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# The Impact of Digital Psycho-Religious Therapy on Stress Reduction and Quality of Life in Patients with Diabetes Mellitus in Indonesia

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**ABSTRACT**

**Background:** Diabetes mellitus (DM) is a chronic disease that imposes significant stress and reduces quality of life (QoL), complicating glycaemic control and increasing complications. Leveraging digital platforms offers a scalable and efficient solution, especially in resource-constrained settings such as Indonesia. Objective: This study evaluates the efficacy of a digital psycho-religious therapy program in alleviating stress and enhancing QoL among type 2 DM patients in Indonesia. **Methods:** A quasi-experimental pretest-post-test control group design was employed with 300 patients diagnosed with type 2 DM in West Java, Indonesia. Stress levels were measured using the Perceived Stress Scale (PSS), while QoL was assessed with the WHOQOL-BREF questionnaire, both at baseline and after the intervention. Statistical analyses, including descriptive and regression were conducted to evaluate outcomes. **Results:** The intervention group experienced a significant reduction in stress (scores decreased from $25.6 \pm 4.2$ to $16.4 \pm 3.5$, $p < 0.001$) and a marked improvement in QoL (scores increased from $58.7 \pm 6.5$ to $72.4 \pm 5.8$, $p < 0.001$). Regression analysis revealed that group allocation, baseline scores, and age were significant predictors of outcomes, whereas a longer duration of diabetes was associated with reduced improvements. **Conclusion:** Digital psycho-religious therapy is a promising intervention for stress reduction and QoL improvement in type 2 DM patients, with potential applicability in other low-resource settings. Future research should investigate the long-term effects and broader applicability of this intervention.

***Keywords: Diabetes Mellitus; Digital Health Intervention; Psycho-Religious Therapy; Quality of Life; Stress Reduction***

## INTRODUCTION

Diabetes mellitus (DM) is a chronic metabolic disorder marked by persistent hyperglycaemia due to defects in insulin secretion, insulin action, or both. Over the past decades, the global prevalence of DM has increased dramatically, posing significant challenges to public health systems worldwide (Saeedi *et al*., 2019). Individuals with DM often experience heightened stress and reduced quality of life (QoL), which can worsen glycaemic control and increase the risk of complications (Chew, Mohd-Sidik & Shariff-Ghazali, 2022). Stress-induced hyperglycemia can negatively affect self-management behaviours, worsening health outcomes (Kong *et al*., 2022).

There is a lot of evidence that shows how stress and glycemic control in people with diabetes are interdependent and complex. Elevated cortisol levels, impaired insulin sensitivity, and worsened hyperglycemia are the outcomes of stress-induced hypothalamic-pituitary-adrenal axis activation (Valente *et al.*, 2021). Psychological interventions, such as cognitive-behavioral therapy (CBT), have demonstrated efficacy in reducing stress and improving glycemic control. However, these interventions often lack a focus on integrating spiritual practices, which could provide additional benefits (Chew *et al*., 2022). Therefore, there is a pressing need for holistic interventions that address both psychological and spiritual well-being to enhance care for individuals with DM.

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Spirituality and religious practices play a significant role in improving psychological well-being and enhancing QoL among individuals with chronic illnesses (Lucchetti *et al.*, 2024). For example, mindfulness-based interventions that incorporate prayer and meditation have been found to significantly reduce stress and improve QoL in patients managing chronic conditions (Conversano et al., 2021). Specifically, in the context of diabetes mellitus (DM), psycho-religious approaches can address spiritual and emotional needs, fostering a sense of hope and purpose in patients (Kong *et al*., 2022).

Nurses, as frontline healthcare professionals, are uniquely positioned to support patients with DM in managing both physiological and psychosocial aspects of their condition. Through routine assessments, counselling, and education, nurses play a pivotal role in identifying signs of stress and implementing tailored interventions that promote emotional well-being and glycaemic control (International Council of Nurses, 2021; Haseldine *et al*., 2025). Nurses often serve as advocates and facilitators of spiritual care, especially in communities where religious beliefs are deeply intertwined with health behaviours (Haseldine *et al*., 2025). The integration of spirituality into nursing practice has been associated with improved coping, patient satisfaction, and therapeutic rapport (Abdelwahab *et al*., 2025). However, spiritual care is often underutilised due to time constraints, lack of training, and insufficient institutional support (Karki, Gajurel, & Chalise 2025; Lazor *et al*., 2025).

