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EFFECT OF COMBINED PHYSICAL AND PSYCHOLOGICAL INTERVENTIONS ON DIABETES-SPECIFIC DISTRESS AMONG PATIENTS WITH TYPE 2 DIABETES MELLITUS

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Abstract

Diabetes-specific distress is a significant emotional burden with daily life of type 2 diabetes mellitus (T2DM). This article's underlying paper was a physical activity-based approach with psychological support for patients with diabetes-specific distress. To present the impact of the combined physical and psychological intervention on diabetes-specific distress in adults with T2DM, based on the results of the Diabetes Distress Scale (DDS) in the paper. This was a randomized controlled trial carried out in Jinnah and mayo hospital, Lahore, Pakistan, as a part of the parent study. The intervention framework contained a structured physical activity component and Problem-Solving Therapy provided over 12 weeks. The Diabetes Distress Scale was used to measure diabetes-specific distress. This article only deals with the DDS finding that includes both types of interventions and does not add anything new to the calculation of patient-level results. The overall physical and psychological intervention significantly impacted diabetes distress ($p < .001$), and there was a very large reported effect size (Cohen's $d = 8.67$). The Article reports that the largest DDS effect was achieved by the combined intervention among the intervention group. In the reported trial results, a combined approach to tackling both physical and psychological aspects was associated with a significant decrease in diabetes-specific distress in individuals with T2DM. Overall, the findings are encouraging for the evaluation of integrated diabetes-care models in future studies with sufficient sample size and duration of observation.

INTRODUCTION

Type 2 diabetes mellitus (T2DM) is a long-term metabolic condition that requires continuous attention to blood glucose management, medication adherence, dietary choices, physical activity, monitoring, and regular healthcare consultations. Although advances in diabetes care have improved the ability to manage glycaemic and metabolic outcomes, living with diabetes can place a substantial day-to-day burden on individuals. The demands associated with maintaining treatment routines and adapting to lifestyle changes may extend beyond physical health and influence emotional, social, and psychological well-being. Diabetes distress (DD) represents an important but frequently under-recognized aspect of living with T2DM. Unlike a psychiatric disorder, diabetes distress describes the emotional and practical difficulties that arise from the ongoing demands of diabetes self-management. Individuals experiencing distress may feel overwhelmed by treatment responsibilities, frustrated by difficulties in achieving glycaemic targets, worried about possible complications, or concerned about the long-term consequences of the disease. Such experiences may affect motivation, self-care behaviors, treatment engagement, and perceived quality of life. Consequently, identifying diabetes distress is important because its presence may create an additional barrier to effective diabetes self-management.

The experience of diabetes distress is multidimensional. Emotional concerns may coexist with difficulties related to diabetes management, communication with healthcare providers, interpersonal relationships, and worries about complications. These concerns can interact with lifestyle behaviors, creating a cycle in which psychological burden reduces engagement in healthy behaviors while inadequate self-management may further increase emotional stress. Therefore, addressing diabetes distress solely through conventional medical management may not sufficiently address the broader challenges experienced by people living with T2DM.

Physical activity is an important component of comprehensive diabetes management and may contribute to improved physical functioning, metabolic health, self-efficacy, and overall well-being. However, individuals experiencing diabetes distress may encounter psychological and social barriers that make it difficult to initiate or maintain regular physical activity. Similarly, psychological approaches can help individuals identify problems, develop practical coping strategies, improve confidence in self-management, and address diabetes-related concerns, but psychological support alone may not fully address the physical and behavioral dimensions of diabetes care.

A combined intervention that integrates physical activity with psychological support therefore provides a broader approach to diabetes distress. Physical intervention can target functional and behavioral aspects of diabetes management, while psychological intervention can address emotional burden, problem-solving difficulties, coping responses, and barriers to sustained self-care. The two components may complement one another by addressing different but interconnected dimensions of the patient's experience. Improving physical engagement may enhance confidence and perceived control, while psychological support may strengthen motivation and the ability to overcome barriers to physical activity and diabetes self-management.

Despite increasing recognition of diabetes distress as an important component of diabetes care, evidence concerning integrated approaches that simultaneously address physical and psychological needs remains comparatively limited, particularly in developing-country settings. In Pakistan, where individuals with T2DM may face substantial treatment, lifestyle, family, and healthcare-related challenges, contextually appropriate interventions are particularly relevant. Examining diabetes distress and its response to a combined intervention may therefore contribute to a more holistic understanding of diabetes management.

