








Relationship between acceptance and self-care in type 2 diabetes

Relação entre aceitação e autocuidado em diabetes tipo 2

Relación entre la aceptación y el autocuidado en la diabetes tipo 2

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ABSTRACT

Acceptance in diabetes refers to a person's willingness to openly manage their condition without judgment of the limitations and emotions involved. This study analyzed the relationship between acceptance and self-care in 68 Brazilian adults with type 2 diabetes. A sociodemographic and clinical questionnaire, the Instrumento de Avaliação do Autocuidado dos Pacientes com Diabetes Mellitus Tipo 2 (INAAP-DM2), and the Acceptance and Action Diabetes Questionnaire (AADQ-6) were used. Spearman's correlation and ANCOVA were applied, considering age and education as covariates. No statistically significant correlation was found between diabetes acceptance and self-care, but age was found to be an influence in the relationship between diabetes acceptance and self-care (in the acceptance dimension). The results may be explained by factors such as low education levels and an age above 61 years in the sample, as well as the absence of a Brazilian validation of the AADQ. The need for further national studies on the topic is highlighted.

Keywords: Self Care. Outcome Assessment, Health Care. Diabetes Mellitus, Type 2

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RESUMO

A aceitação em diabetes refere-se à disposição da pessoa para lidar com sua condição de forma aberta, sem julgamento das limitações e emoções envolvidas. Este estudo analisou a relação entre aceitação e autocuidado em 68 adultos brasileiros com diabetes tipo 2. Foram utilizados um questionário sociodemográfico e clínico, o Instrumento de Avaliação do Autocuidado dos Pacientes com Diabetes Mellitus Tipo 2 (INAAP-DM2) e o Acceptance and Action Diabetes Questionnaire (AADQ-6). Aplicaram-se a correlação de Spearman e ANCOVA, considerando idade e escolaridade como covariáveis. Não houve correlação estatisticamente significativa entre aceitação em diabetes e autocuidado, mas a idade influenciou a relação entre a aceitação em diabetes com o autocuidado (na dimensão aceitar). Os resultados podem ser explicados por fatores como baixa escolaridade e idade acima de 61 anos na amostra, além da ausência de validação brasileira do AADQ. A necessidade de mais estudos nacionais sobre o tema é destacada.

Palavras-chave: Autocuidado. Avaliação de Resultados em Cuidados de Saúde. Diabetes Mellitus Tipo 2

RESUMEN

La aceptación en la diabetes se refiere a la disposición de la persona para manejar su condición de manera abierta, sin juzgar las limitaciones y emociones involucradas. Este estudio analizó la relación entre aceptación y autocuidado en 68 adultos brasileños con diabetes tipo 2. Se utilizaron un cuestionario sociodemográfico y clínico, el Instrumento de Avaliação do Autocuidado dos Pacientes com Diabetes Mellitus Tipo 2 (INAAP-DM2) y el Acceptance and Action Diabetes Questionnaire (AADQ-6). Se aplicaron la correlación de Spearman y ANCOVA, considerando la edad y la escolaridad como covariables. No se encontró una correlación estadísticamente significativa entre la aceptación en la diabetes y el autocuidado, pero la edad influyó en la relación entre la aceptación en la diabetes y el autocuidado (en la dimensión aceptar). Los resultados pueden explicarse por factores como el bajo nivel educativo y la edad superior a 61 años en la muestra, además de la ausencia de validación brasileña del AADQ. Se destaca la necesidad de más estudios nacionales sobre el tema.

Palabras clave: Autocuidado, Evaluación de Resultado en la Atención de Salud, Diabetes Mellitus Tipo 2

Highlights of Clinical Impact

- The absence of a statistically significant relationship between self-care and acceptance in diabetes suggests that disease management may depend on additional variables.
- The use of an instrument that has not been adapted and validated in Brazil raises questions about the accuracy of the diabetes acceptance assessment and reinforces the importance of instrument validation.
- The results highlight the need for studies investigating the interaction between acceptance and mediating or moderating factors that influence self-care.
- For clinical practice, the findings suggest that ACT should consider age profile and individual characteristics as well as integrated strategies to promote self-care in type 2 diabetes.