Digital psycho-religious therapy, which combines psychological counselling with spiritual practices, has gained recognition as a promising strategy for reducing stress and enhancing QoL. This approach draws on the therapeutic benefits of spirituality, which is known to strengthen resilience, improve coping mechanisms, and enhance emotional regulation (Lucchetti *et al.*, 2024). However, traditional interventions often fail to adequately integrate spiritual components due to several limitations. First, many conventional therapies are secular in nature, prioritising evidence-based psychological techniques while overlooking the role of spirituality in mental and emotional well-being (Pargament & Exline, 2021). Second, healthcare providers may lack training in addressing spiritual needs, leading to a gap in holistic care (Puchalski *et al*., 2021). Third, the standardised nature of traditional interventions may not accommodate the diverse spiritual beliefs and practices of individuals, making it difficult to personalise care effectively (Rosmarin *et al*., 2020).

The integration of digital health technologies, such as mobile applications and telehealth platforms, presents new opportunities to make psycho-religious therapy more accessible (Smati *et al*., 2020). Digital platforms can incorporate customisable spiritual practices, such as guided meditations, prayer reminders, or scripture-based reflections, allowing users to engage with their faith in ways that resonate with their beliefs. Despite the success of digital interventions in chronic disease management, their potential in delivering psycho-religious therapy for diabetes mellitus (DM) patients remains underexplored. This gap highlights the need for innovative approaches that leverage digital tools to address both the psychological and spiritual dimensions of chronic illness management.

The evolution of digital health technologies has transformed healthcare delivery, enabling features such as real-time monitoring, personalised feedback, and remote support. These advancements help to overcome common barriers associated with traditional in-person therapy, such as geographic, financial, and time constraints (Smati *et al.*, 2020). While digital interventions have proven effective in improving DM management, most focus on physical health metrics like glycaemic control, leaving the integration of psycho-religious therapy an innovative yet under-researched area (Saeedi *et al.*, 2019; Valente *et al*., 2021). Addressing this gap, this study evaluates the effectiveness of digital psycho-religious therapy specifically tailored to the needs of DM patients. Therefore, this study evaluates the efficacy of a digital psycho-religious therapy program in alleviating stress and enhancing QoL among type 2 DM patients in Indonesia. The findings from this study have the potential to inform the development of innovative, patient-centred care models that integrate psychological and spiritual dimensions into DM management. If successful, this approach could lead to scalable interventions designed to reduce stress, enhance QoL, and improve long-term health outcomes for DM patients.

## METHODOLOGY

### Study Design

This study utilised a quasi-experimental design incorporating pretest and post-test control groups to

evaluate the effects of digital psycho-religious therapy on stress levels and quality of life among patients with type 2 diabetes mellitus.

**Sample**

The study enrolled 300 adults with type 2 diabetes mellitus from Indonesia's West Java outpatient clinics. Individuals had to be between the ages of 30 and 65, have had a diabetes diagnosis for a minimum of a year, and be rated as having moderate to high stress levels on the Perceived Stress Scale (PSS). Patients were not included if they had major mental health issues, serious cognitive impairments, or were taking part in any other stress-management programs.

For a repeated-measures ANOVA design with two groups and two time points, the necessary sample size was determined using G*Power 3.1 software. The estimated that 252 people would make up a sufficient sample size by assuming a medium effect size of 0.3 (Cohen *et al*., 1983), a 0.05 threshold of significance, and a power of 0.95. The planned sample size was raised to 300 participants to reduce the risk of a 15% dropout rate. All patients who met the inclusion criteria throughout the recruiting period were invited to participate in the study using a sequential sampling method.

**Instrument**

Cohen *et al*., (1983) created a 10-item tool called the Perceived Stress Scale (PSS) to measure stress levels. With a total score between 0 and 40, the scale uses a 5-point Likert style, with 0 representing never and 4 representing very often. Stress levels are shown by higher scores. Prior validation studies found that the original version was reliable (Cronbach's alpha = 0.78), whereas in the current study, the Bahasa Indonesia version achieved a Cronbach's alpha of 0.81.

The World Health Organization's Quality of Life Assessment Form (WHOQOL-BREF) was used for this purpose (WHO, 1996). The 26-item scale assesses four domains of health: mental health, social relationships, physical health, and environmental factors. A higher score indicates a better quality of life; the scores can vary from 0 to 100. A Cronbach's alpha of 0.88 was found for the original version, while in the current study, the Bahasa Indonesia translation showed a reliability of 0.85.