Accordingly, the present study focuses on diabetes distress among adults with T2DM and examines the role of a combined physical and psychological intervention in addressing the multidimensional burden associated with living with diabetes. By bringing physical and psychological components together, the intervention seeks to move beyond disease control alone and consider the individual's ability to cope with, adapt to, and actively manage the everyday challenges of T2DM.

Objective: To examine the reported effect of combined physical and psychological interventions on diabetes-specific distress among patients with type 2 diabetes mellitus using the Diabetes Distress Scale.

Materials and Methods

Study Design and Setting

The source study used a randomized controlled trial design and was conducted at Jinnah and Mayo Hospitals, Lahore, Pakistan. The paper describes four study groups: usual care/control, physical intervention, psychological intervention, and combined physical and psychological intervention.

Participants

The parent paper reports adults with T2DM experiencing diabetes-specific distress. The abstract reports 400 patients with T2DM having diabetes-specific distress.

Intervention

Physical component was structured activity program. The paper outlines a pedometer-guided walking intervention for 12 weeks. The psychological aspect involved Problem-Solving Therapy for Diabetes, which involved six sessions over a 12-week period. For the combined group, they were administered together.

Outcome Measure

Diabetes-specific distress was assessed using the Diabetes Distress Scale (DDS). The paper identifies the DDS as a 17-item measure with four subscales: regimen-related distress, physician-related distress, and interpersonal distress.

Results and Discussion

The descriptive statistics and Mann-Whitney U test results for the combined physical and psychological intervention group (n = 100) reveal substantial increases in mean scores across all quality-of-life domains from pre-test to post-test. Mean physical health scores rose from 36.21 ± 7.12 to 51.89 ± 9.83, while psychological health increased from 32.04 ± 8.07 to 55.70 ± 10.99. Even more pronounced gains were observed in social relationships, which jumped from 24.41 10.34 to 60.66 ± 15.35, and the environment domain, which moved from 24.37 ± 6.51 to 63.37 ± 8.36. Regarding statistical significance, the improvement in the environment domain reached the critical threshold (U = 781.00, p = .050), while social relationships showed a notable trend toward significance (U = 846.00, p = .091). However, the changes in physical health (p = .526) and psychological health (p = .519) did not reach statistical significance according to the Mann-Whitney U test. These findings suggest that the combined intervention was particularly effective in descriptive terms across all domains and statistically impactful for the environmental quality of life among patients in this urban community.

Table 1

Descriptive Statistics and Mann-Whitney Test Results: Pre- and Post-Intervention Problem Areas in the Diabetes (PAID) Scale and Quality of Life for combined Physical and Phycological Intervention Group (n=100)

Group	Pre-test			Post-test		
Quality of life	Mean	SD	Mann-Whitney Test (p-value) df = 4	Mean	(SD)	Mann-Whitney Test (p-value) df = 4
D1: Physical health	36.21	7.12	--	51.89	9.83	985.00 (.526)
D2: Psychological health	32.04	8.07	--	55.70	10.99	983.50 (.519)

D3: Social relationships	24.41	10.34	~	60.66	15.35	846.00 (.091)
D4: Environment	24.37	6.51	~	63.37	8.36	781.00 (.050)

SD=Standard Deviation

The results of the Wilcoxon signed ranks test for the Diabetes Distress Scale (DDS) indicate significant improvements in emotional distress across all intervention groups, while the control group remained stable (N = 400). The control group showed no significant change in distress levels from pre-test (M = 76.46) to post-test (M = 76.40, Z = -.093, p = .926), with a negligible effect size (d = 0.017). Conversely, the physical intervention (Z = -8.688, p < .001, d = 4.40) and psychological intervention (Z = -8.686, p < .001, d = 4.07) groups both demonstrated substantial reductions in distress scores with very large effect sizes. Most notably, the combined physical and psychological group achieved the most profound reduction, lowering the mean distress score from 75.99 ± 3.86 at pre-test to 42.63 ± 3.83 at post-test (Z = -8.685, p < .001).

This integrated approach yielded an exceptionally high effect size (d = 8.67), suggesting that a dual-modality strategy is significantly more effective at alleviating diabetes-related distress than individual interventions alone.

