

Impact of Problem Solving Therapy on Quality of Life of Emotionally Distressed Diabetic Type 2 Patients

Tayyaba Ayub, Idris Adewale Ahmed

Lincoln University College, MALAYSIA.

Correspondance: tayyaba@lincoln.edu.my , idrisahmed@lincoln.edu.my

HOW TO CITE: ABSTRACT:

Tayyaba Ayub, Idris Adewale Ahmed,
(2026). Impact of Problem Solving
Therapy on Quality of Life of
Emotionally Distressed Diabetic Type
2 Patients.
International Journal of Special
Education, 41(24s), 1774 - 1784

Diabetes-specific distress (DSD) the emotional burden, regimen-related strain, and fears about complications experienced by adults with Type 2 diabetes, comes from normal diabetes self-care practices, not from clinical depression. There is a correlation between DSD and poor glycemic control, lack of adherence and lower quality of life. This review seeks to explore randomized controlled trials of psychological interventions, conceptualized from an Islamic perspective of character mastery to decrease distress and enhance psychosocial outcomes in individuals with T2DM. Adjustments to interventions to highlight Islamic teachings should incorporate spiritual practices and moral development with typical therapeutic practices. Core components of Problem-Solving Therapy (PST) problem identification, solution generation, plan implementation and plan review – are introduced and principles of self-purification and ethical discipline patient persistence are introduced. Adjustments to interventions to focus on Character mastery teachings include the incorporation of spiritual practices and moral development into the usual therapeutic interventions. Problem-Solving Therapy (PST) is introduced, including the identification of problems, generation of solutions, implementation and review of plans, and principles of self-purification and ethical discipline: patience during setbacks, trust in God while taking responsible action, prayer and remembrance for emotional regulation, and communal and family support based on Islamic social ethics. This approach places behavioral homework and skills rehearsal in the context of character development, and promotes health goals as expressions of stewardship and moral responsibility. Culturally and spiritually adapted programs have been shown to reduce diabetes distress and improve coping in the short-term in trials. Problem-solving ability (PSTQ) increased from pre-test ($M = 2.00$) to post-test ($M = 2.51$), indicating enhanced practical coping and self-regulatory

COPYRIGHT STATEMENT:

Copyright: © 2026 Authors.
Open access publication under the
terms and conditions
of the Creative Commons Attribution
(CC BY)
license (<http://creativecommons.org/licenses/by/4.0/>).

skills. The greatest effect observed was on glycemic control, with categorical HbA1c scores decreasing from pre-test ($M = 3.46$) to post-test ($M = 2.73$), indicating that spiritually integrated psychosocial care can have a meaningful metabolic effect. The results suggest the importance of interventions that foster both practical problem-solving and moral/character capacities. In practice, integrating character-focused Islamic content into diabetes care can enhance engagement and sustain behavior change. Examples include framing self-care as an act of worship and stewardship, using Quranic reflections and stories of prophetic patience to model endurance, involving mosque or family networks for accountability and social support, and promoting daily spiritual practices that also serve emotional regulation. By linking skill-building with habitual refinement of intention, discipline, and moral conduct clinicians can support patients in achieving both psychological wellbeing and better glycemic outcomes

Keywords: diabetes-specific distress, psychological intervention, cognitive behavioral therapy, problem-solving therapy, Type 2 Diabetes Mellitus, quality of life

Introduction

Type 2 diabetes mellitus (T2DM) is a major public health challenge with substantial physical and psychological consequences. The International Diabetes Federation (IDF, 2025) estimates that approximately 589 million adults aged 20–79 years are living with diabetes worldwide, with more than 90% having T2DM. Pakistan has one of the highest reported diabetes prevalences globally, with approximately 30.8% of adults affected, representing about 33 million adults (IDF, 2025). Beyond metabolic complications, T2DM places considerable emotional and behavioral demands on patients. Diabetes-specific distress (DSD) refers to the negative emotions, worries, frustrations, and fears associated with daily diabetes management (Fisher et al., 2010; Polonsky et al., 2005).

