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# Self-care barriers and the empowerment of type 2 diabetes in Mexican adults: a structural model

*Las barreras de autocuidado y el empoderamiento de la diabetes tipo 2 en adultos mexicanos: un modelo estructural*

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## ABSTRACT

**Aim:** To explain the effect of self-care barriers on disease empowerment in adults with diabetes.

**Methods:** Correlational-exploratory design, collected by convenience sampling in 657 adults with diabetes. A personal data questionnaire, the Self-Care Barriers scale (α=0.78) and the Diabetes Empowerment scale (α=0.89) were used. Informed consent and legal requirements for the research were applied. Descriptive statistics were used, as well as inferential statistics such as Spearman's test and a structural equation model.

**Results:** The participants had an M=50.10 years, being the majority female (58.9 %) and mature adult (37.6 %). 56.5 % have no empowerment in diabetes and had an M=82.12 in self-care barriers. Empowerment is related to age (r=-0.199), years of living with diabetes (r=-0.097) and self-care barriers (r=0.302). Together, both are explained (- 0.34). The goodness of fit indicators were $\chi 2$= 35.309 (8 *g.l.*), $p$<.0001, $\chi 2$ relative= 4.41, and the practical indicators were BBNFI=.99, BBNNFI=.98, CFI=.99 and the RMSEA=.07, explaining 12% of the variance in diabetes empowerment.

**Conclusion:** It is confirmed by structural equation modeling that self-care barriers positively and significantly influence diabetes empowerment by 12%.

**Keywords:** self-care barriers, health empowerment, type 2 diabetes mellitus, adult.

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## RESUMEN

**Objetivo:** Explicar el efecto de las barreras de autocuidado sobre el empoderamiento de la enfermedad en adultos con diabetes.

**Método:** Diseño correlacional-explicativo, recolectado mediante muestreo a conveniencia en 657 adultos con diabetes. Se empleó una cédula de datos personales, la escala de Barreras de Autocuidado (α=0.78) y la escala de Empoderamiento en Diabetes (α=0.89). Se aplicó el consentimiento informado y requerimientos legales para la investigación. Se utilizó estadística descriptiva, al igual que estadística inferencial como la prueba de Spearman y un modelo de ecuaciones estructurales.

**Resultados:** Los participantes tuvieron una M=50.10 años, siendo la mayoría mujer (58.9 %) y adulto maduro (37.6 %). El 56.5 % no tiene empoderamiento en diabetes y tuvo una M=82.12 en las barreras de autocuidado. El empoderamiento se relaciona con la edad (r=-0.199), los años de vivir con diabetes (r=-0.097) y con las barreras de autocuidado (r=0.302). Aunado, ambas se explican (- 0.34). Los indicadores de bondad fueron $\chi 2$= 35.309 (8 *g.l.*), $p$<.0001, $\chi 2$ relativa= 4.41, y al igual los indicadores prácticos fueron de BBNFI=.99, BBNNFI=.98, CFI=.99 y el RMSEA= .07, explicando el 12 % de la varianza de empoderamiento de la diabetes.

**Conclusión:** Se confirma mediante el modelo de ecuaciones estructurales que las barreras de autocuidado influyen positiva y significativamente en un 12 % sobre el empoderamiento de la diabetes.

**Palabras clave:** barreras de autocuidado, empoderamiento para la salud, diabetes mellitus tipo 2, adulto.

## INTRODUCTION

Diabetes affects approximately 463 million people worldwide, 90 % of whom have type 2 diabetes (T2DM), and the prevalence is expected to increase by 51 % by 2045. A large number of people with diabetes live in developing regions, and estimates suggest that 55 million people in the Middle East/North Africa, 32 million in South and Central America, 19 million in sub-Saharan Africa, and 88 million in Southeast Asia have diabetes (1,2).

