

Selection of Mental Health Intervention Programs for University Students Using Fuzzy TOPSIS

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ABSTRACT

Universities carry a central responsibility in student well-being, as there has been a troubling increase in the number of university students experiencing mental health challenges, ranging from anxiety and depression to emotional distress. This growing concern highlights the urgent need for universities to identify and implement effective mental health intervention programs. In this study, selecting a mental health program is viewed as a multi-criteria decision-making (MCDM) problem and analyzed using the fuzzy technique for order preference by similarity to ideal solution (fuzzy TOPSIS). The study involved six experts from the Psychology and Counseling Unit at UiTM Cawangan Kelantan, who evaluated four intervention alternatives: counseling and therapy services, physical activities, peer support groups, and online mental health resources. In addition, five key criteria were considered: accessibility, effectiveness, cost-efficiency, flexibility, and privacy. The findings demonstrate that counseling and therapy services are ranked as the most effective mental health intervention programs based on expert evaluation. Therefore, universities must focus on interventions that enhance students' psychological well-being and emotional resilience.

Keywords-well-being, mental health intervention programs, counseling and therapy services, physical activities, peer support groups, online mental health resources

INTRODUCTION

Mental health issues among students, especially in Malaysia, have become a growing concern. According to [1], mental health is a dynamic state of internal equilibrium that enables individuals to use their abilities in harmony with the universal values of society. Mental health illnesses affect many people, especially young people, with anxiety and depression being the most common conditions. Mental health problems among adolescents have increased significantly. In Malaysia, university students show a high percentage of depression up to 31%, anxiety up to 60%, and stress up to 26% as in [2]. Related to this problem, effective mental health interventions are needed to overcome mental health problems among students. Traditional approaches, such as counseling and therapy services, peer support groups, and physical activities, are often organized by the university to help students who are struggling to find a way out of mental illness. Other innovative techniques, such as digital mental health tools or resources, can help address student problems if the student is too shy to see a counselor in person. However, selecting the most effective intervention is complex, given the varying needs and preferences of the students. This complexity necessitates effective methods to identify interventions that maximize impact while considering resource limitations.

Multi-criteria decision-making (MCDM) is widely used across various fields, including economics, social sciences, medical sciences, and more. Sometimes, MCDM is called multiple-criteria decision analysis (MCDA) or multi-attribute decision-making (MADM). Regardless of their variations, MCDM problems share a common feature of having multiple objectives and criteria that often conflict with each other. Decision-makers are required to choose, assess, or prioritize these alternatives based on the significance of the criteria.

Thus, the technique for order of preference by similarity to ideal solution (TOPSIS) is the most popular in solving MCDM problems. It chooses the alternative that has the shortest distance to the positive ideal solution (PIS) (this solution minimizes the cost criteria and maximizes the benefit criteria) of the farthest distance to the negative ideal solution (NIS) as in [3]. After that, [4] extended fuzzy TOPSIS to the fuzzy environment using triangular fuzzy numbers (TFN) to change the number of linguistic scales for classification and weighting. By comparing alternatives to positive and negative ideal solutions as in [5], TOPSIS systematically ranks options as in [6]. Its versatility has been demonstrated in areas such as online shopping evaluation as in [7], identifying stress factors in students as in [8] and ranking music education interventions as in [9]. These applications confirm the method's reliability for handling uncertainty and guiding practical decision-making.

This study aims to identify the most effective mental health intervention programs using the fuzzy TOPSIS method, which allows a more accurate and systematic analysis of multiple criteria under conditions of uncertainty. This research is expected to help university management select the most effective and practical solutions to support student mental health.

LITERATURE REVIEW

This literature review explores four intervention alternatives (counseling and therapy services, physical activities, peer support groups, and online mental health resources) and five key criteria (accessibility, effectiveness, cost-efficiency, flexibility, and privacy) considered in this study.