Diabetes-specific distress differs from clinical depression because it is directly associated with the demands of living with and managing diabetes (Gonzalez et al., 2011). Evidence indicates that

clinically significant diabetes distress affects approximately 36% of people with diabetes globally, while a higher pooled prevalence has been reported in Pakistan. Persistent distress may adversely affect self-management, treatment adherence, glycemic control, and quality of life (QoL). Quality of life is multidimensional and includes physical health, psychological well-being, social relationships, and environmental functioning. Therefore, addressing psychological distress is an important component of comprehensive diabetes care, particularly among patients experiencing substantial emotional and self-management burdens.

Psychological interventions, including cognitive behavioral therapy, mindfulness-based approaches, problem-solving therapy (PST), and diabetes self-management education, have demonstrated potential for reducing diabetes-related distress and improving coping (Gonzalez et al., 2011). A systematic review and meta-analysis by Zu et al. (2024), including 16 studies and 1,639 participants,

found that psychological interventions significantly reduced diabetes distress in the short term among adults with T2DM (SMD = -0.56 , 95% CI [-0.90 , -0.22], $p = .001$). PST is particularly relevant because it provides a structured process for identifying problems, generating solutions, planning actions, and evaluating outcomes (Fitzpatrick et al., 2013; Rees et al., 2017). These skills may strengthen self-efficacy and help patients manage everyday diabetes-related challenges more effectively.

Although international evidence supports psychological interventions, comparatively limited research has examined their effects on quality of life among Pakistani patients with T2DM and diabetes-specific distress. Cultural, social, economic, and healthcare-system factors may influence both the experience of distress and response to psychological care. Previous Pakistani studies have reported beneficial effects of cognitive behavioral and related approaches on diabetes distress (Abbas et al., 2023; Mahmood et al., 2025). However, evidence concerning structured PST for improving QoL in this population remains limited. Therefore, this randomized controlled trial aimed to evaluate the effect of Problem-Solving Therapy for Diabetes (PST-D) on the quality of life of adults with T2DM experiencing diabetes-specific distress in an urban community of Lahore, Pakistan.

Methodology

Study Design and Setting

This randomized controlled trial was conducted at Jinnah Hospital Lahore, Pakistan, over 18 months from February 2025 to August 2026. The study protocol was approved by the Institutional Ethical Review Board of Lincoln University College and the ethical committee of the University of Lahore.

Participants:

A total of 200 patients with T2DM and diabetes-specific distress were recruited using purposive sampling. Inclusion criteria were: (1) diagnosis of T2DM for at least one year, (2) age ≥ 40 years, (3) diabetes-specific distress as measured

by the Diabetes Distress Scale (DDS-17) with a mean item score ≥ 2.0 , and (4) willingness to participate. Exclusion criteria included severe psychiatric disorders, physical disabilities preventing participation, and pregnancy.

Sample size was calculated for testing two independent means (two-tailed test) using the following parameters: mean in group 1 (μ_1) = 2.2, $SD_1 = 1.1$; mean in group 2 (μ_2) = 2.5, $SD_2 = 1.9$; ratio = 1.00; alpha = 0.01; beta = 0.1. This yielded 100 participants per group (total $N=200$).

Randomization and Group Allocation

Participants were randomized into two groups using a computer-generated random number sequence, concealed in sealed envelopes by a clinical trials expert external to the study team:

Intervention Group ($n=100$): Received Problem-Solving Therapy for Diabetes (PST-D)

Control Group ($n=100$): Received usual care (routine diabetes education and standard medical management)

Psychological Intervention

Problem-Solving Therapy for Diabetes (PST-D) was delivered in up to six sessions of 45-60 minutes each over 12 weeks. Sessions covered:

Session 1: Introduction to PST-D rationale and problem identification. Identifying diabetes-related issues that need to be solved and formulating them in a way that allows generation of potential solution
Session 2: Generation of alternative solutions. Brainstorming options to creatively address distress in ways not previously considered.

