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Relationship between Depression and Distress with Age and Gender in Patients with Type 2 Diabetes

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ABSTRACT

The objective of this study was to determine the relationship between depression and distress with the age and gender of patients with type 2 diabetes. 237 patients. with medical diagnosis of type 2 diabetes for at least one year; age between 18 and 70 years participated in the study. Distress was measured with "The Problem Areas in Diabetes (PAID) Scale", and depression with "The Patient Health Questionnaire (PHQ-9)". Negative correlations were found between age and depression ($r = -0.203$, $p < 0.01$) and distress ($r = -0.34$, $p < 0.001$). And a positive relationship was also observed between depression and distress ($r = 0.65$, $p < 0.001$). Also significant differences were found, with women presenting higher scores in both depression (PHQ) ($t = -3.466$, $p < 0.001$) and distress (PAID) ($t = -4.504$, $p < 0.001$). The factors of depression, distress, gender, and age are crucial for understanding the entirety of the patient's experience with diabetes. To improve disease control and quality of life, it is essential to adopt an integrated approach that respects the diversity of patients' experiences and provides them with appropriate support.

Keywords: Type 2 Diabetes, Distress, Depression, Age, Gender.

Diabetes is a chronic metabolic disease characterized by elevated blood glucose levels, which over time leads to serious damage to the heart, blood vessels, eyes, kidneys, and nerves. The most prevalent form is type 2 diabetes, which occurs when the body becomes resistant to insulin or does not produce enough of it. The International Diabetes Federation (2025) reported in its 11th Edition of the Diabetes Atlas that in 2024 it was reported that approximately 589 million adults (20-79 years) were living with diabetes and the total number of people with diabetes is expected to increase to 853 million by 2050. In addition, there are 254 million people with undiagnosed diabetes. On the other hand, more than 4 out of 5 adults (81%) with diabetes live in low- and middle-income countries, including countries in Latin America. In Mexico, in 2020, diabetes was the third leading cause of death (only after heart diseases and COVID-19), with the highest rate recorded in recent years. In Mexico, in 2022, the prevalence of prediabetes was 22.1%, with diagnosed and undiagnosed diabetes at 12.6% and

5.8%, respectively, resulting in a total diabetes prevalence of 18.3%. It is expected that by 2045, this number will increase to 22.9 million. In addition to physical complications and its prevalence, diabetes is intrinsically related to psychological and social aspects that can significantly influence its management and progression. It has been reported that 60% to 70% of patients with diabetes present emotional comorbidity (distress, depression, anxiety, among others) to varying degrees, a situation that adversely affects their therapeutic outcomes and quality of life (International Diabetes Federation, 2025). Depression has become a significant issue for those suffering from type 2 diabetes. It not only impacts the quality of life of these patients but also has a direct effect on metabolic control of the disease. The prevalence of depressive symptoms in individuals with diabetes is considerably higher than in the general population. Wojujutari and Sunday (2025) reported that the presence of depression can lead to poor glucose control, increasing the risk of complications such as neuropathy, retinopathy, and cardiovascular disease. Furthermore, depression can interfere with adherence to treatment and lifestyle changes that are recommended, such as exercise and diet. Fatima, Wang, and Din (2025) demonstrated that patients reporting depressive symptoms were 25% less likely to adhere to their treatment plans and antidiabetic medications and 20% less adherence to healthy diets. This translates into metabolic dysregulation that can accelerate the progression of the disease and worsen quality of life. Additionally, the chronic nature of diabetes, combined with the emotional burden of managing the disease, can contribute to the onset of depression and an increase in its severity. The inability to meet therapeutic expectations or fear of complications can create a sense of helplessness, fostering a negative cycle that perpetuates both depression and diabetes dysregulation (Beverly & Gonzalez, 2025).