Alternatives

Counseling and Therapy Services

Research by [10] has shown that students suffering from trauma need consistent mental health services, which counselors can provide in short-term sessions during the day. Each university has a Student Counseling and Psychological Unit that offers free counseling services to students. Hence, students do not need to spend money to get counseling services at the university, which is very convenient for students who need counseling sessions regularly. Therefore, the Counseling Unit is available weekly during office hours and allows students to attend without skipping their classes. According to [11], counseling reliably reduced experiences of depression, distress, and hostility and led to improvements in social anxiety, eating concerns, and academic distress. Both measures highlight counseling to be particularly effective for depression, which is noteworthy as students, on average, received four counseling sessions. Hence, the number of university students accessing counseling services has increased faster than the number of students. It shows that counseling services are very effective for university students.

Physical Activities

Physical activity and regular exercise are essential for a positive lifestyle and can improve individual health. There are various physical activities that students can do. There are jogging, yoga, zumba, and walking around the university. Each student's society must provide a variety of engaging activities to attract students to participate. Various programs organized by the students' society include neon run, treasure hunt, inter-faculty sports, and aerodance. This allows students to participate in the program because the programs are flexible for students, and they are organized on weekends. According to [12], physical exercise is one of the methods for preventing and treating mental health issues among university students; it is not only easy to implement but also cost-effective. The findings from [13] indicate that these interventions can positively affect higher education students' mental health and quality of life. It shows that interventions that combine moderate to vigorous physical activity are the most effective, such as aerobics, dance, basketball, and running. Mind-body exercises, including yoga, Tai Chi, and Qigong, are also beneficial. If this intervention is widely implemented over the long term across higher education institutions, moderate to strong physical activity interventions may promote better mental health among higher education students. In conclusion, outdoor activities provide good advantages for mental health issues. By enhancing students' well-being, improving life, and boosting pleasure and happiness, doing physical activities favours overall health and cognitive ability.

Peer Support Groups

University students often communicate and spend more time with friends, lecturers, and classmates. Their ability to socialize with entities in the university affects their mental health as in [14]. Current research indicates that the relationship between student involvement in school organizations and levels of depression is essential. Students who engage in many programs or organizations generally tend to have lower depression levels. This finding is supported by research from [15], which examined underrepresented college students in the USA and discovered that participation in extracurricular activities is negatively associated with fewer symptoms of depression throughout the semester. One advantage of peer support is that it provides a good atmosphere for students seeking help and support from others. Peer support groups often share similar life experiences, allowing them to relate closely to those they are helping. Many of these peers have faced the typical challenges that accompany students. This shared understanding enables them to provide genuine empathy and validation, making their peers feel more at ease and more likely to accept their advice and recommendations. Hence, peer support groups are very cost-efficient, and students can join without considering the cost they will pay for the organizations. This also makes it easier for students to attend the program because it only involves the university. Thus, a peer support center is potentially flexible and cheaper than appointing professional counseling as in [16].

Online Mental Health Resources

Nowadays, young people with mental health disorders often participate in harmful behaviours that are associated with an increased risk of early death from physical conditions in adulthood. Desirable, accessible, and cost-effective digital health technologies can help address health behaviours in public mental health settings where many youths with significant mental health challenges receive treatment. According to [17], with the increasing number of young people using digital technologies, digital mental health interventions are treated to have a high potential to support mental health and well-being in this generation because it is easy to access as example web-based online/computer-delivered interventions that were found effective at decreasing the depression, anxiety, stress and eating disorder symptoms as in [18]. Furthermore, the study from [19] found That online mental health platforms for youth are cost-efficient for individuals aged 18 to 25, compared with traditional methods. The web-based survey did not collect any personally identifiable information; this proves that this intervention is confidential and will not involve any of the user's privacy. [20] found that digital mental health interventions can improve the lives of people who are struggling with depression and anxiety. Thus, it can potentially enhance the university student's psychological well-being. This study proved that digital mental health has a positive impact on people who are struggling with mental illness.

Criteria

Five criteria were used to achieve the objective of this study based on past studies. Table 1 illustrates the criteria used in this study.