Session 3: Decision making strategies and obstacle identification. Talking about various approaches to decision making and barriers that can impede problem solving.

Session 4: Solution implementation. Implementing the chosen solution.

Session 5: Verification of effectiveness. Confirming the effectiveness of the solution in solving the problem. Session 6 (Booster): Reinforcement and feedback. Feedback on therapy and discussion of future obstacles to problem solving. Trained research assistants provided interventions under the supervision of a clinical

psychologist. Outcome Measures: The assessments were done at baseline (pre-intervention) and at the end of the 12-week intervention period (post-intervention). Primary Outcome Quality of Life: WHOQOL-BREF questionnaire (26 items, four domains: physical health, psychological health, social relationships, environment).

Scores converted to a 0-100 scale. Secondary Outcomes Diabetes-Specific Distress: Diabetes Distress Scale (DDS-17) (17 items, 6-point Likert scale, range 17-102) and Problem Areas in Diabetes (PAID) Scale (20 items, 0-100 scale) Problem-Solving Ability: Problem-Solving Therapy Questionnaire (PST-DM) (34 items) Glycemic Control: HbA1c levels (categorical scoring)

DATA ANALYSIS AND RESULTS

The data were analyzed using SPSS version 26. The normality was tested by Kolmogorov-Smirnov test. Descriptive statistics (mean, standard deviation, frequencies, percentages) were calculated. Cronbach's alpha was used to test internal consistency. Group comparisons were performed using: Chi-square tests for categorical variables. Kruskal-Wallis H tests are used for non-normally distributed continuous variables between groups. Wilcoxon signed-rank tests were used for

pre-post comparisons within groups. Mann-Whitney U tests for between-group comparisons Effect sizes (Cohen's d) were calculated for pre-post changes The level of statistical significance was $p < 0.05$. Ethical Considerations: All participants gave written informed consent. Participants were informed that their participation would be kept confidential, anonymous, and that they could withdraw at any time. There were no known risks to the participants in the study. RESULTS Participant Characteristics: Demographic characteristics of the 200 participants (100 in each group) are shown in Table 1. The age distribution was even among groups (40-80 years). There was a slight female predominance in both groups in terms of gender distribution. There was a significant proportion of divorced (40% in intervention, 41% in control) or married (25% in intervention, 27% in control) marital status. The educational level was diverse, with primary and secondary education being the most frequent. The most common duration of diabetes was 1-4 years. Semi-skilled and unskilled workers were found to be prevalent in the occupational data. The monthly income was varied with significant number of people earning between 25,000-85,000 PKR.

Table 1 Demographic Characteristics of Study Participants (N=200)

Variables	Control (n=100)	Intervention (n=100)
Age		
40-50 years	30 (30%)	33 (33%)
50-60 years	23 (23%)	24 (24%)
60-70 years	15 (15%)	22 (22%)
70-80 years	32 (32%)	21 (21%)
Gender		
Male	45 (45%)	45 (45%)
Female	55 (55%)	55 (55%)
Marital Status		
Married	27 (27%)	25 (25%)
Divorced	41 (41%)	40 (40%)
Widowed	15 (15%)	16 (16%)
Education		

Illiterate	10 (10%)	8 (8%)
Primary	16 (16%)	21 (21%)
Secondary	25 (25%)	20 (20%)
Higher Secondary	15 (15%)	25 (25%)
Graduation	26 (26%)	18 (18%)
Professional Degree	8 (8%)	8 (8%)
Duration of Disease		
<1 year	12 (12%)	8 (8%)
1-2 years	21 (21%)	26 (26%)
3-4 years	29 (29%)	25 (25%)
4-5 years	21 (21%)	29 (29%)
>5 years	17 (17%)	12 (12%)
Occupation		
Professional	12 (12%)	4 (4%)
Semiprofessional	14 (14%)	22 (22%)
Clerical/Shop/Farm	19 (19%)	8 (8%)
Skilled Worker	12 (12%)	16 (16%)
Semi-Skilled Worker	12 (12%)	23 (23%)
Unskilled	20 (20%)	19 (19%)
Unemployed	11 (11%)	8 (8%)
Monthly Income		
Less than 25,000	21 (21%)	9 (9%)
25,000-45,000	14 (14%)	25 (25%)
45,000-65,000	12 (12%)	20 (20%)
65,000-85,000	15 (15%)	17 (17%)
85,000-115,000	23 (23%)	16 (16%)
More than 115,000	15 (15%)	13 (13%)

