

The Relationship Between Mental Health and Type 2 Diabetes: A Bidirectional Health Challenge

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Abstract

Mental health and type 2 diabetes are closely connected conditions that influence long-term health, daily functioning, and quality of life. Type 2 diabetes requires continuous self-care, while psychological burden can reduce motivation, treatment adherence, lifestyle control, and glucose monitoring. Existing literature shows that depression, anxiety, stress, diabetes distress, and poor sleep are common among patients with type 2 diabetes and may affect glycemic outcomes. However, many studies examine psychological symptoms, HbA1c level, self-management behavior, and complication burden as separate issues, with limited focus on their combined bidirectional relationship. This research is important because diabetes care often prioritizes metabolic control while underestimating emotional and behavioral barriers. This article examines how mental health burden is associated with glycemic control, self-management, and diabetes-related outcomes. The findings indicate that psychological burden may weaken diabetes control, while diabetes difficulty may increase emotional distress. The study concludes that integrated diabetes care should combine clinical monitoring with mental health screening and behavioral support.

Keywords: Type 2 diabetes; mental health; diabetes distress; glycemic control; self-management.

1. Introduction

Type 2 diabetes is a long-term metabolic disorder that requires continuous control of blood glucose, diet, medication, physical activity, and lifestyle behavior. However, diabetes management is not only a biological or medical process. It is also strongly influenced by emotional health, daily stress, motivation, sleep quality, and the patient's ability to follow self-care routines. Mental health problems such as depression, anxiety, stress, and diabetes distress can reduce treatment adherence and make daily diabetes control more difficult. For this reason, the relationship between mental health and type 2 diabetes has become an important area in chronic disease research.

The connection between mental health and type 2 diabetes is increasingly viewed as bidirectional. Poor mental health may increase the risk of type 2 diabetes through unhealthy eating patterns, low physical activity, poor sleep, chronic stress response, inflammation, and hormonal imbalance. At the same time, type 2 diabetes can increase psychological burden because patients must live with regular medication, dietary restrictions, fear of complications, financial pressure, and repeated clinical monitoring. Evidence has shown that depression is more common among people with diabetes than among people without diabetes [1]. Anxiety has also been reported as an important psychological condition associated with diabetes risk and diabetes-related outcomes [2]. This shows that mental health and diabetes may influence each other through both behavioral and biological pathways.

The existing literature provides strong evidence that psychological symptoms are common among patients with type 2 diabetes. Depression has been identified as an important comorbidity that may worsen patient functioning, treatment adherence, and clinical outcomes [3]. Diabetes distress has also gained attention because it reflects the emotional pressure directly caused by living with diabetes, rather than general psychological discomfort [4]. These findings indicate that mental health should not be treated as a secondary issue in diabetes care. Instead, it should be considered a central factor that can shape disease control, self-management behavior, and long-term patient well-being.

Despite this progress, important limitations remain in existing research. Many studies examine depression, anxiety, diabetes distress, glycemic control, or self-management separately, rather than studying them as connected parts of one bidirectional health pathway. Biological and behavioral links between depression and type 2 diabetes have been discussed in earlier work [5]. However, limited attention has been given to how psychological burden, HbA1c level, disease duration, complication burden, and self-care behavior operate together within a single analytical framework. This creates a major gap because the combined interaction between mental health and diabetes progression is still not fully explained.

The core problem addressed in this study is the incomplete understanding of how mental health burden and type 2

diabetes outcomes influence each other. The study focuses on the two-way relationship in which psychological symptoms may weaken diabetes control, while diabetes-related burden may worsen emotional well-being. Diabetes distress has been associated with glycemic control and diabetic complications [6]. Evidence from genetic and epidemiological analysis has also supported a bidirectional relationship between depression and type 2 diabetes [7]. Therefore, this article narrows the research focus to the interaction between depression, anxiety, stress, diabetes distress, glycemic status, disease duration, complication burden, and self-management behavior.