Table I -Description Of Criteria

Criteria	Description	Source(s)
Accessibility	Students can access the mental health intervention programs	[17], [21]
Cost-efficiency	Worthwhile and affordable program for students to join	[12], [16], [19]
Effectiveness	Evaluate the program's ability to achieve desired outcomes	[11], [13], [15], [18], [20]
Flexibility	The student engagement in terms of times and places that are flexible for students to join anytime	[14]
Privacy	Focus on the program's ability to ensure privacy and protect students' sensitive information.	[16], [18]

METHODOLOGY

This study uses the fuzzy TOPSIS method to select the best mental health intervention programs. The steps involved are as follows:

Step 1: Data Collection

The data were collected from six decision-makers in the psychology unit at UiTM Cawangan Kelantan, who were asked to evaluate and rank mental health intervention programs for university students by answering a questionnaire and conducting interviews with the decision-makers. The chosen criteria and alternatives for selecting mental health intervention programs in this research are presented in Fig. 1 and used to generate the fuzzy questionnaire.

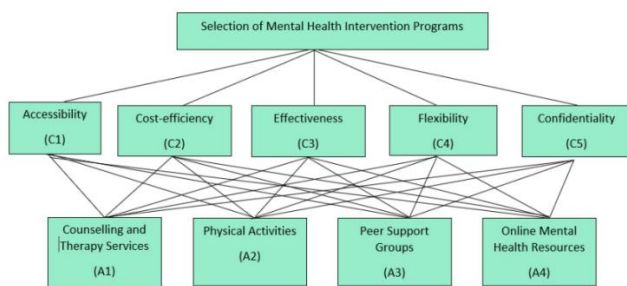


Fig. 1 Hierarchy Structure of Selection of Mental Health Intervention Programs

Step 2: Convert Data to Triangular Fuzzy Number (TFN)

The importance of weights on the criteria and the alternatives' ratings are expressed using linguistic variables. These linguistic variables are then converted into triangular fuzzy numbers (TFNs) adopted from [22] as shown in Tables II and III, to handle the uncertainty and subjectivity for the qualitative data and to allow further calculations in the fuzzy TOPSIS method.

Table II Linguistic Scale For The Importance Of Each Criterion

Linguistic Term	Triangular Fuzzy Numbers
Very Low (VL)	(0.0,0.1,0.3)
Low (L)	(0.1,0.3,0.5)
Medium (M)	(0.3,0.5,0.7)
High (H)	(0.5,0.7,0.9)
Very High (VH)	(0.7,0.9,1.0)

Table III Linguistic Scale For The Rating Of Each Alternative

Linguistic Variable	Triangular Fuzzy Numbers
Very Poor (VP)	(0,1,3)
Poor (P)	(1,3,5)
Fair (F)	(3,5,7)

Good (G)	(5,7,9)
Very Good (VG)	(7,9,10)

Step 3: Aggregated Alternative and Criteria Weightage Fuzzy Decision Matrix

The aggregated alternative is calculated using Eqn. (1), while Eqn. (2) is for the criteria weightage.

$$x_{ij}^k = (a_{ij}^k, b_{ij}^k, c_{ij}^k) \quad (1)$$

$$a_{ij}^k = \min(a_{ij}^k), \quad i, j = 1, 2, \dots, n$$

$$\text{where } b_{ij}^k = \frac{1}{K} \sum_{k=1}^K b_{ij}^k, \quad K \text{ is the number of decision-makers}$$

$$c_{ij}^k = \max(c_{ij}^k), \quad i \text{ is the alternative and } j \text{ is the criterion}$$

$$w_j^k = (w_{j1}^k, w_{j2}^k, w_{j3}^k) \quad (2)$$

where

$$w_{j1}^k = \min(w_{jk1})$$

$$w_{j2}^k = \frac{1}{K} \sum_{k=1}^K w_{jk2}, \quad K \text{ is the number of decision-makers}$$

$$w_{j3}^k = \max(w_{jk3}), \quad j \text{ is the criterion}$$

In this step, the fuzzy decision matrix will be constructed where i is the criterion index ($i = 1, 2, \dots, m$) and j is the alternative index ($j = 1, 2, \dots, n$). The elements of $C_1, C_2, \dots, C_n$ are referred to as the criteria, while the elements of $A_1, A_2, \dots, A_m$ are referred to as the alternatives. The decision matrix of the alternative and the criteria, $\tilde{D}$ is shown in (3). Subsequently, the average fuzzy weight for each criterion is shown as (4).