Type 2 diabetes mellitus is a severe metabolic dysfunction that develops slowly and progressively, with high rates of morbidity and mortality as well as a reduction in quality of life. Around 90% of people with diabetes have type 2, which manifests more often in adults (Pereira Campos et al., 2016; Ribeiro Coelho & Adami Raposo do Amaral (2012).; Sociedade Brasileira de Diabetes [SBD], 2017). Data from the International Diabetes Federation (IDF) (2021) showed that, in 2017, the estimated number of people diagnosed with type 2 diabetes in Brazil was the highest among Central and South American countries (12.5 million people) and was forecast to increase to 20.3 million people by 2040 (Anjos, 2020).

A diagnosis of type 2 diabetes is confirmed when the body is unable to use the insulin it produces properly, or when it

does not produce enough insulin to control blood glucose levels. In type 1 diabetes, which accounts for between 5 and 10% of all people with the disease, the immune system mistakenly attacks the beta cells (responsible for producing insulin), affecting the production of insulin that released into the body. Treatments for type 1 and type 2 diabetes differ due to their causes and physiological mechanisms. However, in both cases, insulin injections and lifestyle changes, such as maintaining physical activity and controlling carbohydrates, are expected (SBD, 2017). Care also involves daily blood glucose monitoring, which helps to identify variations in blood sugar levels throughout the day, and periodic assessment of glycated hemoglobin (HbA1c), which provides the average glycemic variation over the last three months (Lyra et al., 2024).

These self-care behaviors for diabetes management are essential for giving patients control over their health (Abdollahi *et al.*, 2020; Anderson *et al.*, 1993; Delamater, 2006; Saito & Kumano, 2022; Silva *et al.*, 2006) and for preventing complications associated with the progression of the disease (Abdollahi *et al.*, 2020; Delamater, 2006). In type 2 diabetes, self-care behaviors involve adjustments to the doses of oral medications and insulin injections, continuous blood glucose monitoring, dietary adaptations, and the identification and management of symptoms of hypo- or hyperglycemia, but not by rigidly following a set of rules (Sigurðardóttir, 2005; Silva *et al.*, 2006). The term self-care has been popularized by Dorothea Orem's Self-Care Theory (Orem, 2001), which asserts the importance of the individual's voluntary and deliberate involvement in their personal care, requiring disease management skills and well-being maintenance (Felix *et al.*, 2009). Luchetti Rodrigues *et al.* (2012) argue that these skills may be compromised in people with lower functional and cognitive capacity or lower levels of education, though it is necessary to consider the emotional factors involved in this process.

When confronting the limitations imposed by treatment and the complications of the disease (e.g., limiting the intake of certain foods and complications such as retinopathy), people with diabetes may experience various emotions, such as fear and anxiety, that tend to limit their self-care activities. As an example, the fear of experiencing hypoglycemia after a period of fasting may lead to consuming too much food to "prevent" new crises. This can lead to spikes in blood glucose, which can, in turn, lead to guilt and worry about the complications of diabetes while reinforcing the ineffective attempt to avoid hypoglycemia (Schmitt *et al.*, 2014). This process can compromise not only the patient's health, but also their beliefs about their own well-being and quality of life, reinforcing avoidant patterns and hindering the changes necessary for effective diabetes control (Hofman *et al.*, 2023).

Being frightened by the complications of an illness is completely rational. However, when this fear begins to dominate the person's life, it can lead to maladaptive and ineffective health care choices, usually related to a restriction in the patient's thought patterns, emotions, and behaviors (Hofman *et al.*, 2023). People with diabetes also tend to avoid disturbing thoughts about the disease and its complications, including possible death. Throughout this attempt at experiential avoidance, they may suffer long-term damage. They are often motivated by the possibility of short-term relief from discomfort in lieu of care with long-term benefits (Hofman *et al.*, 2023), which can result in discomfort and anger, as well as insufficient diabetes care (Asl *et al.*, 2020).