**Intervention Protocol**

The digital psycho-religious therapy intervention was designed to integrate cognitive-behavioural techniques with spiritual practices, aiming to support diabetes self-management while addressing psychological and emotional challenges. This intervention was delivered through a mobile application specifically developed for the study. The platform included interactive modules, guided prayers, meditations, and cognitive-behavioural strategies such as cognitive restructuring, stress management techniques, and behavioural activation exercises. Each module was structured to progressively guide participants through self-reflection, faith-based coping strategies, and cognitive reframing to improve their emotional well-being and diabetes self-care behaviours.

The intervention was primarily automated, allowing participants to engage with the digital content at their own pace. However, optional live sessions were offered through scheduled virtual meetings, where participants could join group discussions moderated by a trained facilitator. These sessions provided opportunities for peer support, discussion of personal experiences, and clarification of concepts related to diabetes self-care and spiritual coping. Adherence to the intervention was actively monitored through app engagement metrics, including login frequency, module completion rates, and time spent on guided practices. Additionally, automated reminders were sent via in-app notifications and text messages to encourage participants to complete the weekly modules. The research team conducted bi-weekly check-ins through phone calls or messages to provide support and address any technical or content-related issues.

**Procedures**

The eligible participants for this study were identified by reviews of medical records and were invited to participate in the study during their clinic visits. Eligible participants were identified based on diabetes diagnosis, stress (according to the Perceived Stress Scale), and willingness to participate in a mobile health

intervention. Research assistants approached the eligible individuals with an explanation of the study and informed them about everything, allowing them an opportunity to ask for clarification/clarification before signing the consent form. Participants completed baseline assessments, including the WHOQOL-BREF and PSS, before being assigned to either the intervention group or the control group. The intervention group received digital psycho-religious therapy through a mobile application that was specifically created for this study. This application consisted of modules integrating cognitive-behavioral techniques with spiritual measures, guided prayers, and meditations specifically designed to provide support for diabetes management.

Various mechanisms were put in place to reduce dropout rates and keep participants involved over the 12-week intervention. The participants received reminders via SMS and periodic notifications included through their mobile applications, encouraging them to complete their modules and remain engaged in the study. Those who completed more than 80% of their modules were given petty incentives like mobile data credits or e-health resources. There was also a helpline that addressed any technical trouble encountered during the app's use. Participants were motivated through peer/family sharing regarding their progress, hence engendering motivation through social accountability. As this study was not randomised, there was a potential risk of selection bias in this study. However, an attempt was made by using a sequential sampling method where participants were included only when they met predefined eligibility criteria. The latter was, however, only possible as a part of the regular diabetes self-management education given to the intervention group and until the intervention was finished. Therefore, their information was drawn from evidence-based guidelines about diet, physical activity, medication adherence, and stress management, which were combined with pamphlets and usually involved short in-person counselling sessions at the clinics. Participants in the members of the control group did not receive any digital intervention. Their education was therefore based solely on recommendation regarding general practices of self-care of diabetes. Guidance from healthcare providers was considered necessary. After the 12-week program, both groups were assessed again on the same scales-the PSS and WHOQOL-BREF-to determine stress level and quality of life, respectively. Additionally, anonymous feedback was also sought from the participants in digital therapy concerning usability, perceived effectiveness, and areas for improvement via online survey.

**Data Analysis**

Descriptive statistics were used to summarise demographic characteristics. For continuous variables, measures of central tendency (mean, median) and dispersion (standard deviation, interquartile range) were calculated, while categorical variables were presented as frequencies and percentages. To assess the intervention's impact on post-intervention stress and quality of life, multiple regression analyses were conducted with these outcomes as dependent variables. Covariates, including baseline scores, age, gender, and socioeconomic status were included to control for potential confounders. Model assumptions such as homoscedasticity, normality of residuals, and absence of multicollinearity were verified. Statistical significance was set at $p < .05$, and practical significance was assessed using adjusted $R^2$ and standardised beta coefficients. All analyses were performed using IBM SPSS Statistics version 27, with results presented in tables and figures where appropriate.

**Ethical Consideration**

The research obtained ethical clearance from the Institutional Review Board, STIKes Sukabumi, West Java, Indonesia, under Approval Number 1234/IRB/2024 on 10$^{th}$February 2024.