$$C_1 \quad C_2 \quad \dots \quad C_n \quad (3)$$

$$\tilde{D} = \begin{matrix} A_1 \\ A_2 \\ \vdots \\ A_m \end{matrix} \begin{bmatrix} \tilde{x}_{11} & \tilde{x}_{12} & \dots & \tilde{x}_{1n} \\ \tilde{x}_{21} & \tilde{x}_{22} & \dots & \tilde{x}_{2n} \\ \vdots & \vdots & \ddots & \vdots \\ \tilde{x}_{m1} & \tilde{x}_{m2} & \dots & \tilde{x}_{mn} \end{bmatrix}$$

$$\tilde{W} = (w_1, w_2, w_3) \quad (4)$$

Step 4: Calculation of Normalized Decision Matrix, $\tilde{R}$

The normalized fuzzy decision matrix is denoted by $\tilde{R}$ will be obtained using equation (5) and then the normalization process can be performed using equation (6).

$$\tilde{R} = [\tilde{r}_{ij}]_{m \times n}, \quad i = 1, 2, \dots, m; \quad j = 1, 2, \dots, n \quad (5)$$

$$\tilde{r}_{ij} = \left(\frac{a_{ij}}{c_j^+}, \frac{b_{ij}}{c_j^+}, \frac{c_{ij}}{c_j^+} \right) \text{ where } c_j^+ = \max(c_{ij}) \quad (6)$$

Step 5: Determine the Weighted Normalized Decision Matrix, $\tilde{V}$

$$\tilde{V} = [\tilde{v}_{ij}] \quad (7)$$

$$\tilde{v}_{ij} = \tilde{r}_{ij} \times \tilde{W}_j \quad (8)$$

where $i=1,2,\dots,m$; $j=1,2,\dots,n$ and $\tilde{W}_j$ is the weight

Step 6: Find the Distance of Each Alternative from Fuzzy Positive-Ideal Solution (FPIS) and Fuzzy Negative-Ideal Solution (FNIS)

The FPIS is the solution that maximizes the benefit criteria and minimizes the cost criteria. Hence, the FNIS is the solution that minimizes the benefit criteria and maximizes the cost criteria. Therefore, to obtain FPIS (A^+) and FNIS (A^-), equations (9) and (10) will be applied.

$$A^+ = (\tilde{v}_1^+, \tilde{v}_j^+, \dots, \tilde{v}_n^+) \quad (9)$$

$$A^- = (\tilde{v}_1^-, \tilde{v}_j^-, \dots, \tilde{v}_n^-) \quad (10)$$

where

$$\tilde{v}_j^+ = \max_i(\tilde{v}_{ij}) \text{ and } \tilde{v}_j^- = \min_i(\tilde{v}_{ij})$$

$$i=1,2,\dots,m; j=1,2,\dots,n$$

Then compute the distance d_i^+ and d_i^- of each alternative from the respective $\tilde{v}_j^+$ and $\tilde{v}_j^-$ by using equations (12) and (13). Then, equation (11) will be used to find the distance of each criterion from FPIS and FNIS for each alternative, along with equations (12) and (13).

$$d(a,b) = \sqrt{\frac{1}{3} \left[(a_1 - b_1)^2 + (a_2 - b_2)^2 + (a_3 - b_3)^2 \right]} \quad (11)$$

$$d_i^+ = \sum_{j=1}^n d_v(\tilde{v}_{ij}, \tilde{v}_j^+) \quad (12)$$

$$d_i^- = \sum_{j=1}^n d_v(\tilde{v}_{ij}, \tilde{v}_j^-) \quad (13)$$

Step 7: Calculation of Closeness Coefficient for Each Alternative, CC_i

To find the closeness coefficient for each alternative, equation (14) will be used.

$$CC_i = \frac{d_i^-}{d_i^+ + d_i^-}, i = 1, 2, \dots, m \quad (14)$$

Step 8: Ranking the Alternatives According to CC_i

The conclusion is made depending on the closeness coefficient. The ranking of the alternatives will be arranged in descending order.