Acceptance in the context of diabetes would therefore consist of a person's willingness to deal with the reality of their condition openly and without judgment, acknowledging and accepting both the physical limitations and the emotions

associated with the disease (Rashidi *et al.*, 2021). This involves abandoning the constant struggle against the symptoms of diabetes and frustration with the condition, accepting that certain difficulties and discomforts are part of the process of managing the disease. This process allows the person with diabetes to develop a more flexible and adaptive approach to dealing with daily challenges, such as glucose levels, dietary changes, and the use of medication (Shahnavazi *et al.*, 2022). Instead of avoiding or denying the condition, the person learns to live with it, making choices that are in line with their life values despite the difficulties associated with diabetes (Gregg *et al.*, 2007).

According to Hayes *et al.* (2006), acceptance is one of the essential components of Acceptance and Commitment Therapy (ACT). However, this term is often confused with psychological flexibility (Cherry *et al.*, 2021) which, in the broadest sense, refers to a person's ability to connect to the present moment consciously, without avoiding momentarily uncomfortable thoughts or feelings, favoring an attitude of openness or acting towards what is really meaningful to them (Luoma *et al.*, 2022). Due to the indiscriminate use of the terms; acceptance and psychological flexibility, it is important to note that the variables investigated in the studies have been presented as quoted by the authors.

Gregg *et al.* (2007) evaluated the effects of a three-and-a-half hour ACT intervention versus six hours of general diabetes care guidance for a group of low-income people with diabetes. The ACT intervention involved a set of strategies to get participants in touch with their challenging thoughts and emotions related to diabetes, inviting them to observe these events rather than avoid them. The sessions also allowed participants to reflect on their values and to make choices related to their health care needs. As a result of this study, participants who underwent the ACT intervention showed a statistically significant increase in self-care and acceptance of challenging thoughts and emotions related to diabetes. After three months, the ACT group achieved superior glycemic control, with HbA1c levels closer to the desired range, compared to the group that only received general diabetes counseling. The results of the Shayeghian *et al.* (2016) study corroborate the previous findings, noting that ACT increased acceptance and improved glycemic control as well as showing that participants who used adaptive coping strategies, such as diabetes planning and acceptance, obtained better results related to treatment management.

Considering the high prevalence of diabetes, the inflated costs of controlling it and all the problems caused by it, more research is needed to create a clearer understanding of the constructs evaluated in order to achieve better outcomes for patients. Database searches (PsycINFO, LILACS, PubMed), using the descriptors "Diabetes AND Acceptance OR Acceptance and Commitment Therapy OR Psychological flexibility," found several studies that attested to the effectiveness of ACT in promoting acceptance or, more broadly, psychological flexibility and self-care in people with type 2 diabetes (Gregg *et al.*, 2007;

Jabalamei et al., 2021; Khalatbari et al., 2020; Shahbeik et al., 2019). However, correlational studies referring to acceptance or psychological flexibility in diabetes and self-care in specific samples of adults with type 2 diabetes have not been found to date. Research of this nature is essential to substantiate and reinforce the understanding of how these variables interact and to offer robust theoretical support for the findings of therapeutic interventions.

Schmitt et al. (2014) investigated the relationship between acceptance in diabetes and other variables, such as stress, mood, coping with the disease, quality of life, and self-care, for adults with diabetes. However, only 30% of the sample consisted of people with type 2 diabetes. The results showed that non-acceptance of diabetes (assessed by the Acceptance and Action Diabetes Questionnaire [AADQ-6]) was correlated with ineffective coping strategies, reduced self-care activities and higher HbA1c levels. Although there are studies of type 1 diabetes (Kamody et al., 2018; Nicholas et al., 2022), their findings should not be considered as a basis for the present study, since the age range of the population investigated (children and adolescents) and diagnostic specificities are factors that affect the results. Zukerman et al.'s (2023) study, carried out exclusively with adults with type 2 diabetes, the authors assessed psychological flexibility and found it correlated with well-being but not with the adjustment variable, which involves emotional, behavioral, and cognitive adaptation to better manage the disease. The results leave gaps to be further investigated about the impact of psychological flexibility or the acceptance component and management of type 2 diabetes. That being the case, this research aims to investigate the relationship between acceptance in diabetes and self-care (dimensions of acceptance and self-care).