On the other hand, distress can arise from regular blood glucose self-monitoring, concerns about the future, dietary restrictions, and the constant need to make health-related decisions. In other words, emotional distress refers to the psychological anguish related to daily disease management and includes feelings of frustration, anxiety and exhaustion (Perrin et al., 2017; Ten & Zhao, 2018). The prevalence of distress in diabetes ranges from 18% to 45%, with an incidence of 38% to 48% in individuals older than 18 months with type 2 diabetes (Bhaskara et al., 2022). High levels of distress significantly affect proper medication adherence, contribute to disruptive behaviors, anxiety, and depression, which are often linked to higher levels of glycated hemoglobin (HbA1c), lower self-efficacy, poorer diet, and deterioration in health-related quality of life. Moreover, diabetes-related distress can lead to pessimism, reduced self-efficacy, and decreased adherence to treatment and self-care, resulting in poor glycemic control (American Diabetes Association, 2022, ElSayed etal., 2023). Duka et al. (2021) demonstrated that elevated levels of emotional distress were correlated with poorer glucose control and self-care strategies, highlighting the critical need to address not only the physical factors of diabetes but also the emotional ones. Patients who received education on diabetes-related distress showed improvement in HbA1c levels within three months.

It has also been found that distress in diabetes is likely to vary by gender. Women tend to exhibit higher average levels of distress than men, and this pattern appears to be consistent across cultures. Aronson et al. (2020) revealed that women are more likely to develop distress and experience greater persistence of these symptoms over time. Furthermore, women may have a higher percentage of body fat in disadvantaged areas (such as the abdomen), which can exacerbate insulin resistance compared to men. Additionally, women often face social and economic barriers that hinder their access to healthcare and the resources necessary for

effective diabetes management (Billimek et al, 2015). Another important aspect is that women often bear the burden of family responsibilities, which can limit the time and effort they can dedicate to their health. Chen et al. (2014) noted that women with diabetes who have caregiving responsibilities tend to neglect their self-care, which can result in poor metabolic control and an increased risk of complications.

Age is another essential factor in the development and management of type 2 diabetes. Although type 2 diabetes is traditionally associated with older adults, there has been a concerning increase in its prevalence among younger individuals in recent decades. This trend is linked to rising obesity rates, lack of physical activity, and unhealthy eating habits. Type 2 diabetes in young people can lead not only to glucose control issues but also increases the risk of developing comorbidities such as hypertension, dyslipidemia, and cardiovascular diseases at an earlier rate compared to adults. A study by Kim et al. (2025) indicates that young diabetics have a 30% higher risk of developing cardiovascular complications over their lifetime. It has also been observed that young individuals with type 2 diabetes have higher rates of depression and anxiety compared to their healthy counterparts. Riise et al. (2025) found that diabetes can be perceived as a significant emotional burden, negatively affecting the mental and social health of young people, which can exacerbate the disease and its complications. Regarding disease perception, young people often may not view type 2 diabetes as a serious condition. The perception that "only adults get sick" can lead to a lack of attention to signs and symptoms, as well as a careless approach to management. This lack of awareness can result in late diagnoses and poor glycemic control. Another important point is that many young individuals do not regularly visit a doctor, which can lead to neglect of self-monitoring and management of their condition. A lack of education about diabetes can result in a poor understanding of the importance of maintaining a healthy lifestyle and the consequences of glycemic dysregulation (Flick and Röhnsch, 2025).

The objective of this study was to determine the relationship between clinical variables (depression and distress) and sociodemographic variables (age and gender) in patients with type 2 diabetes.

METHOD

Participants

Convenience sampling was conducted at a private outpatient clinic in Mexico City that specializes in comprehensive diabetes care. A purposive and voluntary sample of 237 patients participated in the study. Participants were selected based on the following criteria: a medical diagnosis of type 2 diabetes for at least one year; age between 18 and 70 years; inclusion of both men and women, and the absence of complications associated with diabetes (such as kidney, liver, or heart disease, vision problems, etc.) and/or untreated emotional comorbidities (such as depression or anxiety).