RESULTS AND DISCUSSION

Six experts were selected to serve as decision-makers and answer the questionnaire. The selected decision-Makers must fill in a fuzzy TOPSIS questionnaire. As mentioned in the methodology section, the questionnaire was developed using specific criteria and alternatives.

Table IV shows a linguistic scale with the corresponding triangular fuzzy number for the criteria rating based on the scale in Table II. In contrast, the linguistic scale with the corresponding triangular fuzzy number for the alternative rating is shown in Table V based on the scale in Table III.

Table Iv Triangular Fuzzy Number For The Criteria Rating

	DM ₁	DM ₂	DM ₃	DM ₄	DM ₅	DM ₆
C ₁	H (0.5,0.7,0.9)	H (0.5,0.7,0.9)	H (0.5,0.7,0.9)	VH (0.7,0.9,1.0)	VH (0.7,0.9,1.0)	VH (0.7,0.9,1.0)
C ₂	M (0.3,0.5,0.7)	M (0.3,0.5,0.7)	M (0.3,0.5,0.7)	H (0.5,0.7,0.9)	VL (0.0,0.1,0.3)	M (0.3,0.5,0.7)
C ₃	VH (0.7,0.9,1.0)	H (0.5,0.7,0.9)	H (0.5,0.7,0.9)	H (0.5,0.7,0.9)	M (0.3,0.5,0.7)	VH (0.7,0.9,1.0)
C ₄	H (0.5,0.7,0.9)	VH (0.7,0.9,1.0)	M (0.3,0.5,0.7)	VH (0.7,0.9,1.0)	H (0.5,0.7,0.9)	H (0.5,0.7,0.9)
C ₅	M (0.3,0.5,0.7)	M (0.3,0.5,0.7)	VH (0.7,0.9,1.0)	M (0.3,0.5,0.7)	VH (0.7,0.9,1.0)	L (0.1,0.3,0.5)