METHOD

PARTICIPANTS AND LOCATION

Data collection was carried out in the clinic rooms of the Basic Health Units (UBS) in the municipality of Sonora (a city in the interior of Mato Grosso do Sul [MS] with around 14,516 thousand inhabitants) during the Hiperdia program. This is a program recommended by the Ministry of Health that stands out as the only planned care activity for patients with hypertension and diabetes in the municipality of Sonora, MS. The event takes place once a month at each UBS, and patients are informed of it ahead of time by community health agents during home visits. Hiperdia provides blood glucose monitoring, blood pressure measurement, body weighing, and, if the patient requests it, medical care.

In addition to attending Hiperdia, participants in this study had to be over 18 years old and to have had a medical diagnosis of type 2 diabetes for at least a year. People with type 1 diabetes, gestational or pre-diabetes, children and adolescents, and people with a diagnosis less than one year old were excluded from the study.

INSTRUMENTS

Sociodemographic and clinical characterization questionnaire: an instrument used to gather sociodemographic data such as marital status, education, family income, gender, age, and employment. Additionally, the interviewees were asked questions about clinical information, such as daily blood glucose levels, time since diagnosis, type of treatment, and complications resulting from diabetes.

Acceptance and Action Diabetes Questionnaire - 6 items (AADQ-6): this is a self-report instrument that assesses the acceptance of thoughts and feelings related to diabetes as well as the impact these thoughts and feelings may have on making impactful decisions related to diabetes. In other words, the instrument assesses acceptance in diabetes. The original instrument has 11 items (Gregg et al., 2007), and the shortened version (Schmitt et al., 2014) has six (e.g.: I don't take care of my diabetes because it reminds me that I have diabetes; I avoid taking or forget to take my medication because it reminds me that I have diabetes) arranged on a five-point Likert scale (1 - never to 5 - always). In Schmitt et al. (2014), the AADQ-6 showed good psychometric properties, with item-total correlations ranging from 0.45 to 0.68 (mean 0.58 ± 0.09) and a Cronbach's coefficient of 0.82. The exploratory factor analysis, based on the Kaiser criterion and principal components, identified a single factor explaining 53% of the variance, with factor loadings between 0.59 and 0.82 (mean 0.72 ± 0.09), and the confirmatory factor analysis also indicating a good fit (comparative fit index = 0.99; root mean square error of approximation = 0.06; P for close fit = 0.33). The study consisted mostly of adults (mean age 43 ± 15 years) with type 1 diabetes (70%) but did not specify on levels of education. Other validation studies of the original 11-item version were conducted in Germany (Schmitt et al., 2013), Turkey (Karadere et al., 2019), and Japan (Saito et al., 2018), and showed good psychometric quality (Cronbach's alpha ≥ 0.80) in predominantly female samples with type 2 diabetes and a mean ages between 44 and 56.6 years. The level of education (predominantly elementary school) was only noted in the study by Karadere et al. (2019). The condensed version of the AADQ-6 presented by Schmitt et al. (2014) was translated (English to Portuguese) for this research, the internal consistency (Cronbach's alpha) was 0.56. No Brazilian studies were found validating the AADQ instrument in any of its versions.

Self-Care Assessment Tool for Patients with Diabetes Mellitus 2 (INAAP-DM2): this questionnaire consists of six domains, which correspond to the self-care requirements defined by Orem's theoretical model (2001). The instrument was developed by Brazilian authors (Baaerto de Mendonça et al., 2017) and aims to assess the self-care of patients with type 2 diabetes mellitus. Due to the large number of items, this study applied only the two domains recommended for application by psychology professionals, namely: 1) Accepting the disease and the need for health care (10 items) and 2) Learning to live

with the effects of the disease as well as the consequences of the medical diagnosis and treatment measures on lifestyle (8 items). A more recent validation study indicated that Cronbach's alpha was 0.79 for both domains (Anjos, 2020). In an analysis of this study's participants, the instrument's internal consistency (Cronbach's alpha) was 0.57 for the accept domain and 0.68 for the learn domain

ETHICAL PRECAUTIONS AND DATA COLLECTION PROCEDURES

This study was approved by the Human Research Ethics Committee of the Dom Bosco Catholic University - Brazil (Approval No. 5.501.857) and followed all the ethical precepts proposed by Resolution 466/12 of the National Health Council.