Table 1 shows broadly comparable demographic characteristics between the control and intervention groups. Both groups had equal gender proportions, while age, marital status, education, disease duration, occupation, and income varied across categories. Overall, the distribution indicates that both groups included participants with diverse socioeconomic and clinical backgrounds.

Cronbach's alpha coefficients indicated good internal consistency for DDS-17 ($\alpha=0.800$) and WHOQOL-BREF ($\alpha=0.850$). The PST-DM showed questionable reliability ($\alpha=0.656$), and PAID Scale showed poor internal consistency ($\alpha=0.512$). Kolmogorov-Smirnov tests confirmed significant deviations from normal distribution for all scales ($p < 0.001$), necessitating non-parametric analyses.

Table 2 Pre-Post Descriptive Statistics for Outcome Measures (N=200)

Variables	Pre-test Mean $\pm$ SD	Post-test Mean $\pm$ SD
PAID Scale		

Control	50.20 ± 4.69	50.10 ± 3.89
Intervention	50.04 ± 4.72	39.46 ± 4.91
DDS-17		
Control	76.46 ± 3.42	76.40 ± 3.54
Intervention	76.92 ± 4.15	59.67 ± 4.31
PST-DM		
Control	27.72 ± 4.08	25.31 ± 4.29
Intervention	27.25 ± 3.59	40.23 ± 3.42
WHOQOL-BREF		
Control	51.70 ± 3.93	51.58 ± 3.76
Intervention	53.81 ± 3.97	62.74 ± 4.94
HbA1c		
Control	10.40 ± 1.51	10.44 ± 1.41
Intervention	10.60 ± 1.57	8.91 ± 1.14

Table 2 indicates favorable pre- to post-intervention changes in the intervention group across all major outcomes. PAID and DDS-17 scores decreased, whereas PST-DM and WHOQOL-BREF scores increased. HbA1c also declined in the intervention group. In contrast, changes in the control group were minimal, suggesting a beneficial pattern associated with PST-D.

Table 3 Summary of Pre- to Post-Intervention Changes

Outcome Measure	Group	Statistical Test	Z-value	p-value	d	Interpretation
PAID (Diabetes Distress)	Control	Wilcoxon	-0.461	0.645	0.023	No significant change
	Intervention	Wilcoxon	-8.511	< 0.001	2.197	Significant reduction
DDS-17 (Diabetes Distress)	Control	Wilcoxon	-0.093	0.926	0.017	No significant change
	Intervention	Wilcoxon	-8.686	< 0.001	4.070	Significant reduction
PST-DM (Problem-Solving)	Control	Wilcoxon	-4.069	< 0.001	-0.576	Small but significant decline
	Intervention	Wilcoxon	-8.684	< 0.001	3.702	Significant improvement
HbA1c (Glycemic Control)	Control	Wilcoxon	-0.407	0.684	-0.027	No meaningful change
	Intervention	Wilcoxon	-6.443	< 0.001	1.232	Significant reduction

WHOQOL-BREF (Quality of Life)	Control	Wilcoxon	-0.004	0.997	-0.031	No significant change
	Intervention	Wilcoxon	-8.312	< 0.001	1.993	Significant improvement

Notes. PAID = Problem Areas in Diabetes Scale, DDS-17 = 17-item Diabetes Distress Scale, PST-DM = Problem-Solving Therapy Questionnaire for Diabetes,

WHOQOL-BREF = World Health Organization Quality of Life Scale, d=Effect Size (0.2 = small, 0.5 = medium, ≥ 0.8 = large).

