = \frac{x_{ij}}{\sqrt{\sum_{i=1}^{m} x_{ij}^{2}}} \tag{1}$$

Construct the weighted normalized decision matrix (Equation 2):

$$V_{ij} = w_j * r_{ij}, \quad j = 1,2,3,\dots,n \tag{2}$$

Determine the positive and negative ideal solutions (Equation 3):

$$A^{+} = \{(max v_{ij} | j \in J), (min v_{ij} | j \in J'), i = 1,2,3,\dots,m\}$$
$$= \{V_1^{+}, V_2^{+}, V_3^{+}, \dots, V_n^{+}\} \tag{3}$$

$$A^{-} = \{(min v_{ij} | j \in J), (max v_{ij} | j \in J'), i = 1,2,3,\dots,m\}$$
$$= \{V_1^{-}, V_2^{-}, V_3^{-}, \dots, V_n^{-}\}$$

Calculate the separation measure (Equations 4 and 5):

Positive ideal separation, S^{+}

$$S_i^{+} = \sqrt{\sum_{j=1}^{n}(A_{ij} - A_j^{+})^2} \tag{4}$$

Negative ideal separation, S^{-}

$$S_i^{-} = \sqrt{\sum_{j=1}^{n}(A_{ij} - A_j^{-})^2} \tag{5}$$

Where i = 1, 2, 3, …, m

Calculate the positive ideal solution (Equation 6):

$$P_i^{+} = \frac{S_i}{\sqrt{(S_i^{-} + S_i^{+})}} \tag{6}$$

Rank the alternatives

Sorted the alternatives C^{+} from the largest to the smallest value. Alternative with the largest value of C^{+} the best solution.

RESULTS

This section presents the ranking results of the 18 factors, including *hopelessness, mental disorder, substance abuse, stress, previous suicide attempts, family factor, poor social support, negative life events, personality characteristic, health problem, low self-esteem,*

residential area, gender, imitation, society pressure, financial problem, religion, and *interpersonal conflicts* using TOPSIS method. These significant factors were discovered from reviewing past research.

Table 3 shows the normalized decision matrix of the data.

Table 3

Normalized decision matrix

Factors	Hopelessness	MD	Stress	SA	FF	Religion	PSS	PSA
Hopelessness	0.2199	0.2707	0.3098	0.1829	0.2712	0.1563	0.2232	0.2095
MD	0.2252	0.2772	0.3052	0.3006	0.2407	0.2353	0.3002	0.3007
Stress	0.1778	0.2275	0.2504	0.3263	0.3015	0.2838	0.2378	0.2502
SA	0.2838	0.2176	0.1811	0.2360	0.2176	0.2848	0.2407	0.2692
FF	0.2056	0.2921	0.2107	0.2752	0.2536	0.2618	0.3338	0.2538
Religion	0.2669	0.2235	0.1675	0.1572	0.1838	0.1898	0.1979	0.2114
PSS	0.2094	0.1962	0.2238	0.2084	0.1615	0.2038	0.2125	0.2902
PSA	0.3420	0.3003	0.3261	0.2856	0.3255	0.2924	0.2386	0.3258
PC	0.2482	0.1850	0.2327	0.1903	0.2628	0.2463	0.2203	0.1859
NLE	0.2642	0.2852	0.2939	0.3142	0.2589	0.2696	0.3065	0.1890
Imitation	0.1789	0.2248	0.1714	0.1503	0.1854	0.1532	0.1513	0.2166
HP	0.2671	0.2326	0.2290	0.2226	0.2532	0.2446	0.2516	0.2284
IC	0.2556	0.2078	0.2465	0.2184	0.2275	0.2688	0.1998	0.1795
SP	0.2425	0.2761	0.2357	0.2483	0.1804	0.2281	0.2353	0.2073
FP	0.2646	0.2391	0.2476	0.3125	0.2899	0.2618	0.2930	0.2589
LSE	0.2024	0.2066	0.2012	0.2098	0.2303	0.2613	0.2227	0.2558
Gender	0.1511	0.1538	0.1473	0.1150	0.1547	0.1619	0.1299	0.1632
RA	0.1477	0.1541	0.1560	0.1313	0.1424	0.1516	0.1288	0.1659