The sample was selected by convenience. That is, the participants were approached during the Hiperdia activities and invited to take part in the study voluntarily. The planned procedures ensured ethical care, such as clarifying the stages of the research, the voluntary nature of participation, and identifying risks and benefits. Those individuals who agreed to take part signed the Informed Consent Form (ICF) and answered the instruments (sociodemographic questionnaire, AADQ-6, and INAAP-DM2) individually, with each participant taking approximately 60 minutes to do so.

All the instruments' items were read aloud by the researcher and answered by the participant with the help of a card indicating the possible answers. At the beginning of the questionnaire, participants were asked to call via WhatsApp to receive a short video with general information about the study.

DATA ANALYSIS

The data was analyzed according to the criteria specified for each instrument using the Statistical Package for the Social Science (SPSS), version 25, with a significance level of 5%. The normal distribution of each variable was analyzed using the Kolmogorov-Smirnov test, and the data did not show a normal distribution. Spearman's correlation analysis was used to investigate the correlation between the acceptance and the learning variables from the INAAP-DM2 and the diabetes acceptance variable from the AADQ-6. The correlations were classified as follows: weak (< 0.30); moderate (0.30 to 0.59), strong (0.60 to 0.99) or perfect (1.0) (Levin & Fox, 2004).

A univariate analysis of covariance (ANCOVA) was also used to verify the influence of diabetes acceptance on self-care (accept and learn dimensions). This aims to compare the average of three or more groups in each outcome variable, controlling for the effect of other variables, called covariates (Field, 2009). For the analysis, the diabetes acceptance score was distributed into three groups (low - score less than or equal to 5; medium - score equal to 6; high - score greater than or equal to 7), and the covariates were age and schooling. Bonferroni's post-hoc test was used to identify these differences.

RESULTS

Sixty-eight people (13.5% of the total of 504 adults diagnosed with type 2 diabetes and registered with the municipal system in Sonora, MS) with a minimum age of 32 years and a maximum of 81 years (mean age of 61.57 years, $SD = 11.16$) took part in this study. None of those invited refused to participate.

As for the sociodemographic characteristics of the participants, the majority were women ($n = 46$; 67.64%), married ($n = 35$; 51.5%), with an income of up to one minimum wage ($n = 34$; 50%), and unemployed ($n = 50$; 73.5%). It is important to note that 86.7% of the sample ($n = 59$) was over 50 years old, and 54% were over 61. Regarding education, there were high rates of illiteracy ($n = 23$; 33.8%) and having only attended elementary school ($n = 30$; 44.1%).

The clinical aspects were as follows: 76.46% of the participants had a glycemic level of more than 131 mg/dL ($n = 52$) on the day of data collection, with a diagnosis of diabetes between 1 and 5 years ago ($n = 32$; 47.1%), who were taking oral medication ($n = 54$; 79.4%). The number of participants was similar among those who did and did not have clinical complications from diabetes, such as pain in the extremities and cataracts. The sociodemographic and clinical characteristics of the participants can be seen in Table 1.

Regarding their clinical aspects, 76.46% of the participants had a glycemic level of more than 131 mg/dL ($n = 52$) on the day of data collection, 47.1% had been diagnosed between 1 and 5 years ago ($n = 32$), and 79.4% of whom were taking oral medication ($n = 54$). A similar number of participants had or did not have clinical complications from diabetes, such as pain in the extremities and cataracts. The sociodemographic and clinical characteristics of the participants (seen Table 1).