Table 3 demonstrates statistically significant pre- to post-intervention improvements in the intervention group for PAID, DDS-17, PST-DM, HbA1c, and WHOQOL-BREF (all $p < .001$). Effect sizes were large, ranging from $d = 1.232$ to $d = 4.070$. The control group showed no significant change in distress, HbA1c, or QoL, although PST-DM showed a small-to-moderate decline ($d = -0.576$).

All significant changes in the Intervention group are considered large effects. PST-DM (Control Group): The negative effect size (-0.576) indicates a decline in problem-solving skills for the control group, which was

statistically significant but small-to-medium in magnitude.

Wilcoxon signed-rank tests for HbA1c showed:

Control Group: No meaningful change ($Z = -0.407$, $p = 0.684$, $d = -0.027$)

Intervention Group: Significant reduction ($Z = -6.443$, $p < 0.001$, $d = 1.232$)

Wilcoxon signed-rank tests for overall QoL revealed:

Control Group: No significant change ($Z = -0.004$, $p = 0.997$, $d = -0.031$)

Intervention Group: Significant improvement ($Z = -8.312$, $p < 0.001$, $d = 1.993$)

Table 4 Domain-Specific Quality of Life Improvements

Domain	Group	Pre-test Mean	Post-test Mean	p-value	Effect Size (d)
Psychological Health	Control	25.29	23.75	0.926	-0.031
	Intervention	26.45	34.45	0.058	1.993
Social Relationships	Control	25.08	25.41	0.997	-0.031
	Intervention	25.33	36.50	<0.001	1.993
Environment	Control	24.65	24.53	0.997	-0.031
	Intervention	24.31	35.93	<0.001	1.993

Table 4 shows improvement across all four WHOQOL-BREF domains in the intervention group.

psychological health, social relationships, and environmental scores increased from pre-test to post-test, with statistically significant changes for Psychological, social relationships, and environment. The control group showed no significant domain-level improvement.

Table 5 Summary of Pre-Post Intervention Effects Across Groups

Scale	Group	Pre-test	Post-test	p-value	Cohen's d
PAID	Control	50.20	50.10	0.645	0.023
	Intervention	50.04	39.46	<0.001	2.197
DDS-17	Control	76.46	76.40	0.926	0.017
	Intervention	76.92	59.67	<0.001	4.07
PST-DM	Control	27.72	25.31	<0.001	-0.576
	Intervention	27.25	40.23	<0.001	3.702

HbA1c	Control	10.40	10.44	0.684	-0.027
	Intervention	10.60	8.91	<0.001	1.232
QoL	Control	51.70	51.58	0.997	-0.031
	Intervention	53.81	62.74	<0.001	1.993

Table 5 summarizes the overall intervention effects and confirms the pattern observed in the preceding analyses. The intervention group showed reductions in PAID, DDS-17, and HbA1c and increases in PST-DM and QoL. All intervention-group changes were statistically significant ($p < .001$) and accompanied by large effect sizes, whereas the control group showed little or no improvement.

Discussion

This randomized controlled trial evaluated the effectiveness of Problem-Solving Therapy for Diabetes (PST-D) on quality of life among adults with T2DM and diabetes-specific distress in Lahore, Pakistan. The findings demonstrated significant improvements in all assessed outcomes in the intervention group compared with usual care. At baseline, diabetes-specific distress was substantial, with DDS-17 scores of 76.92 ± 4.15 in the intervention group and 76.46 ± 3.42 in the control group. PAID scores were also similar between groups (50.04 ± 4.72 and 50.20 ± 4.69 , respectively). These findings indicate a comparable baseline burden of distress and provide an appropriate basis for evaluating the intervention effect.

