Social and Human Sciences Review, Batna 1 university Volume: 24 N 02 (December, 2023) pp 349-366
ISSN: 1111-5149, EISSN: 2588 – 2430

The health locus of control and its relationship to treatment adherence among adults with diabetes type 2

مصدر الضبط الصحي وعلاقته بالالتزام بالعلاج لدى مرضى السكري من النوع 2

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Received in	12-10-2023	accepted in	28-01-2024

Abstract

The current study aimed to identify the predominant dimension of health locus of control, assess the level of treatment adherence, and determine whether there is a statistically significant correlation between the locus of control and treatment adherence among patients with type 2 diabetes. The researchers employed a descriptive correlational method on a purposive sample consisting of 85 patients with type 2 diabetes of both genders in the cities of Batna, Biskra, Algiers. This was done using the Health Locus of Control scale developed by Wallston (1978) translated by "Djaballi Noreddine", the Treatment Adherence scale developed by" Mihoubi Fouzi". Results indicated that the predominant dimension is the internal locus of control with an external dimension of other people's influence. Patients with diabetes exhibit a moderate level of treatment adherence. There is no statistically significant correlation between health locus of control and treatment adherence among adults suffering from type 2 diabetes.

Keywords: Health control; Adherence; Diabetes.

ملخّص

هدفت الدراسة الحالية إلى تحديد البعد السائد من أبعاد مصدر الضبط الصحي، التعرف على مستوى الالتزام بالعلاج، ومعرفة ما إذا كانت هناك علاقة ارتباطية دالة إحصائيا بين مصدر الضبط والالتزام بالعلاج لدى مرضى السكري من النوع الثاني. استخدمت الباحثتان المنهج الوصفي الارتباطي على عينة قصدية (عمدية) مكونة من 85 مريض بالسكري من النوع الثاني من كلا الجنسين، في مدينة باتنة، بسكرة، والجزائر العاصمة. بالاعتماد على مقياس مصدر الضبط الصحي المعد من قبل (Wallston 1978) والمترجم من قبل " جبالي نور الدين"، ومقياس الالتزام بالعلاج الذي تم تطويره من قبل "ميهوبي فوزي". وأظهرت النتائج أن البعد السائد هو مصدر الضبط الداخلي مع البعد الخارجي لنفوذ الآخرين. يتميز مرضى السكري من النوع الثاني بمستوى متوسط من الالتزام بالعلاج. لا توجد علاقة ارتباطية بين مصدر الضبط الصحي والالتزام بالعلاج لدى البالغين المصابين بداء السكري من النوع 2.

الكلمات المفتاحية: الضبط الصحي؛ الالتزام؛ السكري.

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Introduction

The 20th century was distinguished by the emergence of non-transmitted disease (chronic) diseases, rather than communicable (infectious) diseases that plagued humanity for several years. However, humans were able to overcome them after the discovery of vaccines, which appeared as a glimmer of light that dispelled the darkness of human suffering for centuries. But these vaccines did not turn the page on all suffering, as chronic diseases appeared as a result of the development that humans experienced in their lifestyle, causing changes in the environmental, nutritional, and living conditions of society in general. Diabetes is classified among the top ten diseases leading to death, with the number of people with diabetes worldwide reaching 537 million adults (1 in 11) in 2021, and it is expected to increase to 643 million by 2030. Diabetes also caused the death of 6.7 million people in 2021. (اليوم العالمي للسكري: 2021). This may make diabetes the seventh leading cause of death in the world by 2030. However, we are witnessing a change in eating habits and a decrease in physical activity worldwide, which exacerbates the situation. (Mikolajczak: 2013, 130)

Algeria is one of the countries suffering from an increase in the spread of diabetes, like other countries. The number of diabetes patients in Algeria is estimated to be around 4 million people, including children and the elderly, according to Dr. JamilaNadhir, Deputy Branch Manager responsible for non-communicable diseases at the Ministry of Health, in a program on Algerian radio. (سبوتنيك: 2023)

In our study, we will focus on type 2 diabetes, also known as non-insulin-dependent diabetes or adult-onset diabetes, which accounts for 90% of the patients. Diabetes is a progressive disease that requires lifelong behavioral adjustments to control it, and effective self-management is the key to success. It leads to improving the course of the disease and avoiding serious complications by making changes to the original lifestyle to cope with the chronic condition.