Spearman's correlation analysis was used to gain an understanding of the relationships between the self-care variables "accepting the disease and the need for health care" and "learning to live with the effects of the disease and the consequences of the medical diagnosis and treatment measures on lifestyle" with the diabetes acceptance variable. The results, as shown in Table 2, indicated that the acceptance and learning dimensions of self-care (INAAP-DM2) and acceptance of diabetes (AADQ-6) did not show a statistically significant correlation ($p > 0.05$).

To obtain a more detailed understanding of the phenomenon under study, the possibility that the relationship between self-care and acceptance of diabetes could have been affected by the covariates age (prevalence of participants aged over 61) and level of education (low, overall) was investigated using ANCOVA. These covariates were chosen because the literature shows that some sociodemographic characteristics, such as age and schooling, are related to self-care behaviors in people with type 2 diabetes (Brevidelli et al., 2021; Felix et al., 2018; Guerrero-Pacheco et al., 2017). In other words, older people may face self-care challenges due to the reduced

functional capacity that comes with advanced age. Likewise, individuals with low levels of education tend to have difficulties adopting self-care behaviors, as limited educational training can restrict understanding of the actions required for more effective management of the disease (Guerrero-Pacheco et al., 2017; Luchetti Rodrigues et al., 2012).

The covariates investigated showed correlations with INAAP-DM2 (acceptance) in previous Spearman correlation analyses. The analyses of covariance indicated that, for the acceptance dimension, the covariate age had a significant effect on the model ($F(1; 63) = 8.42, p < .01$; partial- $\eta^2 = 0.12$), but the covariate schooling had no significant effect ($F(1;63) = 1.80; p = .18$).

Table 1. Participants' Sociodemographic and Clinical Characteristics (N = 68)

Sociodemographic characteristics			Clinical characteristics		
	n	%		n	%
Age			Fasting glycemia		
30 to 50 years	9	13.23	≤130	15	22
51 to 60 years	22	32.35	131 to 200	28	41.17
61 to 69 years	19	28	201 to 500	24	35.29
70 or more	18	26.42	No answer	1	1.54
Gender			Diagnosis time		
Female	46	67.64	≤ 5 years ago	32	47.1
Male	22	32.36	≤ 10 years ago	23	33.8
			≤ 15 years ago	6	8.8
			≤ 25 years ago	6	8.8
Marital status			Treatment type		
Married	35	51.5	No answer	1	1.5
Widowed	17	25			
Single	11	16.2	Oral medication	54	79.4
Divorced	4	5.9	Oral medication/insulin	6	8.8
No answer	1	1.5	Insulin	4	5.9
Education			No oral medication/insulin		
Literate	23	33.8		4	5.9
Elementary school	30	44.1	Diabetes complications		
High school	12	17.6	No	35	51.5
Higher education	3	3.4	Yes	33	48.5
Monthly income					
≤ 1 minimum salary	34	50			
≤ 2 minimum salaries	20	29.4			
≤ half minimum salary	7	10.3			
≤ 3 minimum salaries	7	10.3			
Employment status					
Less than full-time	50	73.5			
Full-time	18	26.5			

Table 2. Correlation analysis between overall instrument scores

		INAAP-DM2	
		Accepting the illness and need for health care	Learning to live with the illness's effect and diagnostic consequences
AADQ	correlation	-0.185	-0.135
	p-value	0.180	0.331

In other words, when controlling for age, the level of acceptance in diabetes had a statistically significant effect on the acceptance dimension of self-care ($F(2,63) = 3.51$; $p < 0.05$; partial- $\eta^2 = 0.10$). As for the learning dimension, the results showed that the covariate age had a significant effect on the model ($F(1,63) = 6.17$, $p < 0.05$; partial- $\eta^2 = 0.09$), but schooling did not have a significant effect ($F(1, 63) = 0.17$, $p = 0.68$). Despite this, when controlling for age, the level of acceptance of diabetes had no statistically significant effect on the learning dimension of self-care ($F(2,63) = 2.85$, $p = .065$).

Other characteristics (gender, marital status, income, employment, time since diagnosis, and treatment type), constructed a 'typical' profile of the sample (female, married, low income, unemployed, time since diagnosis of 10 years or less, using oral medication), but did not show statistically significant correlations ($p > 0.05$) with self-care and acceptance of diabetes (Spearman's correlation), and were therefore not considered covariates in this study.

