Volume: 11 Issues: 80 Special Issue [January, 2026] pp. 159 – 170
Journal of Islamic, Social, Economics and Development (JISED)
eISSN: 0128-1755
Journal website: academicinspired.com/jised
DOI: 10.55573/JISED.118012

DETERMINING KEY HEALTH BEHAVIOUR PRIORITIES FOR SUBCLINICAL DEPRESSION USING THE FUZZY DELPHI METHOD: PERSPECTIVES OF COUNSELING PSYCHOLOGY PRACTITIONERS

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Article history
Received date : 22-11-2025
Revised date : 23-11-2025
Accepted date : 28-12-2025
Published date : 15-1-2026

To cite this document:
Ibrahim, T. B., Ayub, N. B., & Ading, C. E. (2026). Determining key health behaviour priorities for subclinical depression using the Fuzzy Delphi method: Perspectives of counseling psychology practitioners. *Journal of Islamic, Social, Economics and Development (JISED),* 11 (80), 159 – 170.

Abstract: *Subclinical depression, refers to a mild form of depressive disorder that does not meet the full diagnostic criteria for Major Depressive Disorder (MDD). Despite its subthreshold nature, it exerts a significant impact on individuals' daily functioning, psychological well-being, and overall quality of life, while also increasing the risk of progression to major depression. Although often perceived as "mild," subclinical depression is associated with health behaviour practices. In Malaysia, mental health concerns have become increasingly prevalent. The NHMS 2019 reported that 500,000 adults (2.3%) suffer from depression, while among adolescents the prevalence of depressive symptoms increased from 17.7% (2014) to 33.1% (2019). Importantly, many of these cases fall under subclinical categories not meeting full diagnostic thresholds but still impairing functioning. This study aims to identify and prioritize the primary health behavior constructs for individuals with subclinical depression, based on the consensus of counseling psychology practitioners using the Fuzzy Delphi method. This study shows that health behaviours in subclinical depression follow a clear expert-defined hierarchy. Sleep behaviour is the primary and foundational factor, supported by social relationships and daily routine with behavioural activation as key recovery mechanisms. Psychological resilience and coping capacity play a sustaining role, while physical activity and diet act as secondary supports. Life stressors are mainly contextual, highlighting the need to prioritise core self-regulation and behavioural activation in interventions.*

Keywords: *Health Behaviour, Subclinical Depression, Mental Health, Lifestyle*

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Introduction

Subclinical depression (subthreshold depression) constitutes a psychological condition characterized by the presence of clinically significant depressive symptoms that fail to meet the full diagnostic criteria for Major Depressive Disorder (MDD) (Cuijpers & Smit, 2004). Although often regarded as a "mild" form of depression, this condition warrants serious consideration, as it exerts substantial effects on daily functioning, quality of life, and psychosocial well-being (Nordin et al., 2018). Notably, individuals exhibiting subclinical depressive symptoms demonstrate a two- to threefold elevated risk of progressing to major depression relative to the general population (Cuijpers et al., 2008).

The Ministry of Health Malaysia (MOH), through its health reform initiative titled the "White Paper on Health" released on 13 June 2023, has underscored mental health issues as a primary contributor to the burden of non-communicable diseases and disability-adjusted life years in Malaysia. The prevalence of mental disorders in Malaysia is estimated at 29% among individuals aged 16 years and older in 2015 a near threefold increase from the 11% reported for the same age group in 1996. The MOH identifies key associated factors as financial constraints, familial discord, occupational challenges, and chronic workplace stress. This perspective aligns with the World Health Organization (WHO), which estimates that mental disorders impose a global economic burden of USD 1 trillion annually due to productivity losses, with depression emerging as a predominant contributor.

Subclinical Depression in Malaysia

In Malaysia, mental health concerns have become increasingly prevalent. The NHMS 2019 reported that 500,000 adults (2.3%) suffer from depression, while among adolescents the prevalence of depressive symptoms increased from 17.7% (2014) to 33.1% (2019). Importantly, many of these cases fall under subclinical categories not meeting full diagnostic thresholds but still impairing functioning. Stigma, cultural perceptions, and limited access to psychiatric care lead many subclinical patients to avoid treatment (Mukhtar et al., 2011).