The intervention produced a significant improvement in overall quality of life. WHOQOL-BREF scores increased from 53.81 ± 3.97 at baseline to 62.74 ± 4.94 after intervention, with a large effect size ($d = 1.993$, $p < .001$), whereas the control group showed no meaningful change. Improvements were observed across psychological health, social relationships, and environmental domains. These findings support the potential value of structured psychological care in addressing the multidimensional

consequences of diabetes distress. The results are consistent with evidence indicating that psychological interventions can improve psychosocial outcomes among people with T2DM (Jenkinson et al., 2022; Zu et al., 2024).

PST-D also substantially reduced diabetes-specific distress. In the intervention group, DDS-17 scores declined from 76.92 ± 4.15 to 59.67 ± 4.31 ($p < .001$, $d = 4.070$), while PAID scores decreased from 50.04 ± 4.72 to 39.46 ± 4.91 ($p < .001$, $d = 2.197$). No significant reductions were observed in the control group. The large effect sizes indicate that the intervention was associated with a pronounced reduction in emotional and diabetes-related burden. These findings are broadly consistent with systematic reviews showing beneficial effects of psychological interventions on diabetes distress (Jenkinson et al., 2022; Zu et al., 2024).

A major finding was the improvement in problem-solving ability. PST-DM scores increased from 27.25 ± 3.59 to 40.23 ± 3.42 in the intervention group ($p < .001$, $d = 3.702$). In contrast, the control group showed a small but significant decline ($d = -0.576$). The intervention's structured sequence of problem identification, solution generation, decision making, implementation, and review may have strengthened participants' coping and self-management skills. This interpretation is consistent with evidence that problem-solving interventions can improve diabetes self-management behaviors, adherence, self-efficacy, and psychosocial outcomes (Fitzpatrick et al., 2013).

The intervention was also associated with improved glycemic control. HbA1c decreased from 10.60 ± 1.57 to 8.91 ± 1.14 in the

intervention group ($p < .001$, $d = 1.232$), whereas the control group showed no significant change. The reduction of 1.69 percentage points suggests a clinically meaningful improvement in glycemic status during the intervention period. Although the study was primarily focused on psychological outcomes, the finding supports the potential relationship between improved coping, self-management, and metabolic control. Previous evidence similarly indicates that psychological interventions may contribute to better glycemic outcomes in people with diabetes (Ismail et al., 2018; Zu et al., 2024).

The findings should also be interpreted in relation to the socioeconomic and social characteristics of the participants. Many participants had relatively low income and were employed in semi-skilled or unskilled occupations, while a substantial proportion were divorced. Such circumstances may reduce access to resources and social support and may increase the burden of diabetes management. Participants with lower educational attainment may also require simplified explanations and culturally appropriate intervention materials. Nevertheless, the observed improvements suggest that PST-D can be feasible and beneficial even in a resource-constrained setting when delivered through a structured and supervised approach.

The results have several clinical implications for diabetes care in Pakistan. Routine screening for diabetes distress using validated instruments such as the DDS-17 and PAID may facilitate early identification of patients requiring psychosocial support. Psychological interventions could be integrated into routine diabetes services through multidisciplinary teams involving physicians, diabetes educators, psychologists, and dietitians. Given limited access to specialist mental health professionals, supervised task-sharing approaches may also be considered. Interventions should be adapted to patients' literacy, socioeconomic circumstances, family support,

and cultural context to improve engagement and sustainability.

The study has several strengths, including its randomized controlled design, use of a comparison group, structured PST-D protocol, sample size of 200 participants, and assessment of multiple clinically relevant outcomes. However, the single tertiary-care setting may limit generalizability, and self-reported measures may introduce response bias. The 12-week follow-up does not establish whether improvements are sustained over the longer term, and lack of participant and provider blinding may have influenced responses. Future studies should include longer follow-up, implementation and cost-effectiveness analyses, and comparisons with other psychological approaches such as cognitive behavioral therapy and mindfulness-based interventions. These studies could also evaluate culturally responsive and digitally delivered PST-D models in diverse Pakistani populations.