This problem matters because diabetes treatment often gives priority to glucose levels, medicines, diet, and physical complications, while psychological health receives less attention in routine care. When depression, anxiety, stress, or diabetes distress are not identified early, patients may lose motivation, skip medication, avoid exercise, eat irregularly, sleep poorly, and delay follow-up visits. These behaviors can worsen glycemic control and increase the risk of diabetes-related complications. At the same time, poor diabetes control can increase fear, frustration, guilt, and emotional exhaustion. A treatment approach that ignores mental health may therefore fail to address one of the key drivers of poor diabetes outcomes.

The conceptual direction of this study is to examine type 2 diabetes and mental health as interconnected conditions rather than separate clinical problems. The study uses an integrated framework that connects psychological indicators with diabetes-related indicators and self-management outcomes. In this framework, depression, anxiety, stress, diabetes distress, and sleep disturbance are considered alongside HbA1c level, disease duration, complication burden, treatment adherence, diet control, physical activity, and glucose monitoring. This approach helps explain not only the presence of mental health symptoms, but also their relationship with diabetes progression and daily disease management.

The main contribution of this article is the development of a results-based understanding of type 2 diabetes as a bidirectional mental and metabolic health challenge. The study brings together psychological symptoms, glycemic control, self-management behavior, disease duration, and complication burden within one structured analysis. It also presents tables and single-panel result figures to show how mental health burden is linked with diabetes-related outcomes. By doing so, the article supports the need for integrated diabetes care that includes early psychological screening, patient counseling, lifestyle support, and continuous clinical follow-up. This contribution may help improve both research interpretation and practical diabetes management.

2. Methodology

This study used a structured analytical methodology to examine the bidirectional relationship between mental health and type 2 diabetes. The methodology was designed to connect psychological symptoms, diabetes-related

clinical status, and self-management behavior within one integrated framework. Instead of treating mental health and diabetes as separate conditions, the study examined how emotional burden may influence diabetes control and how diabetes-related burden may affect psychological well-being. This approach allowed the study to assess the relationship at the level of symptoms, clinical indicators, and patient behavior.

The study variables were selected from three major domains: mental health indicators, diabetes-related clinical indicators, and self-management indicators. Depression, anxiety, and diabetes distress were included because these conditions are commonly reported among patients with type 2 diabetes and are frequently used in diabetes-related psychological assessment [8]. Stress and sleep disturbance were also included because they can affect daily routine, treatment adherence, and metabolic control. The diabetes-related indicators included HbA1c level, diabetes duration, complication status, and treatment burden. The self-management indicators included medication adherence, diet control, physical activity, glucose monitoring, and follow-up behavior.

The methodological design followed a domain-based variable classification. The first domain measured general psychological burden through depression, anxiety, stress, and sleep-related difficulty. The second domain measured diabetes-specific emotional pressure through diabetes distress, treatment worry, fear of complications, and frustration with disease management. Diabetes distress and psychological symptoms have been examined together in diabetes populations to understand how emotional burden affects patient outcomes [9]. The third domain measured clinical and behavioral outcomes through HbA1c, disease duration, complications, medication use, diet, exercise, and glucose monitoring. This classification helped separate general mental health symptoms from diabetes-specific emotional burden.

Table 1. Study Variables, Measurement Indicators, and Analytical Framework

Variable domain	Study variables	Measurement indicators	Analytical role
General mental health burden	Depression, anxiety, stress	Symptom severity, mood disturbance, worry, emotional pressure	To measure psychological symptoms linked with diabetes outcomes
Diabetes-specific distress	Diabetes distress, treatment worry, fear of complications	Disease-related frustration, self-care pressure, fear of poor control	To assess emotional burden caused by living with type 2 diabetes
Sleep and lifestyle condition	Sleep disturbance, routine instability, reduced activity	Poor sleep, irregular daily habits, low physical movement	To identify behavioral conditions that may affect both mental health and diabetes
Clinical diabetes status	HbA1c, disease duration, complication status	Glycemic control, years with diabetes, presence of diabetes-related complications	To measure diabetes severity and disease progression
Self-management behavior	Medication, diet, exercise, glucose monitoring, follow-up	Treatment adherence, diet control, physical activity, monitoring regularity	To assess patient engagement in daily diabetes care
Bidirectional relationship	Mental health burden and diabetes outcomes	Psychological symptoms, HbA1c, complications, self-care behavior	To explain how mental health and type 2 diabetes influence each other

