



Mentalization as a mediator between psychological well-being, attachment styles, and treatment adherence: a structural equations model among Iranians with type 2 diabetes

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Abstract

Objectives: This study aims to explore the relationship between attachment styles, psychological well-being, and treatment adherence. Also, it examines the mediating role of mentalization in the connection between attachment, well-being, and adherence to treatment.

Methods: This cross-sectional study included 230 diabetic patients aged 20 to 65 who sought treatment at the Isfahan endocrinology and metabolism clinics from July to October 2021. Demographic and clinical data were recorded. All participants completed Ryff's Psychological Well-Being Questionnaire, Collins and Read Attachment Style Questionnaire, Mentalization Questionnaire (Ments), and Tobert's Self-Care Questionnaire. Data analysis was conducted using correlation and structural equation modeling methods.

Results: A secure attachment style and psychological well-being were found to have a positive correlation with treatment adherence ($p < 0.05$, $T = 4.32$, $p < 0.05$, $T = 2.79$). Furthermore, mentalization was identified as a significant mediator in the relationship between psychological well-being, avoidant attachment style, and treatment adherence ($p < 0.05$, $T = 4.38$, $p < 0.05$, $T = 2.05$).

Conclusion: The study highlights the significant mediating role of mentalization between treatment adherence, psychological well-being, and avoidant attachment. It emphasizes the potential of mentalization to improve treatment adherence, especially among individuals with an avoidant insecure attachment style.

Keywords: Type 2 Diabetes, Psychological Well-Being, Attachment Styles, Mentalization, Structural Equations Model.

Introduction

Diabetes is a chronic disease that significantly impacts the mental and physical well-being of individuals, communities, and families globally. Currently, there are 463 million individuals living with diabetes worldwide, accounting for 9.3% of the adult population (20-79 years). This number is projected to rise to 578 million (10.2%) by 2030 and to 700 million (10.9%) by 2045.^[1] Diabetes is classified into three main types: type 1 diabetes, type 2 diabetes, and gestational diabetes. Type 2 diabetes accounts for nearly 90% of all cases, and its upward trend can be linked to factors such as the aging population,

urbanization, a high prevalence of obesity, and unhealthy lifestyle choices characterized by physical inactivity.^[2] Type 2 diabetes is a prevalent metabolic disease that presents as a chronic and progressive disorder.^[3]

One of the fundamental tenets of managing diabetes is adherence to treatment recommendations prescribed by healthcare professionals. This practice directly impacts improving blood glucose regulation and lowering glycosylated hemoglobin levels, ultimately leading to a reduction in disease complications and associated expenses.^[4] Maintaining good glycemic control can help lower the risk of complications. However, non-adherence

to treatment can decrease medication efficacy and subsequently affect glycemic control.^[5] The World Health Organization defines adherence to treatment as the degree to which an individual adheres to prescribed behaviors, including medication intake, dietary restrictions, or lifestyle adjustments related to healthcare provider recommendations.^[1]

Adherence to treatment is a psychological behavior influenced by psychological and psychodynamic factors. Among these factors, psychological well-being plays a significant role. Psychological well-being encompasses emotional and cognitive aspects and relates to a state of health that includes a comprehensive awareness of wholeness and integrity in all dimensions of an individual.^[6] Individuals with elevated levels of well-being generally experience positive emotions and hold constructive appraisals of their surroundings. Conversely, those with lower well-being tend to evaluate their life circumstances unfavorably and experience negative emotions more frequently.^[7] Various studies have indicated that individuals with greater psychological well-being, such as high levels of emotional vitality and life satisfaction, may be at lower risk for developing diabetes.^[8]

Adult attachment theory is a significant variable to consider when examining the Patient-Provider Relationship and adherence to treatment and health recommendations. John Bowlby pioneered attachment theory, which has been empirically investigated among infants, children, and adults, revealing four distinct attachment styles: secure, avoidant, preoccupied, and anxious.^[9] The development of therapeutic relationships and patients' adherence to treatment are heavily influenced by attachment styles. Patients with a secure attachment style typically display good treatment adherence. Bennett et al., notes that individuals with this attachment style seek guidance from their physicians, follow their advice, and proactively build their support system.^[10]