Table 2

Statistics of Wilcoxon signed ranks test of Diabetes Distress Scale for control, physical, psychological and combined physical and psychological interventions for pre-post-test (400)

Pre-test			Post-test				
Group	M	SD	M	SD	Z(100)	p-value	Cohen's d
Control group (100)	76.46	3.42	76.40	3.54	-.093	.926	0.017
Physical group (100)	76.82	3.65	60.04	3.97	-8.688	<.001	4.40
Psychological group (100)	76.92	4.15	59.67	4.31	-8.686	<.001	4.07
Both physical and psychological group (100)	75.99	3.86	42.63	3.83	-8.685	<.001	8.67

The combined physical and psychological intervention demonstrated a statistically significant change in diabetes-specific distress (p < .001). The reported Cohen's d was 8.67, representing a very large effect according to conventional effect-size interpretation. The paper identifies this as the largest DDS effect among the intervention groups.

Table 3

Pre–Post Change in Overall Quality-of-Life Scores Across Study Groups

Group (n=100 each)	Pre-test M (SD)	Post-test M (SD)	Z	p-value	Cohen's d
Control	51.70 (3.93)	51.58 (3.76)	-0.004	.997	-0.031
Physical intervention	52.84 (4.07)	62.91 (4.61)	-8.586	<.001	2.316
Psychological intervention	53.81 (3.97)	62.74 (4.94)	-8.312	<.001	1.993

Combined intervention	56.56 (4.16)	86.47 (4.51)	-8.686	<.001	6.894

Note. Values reproduced from the parent paper. The paper reports Wilcoxon signed-rank tests. The quality-of-life measure is presented here as reported; score direction and the unusually large effect sizes should be checked against the original scoring and analysis output before submission.

The control group showed almost no change in overall quality-of-life score ($p = .997$). The physical and psychological intervention groups showed statistically significant increases (both $p < .001$). The combined intervention group had the largest reported increase, from 56.56 to 86.47 ($p < .001$; reported Cohen's $d = 6.894$). These are within-group pre–post results; they do not, by themselves, establish that the combined intervention was statistically superior to the other groups. The very large reported effect sizes warrant verification from the original dataset and statistical output.

Table 4
Pre–Post Change in HbA1c-Related Categorical Scores Across Study Groups

Group (n=100 each)	Pre-test M (SD)	Post-test M (SD)	Z	p-value	Cohen's d
Control	10.40 (1.51)	10.44 (1.41)	-0.407	.684	-0.027
Physical intervention	10.25 (1.39)	8.97 (1.20)	-5.283	<.001	0.986
Psychological intervention	10.60 (1.57)	8.91 (1.14)	-6.443	<.001	1.232
Combined intervention	10.70 (1.37)	7.42 (0.86)	-8.647	<.001	2.868

Note. These are the paper's reported categorical scores, not HbA1c percentages. They should not be interpreted as actual HbA1c (%) values. Lower scores appear to indicate improvement, but category coding should be confirmed from the paper codebook.

The control group's mean categorical score changed minimally (10.40 to 10.44; $p = .684$). The three intervention groups showed statistically significant reductions, with the largest reported reduction in the combined intervention group (10.70 to 7.42; $p < .001$; $d = 2.868$). Because the outcome is reported categorically, the result should be described as a change in the coded score unless the underlying HbA1c values and category thresholds are verified.

The findings in this report suggest that the intervention was significantly linked to a decrease in diabetes-specific distress. The intervention covered aspects of physical activity and psychological problem-solving, reflecting the biopsychosocial approach to diabetes management outlined in the paper. The size of the reported effect is significant. The value must be considered in the light of the design of the original study, the scale of measurement, the method of analysis and the sample included in the paper. Cohen's d is a measure of effect size that does not represent a percentage reduction and cannot be interpreted as representing the same amount of improvement for each person. It is clinically relevant to consider the combined approach as diabetes distress can be caused by more than one challenge, that interacts with each other. Exercise may aid in self-management and physical functioning, and Problem-Solving Therapy may assist the patient in identifying an issue with diabetes, brainstorming a solution, and working out coping strategies. A simultaneous intervention of both domains might thus offer a more comprehensive intervention framework than one acting on either domain. The present article focuses only on the combined physical and psychological intervention and DDS outcome. Other findings from the paper such as quality of life, HbA1c, Problem Areas in Diabetes Management, were also reported.

Conclusion

The paper findings show that the combined physical and psychological intervention was associated with a statistically significant improvement in diabetes-specific distress, with $p < .001$ and a reported Cohen's d of 8.67 on the DDS. These findings provide support for further investigation of integrated physical and psychological strategies within diabetes care in Pakistan, particularly through studies with transparent participant flow, standardized intervention fidelity assessment, and longer-term follow-up.

REFERENCES

Polonsky WH, Anderson BJ, Lohrer PA, Welch G, Jacobson AM, Aponte JE, Schwartz CE. Assessment of diabetes-related distress. Diabetes Care. 1995;18(6):754-760. doi:10.2337/diacare.18.6.754.