**RESULTS**

The study participants' demographic profile is shown in Table 1. There was a total of 300 people participated in the study; 150 were part of the intervention group and 150 were part of the control group; all of them had type 2 diabetes mellitus. The majority of the participants were female, making up 60% of the sample. The participants' ages ranged from 30 to 65 years, with an average age of 52.3 years (SD ± 8.7). According to the data on educational attainment, 45.7% of the population has finished secondary school. Not only that, but 62% of those who took part in the study had jobs when it was happening. The reported average number of years since diabetes diagnosis was 7.5 (SD ± 3.4).

***Table 1: Demographic Characteristics of Participants***

| Variable | Total (n=300) | Intervention (n=150) | Control (n=150) |
|---|---|---|---|
| Age (years) | 52.3 ± 8.7 | 52.1 ± 8.5 | 52.5 ± 8.9 |
| **Gender** | | | |
| Male | 120 (40%) | 58 (38.7%) | 62 (41.3%) |
| Female | 180 (60%) | 92 (61.3%) | 88 (58.7%) |
| **Education Level** | | | |
| Primary | 80 (26.7%) | 41 (27.3%) | 39 (26%) |
| Secondary | 137 (45.7%) | 69 (46%) | 68 (45.3%) |
| Higher | 83 (27.7%) | 40 (26.7%) | 43 (28.7%) |
| **Employment Status** | | | |
| Employed | 186 (62%) | 91 (60.7%) | 95 (63.3%) |
| Unemployed | 114 (38%) | 59 (39.3%) | 55 (36.7%) |
| Duration of Diabetes | 7.5 ± 3.4 | 7.6 ± 3.2 | 7.4 ± 3.6 |

Table 2 shows the pre- and post-intervention scores for quality of life and stress levels for the control and intervention groups, respectively. The intervention group showed a significant decrease in stress levels, as judged by the Perceived Stress Scale (PSS), going from 25.6 ± 4.2 to 16.4 ± 3.5 ($p < 0.001$). Stress levels in the control group decreased from 25.4 ± 4.1 to 23.8 ± 4.0 ($p = 0.012$), which was less but still statistically significant. The intervention group also showed a significant increase in quality of life, as measured by the WHOQOL-BREF, with scores increasing from 58.7 ± 6.5 to 72.4 ± 5.8 ($p < 0.001$). As a result, quality of life scores in the control group went up somewhat, going from 58.5 ± 6.2 to 60.8 ± 6.0 ($p = 0.045$).

***Table 2: Stress and Quality of Life Scores (Pre- and Post-Intervention)***

| Variable | Group | Baseline Mean ± SD | Post-Intervention Mean ± SD | *p*-value |
|---|---|---|---|---|
| Stress (PSS) | Intervention | 25.6 ± 4.2 | 16.4 ± 3.5 | <0.001 |
| | Control | 25.4 ± 4.1 | 23.8 ± 4.0 | 0.012 |
| Quality of Life (WHOQOL-BREF) | Intervention | 58.7 ± 6.5 | 72.4 ± 5.8 | <0.001 |
| | Control | 58.5 ± 6.2 | 60.8 ± 6.0 | 0.045 |

The bivariate analysis presented in Table 3 identifies significant predictors of stress reduction and improvements in quality of life (QoL). Age emerges as a notable factor, demonstrating a statistically significant relationship with both outcomes, with p-values of 0.043 for stress reduction and 0.034 for QoL improvement. Similarly, the duration of diabetes is significantly associated with these outcomes, yielding *p*-values of 0.027 and 0.015, respectively. Group allocation, distinguishing intervention from control groups, has a particularly strong influence on both stress reduction and QoL improvement, as evidenced by highly significant p-values below 0.001. In contrast, gender does not show a statistically significant relationship with either outcome, with p-values of 0.215 for stress reduction and 0.278 for QoL improvement.

***Table 3: Bivariate Analysis of Predictors of Stress and Quality of Life Changes***

| Predictor | Stress Reduction (*p*-value) | QoL Improvement (*p*-value) |
|---|---|---|
| Age | 0.043 | 0.034 |
| Gender | 0.215 | 0.278 |
| Duration of Diabetes | 0.027 | 0.015 |
| Group (Intervention/Control) | <0.001 | <0.001 |

Table 4 displays the results of the multivariate regression analysis, which show the variables that affect QoL improvements and stress reduction. Greater subsequent changes were associated with higher beginning scores for both stress and QoL, which were found to be significant predictors ($\beta = 0.42$, $p < 0.001$ for stress and $\beta = 0.48$, $p < 0.001$ for QoL). The intervention group had a strong impact, with stress levels much lower ($\beta = -0.62$, $p < 0.001$) and quality of life significantly improved ($\beta = 0.59$, $p < 0.001$) when compared to the control group. Older individuals' stress levels were lower ($\beta = -0.15$, $p = 0.034$) and their quality of life was better ($\beta = 0.13$, $p = 0.028$), indicating a small but statistically significant effect of age. On the flip side, worse outcomes were linked to greater diabetes duration, as stress reduction ($\beta = -0.21$, $p = 0.012$) and quality of life improvement ($\beta = -0.18$, $p = 0.019$) both declined as diabetes duration increased.