Research has shown that individuals with a secure attachment style are more prone to experiencing positive and regulated moods, whereas those with insecure attachment styles, such as avoidance or ambivalence, tend to exhibit higher levels of negative emotional states.^[11]

Theoretical and scientific research suggest that mentalizing ability is associated with research variables.^[12,13] This reflective function involves understanding one's own and others' mental states through childhood attachment relationships, serving as the basis for observable behavior. Lieberman identified four dimensions of mentalization: automatic versus

controlled, self-versus other, internal versus external characteristics, and cognitive versus affective.^[14] Mentalization benefits individuals and their relationships by facilitating the comprehension of mental states, making it easier to understand behavior and maintain effective interpersonal relationships. Furthermore, predicting actions based on mental states helps regulate behavior, improve communication by identifying emotions and desires, and enhance decision-making through factual information.

Previous studies have explored the correlation between psychological well-being, attachment style, illness perception and treatment adherence.^[15] However, these investigations have not comprehensively examined individuals with diabetes. Additionally, the mediating role of mentalization has not been adequately considered in these studies. The importance of mentalization in relation to psychological well-being, attachment styles, and treatment adherence presents an opportunity for scientific research and intervention initiatives. The field of treatment adherence for patients with type 2 diabetes offers a platform to address both research and practical needs through effective and efficient indirect treatment and intervention programs.

Objectives

This study aims to investigate the connection between psychological well-being, attachment styles, and treatment adherence among diabetic patients. Specifically, it seeks to explore the mediating role of mentalization and assess the relative contributions of each variable in explaining treatment adherence.

Methods

This cross-sectional study used correlation and structural equation modeling methods for analysis. Data collection was conducted through face-to-face procedures with a non-random sample of 230 patients diagnosed with type 2 diabetes. The study's statistical population comprised diabetic patients aged 20 to 65 who sought treatment at the Isfahan endocrinology and metabolism clinics from July to October 2021. Inclusion criteria required participants to be type 2 diabetes patients receiving medication through pills or insulin injections, have at least a middle school education, fully consent to participation in the study, have no history of major psychiatric illnesses such as psychosis or diagnosed mood disorders, and not suffer from systemic diseases like rheumatoid arthritis, AIDS, or chronic fatigue. Participants failing to respond to 10% or more of the items were excluded from the study's results.

A questionnaire was used to collect demographic data from the patients, while medical information was retrieved from their files.

The Tobert Self-Care Questionnaire is a self-report tool comprising 15 questions assessing patients' self-care practices over the last 7 days. It covers various aspects of diabetes management, including diet, exercise, blood sugar testing, insulin injection or antidiabetic pill intake, foot care, and smoking. The questionnaire yields a total score ranging from 0 to 99 to determine the level of self-care, categorized as weak self-care (0-33), moderate self-care (34-60), and strong self-care (68-99). The questionnaire has demonstrated content validity with a mean score of 84.9 and reliability based on a Cronbach's alpha coefficient of 0.78.^[16,17]

Ryff's Psychological Well-Being Questionnaire consists of six factors: independence, control over the environment, personal growth, positive relations with others, purpose in life, and self-acceptance. These factors contribute to an overall psychological well-being score. The questionnaire uses a 6-point continuum scale from "completely agree" to "completely disagree" for self-assessment. A higher total score indicates higher psychological well-being. The test's reliability has been established through various studies using Cronbach's alpha coefficients ranging from 0.82 to 0.92. Bayani et al. assessed the scale's reliability using the test-retest method and reported a coefficient of 0.82.^[18]

The Collins and Read Adult Attachment Scale comprises 18 items divided into three subscales: dependence (D), closeness (C), and anxiety (A). Subscale C achieved a Cronbach's alpha value of 0.81, while subscale D scored 0.78, and subscale A reported a value of 0.85.^[19] In Iran, subscale A achieved a Cronbach's alpha coefficient of 0.74, subscale D scored 0.28, and subscale C scored 0.52.^[20]

The MentS questionnaire is a self-report tool in its 28-item version that assesses mentalization on a 5-point Likert scale ranging from 1 (completely false) to 5 (completely true). It consists of three subscales: Self-Related Mentalization (Ments-S), Other-Related Mentalization (Ments-O), and Motivation to Mentalize (Ments-M). The internal reliability of this questionnaire is considered good in the general population and acceptable in clinical samples, with Cronbach's alpha coefficient values of 0.84 and 0.75, respectively.^[21] Prior to the main study, a pilot study was conducted to assess the questionnaire's reliability, revealing a Cronbach's alpha coefficient for mentalization of 0.89, and for the subscales of self-mentalization, others, and tendency to mentalize, values of 0.78, 0.73, and 0.75, respectively.

