

BELIEFS, ATTITUDES AND SUBJECTIVE NORMS AS PREDICTORS OF PREVENTIVE BEHAVIORAL INTENTIONS IN OFFSPRING OF PEOPLE WITH TYPE 2 DIABETES MELLITUS

Crenças, atitudes e normas subjetivas como preditores da intenção de realizar comportamentos preventivos em filhos de indivíduos com Diabetes Mellitus tipo 2

Beliefs, attitudes and subjective norms as predictors of preventive behavioral intentions in offspring of people with Type 2 Diabetes Mellitus

Original Article

ABSTRACT

Objective: To analyze beliefs, attitudes and subjective norms as predictors of preventive behavioral intention in offspring of parents with type 2 diabetes mellitus in two cities in the state of Hidalgo, Mexico. **Methods:** This is a quantitative, non-experimental, explanatory and cross-sectional study. Through a two-stage probabilistic sample, 246 subjects (between 15 and 59 years old) whose parents were enrolled in a diabetes program in the social security service were interviewed in a personal manner. **Results:** It was observed that the reduction in the risk of developing diabetes affects the intent of developing preventive behaviors mediated by attitude toward prevention ($p=0.000$), which is the most important predictor of that intention ($p=0.000$). Subjective norms also have a significant impact on the preventive behavioral intention ($p=0.000$), although the preventive attitude is not affected by beliefs regarding the development ($p=0.095$) and severity of the disease ($p=0.056$). **Conclusion:** The application of the model allowed the identification of relevant aspects to support health promotion, oriented to influence the processes of change in social behavior, in a population at risk of developing type 2 diabetes mellitus in Mexico.

Descriptors: Attitude; Health Promotion; Diabetes Mellitus.

RESUMEN

Objetivo: Analizar los conocimientos, las actitudes y las normas subjetivas como predictores de la intención de realizar comportamientos preventivos en hijos de personas con diabetes mellitus tipo 2, en dos ciudades del estado de Hidalgo, México. **Métodos:** Se trata de un estudio cuantitativo, no experimental, de naturaleza analítica y transversal. A través de una muestra probabilística de dos etapas, 246 hijos (entre 15 y 59 años de edad) de pacientes apuntados en un programa de diabetes en el servicio de seguridad social fueron encuestados de manera personal. **Resultados:** Se observó que la reducción del riesgo de contraer diabetes afecta la intención de desarrollar comportamientos preventivos mediada por la actitud hacia la prevención ($p=0,000$) que es el predictor más importante de tal intención ($p=0,000$). Las normas subjetivas también tienen un impacto significativo en la intención del comportamiento preventivo ($p=0,000$), aunque la actitud hacia la prevención no es afectada por las creencias sobre la obtención ($p=0,095$) y la gravedad de la enfermedad ($p=0,056$). **Conclusión:** La aplicación del modelo permitió identificar aspectos relevantes para apoyar la promoción de la salud orientada a influir en los procesos de cambio de comportamiento social en una población con el riesgo de contraer diabetes mellitus tipo 2 en México.

Descriptores: Actitud; Promoción de la Salud; Diabetes Mellitus.

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RESUMO

Objetivo: Analisar os conhecimentos, atitudes e normas subjetivas como preditores da intenção de realizar comportamentos preventivos em filhos de indivíduos com diabetes

mellitus tipo 2 em duas cidades do estado de Hidalgo, México.

Métodos: Trata-se de um estudo quantitativo, não experimental, de natureza analítica e transversal. Através de um tipo de amostragem probabilística de duas etapas, 246 filhos (entre 15 e 59 anos) de pacientes inscritos em um programa de diabetes no serviço de segurança social foram entrevistados de maneira pessoal. **Resultados:** Observou-se que a redução do risco de contrair diabetes afeta a intenção de desenvolver comportamentos preventivos mediados pela atitude para a prevenção ($p=0,000$), que é o preditor mais importante da intenção ($p=0,000$). As normas subjetivas também têm um impacto significativo na intenção do comportamento preventivo ($p=0,000$), embora a atitude de prevenção não seja afetada por teorias sobre a obtenção ($p=0,095$) e gravidade da doença ($p=0,056$). **Conclusão:** A aplicação do modelo permitiu identificar aspectos relevantes para apoiar a promoção da saúde, orientada a influir nos processos de mudança do comportamento social em uma população com o risco de contrair Diabetes Mellitus tipo 2 no México.