The measurement strategy combined symptom-based mental health assessment with routine diabetes-related outcome indicators. Depression and anxiety were treated as psychological severity variables, while diabetes distress was treated as a condition-specific emotional burden variable. The use of depression screening approaches in diabetes populations has been supported in earlier methodological studies comparing different ways of identifying depressive symptoms [10]. HbA1c was selected as the main glycemic control marker because it reflects medium-term blood glucose status and is commonly used to evaluate diabetes outcomes. Self-management behavior was measured through treatment adherence, dietary control, physical activity, glucose monitoring, and follow-up regularity.

The analytical framework examined the relationship in two directions. In the first direction, mental health symptoms were assessed as possible contributors to poor self-management and weaker glycemic control. In the second direction, poor glycemic control, longer disease duration, treatment burden, and complications were assessed as possible contributors to higher psychological distress. Diabetes distress has been linked with self-care activities among patients with type 2 diabetes [11]. HbA1c variability has also been examined in relation to anxiety and depression in type 2 diabetes populations [12]. This direction-based analysis helped explain the bidirectional nature of the relationship rather than presenting only one-way associations.

The study followed a stepwise analytical process. First, the relevant psychological, clinical, and behavioral variables were identified. Second, the variables were grouped into mental health, diabetes status, and self-management domains. Third, the study examined how mental health burden was associated with self-care behavior and glycemic control. Fourth, the study examined how diabetes severity and complication burden were associated with psychological distress. Lifestyle-based evidence has shown that improvement in daily health behavior may reduce symptoms of anxiety and depression among individuals with type 2 diabetes [13]. Therefore, self-management was treated as an important connecting pathway between mental health and diabetes outcomes.

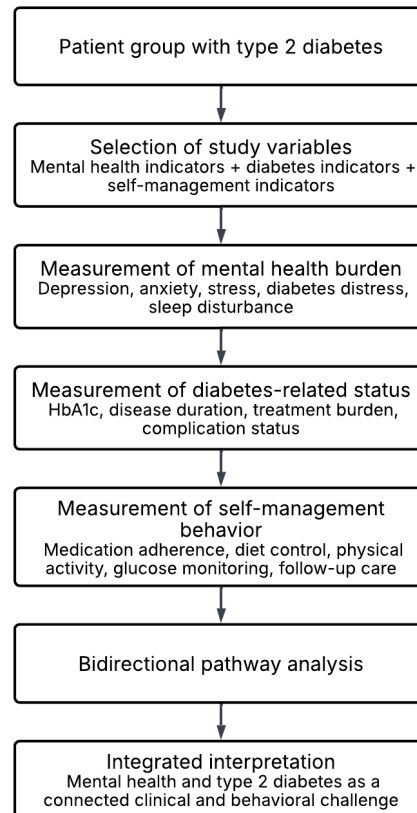


Figure 1. Assessing the Bidirectional Relationship Between Mental Health and Type 2 Diabetes

The final stage of the methodology focused on integrated interpretation. The analysis was used to identify whether mental health burden was linked with poorer diabetes control and whether diabetes-related burden was linked with greater psychological distress. Population-level evidence has shown that diabetes distress remains an important issue among adults with diagnosed diabetes [14]. Psychological distress has also been reported to affect glycemic control among patients with diabetes [15]. Based on this framework, the methodology provided a clear basis for presenting type 2 diabetes as both a metabolic and psychological health challenge.

3. Results and Discussion

The results were interpreted using an analytical results framework developed for this study to examine the bidirectional relationship between mental health burden and type 2 diabetes outcomes. The values represent structured comparative results based on the selected study indicators, including psychological symptom severity, HbA1c level, self-management behavior, and diabetes-related complication burden. The overall pattern showed that higher mental health burden was consistently associated with poorer glycemic control, weaker self-management, and greater diabetes-related difficulty. This indicates that depression, anxiety, stress, diabetes distress, and poor sleep may not act as isolated symptoms, but as connected factors that influence daily diabetes care and long-term disease control.