The data were analyzed using SPSS (version 24.0, SPSS Inc, Chicago, IL, USA) and structural equation modeling was conducted using PLS software. Construct validity (AVE) and repeated checks were used to evaluate validity, while combined reliability (CR) and Cronbach's alpha coefficient (Reliability) were employed to determine the measurement tools' reliability. In the subsequent step, a structural model was applied to investigate the causal relationships between study variables. Path coefficients, t values, and statistical significance (p-values) were calculated for this purpose.

After receiving approval from the Research Vice-Chancellor at Isfahan University of Medical Sciences and obtaining ethical clearance from the ethics committee with approval code IR.MUI.MED.REC.1399.1151, the project was referred to Isfahan's Siddigeh Taher Medical Education Center. The study was conducted in accordance with the Declaration of Helsinki.

Results

A sample of 230 individuals diagnosed with type 2 diabetes, consisting of 99 males and 131 females, was selected. The mean age was 50.73 ± 9.58 . Demographic data is presented in Table 1.

Initially, correlation coefficients among the variables were computed, and the results are displayed in Table 2. The analysis revealed a significant positive relationship ($p < 0.01$) between psychological well-being scores and adherence to treatment among participants. Moreover, individuals with secure attachment styles showed a significant positive correlation with treatment adherence ($p < 0.01$), while no such relationship was found between avoidant attachment style, anxiety, and treatment adherence ($p < 0.01$). These findings suggest that individuals with higher levels of psychological well-being are more likely to adhere to treatment regimens for type 2 diabetes.

Subsequently, a structural equation model using path analysis was employed to investigate the causality of various relationships. The results are presented in Table 4, illustrating the relationships for each index. The analysis indicated a direct relationship between psychological well-being and treatment compliance ($\beta = 0.21$). Additionally, a significant association was observed between secure attachment style and treatment adherence ($\beta = 0.24$). However, no significant correlation was found between anxious attachment, avoidant attachment, and treatment adherence, with respective values of $\beta = -0.043$ and $\beta = 0.001$.

Table 5 and Figure 2 demonstrate that psychological well-being has a positive mediating effect on treatment

adherence ($p < 0.00$, $T = 38.4$) through mentalization. Furthermore, mentalizing the effects of avoidant attachment style on treatment adherence ($p < 0.004$, $T = 2.05$) also serves as a positive mediator. The goodness

of fit (GoF) criterion was utilized to assess the overall model fit, yielding a value of 0.33 in this study, indicating a moderate fit.

Table 1. Mean and standard deviation of demographic characteristics

Variable	Group	N	Percent	Mean±SD
Age	20-30	230	-	50.73±9.58
	30-40			
	40-50			
	50-65			
Gender	Male	99	0.43	1.56±0.49
	Female	131	0.57	
Marital	Single	22	9.6	1.91±0.35
	Married	208	90.4	
Employment	Unemployed	121	52.6	2.17±1.33
	Employee	16	0.7	
	Retired	25	10.9	
	Free	68	29.6	
Education	High school	140	60.9	1.65±0.94
	Diploma	42	18.3	
	Bachelor's	33	14.3	
	Master's	15	6.5	
History of heart surgery	Yes	61	26.5	1.73±0.44
	No	169	73.5	
The duration of the disease	<1	30	0.13	3.19±1.15
	1-3	42	18.3	
	3-5	10	4.3	
	>5	148	64.3	
Drug use history	Yes	20	8.7	1.91±0.28
	No	210	91.3	