Need for Focus on Health Behaviors

While biomedical treatment focuses on pharmacology and psychotherapy for major depression, health behaviors including lifestyle, resilience, and coping offer protective mechanisms that can prevent deterioration. Research has shown that exercise, balanced nutrition, and sleep hygiene reduce depressive symptoms (Bourke et al., 2022). Moreover, resilience helps individuals adapt to adversity, while coping strategies determine whether individuals recover or relapse. Yet, in Malaysia, little is known about how subclinical depression patients practice health behaviors in daily life.

Literature Review

Subclinical depression is a prevalent condition with significant clinical implications, notwithstanding its failure to meet the diagnostic criteria for major depression (Cuijpers et al., 2004; Fusar-Poli et al., 2020). Individuals exhibiting subclinical depressive symptoms experience functional impairment, diminished quality of life, and elevated risk of progression to major depression and comorbid anxiety disorders (Judd et al., 2002; Cuijpers & Smit, 2004). Consequently, early detection and intervention at the subclinical stage constitute essential components of mental health prevention strategies, consistent with evidence that brief psychological interventions can alleviate symptoms and mitigate the risk of developing major depression (Cuijpers et al., 2014; Buntrock et al., 2017).

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Empirical evidence demonstrates a consistent association between lifestyle behaviors and depressive symptoms, particularly those involving sleep, physical activity, nutrition, and social relationships (Sarris et al., 2014; Lam et al., 2016). Randomized controlled trials and meta-analyses indicate that improvements in sleep quality and regular engagement in moderate physical activity effectively reduce depressive symptoms, while nutrition-based interventions grounded in healthy dietary patterns yield promising preventive effects (Biddle et al., 2019; Firth et al., 2019; White et al., 2024). Nevertheless, the strength of these associations varies according to age, baseline symptom severity, social support, and individual life contexts, underscoring the need for approaches that integrate universal elements with context-sensitive adaptations (White et al., 2017; Fusar-Poli et al., 2020).

Although the importance of lifestyle behaviors in subclinical depression is well-established, there remains a paucity of practitioner based consensus regarding the health behavior elements warranting prioritization within time limited counseling contexts (Lam et al., 2016; Marx et al., 2023). Existing clinical guidelines typically recommend general lifestyle assessments without providing structured, practical priority lists for counseling psychologists (NICE, 2020). Accordingly, the Fuzzy Delphi method is deemed appropriate for synthesizing empirical evidence and expert clinical judgment to identify and prioritize the most relevant and feasible health behavior elements for early interventions in subclinical depression (McMillan et al., 2016; Nazeri et al., 2025).

Table 1: Construct of Health Behaviour for Subclinical Depression

Construct	Operational Definition
Sleep Behaviour	The quality and regularity of an individual's sleep pattern, including difficulties in falling asleep, maintaining sleep, and maintaining a consistent sleep–wake schedule.
Physical Activity	The extent to which an individual engages in regular physical activity that supports physical health and emotional well-being.
Dietary Behaviour	The quality and balance of an individual's dietary intake, particularly habits that contribute to physical and psychological functioning.
Social Relationships	The presence and quality of meaningful social interactions and perceived social support from family, peers, or the community.
Daily Routine and Behavioural Activation	The degree to which an individual maintains structured daily routines and engages in meaningful or enjoyable activities.
Psychological Resilience and Coping Capacity	An individual's ability to manage stress and emotional challenges through the use of adaptive or maladaptive coping strategies.
Life Stressors	Ongoing stress related to work, financial demands, or family responsibilities that may contribute to emotional distress.

Research Aim

This study aims to identify and prioritize the primary health behavior constructs for individuals with subclinical depression, based on the consensus of counseling psychology practitioners using the Fuzzy Delphi method (FDM). The findings of this study are expected to support the development of focused, professionally grounded health behavior interventions to prevent progression to major depressive disorder.

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Methodology

This study employed the Fuzzy Delphi technique to identify and prioritize the primary health behavior elements for individuals with subclinical depression. This method proves particularly efficacious when research necessitates validation from a panel of experts. Responses can be elicited expeditiously through parallel survey administration, incurring lower costs; moreover, it enables experts to articulate their authentic opinions without misinterpretation, thereby ensuring the precision and consensus of the resultant viewpoints.