Descritores: Atitude; Promoção da Saúde; Diabetes Mellitus.

INTRODUCTION

In the last 20 years, an increase has been verified in chronic degenerative diseases such as cardiovascular disease, cancer and diabetes⁽¹⁾, the latter having an alarming worldwide increase since it currently affects more than 346 million people⁽²⁾. It is estimated that worldwide diabetic population in 2030 will be approximately 439 million adults between 20 and 79 years old⁽³⁾.

In Mexico, Diabetes Mellitus has become the leading cause of death by representing 12% of all deaths. For 2030 a national prevalence of 10.9% is estimated, and solely in 2002, 114.6 new cases per 100,000 inhabitants were recorded. Moreover, from an economic view, the costs and losses for health services are approximately \$318 million annually, and the attention to the disease has become the field of most significant expenditure of the *Instituto Mexicano del Seguro Social - IMSS* (Mexican Social Security Institute)⁽⁴⁾.

In most cases, the diabetic patient dies from chronic complications rather than from the disease: simultaneously, diabetes is related with obesity, being noteworthy that it is almost exclusively caused by diet and inactivity⁽⁵⁾. The prevention or delay of progression to diabetes results in life expectancy and a better quality of life according to

the population and actions adapted to each specific local situation⁽⁶⁾.

There is a lack of studies investigating the family members' knowledge and feelings about type II diabetes⁽⁷⁾, and the way their attitudes are influenced by the occurrence of illness to a close relative. The Diabetes Education Committee of the IMSS⁽⁸⁾ supports that people who are at greater risk of developing diabetes are the offspring of diabetics, although the disease is 80% attributable to overweight and obesity, which emphasizes that the prevention of such disease can be achieved through behavioral change.

In order to better understand the contributions that can be made from the social marketing, and aiming to contribute to the audience's behavior modification, the purpose of this research was to analyze the beliefs, attitudes and subjective norms as predictors of the intention to perform preventive behaviors in the offspring of people with type 2 diabetes mellitus in two cities of the state of Hidalgo, Mexico.

METHODS

A quantitative study of analytical and cross-sectional nature⁽⁹⁾ was developed in the municipalities of Pachuca and Mineral de la Reforma, in the state of Hidalgo, Mexico between August 11 and September 13 of the year 2012. The former is the most populated municipality of the state, with just over 256,000 inhabitants, and the latter is third with 127,404 inhabitants.

The universe considered for sample size determining was obtained from the list of patients enrolled in the DiabetIMSS program, a multidisciplinary program established by the Mexican Social Security Institute for the management and control of patients aged 16 years and over with type 2 diabetes mellitus. The development of this study has been allowed under strict confidentiality in the handling of the database.

From the list of DiabetIMSS, the subjects of Pachuca and Mineral de la Reforma with offspring aged between 15 and 59 years were identified. Thus, based on statistical criteria for the use of structural equations a ratio of 5 subjects per variable was estimated⁽¹⁰⁾. A sample size of at least 125 individuals for 25 variables (Table I) was calculated and 246 people were thus comprised, being 189 in Pachuca and 57 in Mineral de la Reforma.

Probability sampling was performed in two stages. The application areas were initially divided and then random numbers were generated for the selection of the households. An appointment was scheduled, by phone or personnel, in order to explain and ask the respondents their support for conducting the survey, being chosen one offspring per household that met the selected age criteria.

Table I - Constructs and indicators.