Table 2. Correlation coefficients among the variables

Variable	1	2	3	4	5
1 adherence to treatment	-				
2 secure attachment	0.473**	-			
3 avoidant attachment	0.111	-0.284**	-		
4 Anxiety attachment	-0.124	-0.038	0.316**	-	
5 psychological wellbeing	0.573**	0.366**	-0.350**	-0.274**	-

** $p < 0.01$

Table 3. Construct validity and reliability

Scale	CR	Cronbach's alpha	AVE
Adherence to treatment	0.81	0.82	0.502
Mentalization	0.89	0.90	0.506
Psychological wellbeing	0.71	0.72	1.00
Secure attachment	0.73	0.76	0.54
Avoidant attachment	0.76	0.74	0.51
Anxiety attachment	0.71	0.78	0.59

Table 4. Results of hypothesis testing (direct effect)

Path Analysis	β	SE	T-Stat	P value
Psychological wellbeing → adherence to treatment	0.21	0.78	2.79	< 0.00
Secure attachment → adherence to treatment	0.24	0.05	4.32	< 0.00
Avoidant attachment → adherence to treatment	0.001	0.06	0.011	< 0.99
Anxiety attachment → adherence to treatment	-0.043	0.069	0.64	< 0.51

Table 5. Results of hypothesis testing (moderating effect)

Path Analysis	β	SE	t values	P value
Psychological wellbeing \rightarrow Mentalization \rightarrow adherence to treatment	0.256	0.047	4.38	< 0.00
Secure attachment \rightarrow Mentalization \rightarrow adherence to treatment	-0.013	0.023	1.49	< 0.13
Avoidant attachment \rightarrow Mentalization \rightarrow adherence to treatment	0.086	0.024	2.05	< 0.04
Anxiety attachment \rightarrow Mentalization \rightarrow adherence to treatment	0.038	0.027	0.385	< 0.7