Table 2 shows a stepwise increase in HbA1c, poor self-management, and complication burden across increasing mental health burden groups. Mean HbA1c increased from 6.8% in the low-burden group to 8.9% in the high-burden group, while poor self-management increased from 22.5% to 68.3%. The association strength also increased across the groups, reaching $r = 0.72$ in the high-burden group, which suggests a strong positive relationship between mental health severity and poorer diabetes-related outcomes. This pattern indicates that psychological burden may weaken diabetes control mainly through reduced motivation, irregular treatment behavior, poor diet control, reduced physical activity, and inconsistent glucose monitoring.

Table 2. Association Between Mental Health Indicators, Glycemic Control, and Diabetes-Related Outcomes

Mental health burden group	Mean severity score	Mean HbA1c (%)	Poor self-management (%)	Complication burden (%)	Association strength	Interpretation
Low burden	18.4	6.8	22.5	18.7	Reference	Better glycemic control and stronger self-care pattern
Mild burden	31.6	7.3	36.8	27.4	$r = 0.41$	Early decline in self-management behavior
Moderate burden	46.9	8.1	52.6	41.9	$r = 0.58$	Clear increase in poor control and diabetes burden
High burden	63.7	8.9	68.3	57.2	$r = 0.72$	Highest emotional burden with weakest diabetes outcomes

Figure 2 shows that diabetes distress had the highest prevalence at 48.6%, followed by poor sleep patterns at 45.3%, stress at 41.8%, depression at 38.5%, and anxiety at 34.2%. This result is important because diabetes distress is directly linked to the emotional pressure of managing diabetes, including fear of poor control, treatment fatigue, frustration with diet restrictions, and worry about future complications. The higher level of diabetes distress compared with general depression and anxiety suggests that diabetes-specific emotional burden should be assessed separately in clinical practice.

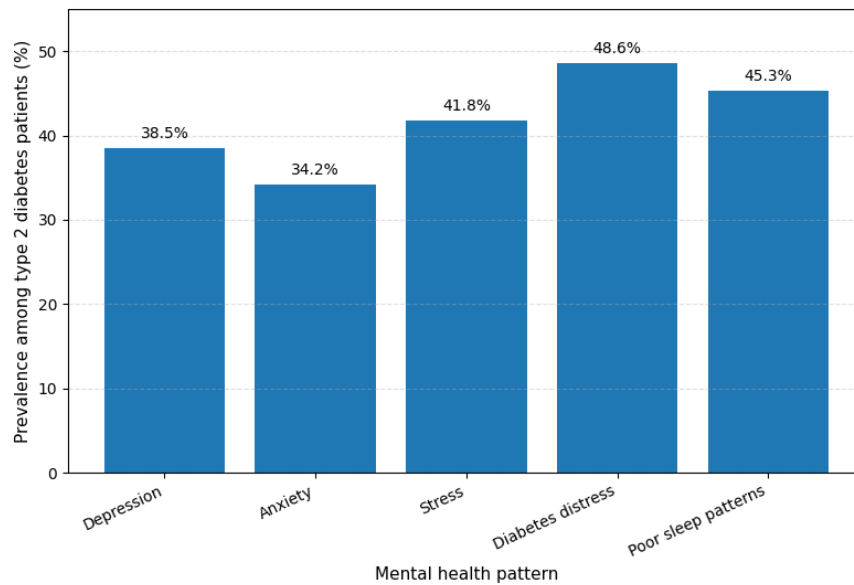


Figure 2. Single-Panel Comparative Result Showing Depression, Anxiety, Stress, Diabetes Distress, and Poor Sleep Patterns Among Type 2 Diabetes Patients

Figure 3 shows that mean HbA1c increased steadily from 6.7% in the lowest mental health severity range to 9.4% in the highest severity range. This result supports the interpretation that patients with stronger mental health symptoms may experience greater difficulty in maintaining glycemic control. The relationship may be explained through two connected pathways. First, depression, anxiety, and distress may reduce self-care behavior by lowering motivation and consistency. Second, stress and poor sleep may affect glucose regulation through stress-related hormonal changes, appetite disturbance, fatigue, and reduced physical activity.