Constructs and indicators	Item	%				
		1	2	3	4	5
<i>Beliefs about developing diabetes^a</i>						
I can get the diabetes disease	x ₁	2.00	2.40	6.10	42.30	47.20
I know what causes diabetes	x ₂	1.60	5.70	3.70	48.40	40.70
Diabetes is inherited from parents and/or grandparents	x ₃	3.30	3.30	6.10	37.00	50.40
Sedentary lifestyle causes diabetes	x ₄	3.30	4.90	12.60	36.60	42.70
There are different types of diabetes	x ₅	2.00	1.60	5.30	32.90	58.10
One of the agents causing diabetes is poor diet	x ₆	2.40	2.80	9.30	32.50	52.80
<i>Beliefs about the seriousness of diabetes^a</i>						
Diabetes is an incurable degenerative chronic disease	x ₇	2.80	7.30	6.50	35.40	48.00
The diabetes disease is the second leading cause of death in the world	x ₈	1.20	5.70	22.00	36.60	34.60
Diabetes disease causes limbs amputation	x ₉	0.80	1.60	9.80	30.10	57.70
Diabetes is a disease that affects the cardiovascular system	x ₁₀	0.80	1.60	11.40	41.90	44.30
<i>Beliefs about reduction in diabetes risk^a</i>						
I know what I must do to prevent getting diabetes	x ₁₁	2.00	4.10	14.20	43.90	35.80
I believe that daily 30-minute exercise reduces diabetes risk	x ₁₂	1.20	0.40	6.50	40.70	51.20
Healthy eating reduces diabetes risk	x ₁₃	0.80	0.80	6.10	35.40	56.90
I must control my weight to avoid getting diabetes	x ₁₄	1.60	1.20	4.50	42.70	50.00
Attend the doctor at least once a year helps prevent and not get diabetes	x ₁₅	1.60	5.70	8.90	43.10	40.70
<i>Attitude toward prevention^b</i>						
Being so worried on the point of being physically active as a measure to prevent diabetes disease	x ₃₈	5.30	14.20	39.00	17.90	23.60
Being so worried on the point of taking measures to change eating habits and prevent diabetes disease	x ₃₉	2.40	9.80	39.80	21.50	26.40
Being so worried on the point of taking measures to control weight and prevent diabetes disease	x ₄₀	3.70	6.90	39.40	19.50	30.50
<i>Subjective norms^a</i>						
The health sector boards believe that obesity, poor diet, and genetics are the leading causes of diabetes disease	x ₁₇	1.20	2.00	6.50	41.90	48.40
Most people consider that fright and anger are major triggering causes of diabetes	x ₁₈	5.30	12.60	20.30	37.00	24.80
Most people think that depression and emotions are triggering factors for diabetes	x ₁₉	6.90	17.50	28.50	28.90	18.30
Most people believe that stress is a triggering factor for diabetes	x ₂₀	5.70	15.90	29.30	30.10	19.10
<i>Preventive behavioral intention^c</i>						
Intends to be tested for glucose measurement this year	x ₅₁	10.60	89.40			
Intends to go to the doctor at least once a year	x ₅₂	6.50	93.50			
Intends to go to a diabetes prevention program this year	x ₅₅	24.40	75.60			

Note: ^a(1) strongly disagree, (2) disagree, (3) neither agree nor disagree, (4) agree, (5) strongly agree, ^b(1) not at all concerned, (2) slightly worried, (3) interested, (4) regularly interested, (5) very interested, ^c(1) definitely not, (2) definitely yes.

The instrument was developed based on different scales (Table I), one of them in the Structural Equation Model (SEM) as latent dependent variable, and five others that functioned as latent independent variables. The latent dependent variable was represented by the preventive behavioral intention, measured by three indicators ($\alpha=0.487$). The latent independent variables in the instrument included beliefs about developing diabetes with six indicators ($\alpha=0.778$), beliefs about the seriousness of diabetes with four indicators ($\alpha=0.729$), beliefs about reduction in diabetes risk, consisting of five indicators observed in the developed instrument ($\alpha=0.776$), attitude toward prevention measured by three indicators ($\alpha=0.836$), and subjective norms measured with four indicators ($\alpha=0.740$).

For analysis of the influence of predictor variables on the dependent variable, a conceptual model was developed with basis on the model of reasoned action, which proposes the following hypothesis (Figure 1):

H1: Beliefs about developing diabetes directly and positively impact on attitudes toward prevention.