Instruments

- The Problem Areas in Diabetes (PAID) Scale is designed to assess emotional distress related to diabetes management. It examines various aspects, including: 1. Worry about the future, 2. Emotional burden, 3. Difficulties in daily routines, 4. Financial concerns, and 5. Feelings of guilt and frustration. The scale consists of 20 items, rated on a Likert

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scale from 0 to 4, where 0 signifies "not a problem" and 4 indicates "a serious problem." The total score is calculated by summing the scores of the 20 items and then multiplying by 1.25, resulting in a score that ranges from 0 to 100, with higher scores signifying greater diabetes-related distress. A PAID score of 40 or higher is considered indicative of "significant emotional distress" related to diabetes. The scale has a Cronbach's alpha of 0.95, demonstrating excellent internal consistency (Hagger et al., 2017).

- The Patient Health Questionnaire (PHQ-9) is a self-report questionnaire consisting of 9 items that assesses depression and its severity. It identifies depressive symptoms and evaluates their impact on the patient over the previous two weeks. The questionnaire employs a Likert scale ranging from 0 (never) to 3 (almost every day), leading to a total score that can range from 0 to 27. The severity of symptoms is categorized into four groups: 0-4 (minimal), 5-9 (mild), 10-14 (moderate), 15-19 (moderate to severe), and 20-27 (severe) (Kroenke et al., 2001). Additionally, the internal consistency of the PHQ-9 is strong, with a McDonald's ω coefficient of 0.90 and a Cronbach's alpha of 0.89 (Saldivia et al., 2019).

Procedure

The PAID and PHQ-9 were administered in a single, approximately 20-minute session, individually and in person to patients with type 2 diabetes who were waiting to be seen at a private clinic specializing in the treatment of this disease. These patients were selected according to the inclusion criteria defined for this study and their informed consent was obtained.

Ethical Considerations

The selection of participants and the application of measurement instruments were carried out with due regard for the rights and dignity of patients, as well as the confidentiality of their personal data, and were carried out solely for research purposes. These aspects were made explicit when informed consent was obtained from participants after being informed of the objectives, procedures, risks, and benefits of the research.

Results

In the evaluated sample, 56.54% (n=134) were men and 43.46% (n=103) were women, with a mean age of 49.59 years (SD=11.53). Additionally, 54.85% (n=130) of the participants reported being married, while 44.73% (n=106) hold a university degree (see Table 1).

Table 1: Sociodemographic information of patients

Age [M (S.D)]	**49.59**	**(11.53)**
Gender	f	(%)
Male	134	56.54
Female	103	43.46
Marital Status		
Single	50	21.01
Married	130	54.85
Common-law marriage	29	12.24
Divorced	16	6.75
Widowed	12	5.06
Schooling		

Unschooled	5	2.11
Primary	13	5.48
Secondary	25	10.55
High school	55	23.21
Bachelor's degree	106	44.73
Postgraduate	33	13.92
Religion	n	(%)
Catholic	186	78.48
Christian	14	5.91
No religión	25	10.55
Other	12	5.06
Occupation		
Home	24	10.13
Employed	74	31.22
Businessperson	23	9.70
Businessman	27	11.39
Professional	61	25.74
Retired	15	6.33
Unemployed	6	2.53
Student	6	2.53

Negative correlations were found between age and depression (PHQ) variables ($r = -0.203$, $p < 0.01$) as well as between age and distress (PAID) ($r = -0.34$). A positive relationship was also observed between depression and distress ($r = 0.65$, $p < 0.001$) (see Table 2).

Table 2: Pearson Correlations between age, depression and distress, and alpha value of the PHQ and PAID instruments.

Variable	Mean (SD)	Cronbach's alpha	1		2	
1. Age	49.59 (11.53)		—			
2. Depression PHQ	6.73 (5.23)	.852	-0.203	**	—	
3. Distress PAID	9.06 (9.44)	.937	-0.346	***	0.657	***
* p < .05, ** p < .01, *** p < .001						

Regarding the differences between men and women, significant differences were found, with women presenting higher scores in both depression (PHQ) ($t = -3.466$, $p < 0.001$) and distress (PAID) ($t = -4.504$, $p < 0.001$) (see Table 3).

Table 3: Differences between men and women regarding Depression and Distress.