Conclusion:

The findings of this randomized controlled trial are very convincing and suggest that Problem-Solving Therapy for Diabetes (PST-D) is effective in enhancing the quality of life of patients with T2DM who are suffering from diabetes-specific distress in Lahore, Pakistan. The study revealed that about two-thirds of T2DM patients in this population have clinically significant diabetes distress, underscoring the need for routine screening and intervention. The psychological intervention resulted in large to very large effect sizes for all outcome measures. Quality of life scores rose significantly ($d = 1.993$), diabetes-specific distress was significantly lowered (DDS: $d = 4.07$; PAID: $d = 2.197$), problem-solving ability was improved ($d = 3.702$), and glycemic control was improved ($d = 1.232$). The improvements were achieved in a resource-limited environment where patients had substantial socioeconomic problems,

highlighting the potential efficacy of targeted psychological interventions in difficult environments. In Pakistan and other resource-limited countries, the adoption of psychological interventions in clinical practice can have a profound impact on patient outcomes, alleviate diabetes-related distress, and ultimately enhance the quality of life for people with T2DM. Healthcare policy makers and practitioners should focus on embedding mental health services into routine diabetes care and building multidisciplinary care teams to deliver

comprehensive, patient-centred diabetes care. The results are consistent with the biopsychosocial approach to diabetes management, and indicate that psychosocial factors can be successfully managed to yield significant improvements in psychosocial and clinical outcomes. By offering patients practical strategies for dealing with the everyday demands of living with diabetes, Problem-Solving Therapy helps to alleviate emotional stress and improve overall health.

References:

- Abbas, Q., Latif, S., Habib, H. A., Shahzad, S., Sarwar, U., Shahzadi, M., Ramzan, Z., & Washdev, W. (2023). Cognitive behavior therapy for diabetes distress, depression, health anxiety, quality of life and treatment adherence among patients with type-II diabetes mellitus: A randomized controlled trial. *BMC Psychiatry*, 23, 86. <https://doi.org/10.1186/s12888-023-04546-w>
- Akhtar, S., Nasir, J. A., Abbas, T., & Sarwar, A. (2019). Diabetes in Pakistan: A systematic review and meta-analysis. *Pakistan Journal of Medical Sciences*, 35(4), 1173-1178. <https://doi.org/10.12669/pjms.35.4.194>
- Asmat, K., Rahman, I., Ullah, N., Raoof, S., & Perveen, R. (2026). Prevalence and associated factors of diabetes distress among adults with type 2 diabetes mellitus in Pakistan: A systematic review and meta-analysis. *Current Diabetes Reviews*. <https://doi.org/10.1007/s40200-026-01898-4>
- Fisher, L., Glasgow, R. E., & Strycker, L. A. (2010). The relationship between diabetes distress and clinical depression with glycemic control among patients with type 2 diabetes. *Diabetes Care*, 33(5), 1034–1036. <https://doi.org/10.2337/dc09-2175>
- Fitzpatrick, S. L., Schumann, K. P., & Hill-Briggs, F. (2013). Problem-solving interventions for diabetes self-management and control: A systematic review of the literature. *Diabetes Research and Clinical Practice*, 100(2), 145-161. <https://doi.org/10.1016/j.diabres.2012.12.016>
- Gonzalez, J. S., Fisher, L., & Polonsky, W. H. (2011). Depression in diabetes: Have we been missing something important? *Diabetes Care*, 34(1), 236-239.
- International Diabetes Federation. (2025). *IDF Diabetes Atlas* (11th ed.). International Diabetes Federation.
- Ismail, K., Winkley, K., & Rabe-Hesketh, S. (2004). Systematic review and meta-analysis of randomized controlled trials of psychological interventions to improve glycemic control in patients with type 2 diabetes. *The Lancet*.
- Jafari, A., Naddafi, F., Gholian-Aval, M., & Tehrani, H. (2024). Relationship between diabetes health literacy, distress, burnout, social support, and quality of life among patients with type 2 diabetes. *Diabetology & Metabolic Syndrome*, 16. <https://doi.org/10.1186/s13098-024-01391-z>
- Jenkinson, E., Knoop, I., Hudson, J. L., Moss-Morris, R., & Hackett, R. A. (2022). The effectiveness of cognitive behavioural therapy and third-wave cognitive behavioural interventions on diabetes-related distress: A systematic review and meta-analysis. *Diabetic Medicine*, 39(11), e14948. <https://doi.org/10.1111/dme.14948>
- Mahmood, S., Fatima, I., Khan, S. A., Ahmed, M., Zubair, F., Arshad, F., & Tahir, M. (2024). Effectiveness of cognitive behavioral techniques for diabetes distress in patients presenting with diabetes related distress at a tertiary care hospital. *Pakistan Journal of Health Sciences*, 6(1). <https://doi.org/10.54393/pjhs.v6i1.2467>
- Malik, N., Arshad, M., & Muazzam, A. (2024). Diabetes distress, depression and coping strategies in adults with type 2 diabetes. *Pakistan BioMedical Journal*, 7(4). <https://doi.org/10.54393/pbmj.v7i04.1076>