According to the Chronic Disease Information System (SIC, 2021), in Mexico there are 1 018 485 people living with TD2 who are being treated in some care center in the country. Of these, 721 393 (70.8 %) are women and 297 091 (29.2 %) are men; of all of them, 28.2 % had a consultation in the last 60 days (2). Of those surveyed, 41.9 % have a record of glycosylated he-

moglobin (HbA1c) measurement in the last 12 months; of these, almost half are in control with an HbA1c of less than 7 mg/dl (46.5 %) and 53.5 % are in control with an HbA1c of less than 7 mg/dl (46.5 %) .5 %) and 53.5 % have more than 7 mg/dl, i.e., out of control, with 29.7 % with HbA1c <7 mg/dl and 23.8 % with HbA1c >9 mg/dl(2).

A study conducted on glycemic control in people with T2D in developed countries evidence control over a 12-year period, indicating the need to make changes in the system and organization of care to improve self-management and achievement of treatment goals(3).

In developing countries such as Mexico, it has been quantified that only about 20% of patients comply with their treatment. At the same, the Health and Nutrition Survey (ENSANUT) 2018-19 reported that in Mexico many people with diabetes are still out of control after starting therapy, noted that the average HbA1c is 9 % mg/dl, and approximately 60 % of people have HbA1c ≥ 8 % mg/dl(4).

Similarly, the American Diabetes Association (ADA) notes that a person's behavior is the foundation for all diabetes interventions; therefore, there is a need to rebalance the focus and increase resources to generate behavioral interventions for people with diabetes. Currently, the ADA standards of care incorporate assessment and treatment recommendations for the variety of psychosocial conditions that come with diabetes. This is why it is referred to as a behavioral science (5,6). As a result, some of the fundamental assumptions about behavior in people living with T2DM are that behavioral factors are important in disease management, HbA1c variability is biologically controlled, and behavior meets biology (6).

So far diabetes is identified as a chronic disease controlled by the person himself. Therefore, when behavior meets biology, we do not expect behavioral interventions to fail. Two of the effective behavioral strategies for diabetes self-management is to approach it as a chronic disease and to have a basic theoretical framework for skill development, such as the philosophy of empowerment(7,8).

## Empowerment

Based on the above, empowerment was introduced in "diabetes self-care education" in the early 1990s, inspired by the contributions of Paulo Freire and based on self-determination theory



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(SDT) and intrinsic motivation that were applied to health education and community psychology (7,9,10). This concept is used today in different fields with different meanings. Within health care, the health promotion movement has placed great value on it, and it has become one of the seven main principles of the promotion of health care (11-13). Thus, empowerment recognizes the right of people with diabetes to be the first decision-makers in the management of their disease, being more compatible with care (11). In this way, the philosophy of empowerment, the person's behavior is conceived as a symptom of his or her underlying thoughts, feelings and beliefs. By exploring the world that the person inhabits, one identifies what he or she wants to achieve according to his or her needs. Interventions based on this philosophical framework are more likely to have a positive influence on behavior, i.e., facilitate behavior change (14).

Ultimately, the empowerment approach involves facilitating and supporting people to reflect on their experience of living with diabetes. The self-reflection that occurs is based on a relationship characterized by psychological safety, warmth, and respect, essential to lay the foundation for positive self-directed changes in behavior, emotions, and/or attitudes. This reflection often leads to a greater awareness and understanding of the consequences of their self-management decisions.

## Barriers to Self-Care and Empowerment

Avoiding the complications of diabetes is an urgent need and can be prevented by controlling the disease and improving diabetes self-care. However, there are situations that prevent people from carrying out self-care activities, among these four factors: nutrition, physical activity, medication and access to information, which are congruent with the self-care of the person with diabetes, being the EBADE scale (Diabetes Self-Care Barriers Scale) the one that assesses the behaviors and self-care of the possible difficulties to achieve adequate control of diabetes. This scale has as its theoretical framework the Theory of Planned Behavior (TCP) to predict compliance or non-compliance behavior in people living with TD2 (15,16, 17).

That said, CTP has been extensively studied, however, it has not been applied to self-care barriers, i.e., to dietary variables, level of physical activity, medication consumption and relationship with health professionals. It can also be seen that the evidence does not point to studies that relate self-care barriers to empowerment. The aim of this study is to explain the effect of self-care barriers on disease emergence in adults with TD2.