Factors	PC	NLE	Imitation	HP	IC	SP	FP	LSE	Gender	RA
Hopelessness	0.2019	0.2153	0.2212	0.1993	0.1837	0.2115	0.2165	0.2478	0.2148	0.2159
MD	0.3414	0.2514	0.2219	0.2884	0.2849	0.2341	0.3021	0.3060	0.2660	0.2607
Stress	0.2452	0.2204	0.2629	0.2647	0.2169	0.2479	0.2635	0.2839	0.2508	0.2327
SA	0.2825	0.1943	0.2826	0.2566	0.2308	0.2217	0.1967	0.2566	0.3027	0.2607
FF	0.2199	0.2535	0.2461	0.2425	0.2380	0.3280	0.2279	0.2512	0.2418	0.2582
Religion	0.1756	0.1821	0.2229	0.1878	0.1507	0.1941	0.1888	0.1656	0.1729	0.1815
PSS	0.2198	0.1794	0.2527	0.2045	0.2271	0.2107	0.1889	0.2177	0.2413	0.2392
PSA	0.3992	0.4459	0.2706	0.3452	0.3874	0.3666	0.3278	0.2905	0.2946	0.2847
PC	0.2278	0.2358	0.2855	0.2461	0.2373	0.2583	0.2504	0.2463	0.2135	0.2291
NLE	0.2499	0.2587	0.2771	0.2947	0.2328	0.2441	0.2959	0.2161	0.3062	0.2615
Imitation	0.1436	0.1680	0.1799	0.2037	0.1930	0.1554	0.1832	0.1814	0.1868	0.1857
HP	0.2240	0.2124	0.2138	0.2420	0.3201	0.2484	0.2683	0.2194	0.2667	0.2242
IC	0.2050	0.2372	0.1991	0.1614	0.2135	0.1903	0.2135	0.2517	0.2355	0.2428
SP	0.2057	0.2472	0.2700	0.2273	0.2617	0.2332	0.2082	0.2497	0.2380	0.3143
FP	0.2371	0.2277	0.2559	0.2350	0.2605	0.2919	0.2605	0.2679	0.2101	0.2270
LSE	0.2110	0.2730	0.2262	0.2516	0.1935	0.2130	0.2218	0.2281	0.2275	0.2583
Gender	0.1575	0.1247	0.1421	0.1339	0.1338	0.1446	0.1830	0.1480	0.1476	0.1509
RA	0.1442	0.1434	0.1405	0.1566	0.1275	0.1076	0.1664	0.1280	0.1417	0.1450

Table 4

The weighted normalized decision matrix

Factors	Hopelessness	MD	Stress	SA	FF	Religion	PSS	PSA	PC
Hopelessness	0.0117	0.0180	0.0189	0.0108	0.0167	0.0072	0.0117	0.0165	0.0114
MD	0.0120	0.0184	0.0186	0.0178	0.0149	0.0108	0.0157	0.0236	0.0193
Stress	0.0095	0.0151	0.0153	0.0194	0.0186	0.0130	0.0124	0.0197	0.0138
SA	0.0151	0.0145	0.0111	0.0140	0.0134	0.0131	0.0126	0.0212	0.0159
FF	0.0110	0.0194	0.0129	0.0163	0.0157	0.0120	0.0174	0.0200	0.0124
Religion	0.0142	0.0148	0.0102	0.0093	0.0113	0.0087	0.0103	0.0166	0.0099
PSS	0.0112	0.0130	0.0137	0.0124	0.0100	0.0094	0.0111	0.0228	0.0124
PSA	0.0182	0.0199	0.0199	0.0169	0.0201	0.0134	0.0125	0.0256	0.0225
PC	0.0132	0.0123	0.0142	0.0113	0.0162	0.0113	0.0115	0.0146	0.0129
NLE	0.0141	0.0189	0.0179	0.0186	0.0160	0.0124	0.0160	0.0149	0.0141
Imitation	0.0095	0.0149	0.0105	0.0089	0.0114	0.0070	0.0079	0.0170	0.0081
HP	0.0142	0.0154	0.0140	0.0132	0.0156	0.0112	0.0131	0.0180	0.0126
IC	0.0136	0.0138	0.0150	0.0129	0.0140	0.0123	0.0104	0.0141	0.0116
SP	0.0129	0.0183	0.0144	0.0147	0.0111	0.0105	0.0123	0.0163	0.0116
FP	0.0141	0.0159	0.0151	0.0185	0.0179	0.0120	0.0153	0.0204	0.0134
LSE	0.0108	0.0137	0.0123	0.0124	0.0142	0.0120	0.0116	0.0201	0.0119
Gender	0.0081	0.0102	0.0090	0.0068	0.0096	0.0074	0.0068	0.0128	0.0089
RA	0.0079	0.0102	0.0095	0.0078	0.0088	0.0070	0.0067	0.0130	0.0081