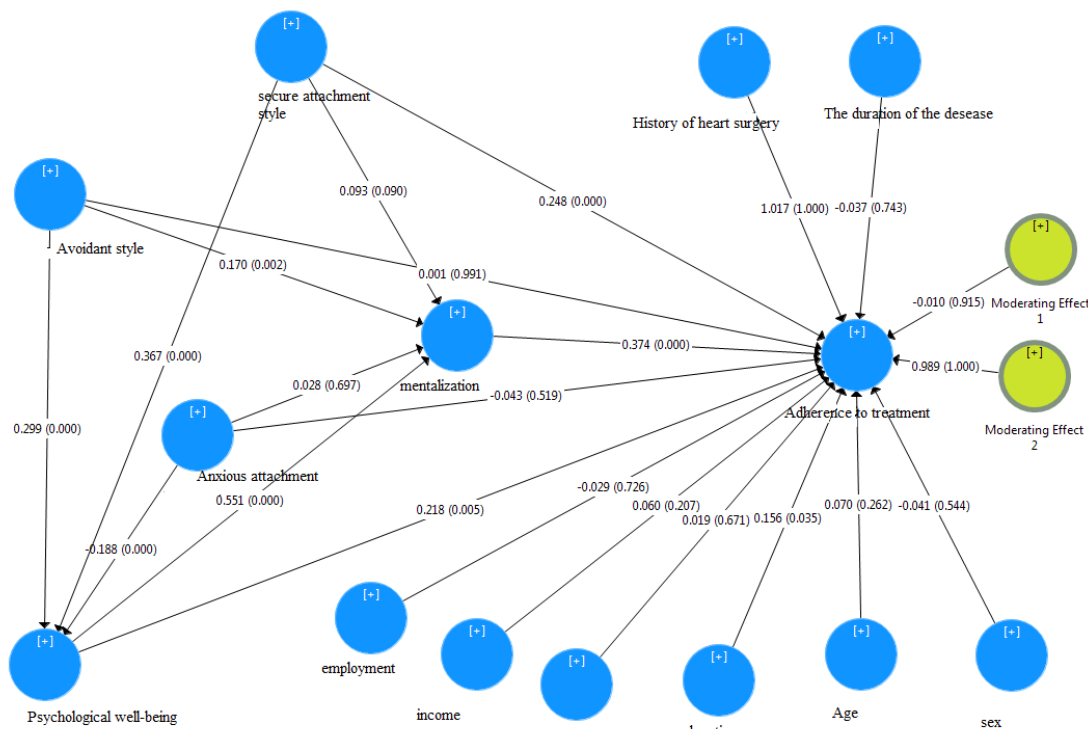


Figure 1. PLS Algorithms result P-values

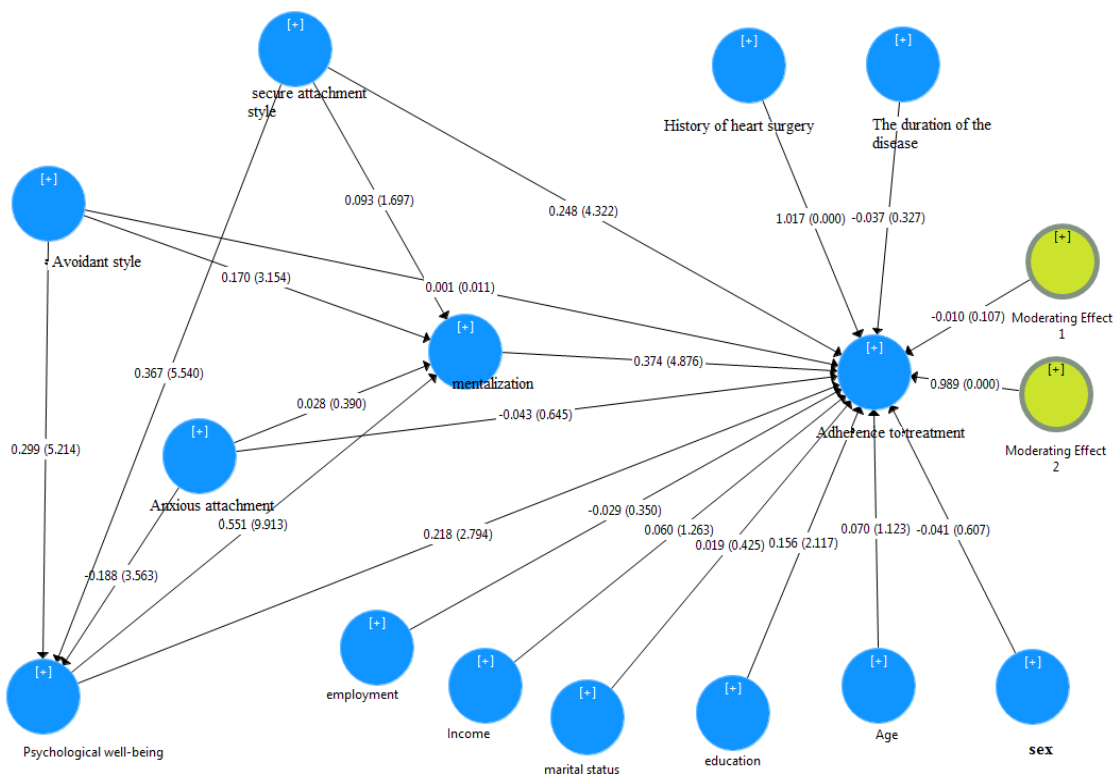


Figure 2. PLS Algorithms result t-values

Discussion

The aim of this study was to investigate the relationship between psychological well-being, attachment styles, and treatment adherence in individuals with Type 2 diabetes. Additionally, the mediating role of mentalization was explored. The results of the study confirmed that mentalization acts as a mediator in the association between psychological well-being and treatment adherence. This finding is consistent with previous research conducted by Koshkestani et al.,^[22] Hamilton et al.,^[23] Massey et al.,^[24] and Lama et al.^[25] The findings suggest that psychological well-being can be used as a predictor of treatment adherence, highlighting the potential benefit of improving mental health in patients with diabetes. Positive psychological aspects such as optimism and positive affect have been linked to better medical outcomes, including improved glucose control and reduced mortality rates.^[6]