# METHODS

## Design and participants

Quantitative correlational-exploratory design, with a sample of 657 adults with type 2 diabetes mellitus collected from August to December 2021. A non-probabilistic convenience sampling was performed, having as inclusion criteria to have a medical diagnosis of type 2 diabetes mellitus (T2DM) with at least 1 year of confirmation and living in Yucatan (Mexico).

## Instruments

A personal data survey was administered that assesses age, sex, years of living with diabetes, last capillary glucose measured at the last medical appointment, perceived economic status, perception of complications of the disease, and whether the patient attends a mutual help group for people living with diabetes.

To evaluate the barriers, the Self-Care Barrier in Diabetes Mellitus Type 2 (EBADE) scale was applied based on the TCP; this has been validated by the author of the scale and has an α=0.78. It has 15 items, with a Likert-type scale ranging from 1 (least desirable) to 7 (most desirable). It is divided into four subscales, called behavioral intention, subjective noma, perceived control behavior and attitudes. The score ranges from 15 to 105 points, indicating the higher the score, the greater the barriers to self-care in diabetes (18).

The Diabetes Empowerment Scale (DES28) was used to measure empowerment; this scale evaluates self-efficacy related to diabetes care in different contexts. It consists of 28 items with Likert-type responses from 1 - 5. Three subscales were identified referring to: management of the psychosocial aspects of diabetes, willingness to change and fulfillment of goals. The score ranges between 28 and 140 points, with a cut-off point of 103; if the score is below this point, it is classified as not empowered, and subjects who obtain a score higher than 103 are empowered. This instrument reports a Cronbach's alpha by the author of the scale of 0.89(19).



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## Ethical Considerations

The research proposal was approved by the Ethics Committee of the School of Nursing "Dr. Santiago Valdés Galindo" of the Universidad Autónoma de Coahuila and complied with the following requirements.

As established in the regulations of the General Health Law on research, article 13 of chapter 1, title two, was applied, treating with respect and protecting the well-being of the participant, explaining clearly the objective of the study and of all activities or procedures carried out in the research; This will be fulfilled through the delivery and signature of the informed consent, in which the human rights of the participant are protected, his autonomy and right to free decision, which involves the collection and evaluation of his data, respecting confidentiality and anonymity if desired, without the intention of causing any discomfort or harm to the subject of the study in a given time.

Reference is made to the second title of the General Health Law "On the ethical aspects of research on human beings", which in its articles 13, 17, 18, 20, 21, addresses the subject of study as a being in which the criteria of respect, dignity and the protection of his/her rights and wellbeing prevail. It is considered of minimal risk and will be cancelled when there is damage to health, in addition to the fact that informed consent must be applied, clearly and precisely explained. Likewise, the Declaration of Helsinki (1964) and adherence to the principles of justice, beneficence, respect and non-maleficence of the Belmont report will be considered.

Finally, and in compliance with the General Law for the Protection of Personal Data in Possession of Obligated Subjects and the Law for the Protection of Personal Data in Possession of Obligated Subjects for the State of Quintana Roo, the data collected will be used only for research purposes, with the research team taking legal and security measures to protect the personal data of the participants.

## Statistical Analysis

The data were analyzed with the Statistical Package for Social Sciences (SPSS) version 22 for Windows 2010. Descriptive statistics were used, and absolute frequencies, proportions and percentages were obtained. A distribution analysis of the continuous variables was performed with

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the Kolgomorv Smirnov test, determining the variables as nonparametric, while for the correlations of the variables the Spearman test was applied, demonstrating the strength of the correlation ($r$) and the level of significance ($p$).

A structural equation model was tested using EQS v6.1 statistical *software* to measure the effect of emotional distress on empowerment in adults with diabetes mellitus type 2. Given the number of items in the instrument, plots were constructed; to evaluate the goodness-of-fit of the model, the indicators of practical, statistical and population goodness-of-fit were considered from the robust method. The statistical indicator was the chi-square ($\chi 2$); if this relationship results with a significance level of $p>.05$, the model is considered to present an adequate statistical fit. Considering that the $\chi 2$ is usually susceptible to the sample number, the relative $\chi 2$ was used, which is calculated by dividing the adjusted $\chi 2$ index by the degrees of freedom. If this value is less than 5, it is considered a good statistical fit. Additionally, since statistical indicators are usually very sensitive to sample size, practical indicators were also considered; these include the Comparative Fit Index (CFI), Bentler-Bonett Normalized Fit Index (BBNFI) and Non-Normed Fit Index (BBNNFI) equal to or greater than .90, and the Root Mean Square Error of Approximation (RMSEA), which is an absolute mean of population fit with a value ≤.09 which made it possible to consider the relevance of the model.