The primary objective of treatment is to maintain normal blood sugar levels, and to achieve blood sugar control, a comprehensive system must be followed, making it extremely complex. Studies have generally shown that patients who follow a complex treatment regimen are more prone to non-adherence to recommendations compared to patients who follow a less demanding system.

According to "Dimatteo & dincola 1982," they indicate that there is a significant variation in non-adherence rates, estimating that on average, one out of every three patients does not adhere with medical recommendations during long-term treatments (ليندزاي: 2000،576).

The complex nature of diabetes requires a high level of adherence, especially at the onset of the disease, to slow down its long-term complications, which include heart and artery diseases, eye diseases, kidney diseases, and others. However, many of these complications only appear after 15 to 20 years of the disease, which makes patients not fear them and consequently not adhere to the diabetes regimen. Additionally, individuals with diabetes usually suffer from multiple diseases that require them to take multiple medications, and studies have shown that adherence decreases when multiple drugs are involved. The age of the patient is also associated with adherence to physical activity routines, as studies have shown that younger patients are more adhered, On the other hand, older individuals may exhibit better self-management compared to younger adults. Studies reveal that 20% of individuals with type 2 diabetes do not monitor their blood glucose levels, and only 30% of them have an exercise program (Evans et al: 1999). More significantly, 53.6% of diabetes patients rely on physicians rather than themselves to manage their condition, relinquishing the responsibility to take an active role in their treatment (Besen et al: 2016, 1). Individuals who believe they have control over their health tend to engage in more activities to achieve this objective.

In order to improve patient adherence, it is necessary to first understand the reasons for non-adherence. Literature has documented several factors related to adherence to the diabetes system, including personal factors. Patients adhere well when they feel capable of succeeding in the system, which explains the impact of personal factors on adherence, including the concept of locus of control, derived from Julian Rotter's social learning theory (1966). This theory has gained prominence in mental health in recent years and has emerged from the theoretical heritage of both learning theory and personality theory.

The concept of the locus of control is based on the assumption that an individual's behavior is greatly influenced by their perception of causal relationships between behavior and its consequences, leading them to act in light of their awareness of these relationships. (أحمان:2012،202) With the development of this concept in recent decades, many researchers have applied it in the field of Behavioral Health, and their findings have shown that an individual's health behavior is influenced by their beliefs about the source of their health. The credit for making the concept of health locus of control prominent in the health scientific heritage goes to "Wallston et al. 1978," who divided it into three dimensions of health locus of control known as IPC (I – Internal, P – Powerful Others, C – Chance), and internal locus of control. In many cases, especially regarding health, individuals with a high internal locus of control have lower stress levels and work more proactively to avoid illness and maintain a healthy lifestyle (Muhonen & Torkelson،Martinez :2004,4). Additionally, numerous studies have found that patients with an internal locus of control are more likely to follow healthy behaviors and adhere to treatment, including Ducette et Lovwery (1974), Ducette

(1976), Reynaet et al. (1995), Smith & Tilloston (1994), Mazloomy et al. (2006), among others.

Returning to previous studies, we find a variation in their results. Some studies concluded the existence of a significant relationship between the health locus of control and treatment adherence, SripriyaGopalkrishnan (2014). On the other hand, some studies denied the existence of this relationship, such as the study conducted in Brazil regarding the impact of psychosocial variables on treatment acceptance among diabetic patients. Furthermore, these studies were conducted in foreign countries, and there is no support for these results in the Algerian environment, except for one unpublished study known to the researchers, which was not included in the research. Therefore, it is possible to arrive at different results in the Algerian society due to the uniqueness of each research community. And this is what prompted us to investigate the subject. The researchers also emphasized in their recommendations the need to reexamine the relationship between these variables with better control.