***Table 4: Multivariate Regression Analysis of Stress and Quality of Life Outcomes***

| Variable | Stress Reduction | | | QoL Improvement | | |
|---|---|---|---|---|---|---|
| | *β* | 95% CI | *p*-value | *β* | 95% CI | *p*-value |
| Baseline Stress Score | 0.42 | (0.32, 0.52) | <0.001 | | - | |
| Baseline QoL Score | | - | | 0.48 | (0.36, 0.60) | <0.001 |
| Group (Intervention/Control) | -0.62 | (-0.76, -0.48) | <0.001 | 0.59 | (0.45, 0.73) | <0.001 |
| Age | -0.15 | (-0.27, -0.03) | 0.034 | 0.13 | (0.03, 0.23) | 0.128 |
| Duration of Diabetes | -0.21 | (-0.31, -0.11) | 0.012 | -0.18 | (-0.28, -0.08) | 0.319 |

*Note: CI=Confidence Interval*

## DISCUSSION

This research contributes to the understanding of digital interventions by proving digital psycho-religious therapy to have a positive effect for stress reduction and on QoL among people with type 2 diabetes mellitus in Indonesia. Unlike previous research on secular or purely psychological digital interventions, this one has an integrated digital intervention with spirituality, a new approach that would sit right with the Indonesian population-value system of culture and religion (Abbas, 2024). This psycho-religious therapy addresses barriers to delivery, such as distance or time, using mobile technology, therefore providing a scalable and feasible option for resource-limited settings (Smati *et al*., 2020).

Results provide a salient cultural interpretation of healthcare settings in Indonesia where spirituality and religion are very centre-oriented in everyday life. The study, for instance, indicates that mind exercises in Islam, such as prayer, could be integrated into more standard digital health interventions to make them more accepted and relevant for people who follow Islamic tenets (Awoke & Cosendey, 2025). The specificity method nurtures patient involvement through the establishment of trustworthiness and faith in the intervention-parameters key to success in long-term chronic disease management (Alam *et al*., 2020).

The findings complement existing findings which have shown that psycho-spiritual therapies are effective for ameliorating stress and enhancing QoL. For instance, Abbas (2024) reported that faith-based counselling significantly lowered stress levels among patients with chronic conditions, underscoring the critical role of spirituality in coping strategies. Similarly, Koenig (2012) found that religiously oriented therapies had a significant positive effect on mental health outcomes among people with chronic illnesses. In line with it, this study revealed that the digital psycho-religious therapy ensured an efficient handling of the mental baggage specific to T2DM sufferers and addressed the cultural or spiritual considerations of the Indonesian sample. This study thus contributes to the growing evidence supporting integrative, culturally sensitive approaches in managing chronic diseases, particularly in low- and middle-income countries where traditional healthcare resources may be limited (Valente *et al*., 2021).

The digital format used in this study offered advantages over traditional face-to-face counselling, particularly in terms of accessibility and scalability, especially in rural or underserved regions of Indonesia. This observation is supported by (Li *et al*., 2025), who reported improved engagement and adherence to treatment through digital health interventions for diabetes patients. Moreover, incorporating culturally relevant religious elements into the intervention mirrors findings by Bouwhuis-Van *et al*. (2021), who emphasised that integrating spiritual beliefs into therapy enhances therapeutic outcomes, especially within Muslim communities. There were, however, some inconsistencies with earlier studies. Discrepancies observed with earlier studies, such as the one conducted by Peng *et al*. (2024), need further exploration. These differences could be accounted for by different factors, such as the usual conventional process of onboarding in the current study, which may have been affected by the country's culture or some technological change since previous research was done. Age or educational qualifications as demographic characteristics may affect the outcome of this digital intervention. While some of the findings corroborate previous research, there is inconsistencies in other areas. Digital intervention was found to be limited in effectiveness for reducing stress on older adults who are less tech-savvy (Peng *et al*., 2024), citing that such familiarity with technology could probably moderate the effectiveness of the interventions. Future studies need to look deeper into these

influences on intervention effectiveness across different populations.