Factors	NLE	Imitation	HP	IC	SP	FP	LSE	Gender	RA
Hopelessness	0.0139	0.0095	0.0117	0.0098	0.0122	0.0135	0.0136	0.0076	0.0075
MD	0.0163	0.0096	0.0169	0.0151	0.0136	0.0188	0.0168	0.0094	0.0090
Stress	0.0143	0.0113	0.0155	0.0115	0.0143	0.0164	0.0156	0.0089	0.0081
SA	0.0126	0.0122	0.0151	0.0123	0.0128	0.0123	0.0141	0.0107	0.0090
FF	0.0164	0.0106	0.0142	0.0126	0.0190	0.0142	0.0138	0.0086	0.0089
Religion	0.0118	0.0096	0.0110	0.0080	0.0112	0.0118	0.0091	0.0061	0.0063
PSS	0.0116	0.0109	0.0120	0.0121	0.0122	0.0118	0.0120	0.0086	0.0083
PSA	0.0289	0.0117	0.0203	0.0206	0.0212	0.0204	0.0160	0.0105	0.0099
PC	0.0153	0.0123	0.0144	0.0126	0.0150	0.0156	0.0135	0.0076	0.0079
NLE	0.0167	0.0120	0.0173	0.0124	0.0141	0.0185	0.0119	0.0109	0.0091
Imitation	0.0109	0.0078	0.0120	0.0102	0.0090	0.0114	0.0100	0.0066	0.0064
HP	0.0138	0.0092	0.0142	0.0170	0.0144	0.0167	0.0121	0.0095	0.0078
IC	0.0154	0.0086	0.0095	0.0113	0.0110	0.0133	0.0138	0.0084	0.0084
SP	0.0160	0.0116	0.0133	0.0139	0.0135	0.0130	0.0137	0.0084	0.0109
FP	0.0147	0.0110	0.0138	0.0138	0.0169	0.0162	0.0147	0.0075	0.0079
LSE	0.0177	0.0098	0.0148	0.0103	0.0123	0.0138	0.0125	0.0081	0.0089
Gender	0.0081	0.0061	0.0079	0.0071	0.0084	0.0114	0.0081	0.0052	0.0052
RA	0.0093	0.0061	0.0092	0.0068	0.0062	0.0104	0.0070	0.0050	0.0050

Table 5

Positive ideal solution (A+) and negative ideal solution (A-)

	Hopelessness	MD	Stress	SA	FF	Religion	PSS	PSA	PC	NLE	Imitation	HP	IC	SP	FP	LSE	Gender	RA
A+	0.0182	0.0199	0.0199	0.0194	0.0201	0.0134	0.0174	0.0256	0.0225	0.0289	0.0123	0.0203	0.0206	0.0212	0.0204	0.0168	0.0109	0.0109
A-	0.0079	0.0102	0.0090	0.0068	0.0088	0.0070	0.0067	0.0128	0.0081	0.0081	0.0061	0.0079	0.0068	0.0062	0.0104	0.0070	0.0050	0.0050

Table 6

Positive ideal separation (Si+) and negative ideal separation (Si-)

Factors	Si+	Si-
Hopelessness	0.0315	0.0218
MD	0.0192	0.0341
Stress	0.0256	0.0286
SA	0.0281	0.0252
FF	0.0242	0.0295
Religion	0.0380	0.0135
PSS	0.0330	0.0195
PSA	0.0057	0.0476
PC	0.0287	0.0231
NLE	0.0231	0.0312
Imitation	0.0403	0.0109
HP	0.0263	0.0252
IC	0.0322	0.0197
SP	0.0282	0.0241
FP	0.0230	0.0298
LSE	0.0289	0.0219
Gender	0.0477	0.0029
RA	0.0481	0.0021