H2: Beliefs about the seriousness of diabetes directly and positively impact on attitudes toward prevention.

H3: Beliefs about reduction in diabetes risk directly and positively impact on attitudes toward prevention.

H4: Intention to adopt preventive behavior concerning diabetes is directly and positively affected by the attitude toward prevention.

H5: Intention to adopt preventive behavior concerning diabetes is directly and positively affected by subjective norms.

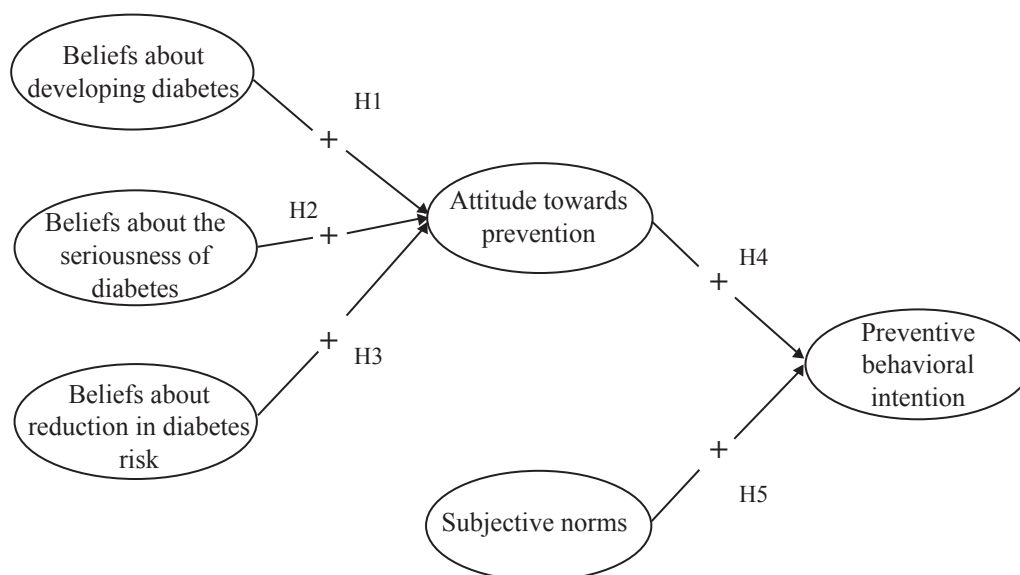


Figure 1 - Hypothetical model of the Preventive Behavioral Intention (PBI) for diabetes, in offspring of diabetic patients.

The conceptual model (SEM) in Figure I was adjusted using the R software with the Structural Equation Modeling package⁽¹¹⁾, through reflective constructs⁽¹²⁾. The process of modeling in two steps was employed to examine the SEM⁽¹³⁾ with: 1) evaluation of measurement models regarding the convergent validity (factor loading with cutoff of 0.5 or more)⁽¹⁴⁾ and the reliability index with 0.60 point cutter)⁽¹⁵⁾ and discriminant validity (square root of the average variance extracted greater than the correlation between the pair of constructs⁽¹⁶⁾); and 2) estimation of the proposed structural model.

Categorical data was analyzed with the method of maximum likelihood with Satorra-Bentler scaled chi-square^(17,18), given the lack of normal distribution of the data⁽¹⁹⁾. The model fit was assessed with: 1) the χ^2 goodness-of-fit test (a non-significant p value is desirable); 2) the comparative fit index (CFI) and the Bentler-Bonett (NNFI) non-normed fit index (values greater than 0.90 are desirable)⁽²⁰⁾; and 3) the root mean square error of approximation (RMSEA; values below 0.05 indicate an excellent fit and from 0.05 to 0.08 are acceptable⁽²¹⁾). In choosing the most parsimonious model, the Lagrange multiplier statistic test

Table II - Standardized estimators of structural equations model with significant alpha equal to 0.001.