	Male		Female				
	Mean	**(SD)**	**Mean**	**(SD)**	**t**	**p**	**Cohen's d**
Depression PHQ	5.77	(4.70)	8.039	5.608	-3.466	<.001	-0.454
Distress PAID	15.11	(13.76)	24.369	17.886	-4.504	<.001	-0.590
N=134 Male, 103 Female							

A logistic regression analysis in two steps was conducted to explore the effect of gender, age, and depression as potential predictive factors for emotional exhaustion (distress). In the first model, only the gender variable was included, and a significant result was found: women have three times the risk of experiencing emotional exhaustion in this sample (OR = 3.175). In the

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second model, age and the total PHQ depression score were added as covariates alongside gender. Although this model was not significant overall, gender remained a significant predictor independently, with the OR decreasing to 2.35 (see Table 4).

In the context of these patients with diabetes, both being female and the presence of depression increase the risk of experiencing emotional exhaustion. As for age, the results suggest that it may have a protective effect, as the likelihood of experiencing emotional exhaustion decreases with increasing age (see Figure 1, Figure 2 y Figure 3).

Table 4: Logistic Regression Coefficients considerig Gender, Age and Depression

						Wald Test		
Model		**Estimate**	**SE**	**OR**	**z**	**Wald Statistic**	**df**	**p**
M_0	**(Intercept)**	-1.998	0.266	0.136	-7.500	56.252	1	< .001
	Gender (Female)	1.155	0.342	3.175	3.376	11.398	1	< .001
M_1	**(Intercept)**	-1.128	0.955	0.324	-1.181	1.395	1	0.238
	Gender (Female)	0.858	0.424	2.357	2.022	4.088	1	0.043
	Age	-0.069	0.019	0.934	-3.559	12.670	1	< .001
	Depression PHQTot	0.291	0.047	1.337	6.149	37.805	1	< .001

Note: PAID level 'With emotional exhaustion ' coded as class 1.

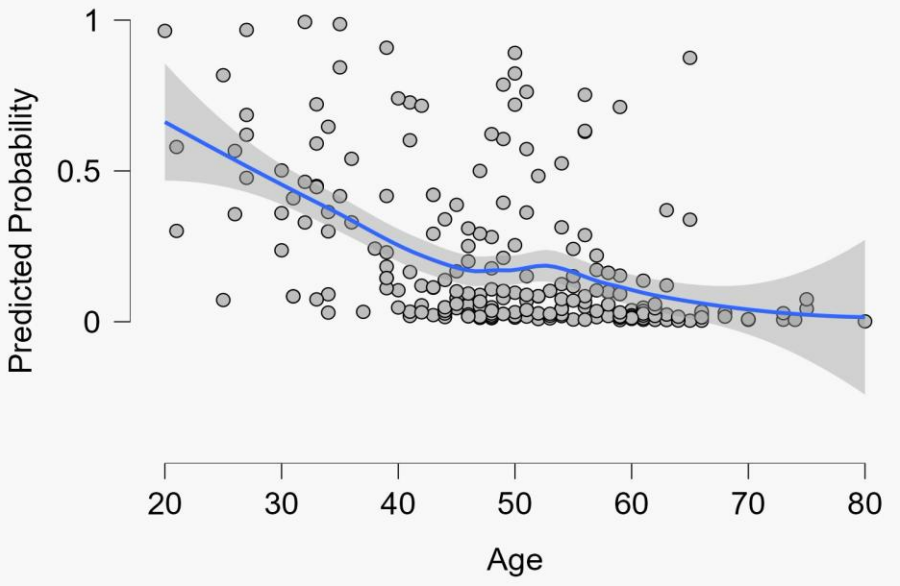

Figure 1: Predicted probability curve for the variable Age.