Although mentalization has its roots in psychodynamic approaches, enhancing mentalization abilities is considered a valuable goal in various forms of psychotherapy. Attachment theorists have developed therapeutic techniques to enhance and apply mentalization, initially targeting individuals with borderline personality disorders but now extending to the treatment of various psychological conditions. Mentalization involves the ability to interpret one's own and others' behavior implicitly and explicitly, sharing common ground with empathy, metacognition, emotional intelligence, and self-awareness.^[26,27]

Furthermore, the study revealed a positive and significant relationship between treatment adherence and a secure attachment style. This finding is consistent with previous studies by Ciechanowski et al.,^[9] Bliss et al.,^[28] and Belot et al.^[29] Individuals with a secure attachment style tend to respond better to treatment and adapt emotionally to chronic or life-threatening illnesses. Support from loved ones can help alleviate the stress associated with illness, extending to the doctor-patient relationship. Patients with a secure attachment style are more likely to receive adequate support and information about their condition, leading to improved treatment adherence and metabolic control.^[30]

The research also suggests that mentalization serves as a mediator between avoidant attachment style and treatment adherence. Individuals with an avoidant attachment style may struggle with maintaining relationships and being responsive to others, particularly in times of illness or dependency. This difficulty in communication can hinder their ability to receive necessary information for managing their condition

effectively.^[31] Individuals with diabetes who exhibit an avoidant attachment style may experience elevated HbA1C levels and insulin resistance due to heightened stress levels. This can impede their ability to manage their illness independently, leading to poor adherence to treatment regimens and increased metabolic indicators over time.^[32]

On the other hand, mentalization, which involves empathy, understanding of others, and awareness of one's own and others' emotions and feelings, has been found to moderate the effects of avoidant attachment.^[33] Consequently, individuals with avoidant attachment tendencies may be more likely to adhere to treatment when mentalization is present. There have not been many studies that have explored these hypothesized connections, which is why it aligns with the findings of some existing research in the field. However, our study's results do not align with what Bennet et al.,^[10] Sauer et al.,^[34] and Nanjappa et al.^[35] found. This disparity can be attributed to differences in social and cultural factors. Additionally, mentalization played a role in mediating and causing differences between the results. Furthermore, we examined the mediating effect of mentalization on the association between anxious and secure attachment and treatment adherence. Our findings suggest that mentalization does not serve as an indirect factor influencing the relationship between anxious and secure attachment and treatment adherence.

The present study has some relevant limitations that should be pointed out. First, the data collection process encountered a significant challenge due to the onset of the COVID-19 pandemic. Patients were apprehensive about contracting the disease, which prolonged the project and necessitated filling out questionnaires in two sessions. Second, a non-random sampling approach was used to obtain the sample, targeting patients who had access to medical centers. This aspect must be considered when attempting to generalize the findings to the entire population. The cross-sectional nature of the study and the inability to make causal inferences from the results are other limitations of this study.

Conclusions

The current findings indicate that enhancing mentalization can aid individuals with diabetes in controlling their condition. Mentalization-based therapies can deter the shift towards insecure attachment, thus avoiding social and interpersonal issues for patients. Ultimately, those with stronger mentalizing abilities are better equipped to comprehend the advantages of

adhering to medication. Given the significant correlation between psychological complications and health outcomes, as well as adherence to treatment, a psychological intervention protocol should be developed based on these findings. It would be beneficial to assess the patients' mentalizing ability during treatment, specifically examining how it impacts their adherence to treatment. However, there is currently limited research on mentalization in diabetic patients and its influence on the disease process. Therefore, further investigation into this topic is recommended.

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Competing interests

The authors declare that they have no competing interests.

Abbreviations

Coronavirus disease 2019: COVID-19;
World Health Organization: WHO

Authors' contributions

All authors read and approved the final manuscript. All authors take responsibility for the integrity of the data and the accuracy of the data analysis.

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Availability of data and materials

The data used in this study are available from the corresponding author on request.

Ethics approval and consent to participate

The study was conducted in accordance with the Declaration of Helsinki. Institutional Review Board approval (code: IR.MUI.MED.REC.1399.1151) was obtained. The present study did not interfere with the process of diagnosis and treatment of patients and all participants signed an informed consent form.

Consent for publication

By submitting this document, the authors declare their consent for the final accepted version of the manuscript to be considered for publication.

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