TABLE V Triangular Fuzzy Number For Alternatives Rating

Criteria	Alternatives	DM ₁	DM ₂	DM ₃	DM ₄	DM ₅	DM ₆
C ₁	A ₁	G (5,7,9)	VG (7,9,10)	VG (7,9,10)	VG (7,9,10)	VG (7,9,10)	VG (7,9,10)
	A ₂	G (5,7,9)	F (3,5,7)	F (3,5,7)	VG (7,9,10)	P (1,3,5)	VG (7,9,10)
	A ₃	F (3,5,7)	G (5,7,9)	G (5,7,9)	G (5,7,9)	G (5,7,9)	G (5,7,9)
	A ₄	F (3,5,7)	VG (7,9,10)	G (5,7,9)	F (3,5,7)	VP (0,1,3)	F (3,5,7)
C ₂	A ₁	G (5,7,9)	G (5,7,9)	VG (7,9,10)	VG (7,9,10)	VG (7,9,10)	VG (7,9,10)
	A ₂	VG (7,9,10)	G (5,7,9)	G (5,7,9)	VG (7,9,10)	G (5,7,9)	VG (7,9,10)
	A ₃	G (5,7,9)	F (3,5,7)	VG (7,9,10)	G (5,7,9)	F (3,5,7)	G (5,7,9)
	A ₄	G (5,7,9)	G (5,7,9)	G (5,7,9)	F (3,5,7)	VP (0,1,3)	F (3,5,7)
C ₃	A ₁	VG (7,9,10)	F (3,5,7)	G (5,7,9)	G (5,7,9)	VG (7,9,10)	VG (7,9,10)
	A ₂	G (5,7,9)	F (3,5,7)	F (3,5,7)	VG (7,9,10)	VG (7,9,10)	G (5,7,9)
	A ₃	F (3,5,7)	G (5,7,9)	F (3,5,7)	VG (7,9,10)	G (5,7,9)	F (3,5,7)
	A ₄	G (5,7,9)	F (3,5,7)	VG (7,9,10)	G (5,7,9)	VP (0,1,3)	F (3,5,7)
C ₄	A ₁	VG (7,9,10)	VG (7,9,10)	VG (7,9,10)	G (5,7,9)	VG (7,9,10)	VG (7,9,10)
	A ₂	VG (7,9,10)	VG (7,9,10)	G (5,7,9)	VG (7,9,10)	G (5,7,9)	G (5,7,9)
	A ₃	F (3,5,7)	VG (7,9,10)	G (5,7,9)	F (3,5,7)	G (5,7,9)	G (5,7,9)
	A ₄	G (5,7,9)	VG (7,9,10)	F (3,5,7)	G (5,7,9)	VG (7,9,10)	F (3,5,7)
C ₅	A ₁	VG (7,9,10)	VG (7,9,10)	G (5,7,9)	VG (7,9,10)	VG (7,9,10)	G (5,7,9)
	A ₂	F (3,5,7)	VG (7,9,10)	VG (7,9,10)	F (3,5,7)	VP (0,1,3)	VP (0,1,3)
	A ₃	G (5,7,9)	VG (7,9,10)	F (3,5,7)	G (5,7,9)	G (5,7,9)	VG (7,9,10)
	A ₄	G (5,7,9)	VG (7,9,10)	G (5,7,9)	F (3,5,7)	P (1,3,5)	G (5,7,9)

The computation of the aggregated fuzzy rating for the criteria and the alternatives has been performed, and a decision matrix has been established as follows.

$$\bar{D} = \begin{bmatrix} (5, 8.67, 10) & (5.8.33,10) & (3,7.67,10) & (5,8.67,10) & (5, 8.33, 10) \\ (1,6.33,10) & (5,8,10) & (3,7,10) & (5,8,10) & (0, 5, 10) \\ (3,6.67,9) & (3,6.67,10) & (3,6.33,10) & (3,6.67,10) & (3,7.33,10) \\ (0,5.33,10) & (0,5.33,9) & (0,5.7,10) & (3,7.0,10) & (1,6.33,10) \end{bmatrix}$$

Subsequently, the average fuzzy weight for each criterion is obtained based on Eqn. (4):

$$\tilde{W} = \begin{bmatrix} (0.50, 0.80, 1.00) \\ (0.00, 0.50, 0.90) \\ (0.30, 0.73, 1.00) \\ (0.30, 0.73, 1.00) \\ (0.10, 0.60, 1.00) \end{bmatrix}$$

Next, the normalized decision matrix, $\tilde{R}$ is calculated using equations (5) and (6). For each column of alternatives, each fuzzy value in the fuzzy decision matrix is divided by the maximum value of that column. Then, the normalized fuzzy decision matrix, $\tilde{R}$ of each alternative is as follows:

$$\tilde{R} = \begin{bmatrix} (0.500, 0.867, 1.000) & (0.500, 0.833, 1.000) & (0.300, 0.767, 1.000) & (0.500, 0.867, 1.000) & (0.500, 0.833, 1.000) \\ (0.100, 0.633, 1.000) & (0.500, 0.800, 1.000) & (0.300, 0.700, 1.000) & (0.500, 0.800, 1.000) & (0.500, 1.000) \\ (0.333, 0.741, 1.000) & (0.300, 0.667, 1.000) & (0.300, 0.633, 1.000) & (0.300, 0.667, 1.000) & (0.300, 0.733, 1.000) \\ (0.533, 1.000) & (0.592, 1.000) & (0.567, 1.000) & (0.700, 1.000) & (0.633, 1.000) \end{bmatrix}$$