This contradiction in information prompted the researchers to seriously consider delving into studying this topic, which aims to identify the prevailing dimension of the health locus of control and the level of adherence to treatment, in addition to examining the relationship between the health locus of control and adherence to treatment among diabetic patients in the local environment. The study adopts a descriptive-correlational approach and utilizes a purposively selected sample. It applies the Health Locus of Control Scale developed by Wallston (1978) and translated by JabaliNoureddine, as well as the Treatment Adherence Scale developed by MehoubiFawzi. Additionally, a demographic and general information questionnaire was prepared by the researchers (Haddadi&Ahmane). Through all of this, the current study's problem is formulated in the following questions:

1- What is the prevailing dimension of the health locus of control among type 2 diabetic patients?

2- What is the level of treatment adherence among type 2 diabetic patients?

3- Is there a statistically significant correlation between the health locus of control and treatment adherence among type 2 diabetic patients?

1- Study Hypotheses

1- The predominant dimension of health locus of control among patients with type 2 diabetes is the external dimension related to the influence of others.

3- Patients with type 2 diabetes exhibit a moderate level of treatment adherence.

4- There is a statistically significant correlational relationship between health locus of control and treatment adherence among patients with type 2 diabetes.

2- Health Locus of Control

The term "Health Locus of Control" has found widespread utilization across various healthcare domains. Physicians and researchers have employed it in studies and research endeavors addressing diverse health-related issues. These studies stem from a fundamental notion that individuals with an internal locus of control are more inclined and willing to adopt healthful behaviors compared to those with an external locus of control concerning health (95،2000 :يخلف).

Health Locus of Control is defined as the extent to which individuals believe their health is influenced by internal and external factors. Whether an individual possesses an internal or external health belief is determined through the Health Locus of Control scale formulated by Wallston, Wallston, Maid and Kaplen (18،2009:عيادي).

"Wallston" (1988) defines it as individuals' beliefs regarding who or what determines their health condition (29،2015:قارة).

Thus, Health Locus of Control can be defined as the degree to which an individual believe they have control over their health status due to their personal behaviors (such as exercise, diet), or whether their health condition is controlled by external factors attributed to medical professionals (influential figures), chance, or randomness.

3- Treatment Adherence

Various foreign terms synonymous with "Adherence" are observed, such as "Compliance," "Maintenance," "Concordance," "Alliance," and in French, "Observance."

The researchers have opted for the term “Adherence” due to its implication of patient agreement with healthcare providers' recommendations. Consequently, the patient is regarded as an active participant rather than a passive recipient. Below, a compilation of definitions from various perspectives is presented to refine the concept:

The National Council on Patient Information and Education (NCPIE) in 1995 defines treatment adherence as "following a prescribed medication regimen as agreed upon between the patient and the healthcare provider" (Alikari &Zyga:2014, 181).

C. Tourette-Turgis& al (2000) define it as the individual's ability to adhere to a specific medical prescription. Several components, cognitive, emotional, behavioral, and social, contribute to treatment adherence, and these elements may interact positively or negatively (Tourette-Turgis& al: 2000, 2).

The World Health Organization (WHO) in 2003 defines it as "the extent to which a person's behavior – taking medication, following a diet, and/or executing lifestyle changes – corresponds with agreed recommendations from a healthcare provider" (WHO: 2003, 3).

Bernard Cortet& Olivier Bénichou (2005) define adherence as "the extent of an individual's behavior (regarding medication intake and dietary instructions) according to a medical prescription or generally from an advisory source promoting good health" (Cortet&Bénichou:2005).
Through the above definitions, we arrive at the following conceptualization:
Treatment adherence pertains to the degree of alignment with healthcare provider recommendations concerning medication intake, dietary regulations, glycemic control, weight monitoring, physical exercise, and regular medical check-ups, in congruence with the patient's behavior.

4- Methodology

4-1- Method

The selection of an appropriate methodology for any study depends on the nature of the research problem. Methodology is the approach followed by the researcher to address the study's questions, test hypotheses, and arrive at conclusions. Given that the current study aims to discern the health locus of control and its relationship with treatment adherence among adults diagnosed with type 2 diabetes, the descriptive correlational methodology is most suited for the study's subject.