Sampling

Purposive sampling was employed in this analysis. This approach is ideally suited, as the researcher seeks to achieve consensus on an established matter. According to Hasson, Keeney, and McKenna (2000), purposive sampling represents the most appropriate method within the FDM) Meanwhile, eight experts participated in this study, with details of those who consented to participate presented in Table 2. These experts were selected based on their specialized knowledge and qualifications. When participants in the analysis exhibit homogeneity, the requisite number of experts ranges from 5 to 10.

Table 2: List of experts

Expert	Post Title	Experience (Years)	Setting
1	Psychology Officer	5	Healthcare
2		5	
3		12	
4		13	
5		10	
6		12	
7		5	
8		5	

Expert Criteria

Experts recruited for this Fuzzy Delphi study were counselling psychology practitioners working in healthcare settings, with a minimum of five years' experience in conducting interventions with individuals presenting psychological disorders. Experts are defined as individuals who have acquired recognised qualifications, experience, and professional credibility through sustained engagement in their field (Booker & McNamara, 2004; Nikolopoulos, 2004; Perera et al., 2012). Within Fuzzy Delphi studies, the careful selection of experts is essential, as participants must demonstrate relevant subject-matter expertise or familiarity to ensure the validity of consensus outcomes (Kaynak & Macauley, 1984). This study selects experts adhering to rigorous criteria, including a minimum of five years' experience, domain-specific proficiency, and pertinence to the research objectives.

Instrumentation

The researcher constructed the Fuzzy Delphi research instrument drawing from extant literature and experiential knowledge. Skulmowski, Hartman, and Krahn (2007) posit that researchers may formulate questionnaire items based on literature, pilot studies, and experiential knowledge. Moreover, Okoli and Pawlowski (2004) assert that the development of items and content domains for research instruments ought to commence with a literature review pertinent to the study area. The selection of a 7-point scale was motivated by the principle that higher scale granularities yield more accurate and precise data (Ridhuan, Saedah, Zaharah,

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Nurulrabihah, and Ahmad Arifin, 2014). To facilitate experts' completion of the questionnaire, the researcher assigned numerical values from 1 to 7 in place of fuzzy values.

The whole methodology is done by dividing the processes into seven stages.

1. **Expert Selection :** In this study, a total of eight experts were involved. The number of experts was determined by considering the importance of fulfilling eligibility criteria to ensure that the selected panel possessed relevant experience and expertise. Experts were selected based on their professional background, and each expert was asked to evaluate the study items according to their experience and area of specialization.

2. **Determining Linguistic Scale :** This stage involved the conversion of all linguistic variables into fuzzy numerical values. The Triangular Fuzzy Number (TFN) approach was applied to transform linguistic scales into fuzzy numbers. The purpose of this process was to convert linguistic judgments into fuzzy scales. The fuzzy scale employed in this study was based on a seven-point linguistic scale, as presented in Table 3.

Table 3: Seven-point linguistic scale

Seven-Point Linguistic Scale				
	Linguistic Variable	**Triangular Fuzzy Number (TFNs)**		
1	Very Strongly disagree	0.0	0.0	0.1
2	Strongly disagree	0.0	0.1	0.3
3	Disagree	0.1	0.3	0.5
4	Not ure	0.3	0.5	0.7
5	Agree	0.5	0.7	0.9
6	Strongly agree	0.7	0.9	1.0
7	Very Strongly agree	0.9	1.0	1.0

3. **Defuzzification and Average Fuzzy Value :** After responses were obtained from the selected experts, the linguistic responses were converted into fuzzy numbers. This process is also referred to as the calculation of average fuzzy responses (Benítez, Martín, & Román, 2007). The procedure was conducted using the following formula:

$$M = \frac{\sum_{i}^{n} = 1 mi}{n}$$

where M represents the mean fuzzy value, m_i denotes the fuzzy score provided by each expert, and n refers to the total number of experts involved.

4. **Threshold Value and Consensus Level**. The determination of the threshold value (d) was conducted to assess the level of consensus among experts. At this stage, the percentage of agreement for each item and the overall consensus were calculated. A consensus level of 75% or higher indicates that agreement has been achieved among the expert panel. This procedure was applied to ensure that only items meeting the minimum consensus requirement were retained for further analysis.