Table 7

Positive ideal solution (Pi) and ranking of the factors

Factors	Pi	Ranking
PSA	0.8924	1
MD	0.6389	2
NLE	0.5743	3
FP	0.5642	4
FF	0.5493	5
Stress	0.5276	6
HP	0.4890	7
SA	0.4734	8
SP	0.4613	9
PC	0.4453	10
LSE	0.4312	11
Hopelessness	0.4086	12
IC	0.3793	13
PSS	0.3721	14
Religion	0.2619	15
Imitation	0.2132	16
Gender	0.0576	17
RA	0.0422	18

After that, the positive ideal solution (Pi) value for the factors is found. Finally, the factors were sorted according to the Pi value from the highest to the lowest.

Notation:

MD = Mental disorder	*SA = Substance abuse*
FF = Family factor	*HP = Health problem*
FP = Financial problem	*NLE = Negative life events*
PSS = Poor social support	*LSE = Low self-esteem*
PSA = Poor social attempts	*IC = International conflicts*
SP = Society pressure	*RA = Residential area*

DISCUSSION

Generally, the 18 risk factors for suicidal ideation were sorted based on the preferences using the TOPSIS method in this study. Table 5 shows that the most important reason for suicidal thoughts is *previous suicide attempts*, with a Pi value of 0.8924. It is followed

by *mental disorder*s (0.6389), *negative life events* (0.5743), *financial problem*s (0.5642), *family factor*s (0.5493), *and stress* (0.5276), among others (Bilsen, 2018). In contrast, *gender* and *residential area* are the least important factors, with a value of less than 0.1.

Based on the result, it can be concluded that *prior suicide attempts* are the most significant factor for suicidal ideation (Bilsen, 2018; Junior et al., 2020). It is because a person with a history of self-injury is more likely to do the same actions again if they do not get help on their first attempt. Hence, people with previous suicide attempts have a high risk of suicidal crises.

Besides that, a *mental disorder* is also considered one of the important risk factors for suicidal ideation (Bilsen, 2018; Pillay, 2021). Most suicide cases are related to mental disorders such as depression, anxiety, and stress. University students are the population group that is more vulnerable to these mental disorder problems owing to various stressors in university life, including academic problems, financial problems, relationship problems, and many others.

Negative life events are also a key contributor that might lead to suicidal ideation (Bilsen, 2018; Pillay, 2021). It is because some mental disorders and problems like stress and depression may stem from negative life events. Negative life events such as the death of someone near the people, financial problems, and health problems will greatly impact the people. It will make people more likely to have serious suicidal thoughts.

Nevertheless, *gender* and *residential area* are the least important factors for suicidal ideation from the result (Abdu et al., 2020). Hence, gender and residential area are not crucial in leading to suicidal intentions among university students.

In a nutshell, the government, parents, and any related authorities should pay more attention to suspicious students with the characteristics of persons who tend to be involved in the suicide crisis. It can help them discover the particular students earlier and take proper actions immediately to help them.

CONCLUSION

The goal of the study is to rank the risk variables for suicide cases according to their seriousness. TOPSIS may be used to compare the many risk variables for suicidal ideation among university students. Although it is difficult to prevent suicide completely, knowing risk factors based on their relevant degree allows the government or society to be aware of the university students at high risk for suicide. The warning signs of the students can be detected earlier. Several rapid and effective solutions, such as suicide prevention programs and medical therapy, can be implemented specifically for the high-risk population to lessen the suicidal crises. Government should organize more suicide prevention events such as World Suicide Prevention Day, held on 10 September annually, and The Malaysian Suicide Prevention Awareness Campaign, among others, especially for targeting high-risk groups

for suicide to minimize the suicide rates. Other than that, mental health treatment or healthy ways to cope with stress can be provided for the students that are identified as a high-risk group individually.

There are some limitations in this study. One of them is that this study only involves public university students. Therefore, the outcome may not represent the condition of all the universities in Malaysia. Furthermore, this study only comprises undergraduate students; the situation of postgraduate students is uncertain.

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