Embedding psycho-religious therapy into digital health platforms offers a promising avenue outside the clinical setting for the comprehensive rehabilitation and psychosocial well-being of T2DM patients (Asif & Gaur, 2025). Care providers can integrate these interventions across the physical, emotional, and spiritual dimensions of holistic care (Pong *et al*., 2024). In Indonesia, where religion significantly influences daily life, the culturally sensitive design of such therapy increases its relevance and acceptance, while the digital format aligns with global telemedicine trends, making it sustainable even in resource-limited settings. Beyond current applications, the model presents opportunities for scale-up and adaptation in other chronic illnesses and across non-Indonesian contexts, whether in faith-based environments or secular settings thus reaching diverse cultural and religious populations (Lucchetti *et al*., 2021). If disseminated widely, digital psycho-religious therapy will necessitate supportive regulatory frameworks, reimbursement mechanisms, and incorporation into national healthcare plans to ensure seamless implementation (Belachew *et al*., 2023). Practically, integration into routine care will involve developing patient-selection criteria, aligning with existing care pathways, and defining long-term outcome monitoring (WHO, 2022). Healthcare providers, especially nurses and allied professionals will require adequate training and resources. This includes building competencies in digital literacy, cultural sensitivity, and psycho-spiritual counselling techniques (Asif & Gaur, 2025).

Nurses play a vital role in the implementation and sustainability of digital psycho-religious interventions. As trusted healthcare providers with close patient interaction, nurses are well-positioned to assess spiritual needs, introduce culturally relevant digital tools, and guide patients in using these interventions effectively. This study underscores the need for nurse training in digital health literacy, culturally sensitive communication, and psycho-spiritual counselling to ensure competent delivery. Additionally, nurse educators and administrators should integrate modules on faith-based digital care into nursing curricula and continuing education programs. By embracing culturally grounded digital therapies, nurses can enhance holistic care, strengthen therapeutic alliances, and support long-term disease self-management in diverse populations.

**Limitation**

This study has limitations. The short 12-week intervention period limits understanding of long-term effects. The quasi-experimental design without randomisation may introduce selection bias. Self-reported measures of stress and quality of life could be influenced by response bias. Attrition and adherence rates were not fully analysed. The sample was limited to T2DM patients in West Java, reducing generalisability to other settings. Additionally, participants' digital literacy levels were not assessed, which may have affected engagement with the intervention.

## CONCLUSION

Digital psycho-religious therapy emerges as an effective and culturally attuned intervention for reducing stress and improving QoL among T2DM patients in Indonesia. This study integrates digital psycho-religious therapy-a culturally oriented intervention-with innovation to address stress and quality of life (QoL) in patients with T2DM in Indonesia. It is unlike current interventions that lack focus on faith-based coping mechanisms-in that it draws on religious tenets within a digital platform for scalable, cost-accessible, and contextually appropriate chronic disease management. The finding and implication from this study directly focus on Indonesia and could be generalised in other regions with strong religious or community-based healthcare systems. The integration of digital and psycho-religious elements presents an opportunity for global healthcare settings to open the avenues for developing culturally responsive interventions to improve patient engagement and well-being. Policymakers, researchers, and practitioners involved in the field of healthcare should consider introducing similar digital psycho-religious interventions as part of their public health strategies. Digital health approaches in harmony with cultural beliefs may improve adherence, psychological resilience, and, eventually, the management of diseases.

Future study designs will need to consider retention incentives or multiple follow-ups to minimise dropout rates and achieve data completeness. Study on relying upon self-reports for stress and quality of life could not be free from the possibility of response bias. While some validated instruments were used, self-reported data are also susceptible to social acceptableness and recall bias. Future studies should incorporate measurements of

objective stress strategies, such as cortisol level or heart rate variability, to yield completely fair assessments. Moreover, the study was limited by the fact that participants consisted of T2DM patients in Indonesia. This could limit the generalisability of study results to other cultural or clinical settings. Therein lies the need for recruiting patients from different contexts in the future so that the findings would carry a much bigger weight. Future studies may consider longitudinal designs for assessing the prevention measures, sustained over time.

**Conflict of Interest**

The authors have no conflicts of interest to declare.

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