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$$d(\tilde{m},\tilde{n}) = \sqrt{\frac{1}{3}\left[(m_1 - n_1)^2 + (m_2 - n_2)^2 + (m_3 - n_3)^2\right]}.$$

5. **Defuzzification Process :**
   This process applied the defuzzification formula Amax =(1)⁄4 (a1+2am + a3).When the researcher employed average fuzzy numbers or average expert responses, the resulting score fell within the range of 0 to 1 (Ridhuan et al., 2014). In this stage, three commonly used defuzzification formulas were applied, as follows:
   i. A = 1/3 * (m1 + m2 + m3) , atau ;
   ii. A = 1/4* (m1 + 2m2 + m3) , atau ;
   iii. A = 1/6 * (m1 + 4m2 + m3).

6. **Alpha-Cut Value (α-cut) :** The α-cut value represents the median value between "0" and "1", where α-cut is calculated as $(0 + 1)/2 = 0.5$. If the resulting defuzzified value (A) is less than the α-cut value of 0.5, the corresponding item is rejected, as it does not indicate sufficient expert consensus. According to Bojdanova (2006), the α-cut value should exceed 0.5. This criterion is further supported by Tang and Wu (2010), who emphasized that an α-cut value greater than 0.5 is necessary to confirm expert agreement.

7. **Ranking Procedure : The final stage involved the ranking process by selecting and** ordering elements based on their defuzzified values, reflecting the level of expert consensus. Elements with higher defuzzification values were assigned higher priority rankings, indicating greater importance as determined by the expert panel (Fortemps & Roubens, 1996).

Findings

The analysis outputs that based on the consensus from the participating experts indicated that there were seven major elements of health behaviour experienced by the subclinical depression patienst. Table 4 summarizes the early ranking of seven health behaviour constructs for subclinical depression based on expert consensus.

Table 4: Early Item Rank for Seven-Constructs of Health Behaviour for Subclinical Depression

Early Item Rank	Construct
1	Sleep Behaviour
2	Physical Activity
3	Dietary Behaviour
4	Social Relationships
5	Daily Routine and Behavioural Activation
6	Psychological Resilience and Coping Capacity
7	Life Stressors

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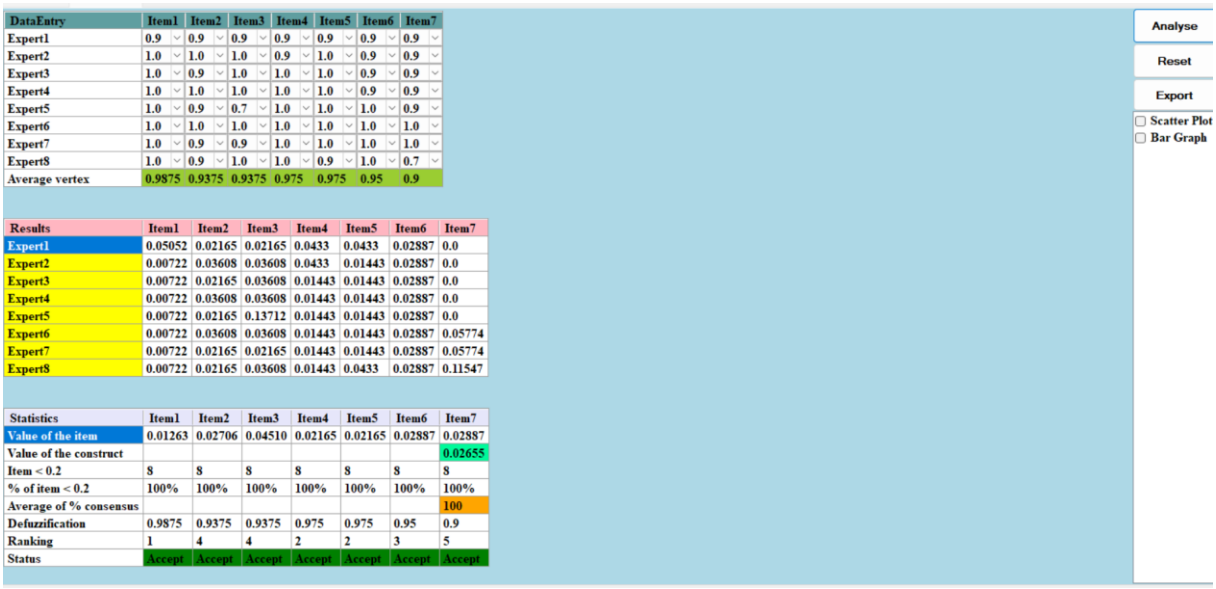