## RESULTS

A total of 657 adults with DT2 participated in the study, with a *mean (M)* age of 50.10 years, *SD*=15.1590; for years of living with the disease the mean was 10.8 years and *SD*=9.6.

**Table 1.** Characterization of adults with diabetes mellitus

| Variable | *Fr* | % |
|---|---|---|
| **Sex** | | |
| Man | 270 | 41,1 |
| Woman | 387 | 58.9 |
| **Age group** | | |
| Young adult (18-44 years old) | 224 | 34,1 |
| Mature adult (45-59 years old) | 247 | 37,6 |
| Older adult (>60 years) | 186 | 28,3 |
| **Belongs to a mutual aid group** | | |
| Yes | 212 | 32,3 |
| No | 445 | 67,7 |
| **Perceived economy** | | |
| Under | 178 | 27,1 |
| Medium | 465 | 70,8 |
| High | 14 | 21 |

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**Note:** fr=frequency, %=percentage, N=657.

With respect to empowerment, 56.5% were found to be not empowered and 43.5% were found to be empowered by diabetes; likewise, the self-care barrier variable was found to be above the mean. Table 2 shows the description of the scores found.

**Table 2.** Description of diabetes self-care and empowerment barriers

| Variable | M | DE | IC |
|---|---|---|---|
| Self-care barrier in diabetes | 82,17 | 16,740 | 80,99-83,45 |
| Behavioral intention | 7,49 | 3,828 | 7,20-7,79 |
| Subjective standard | 21,61 | 5,396 | 21,19-22,02 |
| Perceived control behavior | 10,93 | 2,921 | 10,71-11,16 |
| Attitudes | 42,13 | 8,199 | 41,51-42,76 |
| Diabetes empowerment | 112,40 | 13,633 | 111,37-113,44 |

**Note:** *M=mean*, SD=standard deviation, CI=confidence interval, N=657.

Table 3 shows the correlation of the variables, and it was found that capillary glucose is related to self-care barriers, that is, the higher the capillary glucose, the higher the barrier to self-care in diabetes ($r$=-0.110). Likewise, empowerment was found to be related to age ($r$=-0.199), years of living with diabetes ($r$=-0.097) and self-care barriers ($r$=-0.302), i.e., the less empowerment the greater the age, the years of living with the disease and the greater the barriers to self-care in diabetes.

**Table 3.** Correlation of study variables

| Variable | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|
| 1.Age | 1 | 0,566** | 0,25 | -0,054 | -0,199** |
| Years of living with diabetes | | 1 | 0,061 | -0,018 | -0,097* |
| 3.Pre-prandial capillary glucose | | | 1 | -0,110** | -0,062 |
| Self-care barrier in diabetes. | | | | 1 | 0,302** |
| 5. Empowerment in diabetes | | | | | 1 |

**Note:** $^{**}p<0.001$, $^{*}p<0.05$, N=657.

With respect to the structural equation model, Figure 1 shows the results and their fit indices. This model is made up of 2 factors or latent variables (represented by circles) and the items corresponding to these factors (represented by plots). According to the results of the model, self-care barriers positively and significantly affect diabetes empowerment (- 0.34). The statistical goodness-of-fit indicators were adequate ($\chi^2$ = 35.309 (8 *g.l.*), $p<0.0001$, relative $\chi^2$ = 4.41), as were the practical indicators *(BBNFI=0.99, BBNNFI=0.98, CFI=0.99)* and RMSEA=0.07, indicating that the restricted model is not statistically different from the saturated model. The model explains 12% of the variance of diabetes empowerment.