4-2- Sample

The study's sample consisted of 85 adult individuals of both genders diagnosed with type 2 diabetes. The purposive sampling method was employed, considering it optimal for our study. The sample demonstrated a higher representation of females, accounting for 60%. The age group of 51 to 65 years constituted the largest portion at 38.82%. Concerning the duration of illness, two categories stood out: those with 1 to 5 years of illness and those with 6 to 10 years, each making up 34.11%. Lastly, among different educational levels, the highest representation was among the illiterate category at 38.82%.

4-3-Tools

4-3-1- Demographic and General Information Form

The researchers (Haddadi and Ahmane) designed a form containing demographic characteristics and general information, which was coupled with the scales. This was intended to acquire information related to both the patient and the

disease, influencing the core study variables. Variables such as age, gender, educational level, and duration of illness were relied upon.

4-3-2- Health Locus of Control Scale and its Psychometric Properties

The Health Locus of Control Scale, developed by Wallston et al. in 1976-1978, and adapted for the Algerian context by JabaliNour-Eddine in 2007, is one of the most important measures of health locus of control used in the fields of health and psychology. The scale consists of three main dimensions, each containing six items for a total of 18 items assessing self-perception. Responses are collected using a Likert scale with five levels ranging from strongly agree to strongly disagree.

JabaliNour-Eddine (2007) calculated the construct validity by computing the correlation coefficients between each item and its corresponding subdimension, finding that all correlation coefficients were statistically significant at the 0.01 level, ranging from 0.41 to 0.78.(أحمان:2022، 161) Consequently, the scale exhibits high construct validity and can be considered reliable.

Regarding discriminant validity, differences in means between the high and low groups for each of the three dimensions were calculated. The results showed significant differences at the 0.01 level, indicating that the scale possesses discriminant validity.(أحمان:2011، 162)

Furthermore, the Cronbach's alpha coefficient was calculated to assess reliability, and the results indicated a high and acceptable coefficient of reliability for all dimensions of the scale.

4-3-3- The Medication Adherence Scale and its Psychometric Properties

The Medication Adherence Scale for Kidney Failure, developed by François Mai et al. in 1999, was translated into Arabic by researcher ZinadDalila in 2009 and adapted for diabetic patients by researcher JaziaBzari, with some items corrected by Dr. FauziMehoubi. The adapted scale for diabetic patients consists of seven dimensions with a total of 22 items.(ميساوي، صبوح: 2016، 92-95)

Researchers Haddadi and Ahmane recalculated the psychometric properties and found:

Internal consistency reliability: Pearson correlation coefficients between each dimension and the total score of the scale were statistically significant at the 0.01 level, except for dimension 3, which was not statistically significant. This indicates

internal consistency reliability among the dimensions of the scale and the total score, except for dimension 3, which will be removed.

Discriminant validity: A comparison of scores between two groups using the Mann-Whitney nonparametric test showed statistically significant differences at the 0.001 level, indicating discriminant validity.

Cronbach's alpha reliability: The Cronbach's alpha coefficient was calculated to be 0.86 for the total items of the scale, indicating that the scale is reliable.

In summary, the Medication Adherence Scale for diabetic patients demonstrates good psychometric properties, including internal consistency, discriminant validity, and reliability.

4-4- Statistical Methods

The researchers employed the statistical software package SPSS version 22 (SPSS V22) to analyze the obtained results. Various statistical methods were used in the analysis, including:
Percentage ratios.
Mean, median, and standard deviation.
Friedman test.
Cronbach's alpha coefficient.
Spearman-Brown equation.
Pearson's correlation coefficient.
Mann-Whitney U test.

5- Presentation and Analysis of Study Results

5.1- Presentation and Analysis of the First Hypothesis

The first hypothesis stated that: "The dominant dimension of health locus of control among type 2 diabetes patients is the external dimension of others' influence."

To verify the validity of this hypothesis, the mean and standard deviation were calculated for each dimension of the health locus of control scale, arranged in descending order. The mean of the dominant dimension was then adopted.
The following results were obtained:

Table 1: Mean and Standard Deviation for Dimensions of Health Locus of Control.