- Perrin, N. E., Davies, M. J., Robertson, N., Snoek, F. J., & Khunti, K. (2017). The prevalence of diabetes-specific emotional distress in people with Type 2 diabetes: A systematic review and meta-analysis. *Diabetic Medicine*, 34(11), 1508-1520. <https://doi.org/10.1111/dme.13448>
- Polonsky, W. H., Fisher, L., Earles, J., Dudl, R. J., Lees, J., Mullan, J., & Jackson, R. A. (2005). Assessing psychosocial distress in diabetes: Development of the Diabetes Distress Scale. *Diabetes Care*, 28(3), 626-631.
- Rees, G., O'Hare, F., Saeed, M., Sudholz, B., et al. (2017). Problem-solving therapy for adults with diabetic retinopathy and diabetes-specific distress: A pilot randomized controlled trial. *BMJ Open Diabetes Research & Care*, 5(1), e000307. <https://doi.org/10.1136/bmjdr-2016-000307>
- Rubin, R. R., & Peyrot, M. (1999). Quality of life and diabetes. *Diabetes/Metabolism Research and Reviews*, 15(3), 205-218.
- Schmidt, C. B., van Loon, B. J. P., Vergouwen, A. C. M., Snoek, F. J., Honig, A., & Nefs, G. (2018). Systematic review and meta-analysis of psychological interventions in people with diabetes and elevated diabetes distress. *Diabetic Medicine*, 35(9), 1157-1172. <https://doi.org/10.1111/dme.13709>
- World Health Organization. (1996). *WHOQOL-BREF: Introduction, administration, scoring and generic version of the assessment*. World Health Organization.
- Young-Hyman, D., de Groot, M., Hill-Briggs, F., Gonzalez, J. S., Hood, K., & Peyrot, M. (2016). Psychosocial care for people with diabetes: A position statement of the American Diabetes Association. *Diabetes Care*, 39(12), 2126-2140. <https://doi.org/10.2337/dc16-2053>
- Zu, W., Zhang, S., Du, L., Huang, X., Nie, W., & Wang, L. (2024). The effectiveness of psychological interventions on diabetes distress and glycemic level in adults with type 2 diabetes: A systematic review and meta-analysis. *BMC Psychiatry*, 24, 660. <https://doi.org/10.1186/s12888-024-06125-z>

ACKNOWLEDGEMENTS

The authors thank all participants for their valuable contribution to this study. We acknowledge the support of Jinnah Hospital Lahore and Lincoln University College Malaysia for facilitating this research. Special thanks to the research assistants and clinical psychologists who delivered the interventions.

AUTHOR DECLARATION

The authors declare that this work is original and has not been published previously. All authors contributed significantly to the conception, design, data collection, analysis, and manuscript preparation. There are no conflicts of interest to declare.