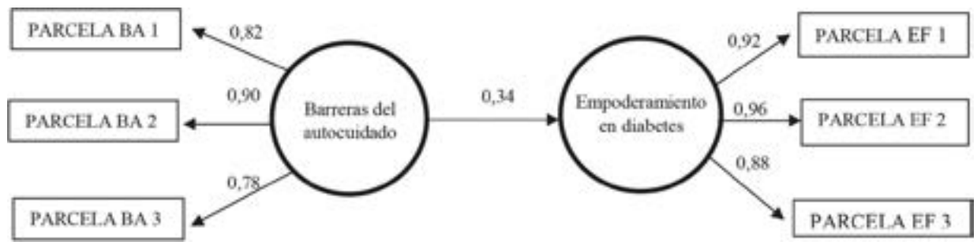


**Figure 1.** Structural model of the effect of self-care barriers on empowerment in diabetes. All factor loadings and measured factors are significant (Goodness of fit: χ2=35.309 (8 g.l.), p=0.0001 relative χ2=4.41, BBNFI=0.99, BBNNFI=0.98, CFI=0.99, RMSEA=0.07, R2 of the empowerment of diabetes: 0.12



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## DISCUSSION

Chronic diseases such as TD2 are influenced by various physical, psychological, social and even institutional situations; hence the need to discuss what was found in this research, starting with the characteristics of the population, where an average age of 50 years and an average of 10 years of living with the disease were observed. In Mexico, being an aging country, an increase in the prevalence of this disease is reported in the mature adult stage (45-59 years); in addition to the fact that the average number of years of diagnosis ranges between 5 and 10 years, being confirmed by Medina et al. (20) and Avila et al. (21), who suggested that these cases will continue to increase, given that there are genetic, behavioral and cultural factors that increase the risk of developing TD2 in our country(20,21).

Similarly, it was found that the majority are women, are in the mature adult stage and do not attend mutual help groups and have a medium perceived economic level. These data are consistent with the studies carried out in Algeria (22), Cuba (23) and Mexico (24), characterized by the fact that their study population are women and are in the mature adult stage and do attend mutual aid groups; which indicates that women have four times the risk of diabetes onset and complication compared to men, since the cultural factors associated with overwork do not allow a good quality of life and state of health; In addition, the article carried out in Mexico (24) described it as a factor mentioned by women, associating this higher risk to the lack of individualized care, limited economic resources and the lack of coordination between the different areas of care in the various mutual aid groups(22-24).

On the other hand, in this research 56.5% were represented as not empowered in diabetes, while in the barriers to self-care in diabetes an M=82.17 was observed. This is similarly mentioned in studies carried out in Brazil (25), Spain (26), United States (27), Ecuador (28) and Indonesia (29), where it was found that diet, exercise behaviors and medication are considered barriers to self-care and decrease diabetes empowerment, with family support and health professional support being added to these projects (25-29). The results of this study may be since mutual help groups focus on disease control but not on the identification and management of barriers according to age, functionality, economy, emotions, among others, thus causing an inadequate control of the disease.

In another point, a relationship was found between empowerment and age, years of living with diabetes and barriers to self-care. These data are like those found in Cuba (30), Mexico (31) and Ecuador (32), since as the person ages he/she has greater control, adherence and self-care of the disease, life experience and behavior are factors that undoubtedly alter this variable. Perceived barriers were found to be economic, family, lack of knowledge of the disease and the treatment by health personnel, which are factors that trigger the onset of the disease (30-32) and finally, it is shown that empowerment has a positive influence on self-care barriers; this has been confirmed by Medina et al. and Orozco, who mention in their study that the health conditions of mature adult and older adult populations are a multifactorial process influenced by economic, cultural, demographic, biological and behavioral aspects(21,32) .This allows us to understand that self-care barriers and the empowerment of self-care actions can have an impact on the TD2 health-in-disease process, so that daily health practices and empowerment lead to reinforce, restore or improve health or prevent complications(33).

## CONCLUSION

It is confirmed by structural equation modeling that self-care barriers positively and significantly influence diabetes empowerment by 12%, which shows the importance of addressing intrinsic factors such as the behavioral factor that leads to diabetes empowerment, being an area of opportunity to be considered in interventions that seek to improve TD2 self-care.

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Self-care barriers and the empowerment of type 2 diabetes in Mexican adults: a structural model

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