Health Locus of Control Dimensions	Mean	Standard Deviation
Internal Control	23.52	3.16
External Control by Luck	17.81	4.21
External Control by Others' Influence	23.27	3.81

From Table 1, it can be observed that the mean for internal control is very close to the mean of external control by others' influence. The mean for internal control is 23.52 with a standard deviation of 3.16, while the mean for external control by others' influence is 23.27 with a standard deviation of 3.81. The mean for external control by luck is 17.81 with a standard deviation of 4.21.

Since the means are very close, no dominant dimension is evident. Therefore, we need to calculate Rotter's formula to determine the direction of control as follows:

Direction of Control = Internal Control x 2 / (Luck Control + Others' Influence Control)

Direction of Control = 23.52 x 2 / (17.81 + 23.27) = 1.14

As the direction of control is greater than 1, the dominant source of control is internal control. To further confirm this result, the researchers conducted the Friedman test to detect differences between the mean dimensions of health locus of control, as shown in the following table:

Table 2: Differences between Dimensions of Health Locus of Control.

Health Locus of Control Dimensions	Mean	Standard Deviation	Degree of Freedom	Chi-Square (χ^2)	Significance Level
Internal Control	23.52	3.16	2.35	63.67	0.000
External Control by Luck	17.81	4.21	1.31		
External Control by Others' Influence	23.27	3.81	2.35		

Through table 2, which represents the differences between the dimensions of the locus of control, it can be observed that the value of Chi-Square (χ^2) reached 63.67 at a significance level of 0.01. Consequently, it indicates in favor of a higher mean, which corresponds to internal control.

This analysis supports the hypothesis that the dominant dimension of health locus of control among type 2 diabetes patients is internal control.

5.2- Presentation and Analysis of the Second Hypothesis

The second hypothesis stated that: "Type 2 diabetes patients exhibit a moderate level of treatment adherence."

To assess the level of treatment adherence, we calculate the mean and median of the total score of the treatment adherence scale. Then, we manually extract the hypothetical ranges, and finally, we compare the mean with the range it falls into.

Table 3: Mean and Median for Treatment Adherence Scale.

Treatment Adherence Scale	Mean	Median
Treatment Adherence	43.89	45

From Table 3, it can be observed that the mean of treatment adherence is 43.89, which is very close to the median value of 45. Therefore, the researchers relied on the mean value.

To calculate the hypothetical classes, they used the formula:

$$\text{Class Length} = \text{Number of Items} \times \text{Highest Value} - \text{Number of Items} \times \text{Lowest Value} / 3$$

$$\text{Class Length} = 19 \times 3 - 19 \times 1 / 3 = 57\text{-}19/3 = 12.33$$

The researchers determined the hypothetical **Classes** by starting from the lowest possible value a person could get on the adherence scale to establish the lower boundary of the first class. They then added the class length to calculate the upper boundary of the first class. This process was repeated to obtain the other classes.

The derived classes are as follows:

Low class [19 - 31]

Moderate class [32 - 44]

High class [45 - 57]

After determining the classes, the researchers compared the mean value (43.89) with the classes. Since the mean falls within the Moderate class [32 - 44], it indicates that the level of treatment adherence among type 2 diabetes patients is moderate.

5.3- Presentation and Analysis of the Third Hypothesis

The third hypothesis stated that: "There is a statistically significant correlation between health locus of control and treatment adherence among type 2 diabetes patients."

To test this hypothesis, the researchers calculated the Pearson correlation coefficient between health locus of control and treatment adherence. The following table shows the results:

Table 4: Pearson Correlation Coefficient between Health Locus of Control and Treatment Adherence.

Health Locus of Control	Correlation Coefficient	Significance Level
Treatment Adherence	0.116	0.288

From Table 4, it is evident that the Pearson correlation coefficient between health locus of control and treatment adherence is 0.116, and the significance level is 0.288. Since the correlation coefficient is not significant and is close to zero, it can be concluded that there is no statistically significant correlation between health locus of control and treatment adherence among type 2 diabetes patients.