Figure 1: Data entry using FUDELO

Table 5: Fuzzy Delphi Result

Defuzzification Report							
Results	**Item1**	**Item2**	**Item3**	**Item4**	**Item5**	**Item6**	**Item7**
Expert1	0.05052	0.02165	0.02165	0.0433	0.0433	0.02887	0
Expert2	0.00722	0.03608	0.03608	0.0433	0.01443	0.02887	0
Expert3	0.00722	0.02165	0.03608	0.01443	0.01443	0.02887	0
Expert4	0.00722	0.03608	0.03608	0.01443	0.01443	0.02887	0
Expert5	0.00722	0.02165	0.13712	0.01443	0.01443	0.02887	0
Expert6	0.00722	0.03608	0.03608	0.01443	0.01443	0.02887	0.05774
Expert7	0.00722	0.02165	0.02165	0.01443	0.01443	0.02887	0.05774
Expert8	0.00722	0.02165	0.03608	0.01443	0.0433	0.02887	0.11547

Statistics	**Item1**	**Item2**	**Item3**	**Item4**	**Item5**	**Item6**	**Item7**
Value of the item	0.01263	0.02706	0.0451	0.02165	0.02165	0.02887	0.02887
Value of the construct							0.02655
Item < 0.2	8	8	8	8	8	8	8
% of item < 0.2	100%	100%	100%	100%	100%	100%	100%
Average of % consensus							100
Defuzzification	0.9875	0.9375	0.9375	0.975	0.975	0.95	0.9
Ranking	1	4	4	2	2	3	5
Status	Accept	Accept	Accept	Accept	Accept	Accept	Accept

This Fuzzy Delphi analysis demonstrates strong expert consensus across all seven items, with each item achieving 100% agreement (all items below the 0.2 threshold) and an overall 100% average consensus (Adler & Ziglio, 1996). The defuzzification values range from 0.9 to 0.9875, with Item 1 ranking highest (0.9875) followed by Item 4 and 5 (0.975), Items 6 ranking third (0.95), and Item 2 and 3 tied ranking fourth (0.9375), and lastly item 7 ranking lowest (0.9) showing not really different values. All items meet the acceptance criteria with threshold values

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well below the conventional 0.2 cut-off point (Bodjanova, 2006; Murray et al., 1985), indicating robust expert agreement and validation of all elements within the construct being measured. The consensus threshold of $d \leq 0.2$ and expert agreement percentage of $\geq 75\%$ confirm that all items have achieved the required level of consensus for acceptance in the Fuzzy Delphi Method (Chu & Hwang, 2008; Tang & Wu, 2010).

Table 6: Final result Seven-Constructs of Health Behaviour for Subclinical Depression

Early item rank	New item rank	construct
1	1	Sleep Behaviour
2	4	Physical Activity
3	4	Dietary Behaviour
4	2	Social Relationships
5	2	Daily Routine and Behavioural Activation
6	3	Psychological Resilience and Coping Capacity
7	5	Life Stressors

Table 6 presents the final consensus ranking of seven health behaviour constructs associated with subclinical depression following expert evaluation. Sleep behaviour emerged as the highest-priority construct, maintaining its top position, indicating strong expert agreement that sleep regulation is the most critical health behaviour influencing psychological functioning in individuals with subclinical depression. Social relationships and daily routine and behavioural activation increased in priority to Rank 2, reflecting expert consensus on the importance of structured daily activities and social engagement in supporting emotional regulation and recovery. Psychological resilience and coping capacity was ranked third, suggesting its role as a key internal resource that supports adaptation to stress. In contrast, physical activity and dietary behaviour were positioned at moderate priority levels, indicating their relevance but comparatively lower perceived impact when considered alongside sleep and psychosocial routines. Life stressors ranked lowest, suggesting that experts viewed stressors as contextual influences rather than modifiable health behaviours. Overall, the findings highlight a clear priority structure in which foundational self-regulation behaviours and psychosocial engagement are emphasized over lifestyle and contextual factors in managing subclinical depression.