DISCUSSION

This study sought to investigate the relationship between diabetes acceptance and the acceptance and learning dimensions of self-care in adults with type 2 diabetes. The analysis of the scores from the instruments used (AADQ-6 and INAAP-DM2) showed that these variables did not present statistically significant associations.

As previously noted, there are few studies in the literature investigating the relationship between acceptance in diabetes or psychological flexibility and diabetic patient self-care, limiting the evidence bases available to support the results of this study. Among the existing studies, the sample consists of studies exclusively of people with type 1 diabetes (Kamody et al., 2018; Nicholas et al., 2022) or having only a small number of participants with type 2 diabetes (Schmitt et al., 2014). With those studies' findings in mind, the authors observed that acceptance in diabetes (Schmitt et al., 2014) and psychological flexibility (Nicholas et al., 2022) were positively correlated with glycemic control, as assessed by HbA1c levels, and self-care in diabetes.

This data supports the argument put forward by some authors (Hor et al., 2018; Molavi et al., 2020; Shahbeik et al., 2019) that suffering from diabetes (which may involve not accepting the disease and the aversive personal events related to it) can lead to reduced care as well as intensify these aversive experiences. Furthermore, Gregg et al. (2007) point out that when aversive experiences arising from the disease are accepted, the individual may be open to learning about treatment, such as understanding the symptoms of diabetes and managing the disease better. That is, cultivating acceptance involves creating a context in which one can experience the thoughts and emotions that diabetes self-care practices evoke (Kamody et al., 2018; Shahnavazi et al., 2022).

Considering the evidence in the literature supporting the relationship between self-care and acceptance in diabetes, the

absence of an association in this study should be investigated with caution and better explored in future research. However, given this study's findings, some hypotheses were raised. One of them concerns the predominant sociodemographic characteristics of the sample, the studied sample being of older age, with low levels of education and income, being female and unemployed, and living in a municipality in the interior of the state of Mato Grosso do Sul, where health services are scarce. It is interesting to note that the characteristics of the sample are consistent with those observed in Brazilian studies that have assessed sociodemographic profile and self-care in diabetes (Luchetti Rodrigues et al., 2012; Portela et al., 2022) and are otherwise relatable to the prevalence of diabetes in Brazil, where sufferers are of advanced age and low schooling (Ministério da Saúde, 2024). However, these studies point out that, even if older people and those with lower education levels might have more self-care difficulties, such a relationship between those variables was not observed either (Luchetti Rodrigues et al., 2012; Portela et al., 2022).

In the covariance analysis carried out in this study, the age variable showed an influence on the relationship between acceptance of diabetes and self-care. Namely, that when controlling for age as a covariate, an association was observed between diabetes acceptance and the accept dimension, suggesting that the age of the participants may in fact influence their ability to understand, judge, and make decisions regarding diabetes self-care (Brevideilli et al., 2021; Lamb et al., 2021).

Guerrero-Pacheco et al. (2017) pointed out that when people with type 2 diabetes have material and personal resources to take care of themselves, they show more self-care behaviors, which has positive effects on treatment and, consequently, on metabolic control. Nevertheless, a study carried out with immigrants from the Republic of the Marshall Islands in the Pacific, which has a high prevalence of diabetes, revealed that age, level of education, and medical follow-up were significantly associated with the level of self-care (Felix et al., 2018). In other words, the literature presented here strengthens the hypothesis that age over 61, a predominant characteristic in this study's sample, may have negatively interfered with the results in terms of self-care.

Other key facts, which may be considered limitations of the research, should be noted. The AADQ instrument, used to assess acceptance in diabetes, while having undergone some validation processes in various countries (Saito et al., 2018; Schmitt et al., 2013; Schmitt et al., 2014; Karadere et al., 2019), has not been adapted and validated for Brazilian samples. However, the choice to use the AADQ-6 was justified by the interest in investigating acceptance and its impact on diabetes care, as this instrument's items assess the acceptance of thoughts and feelings related to diabetes (or the avoidance of these personal events) and how they impact actions undertaken in the name of the disease (Gregg et al., 2007).