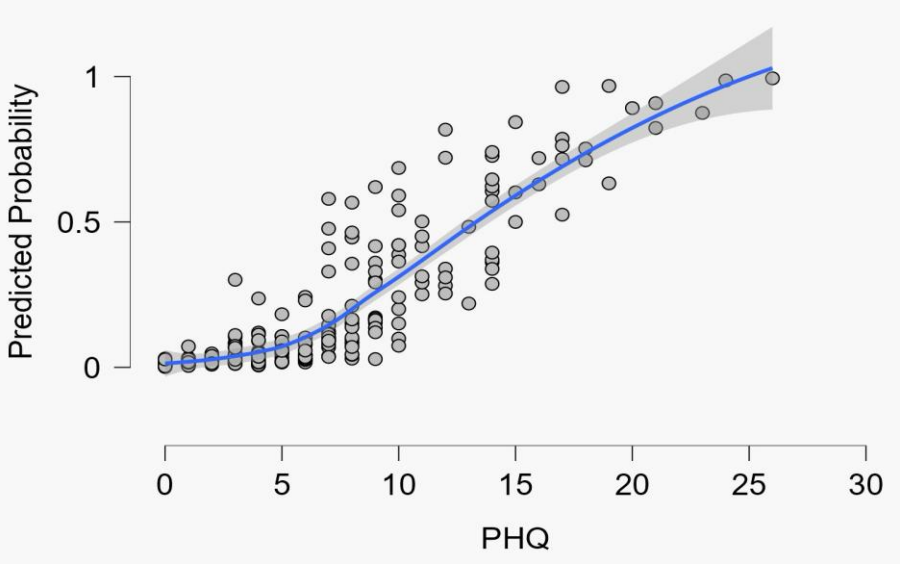

Figure 2: Predicted probability curve for the variable Depression (PHQ).

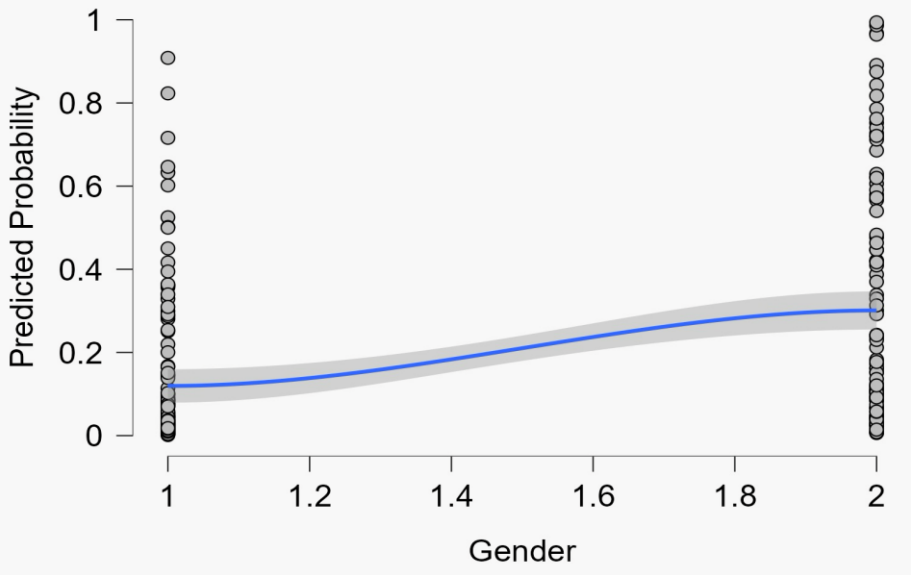

Figure 3: Predicted probability curve for the variable Gender.

DISCUSSION

The objective of this study was to determine the relationship between clinical variables (depression and distress) and their association with sociodemographic variables (age and gender) in patients with type 2 diabetes.

Regarding depression, it was found the patients reported some degree of depression in the PHQ questionnaire. This finding is consistent with reports by Rojas et al. (2024), Paucar Tito (2021) and Núñez Muñoz (2021). It is crucial to detect the presence of depression in patients with diabetes for several reasons: a) it can hinder adherence to diabetes treatment, including following diets, exercising, and taking medication, which in turn may worsen glycemic control; b) it impacts the quality of life of patients, which can decrease motivation and increase emotional suffering, negatively affecting how patients experience and manage their illness; c)

they have a higher risk of developing disease-related complications, such as cardiovascular problems, neuropathies, and retinopathies, due to the fact that depression can lead to poor glycemic control and an increase in risk behaviors; d) untreated depression in patients with diabetes may result in higher healthcare costs due to frequent hospitalizations and increased use of health services, in addition to contributing to productivity loss and an economic burden for both the patient and society.