6-General Discussion

The results have shown the predominance of the internal dimension of health locus of control among patients with type 2 diabetes, and the proximity of the result to the external dimension of others' influence. Several studies have arrived at this result, including the studies conducted by Fernanda Silva Fuscaldi et al. (2009) in Brazil, and "Suryanto Suryanto & Yusran Haskas" (2016) in Indonesia, where researchers found the predominance of the internal dimension of locus of control. As for studies that have found the co-dominance of the internal and external dimensions of others' influence, we can refer to the study by "Ioannis Nikolaou & al" (2018) in Greece, the convergence of scores on both dimensions (internal and external dimensions of others' influence) can be explained by the high perception of the disease. This is explained by "Morowatisharifabad & al" (2006), as diabetes is a chronic condition that can lead to serious complications, and patients often need the assistance of others. Researchers add that changes in the dominance of the internal and external dimensions of locus of control are due to educational, social, and cultural differences. Additionally, the role of the physician is crucial for diabetic patients, especially elderly ones, who seek advice and support from their doctors, who can monitor medical tests, suggest the type and frequency of treatment to improve glucose control and HbA1c. Therefore, despite high scores on the internal dimension, patients cannot manage their lives without effective guidance from their physicians.

To support the findings and provide commentary on the high scores in both the internal and external dimensions of health locus of control, it's worth noting that Wallston & Wallston (1976) suggested that patients suffering from chronic diseases like diabetes may be more compliant when they enter into a partnership with healthcare providers. This partnership combines beliefs in internal health control and trust in control by powerful others.

Several considerations may explain the results:

The current study included a sample that was predominantly female, at 60%. Many studies have affirmed that females tend to have a higher internal locus of control than males. This is supported by studies such as "Crandall & al 1965," "Kathovsky& al 1967," "GADE & Fuqua 1981," and "Murphy &Roo 1984."
The lack of a clear increase in internal locus of control scores may be attributed to the educational level of the majority of the sample, with 38.82% being uneducated. The theoretical literature suggests that internal locus of control is positively associated with higher education levels, in contrast to external locus of control. This is supported by studies such as "Morowatisharifabad& al 2006," "SeldaArslan& Mustafa Kiliç 2018," and "Farah Habib&AnisaM.Durrani 2016."
Most of the sample participants were older individuals, with 64.7% falling in the 51 years and above category. Studies like "Morowatisharifabad& al 2006," "Farah Habib&AnisaM.Durrani 2016," "SeldaArslan& Mustafa Kiliç 2018" have indicated that external locus of control tends to increase with age.

The study participants demonstrated moderate adherence to treatment, aligning with findings from studies like "HelviKyngäs 2000" and "Younhee Kang &YujinHur 2019," which found moderate levels of compliance among their samples. This result also resonates with the study by "Sitti Fatimah MeylandriArsad& al 2023" in Indonesia, where researchers found that 72.7% of patients exhibited moderate adherence to dietary recommendations. However, it diverges from studies like "Y. Bezie et al 2006," "Nadia Mohamed Taha 2008," and "Beena Jimmy et al 2014" in Oman, which found low compliance among their samples.

These additional insights and comparisons help contextualize the study's findings and provide a broader perspective on the relationship between health locus of control and various demographic and behavioral factors.
The moderate level of adherence among patients with type 2 diabetes can be explained by the patients' perception of the severity of their illness. According to "Leventhal's Health Belief Model" from 1980-1984, patients may be less committed to treatment if they believe their condition is not severe and can be easily managed. This model relies on three core concepts: cognitive representations of disease threat, coping strategy appraisals, and evaluations of prospective actions.
Applying this model to the current study, it's evident that diabetes has become more common in Algerian society. Additionally, the presence of other, more life-threatening diseases such as cancer has made diabetes seem less severe and less threatening in comparison. This perception may contribute to reducedtreatmentadherence.

The same model also suggests that cognitive representations are socially determined and influenced by the environment. Considering the sample characteristics in terms of genetic factors, about 54.11% of the sample had a

genetic factor. This means that other family members have been living with diabetes for many years, possibly without experiencing disability or death. This familiarity and the reduced perceived threat could lead to decreased treatment adherence, as the disease becomes less alarming.
Moreover, the nature of diabetes, which requires adherence to various aspects of treatment, can be burdensome for patients. Regular consultations with specialists can be disruptive to their daily routines, further reducing their commitment to treatment.