The weighted normalized fuzzy decision matrix, $\tilde{V}$ is given as follows:

$$\tilde{V} = \begin{bmatrix} (0.250, 0.694, 1.000) & (0.417, 0.900) & (0.090, 0.560, 1.000) & (0.150, 0.633, 1.000) & (0.050, 0.500, 1.000) \\ (0.050, 0.506, 1.000) & (0.400, 0.900) & (0.090, 0.511, 1.000) & (0.150, 0.584, 1.000) & (0.300, 1.000) \\ (0.167, 0.593, 1.000) & (0.334, 0.900) & (0.090, 0.462, 1.000) & (0.090, 0.487, 1.000) & (0.030, 0.440, 1.000) \\ (0.426, 1.000) & (0.296, 0.900) & (0.414, 1.000) & (0.090, 0.511, 1.000) & (0.010, 0.380, 1.000) \end{bmatrix}$$

Table VI ILLUSTRATES THE FPIS, A^+ , AND FNIS, A^- VALUES.

LIST OF FPIS (A^+) AND FNIS (A^-) VALUES

FPIS (A^+)	FNIS (A^-) values
(1.000,1.000,1.000)	(0.000,0.000,0.000)
(1.000,1.000,1.000)	(0.000,0.000,0.000)
(1.000,1.000,1.000)	(0.000,0.000,0.000)
(1.000,1.000,1.000)	(0.000,0.000,0.000)

The fuzzy TOPSIS results are presented in Table VII. The rankings were determined based on the closeness index reviewed for each alternative. The ranking process shows that Counseling and Therapy Services (A1) have the highest closeness coefficient of 0.564. Peer Support Groups (A3) ranks second with a score of 0.504, while Physical Activities (A2) ranks third with a score of 0.502. Online Mental Health Resources (A4), with a score of 0.481, has the lowest coefficient in ranking the most effective mental health intervention programs.

Table Vii Fuzzy Topsis Results

Alternatives	Closeness Coefficient	Rank
Counseling and Therapy Services	0.564	1
Physical Activities	0.502	3
Peer Support Groups	0.504	2
Online Mental Health Resources	0.481	4

The result demonstrates that Counseling and Therapy Services, with a closeness coefficient of 0.564, is the

most effective mental health intervention program for university students. This finding is consistent with the study from [11], which states that counseling was particularly effective in improving depression, anxiety, well-being, hostility, social anxiety, and academic distress. This also proves that counseling can improve individuals with social anxiety, eating concerns, and depression. Following up on Peer Support Groups with a 0.504 closeness coefficient. Some students do not feel comfortable sharing problems with their peers and prefer to talk to professionals to express their problems. Then, Physical Activities have a 0.502 closeness coefficient. This program is ineffective for some students who do not like being active. Finally, Online Mental Health Resources have a closeness coefficient of 0.481. This program is unsuitable for students easily distracted by their cell phones.

CONCLUSIONS

This study employs the fuzzy TOPSIS method to rank the most effective mental health intervention programs for university students, based on the importance of the criteria and corresponding ratings. The goals include integrating fuzzy TOPSIS into multiple criteria decision making (MCDM) and developing a general model for fuzzy TOPSIS to rank the best mental health programs and select the most effective among the alternatives. This study successfully met all objectives. With a closeness coefficient of 0.564, the Counseling and Therapy Services outperformed every other program. Peer Support Groups ranked second with a score of 0.504, while Physical Activities scored third with a score of 0.502. Online Mental Health Resources ranked last with a score of 0.481. As a result, Counseling and Therapy Services is the most effective program option for university students, followed by Peer Support Groups, Physical Activities, and Online Mental Health Resources.

Based on the findings of this research, a few recommendations can be made for future research. First, a more diverse group of students from different universities should be involved to get a broader view of the most effective mental health intervention program. In addition, it is also recommended that additional types of intervention programs be included in future studies to understand their effectiveness and suitability. Lastly, future research could explore other decision-making methods like fuzzy AHP, fuzzy ANP, or fuzzy VIKOR. This could be used to compare the results of different techniques or to strengthen the reliability of current findings.

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