Regarding distress, it was found also that patients reported some degree of distress. This finding is consistent with reports by Ahmed et al. (2025), Pankiv (2025) and Barturen and Mondragon (2024), who report some degree of distress ranging from 39% to 73.95%. The assessment and treatment of psychological distress in patients with diabetes is essential for several reasons: a) psychological distress can arise from the burden of the illness, the demands of self-management, and concerns about diabetes complications, affecting the mental health of patients; b) like depression, distress can negatively impact adherence to medical treatments, glucose monitoring, and the adoption of healthy lifestyle habits, leading to poor disease control and worse health outcomes; c) concerning quality of life, emotional distress can generate frustration, sadness, and anxiety, which affects the patient's perception of their own health and well-being; d) it may increase the risk of complications associated with diabetes, such as cardiovascular problems, neuropathies, and retinopathies; e) if distress is persistent or chronic, it can influence glucose control, leading to situations of hyperglycemia; f) evaluating and managing emotional distress may be key to preventing the development of comorbidities such as anxiety and depression, thus improving overall health.

Evaluating and intervening in depression and psychological distress allows for a more comprehensive approach to diabetes treatment that takes into account not only the physical aspects of the disease but also the emotional and psychological ones. This can lead to more effective management and better long-term outcomes. These psychological variables can benefit from psychological interventions, such as cognitive-behavioral therapy and support groups, which help patients develop skills to manage stress, improve their emotional adaptation, and may also enhance glycemic control and treatment adherence.

Regarding gender, it was found that women have a higher prevalence of distress and depression in diabetes. This finding is consistent with reports on distress by Huang (2022), Lipscombe et al. (2015), and on depression by Rauf (2016) and Dejene (2014). In this sense, in addition to the importance of addressing diabetes in women, the emotional comorbidity, whether it be distress or depression, should demand specific public health programs targeting this group, taking into account their particular needs. Biological differences (hormonal, metabolic) among women may influence susceptibility to diabetes, which underscores the need for studies that investigate these factors in depth. In some cases, women with diabetes and emotional comorbidity may face greater stigmas associated with the illness, impacting their mental health and treatment adherence. Consequently, it is crucial to adapt diabetes education and care programs and their emotional comorbidity to address the particularities and challenges that women face regarding lifestyle and disease management.

Regarding age, it was found that younger individuals reported a higher prevalence of diabetes. These findings are consistent with reports by Flick (2025) and Lerch (2019). Diabetes can significantly affect the quality of life of young people, limiting their ability to participate in

social, sports, and recreational activities. They often face the challenge of balancing diabetes self-management with the typical social pressures of adolescence and youth. On the other hand, the increasing prevalence of diabetes among young people indicates an emerging public health problem that may have long-term repercussions for the population. The rising prevalence of unhealthy lifestyles among the youth, such as unbalanced diets and lack of physical activity, highlights the importance of health education. It is important to note that being diagnosed with diabetes at an early age can significantly impact quality of life, limiting opportunities and affecting the emotional well-being of young individuals. Furthermore, the identification of an increase in youth diabetes underscores the urgent need to implement effective prevention strategies aimed at promoting healthy habits within this age group. Addressing diabetes in young people requires family involvement in disease management, which emphasizes the importance of family support in managing diabetes.

As limitations of this study, we can state that there are no additional clinical data for the patients who participated in this study, which would allow for finding associations or correlations with the variables reported here. Furthermore, the findings are geographically restricted to Mexico City. Future studies could investigate the effects of pre- and post-intervention methods on psychological variables and their relationship with quality of life.

Nonetheless, this study demonstrates that type 2 diabetes is not only related to metabolic aspects but also to psychological and social dimensions. The factors of depression, distress, gender, and age are crucial for understanding the entirety of the patient experience with diabetes. To improve disease control and quality of life, it is essential to adopt an integrated approach that respects the diversity of patients' experiences and provides them with appropriate support. Addressing these factors holistically can not only enhance diabetes care but also prevent disease progression and associated complications, ensuring a more effective and humane approach to managing this prevalent condition.

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