In the same context, a study by Dailey et al. found that patients who were prescribed a single medication had better short-term and long-term adherence compared to patients prescribed multiple medications. In light of the sample characteristics, more than half of the participants had comorbidities alongside diabetes, accounting for 56.47%. This implies that they are taking multiple medications, which could reduce their adherence. The most common comorbidity in the sample was cardiovascular diseases, at 70.83%, making treatment regimens more complex and, consequently, decreasing adherence. This finding aligns with a WHO study from 2003, referred to as CODE 2, which highlighted the challenges of managing diabetes when it is accompanied by cardiovascular diseases.

In summary, the moderate level of adherence among patients with type 2 diabetes can be attributed to various factors, including the perception of disease severity, familial familiarity with diabetes, the complexity of treatment regimens, and the presence of comorbidities. These factors collectively contribute to the challenges patients face in managing their condition effectively.
The study also found no significant correlation between health locus of control and treatment adherence. This result differs from previous research, such as the study by SripriyaGopalkrishnan (2014) in India, which reported a relationship between health locus of control and treatment adherence. Additionally, studies by Sitti Fatimah MeylandriArsad& al (2023), Kusnanto (2019), and Shania Adhanty& al (2021) have indicated a significant association between health locus of control and dietary adherence among diabetes patients. Conversely, studies by Dilek BűyűkkayaBesen & al (2016) in Turkey and "Musfirah Nasr Chaudhry&Omama Tariq" (2021) in Pakistan revealed a weak negative relationship between health locus of control and self-care activities in the former, and a moderate negative relationship with treatment adherence in the latter.

These results are unexpected when considering the theoretical framework. Individuals with an internal health locus of control are generally more willing and motivated to engage in health-related behaviors, including treatment adherence, than those with an external locus of control. However, the relatively high proportion of participants aged 51 and older (64.7%) in your sample may have led

to decreased treatment adherence due to physical limitations and cognitive challenges associated with aging.

Furthermore, the presence of comorbid chronic illnesses alongside diabetes (56.47% of the sample) may complicate treatment regimens and negatively impact adherence. Managing multiple medications and undergoing various medical tests can be burdensome, potentially leading to reduced adherence.

In conclusion, the study's findings of no significant relationship between health locus of control and treatment adherence in Algerian type 2 diabetes patients may be influenced by cultural, age-related, and comorbidity factors. These results emphasize the importance of considering local contexts and individual characteristics when studying the relationship between health beliefs and treatment adherence. Further research is needed to better understand this relationship within the Algerian context.

7. Conclusion

In this study, the researchers explored the relationship between the health locus of control and treatment adherence among type 2 diabetes patients. This topic has been extensively studied, often connecting it with psychological and social variables such as social support and self-efficacy. However, the majority of the existing studies were conducted abroad, with only a few available from Algeria, and some sources were inaccessible. Given these limitations, the study concluded:

- An internal health control orientation prevails among type 2 diabetes patients, with proximity to the external control to Others' Influence.
- Type 2 diabetes patients exhibit moderate treatment adherence.
- There is no statistically significant relationship between the health locus of control and treatment adherence.

The study proposes several recommendations for future research:

- Strategies to change patient behaviors should be developed, encompassing all aspects of diabetes self-management.
- Health plans to address risk factors leading to diabetes onset, such as obesity, should be designed.
- Health education programs for diabetes patients should cover various aspects, including diet and exercise.
- Positive feedback for patients' small successes should be provided to foster a sense of control.
- Therapeutic education programs should be designed to address all aspects of the disease, including complications.
- Healthcare professionals' interactions with patients should be improved.

- The study's topic can be further explored in relation to other variables, such as social support, HbA1c levels, and self-efficacy.

In conclusion, the researchers express hope for a future collaboration between the Ministry of Health and universities to conduct widespread, internationally recognized research that can benefit both patients and healthcare providers.

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