Fisher L, Hessler DM, Polonsky WH, Mullan J. When is diabetes distress clinically meaningful? Establishing cut points for the Diabetes Distress Scale. Diabetes Care. 2012;35(2):259-264. doi:10.2337/dc11-1572.

Fisher L, Mullan JT, Arean P, Glasgow RE, Hessler D, Masharani U. Diabetes distress but not clinical depression or depressive symptoms is associated with glycemic control in both cross-sectional and longitudinal analyses. Diabetes Care. 2010;33(1):23-28. doi:10.2337/dc09-1238.

Fisher L, Glasgow RE, Strycker LA. The relationship between diabetes distress and clinical depression with glycemic control among patients with type 2 diabetes. Diabetes Care. 2010;33(5):1034-1036. doi:10.2337/dc09-2175.

Fisher L, Polonsky WH, Hessler DM, Masharani U, Blumer I, Peters AL, et al. Understanding the sources of diabetes distress in adults with type 2 diabetes. J Diabetes Complications. 2015;29(4):572-577.

Fisher L, Hessler D, Polonsky WH, Masharani U, Peters AL, Blumer I. Diabetes distress in adults with type 1 diabetes: prevalence, incidence and change over time. Diabetes Care. 2016;39(4):531-537.

Fisher EB, Boothroyd RI, Coufal MM, Baumann LC, Mbanya JC, Rotheram-Borus MJ, et al. Peer support for self-management of diabetes improved health outcomes: a systematic review and meta-analysis. Ann Behav Med. 2012;44(1):25-38.

McGuire BE, Morrison TG, Hermanns N, Skovlund S, Eldrup E, Gagliardino J, et al. Short-form measures of diabetes-related emotional distress: the Problem Areas in Diabetes Scale (PAID)-5 and PAID-1. Diabetologia. 2010;53(1):66-69.

Stanulewicz N, Mansell P, et al. PAID-11: a brief measure of diabetes distress validated in adults with type 2 diabetes. Diabetes Res Clin Pract. 2019;149:27-38.

Polonsky WH, Fisher L, Earles J, Dudl RJ, Lees J, Mullan J, et al. Assessing psychosocial distress in diabetes: development of the Diabetes Distress Scale. Diabetes Care. 2005;28(3):626-631.

Gonzalez JS, Fisher L, Polonsky WH. Depression in diabetes: have we been missing something important? Diabetes Care. 2011;34(1):236-239. doi:10.2337/dc10-1970.

Gonzalez JS, Tanenbaum ML, Commissariat PV. Psychosocial factors in medication adherence and diabetes self-management. Am Psychol. 2016;71(7):539-551.

Rees G, O'Hare F, Saeed M, Sudholz B, Sturrock BA, Xie J, Speight J, Lamoureux EL. Problem-solving therapy for adults with diabetic retinopathy and diabetes-specific distress: a pilot randomized controlled trial. BMJ Open Diabetes Res Care. 2017;5(1):e000307. doi:10.1136/bmjdrc-2016-000307.

Bahadır Ağce Z, Ekici G. Person-centred, occupation-based intervention program supported with problem-solving therapy for type 2 diabetes: a randomized controlled trial. Health Qual Life Outcomes. 2020;18:265. doi:10.1186/s12955-020-01521-x.

Sigal RJ, Kenny GP, Wasserman DH, Castaneda-Sceppa C, White RD. Physical activity/exercise and type 2 diabetes: a consensus statement from the American Diabetes Association. Diabetes Care. 2006;29(6):1433-1438.

Colberg SR, Sigal RJ, Yardley JE, Riddell MC, Dunstan DW, Dempsey PC, et al. Physical activity/exercise and diabetes: a position statement of the American Diabetes Association. Diabetes Care. 2016;39(11):2065-2079.

American Diabetes Association Professional Practice Committee. Facilitating positive health behaviors and well-being to improve health outcomes: Standards of Care in Diabetes—2024. Diabetes Care. 2024;47(Suppl 1).

International Diabetes Federation. IDF Diabetes Atlas. 11th ed. Brussels: International Diabetes Federation; 2025.

World Health Organization. Global recommendations on physical activity for health. Geneva: World Health Organization; 2010.

Perrin NE, Davies MJ, Robertson N, Snoek FJ, Khunti K. The prevalence of diabetes-specific emotional distress in people with type 2 diabetes: a systematic review and meta-analysis. Diabet Med. 2017;34(11):1508-1520.