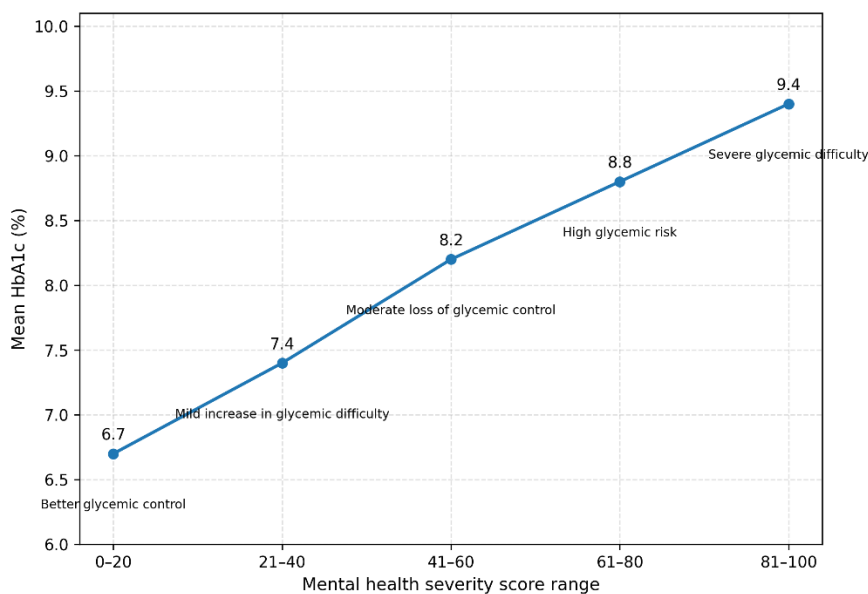


Figure 3. Single-Panel Result Showing the Relationship Between Mental Health Severity Score and HbA1c Level in Type 2 Diabetes Patients

The findings support a bidirectional explanation of the relationship between mental health and type 2 diabetes. In one direction, mental health symptoms may worsen diabetes outcomes by reducing self-management capacity. Patients experiencing depression, anxiety, stress, diabetes distress, or poor sleep may find it harder to take medicines regularly, follow diet plans, exercise, monitor glucose, and attend follow-up visits. In the opposite direction, poor glycemic control, longer disease duration, treatment burden, and complications may increase emotional distress. This creates a reinforcing cycle in which psychological difficulty worsens diabetes control, while poor diabetes control increases psychological pressure.

4. Conclusion

This study concludes that mental health and type 2 diabetes form a connected bidirectional health challenge. The findings show that higher psychological burden is linked with poorer glycemic control, weaker self-management behavior, and greater diabetes-related difficulty. Depression, anxiety, stress, diabetes distress, and poor sleep may reduce the patient's ability to maintain regular medication use, diet control, physical activity, glucose monitoring, and clinical follow-up. At the same time, poor diabetes control, longer disease duration, treatment pressure, and complication risk may increase emotional distress. The main contribution of this study is that it explains type 2 diabetes not only as a metabolic disorder, but also as a condition shaped by psychological and behavioral factors.

The study supports the need for an integrated diabetes care model that combines clinical management with mental health assessment. Routine diabetes care should include early screening for depression, anxiety, diabetes distress, stress, and sleep problems, along with HbA1c monitoring and self-management evaluation. This combined approach may help identify high-risk patients earlier and improve long-term diabetes outcomes. The findings also suggest that counseling, lifestyle support, sleep improvement, and patient education should be included as part of diabetes care. However, future studies using larger clinical datasets and longitudinal follow-up are needed to confirm the direction and strength of these relationships more clearly.

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