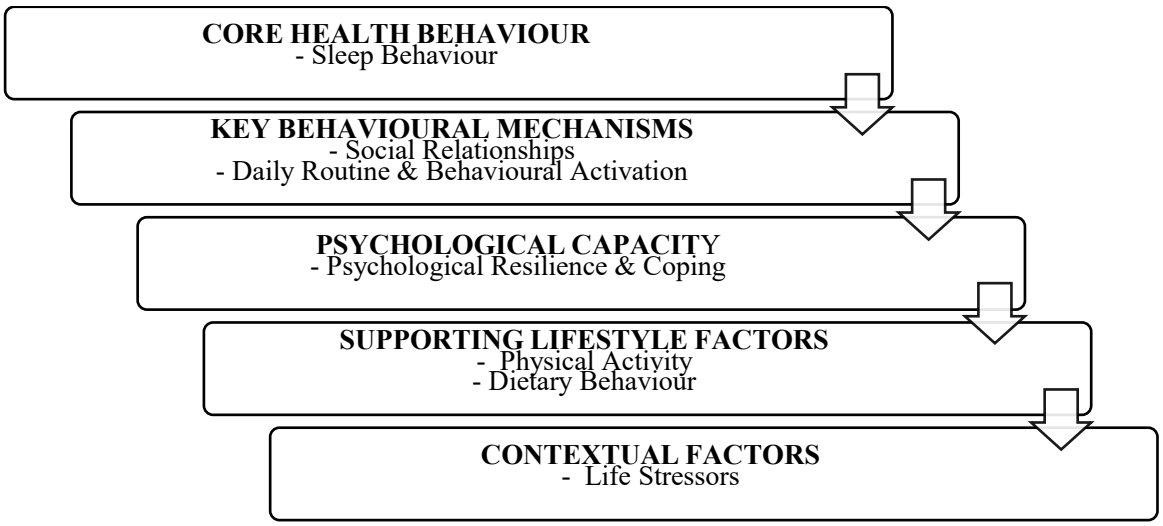

Figure 1: Priority Constructs Health Behaviour for Subclinical Depression

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Conclusion and future research

Based on the priority framework illustrated in Figure 1 and derived through the Fuzzy Delphi Method (FDM), this study concludes that health behaviour in individuals with subclinical depression follows a clear hierarchical structure shaped by expert consensus. Sleep behaviour emerged as the core health behaviour with the highest priority, reflecting strong convergence among experts regarding its foundational role in emotional regulation and psychological functioning. This core behaviour is supported by key behavioural mechanisms namely social relationships and daily routine with behavioural activation which were prioritised as essential processes that translate healthy sleep patterns into broader recovery outcomes. Psychological resilience and coping capacity occupy an intermediate position, indicating their role as internal resources that sustain behavioural change, while physical activity and dietary behaviour were identified as supportive lifestyle factors. Life stressors were ranked lowest, suggesting that experts perceived them primarily as contextual influences rather than modifiable health behaviours. Overall, the FDM results highlight the importance of prioritising foundational self-regulation and behavioural activation processes over secondary lifestyle or contextual factors in interventions targeting subclinical depression.

Future research should empirically test this FDM derived priority framework using longitudinal or experimental designs to examine causal pathways and sequencing among health behaviour constructs. Further studies are also needed to assess the stability of expert derived priorities across different populations, cultural contexts, and stages of subclinical depression. In addition, intervention-based research focusing on high-priority constructs identified through FDM particularly sleep behaviour, behavioural activation, and social engagement may provide valuable evidence for developing targeted, stepped-care interventions and for preventing the progression from subclinical depression to major depressive disorder.

Acknowledgements

The author would like to thank the both academic supervisors Dr. Norzihan binti Ayub and Dr. Carmella E Ading from the Faculty of Psychology and Social Work, University of Malaysia Sabah for their guidance, constructive insights and encouragement throughout the development of this paper.

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eISSN: 0128-1755
Journal website: academicinspired.com/jised
DOI: 10.55573/JISED.118012

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