In this study, the adapted version with six items was used, since Schmitt et al. (2014) excluded five items from the

original version for psychometric reasons (items 2, 9, and 11 due to the inadequacy of the total item Correlations, and items 4 and 7 because of their two-dimensionality) and established its psychometric quality. The translation (English-Portuguese) of the instrument was carried out by three of the authors of this study and, in an attempt to make up for the lack of psychometric analysis, an internal consistency analysis was carried out, which indicated a Cronbach's alpha of 0.56, which suggests a weakness regarding the instrument's reliability (a score above 0.70 is considered adequate). Bearing in mind that the AADQ-6 instrument did not follow all the stages of cross-cultural adaptation for Brazil, it is possible the questions in the instruments were difficult for the participants to understand, considering their age, schooling, and income, and additionally because patients in the municipality of Sonora are not in the habit of answering inventories and scales about their diabetes health care. Thus, the sociodemographic and sociocultural characteristics of the sample may differ from those presented in validation studies carried out in other countries (Saito et al., 2018; Schmitt et al., 2013; Schmitt et al., 2014; Karadere et al., 2019), which may partly explain the fragility of the instrument.

As for self-care, although the INAAP-DM2 was developed in Brazil, only two dimensions of the instrument were used since the number of items (131 items) would make data collection too lengthy, making it potentially tiring for the participants. The choice of these two dimensions is justified by the interest in investigating private events (thoughts and feelings about diabetes) related to self-care, unlike other self-care assessment measures which focus only on public behaviors (e.g., monitoring blood glucose, taking medication, physical activity). An internal consistency analysis was carried out for this instrument, which gave Cronbach's alphas of 0.57 for the acceptance domain and 0.68 for the learning domain, which also indicates fragility for these dimensions of the instrument.

Another limitation of this study was that it was a convenience sample, i.e., for logistical reasons, the participants were those who attended the health units during the Hiperdia events, without establishing specific criteria related to clinical condition, except having been diagnosed with type 2 diabetes at least a year ago. The sample therefore varied in terms of gender, marital status, education, income, employment, and type of treatment that, while not having a statistically significant influence on psychological flexibility and self-care (full data available from the authors), may have had some impact on the response to the instruments.

These limitations aside, the innovative nature of this study stands out, as it investigates the relationship between self-care and diabetes acceptance in people with type 2 diabetes, presenting contributions to the field. The literature suggests that psychological inflexibility can play an important role in the suffering of people with diabetes (Kılıç et al., 2022; Nicholas et al., 2022), as it is associated with the ways individuals avoid uncomfortable thoughts (for example, "I forget to take my

medication because it reminds me that I have diabetes") instead of focusing on self-care actions that favor their health. As such, correlational studies investigating the influence of psychological flexibility and its components, such as acceptance, on the health care of people with type 2 diabetes should be encouraged.

CONCLUSION

The results of this study indicated that there was no correlation between the measurements of the instruments that assessed diabetes acceptance and self-care (acceptance and learning dimensions) in type 2 diabetes. A more detailed investigation of the phenomenon revealed that the covariate age influenced the relationship between diabetes acceptance and self-care (acceptance dimension), suggesting that this sociodemographic variable may be relevant to the analysis. Education levels, on the other hand, were not statistically significant, although the literature suggests a relationship with diabetes self-care.

The main contribution of this study was to provide a basis for more methodologically robust future research and to highlight the immediate need for validation of specific instruments for measuring acceptance in diabetes, along with other components of psychological flexibility, in type 2 diabetes. Given the high prevalence of diabetes, its high treatment costs, and the problems related to the disease, there is a clear need for more research in this context. The lack of Brazilian studies presents numerous opportunities for research on this topic and highlights the preliminary nature of this study. It is recommended that future studies include larger samples, with a diverse sociodemographic profile from different regions of Brazil, that are not limited to patients seeking treatment at health facilities.

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