Construct	Item	Parameter	Models (Estimators)			
			I	II	III	
Beliefs about developing diabetes	x1	$\lambda_{1.1}$	0.668			
	x2	$\lambda_{2.1}$	0.709			
	x3	$\lambda_{3.1}$	0.756			
	x4	$\lambda_{4.1}$	0.584			
	x5	$\lambda_{5.1}$	0.799			
	x6	$\lambda_{6.1}$	0.687			
			φ_{11}	1.000		
			δ_1	0.554		
			δ_2	0.497		
			δ_3	0.428		
			δ_4	0.658		
			δ_5	0.361		
			δ_6	0.528		
Beliefs about the seriousness of diabetes	x7	$\lambda_{7.2}$	0.809			
	x8	$\lambda_{8.2}$	0.597	0.608		
	x9	$\lambda_{9.2}$	0.733	0.774		
	x10	$\lambda_{10.2}$	0.726	0.712		
			φ_{22}	1.000	1.000	
			δ_7	0.346		
			δ_8	0.643	0.631	
			δ_9	0.463	0.401	
			δ_{10}	0.473	0.492	
Beliefs about reduction in diabetes risk	x11	$\lambda_{11.3}$	0.606	0.595	0.590	
	x12	$\lambda_{12.3}$	0.867	0.867	0.861	
	x13	$\lambda_{13.3}$	0.867	0.874	0.895	
	x14	$\lambda_{14.3}$	0.808	0.805	0.787	
	x15	$\lambda_{15.3}$	0.601	0.604	0.575	
			φ_{33}	1.000	1.000	1.000
			δ_{11}	0.632	0.646	0.652
			δ_{12}	0.248	0.248	0.259
			δ_{13}	0.248	0.237	0.199
			δ_{14}	0.347	0.352	0.381
			δ_{15}	0.639	0.635	0.670
	Subjective norms	x17	$\lambda_{16.4}$	0.283		
x18		$\lambda_{17.4}$	0.690	0.669	0.662	
x19		$\lambda_{18.4}$	0.945	0.989	1.000	
x20		$\lambda_{19.4}$	0.823	0.792	0.784	
			φ_{44}	1.000	1.000	1.000
			δ_{16}	0.920		
			δ_{17}	0.524	0.552	0.562
			δ_{18}	0.106	0.023*	0.000
			δ_{19}	0.323	0.372	0.386

Construct	Item	Parameter	Models (Estimators)		
			I	II	III
Attitude toward prevention	x38	$\lambda_{20.5}$	0.716	0.717	0.717
	x39	$\lambda_{21.5}$	0.868	0.867	0.867
	x40	$\lambda_{22.5}$	0.902	0.902	0.902
		ζ_5	0.896	0.943	0.946
		ξ_{20}		0.488	0.487
		ξ_{21}	0.247	0.248	0.249
		ξ_{22}	0.187	0.186	0.186
Preventive behavioral intention	x51	$\lambda_{23.6}$	0.586	0.550	0.550
	x52	$\lambda_{24.6}$			
	x55	$\lambda_{25.6}$	0.939	1.000	1.000
		ζ_6	0.760	0.788	0.788
		ξ_{23}	0.657	0.697	0.697
		ξ_{24}			
		ξ_{25}	0.119*		
		γ_{51}	-0.427*		
		γ_{52}	0.478*	0.033*	
		γ_{53}	0.216*	0.213*	0.231
		β_{65}	0.463	0.431	0.432
		γ_{64}	0.124*	0.132	0.133
		φ_{12}	0.891		
		φ_{13}	0.720		
		φ_{23}	0.695	0.755	
	φ_{41}	0.390			
	φ_{42}	0.362	0.305		
	φ_{43}	0.348	0.312	0.292	
	$\theta_{14,15}$			0.140	
Goodness-of-fit indices					
χ^2 of independent model			3670.90	2128.70	1738.00
χ^2 of Satorra-Bentler ^a			600.98	256.71	149.85
CFI ^b			0.89	0.92	0.95
BBNFI ^c			0.84	0.88	0.91
RMSEA			0.08	0.08	0.08

^a Significant at 0.05

^b Comparative fit index

^c Bentler-Bonett normalized fit index

* not significant, p value > 0.05

was used. For the final model, the insignificant coefficients of the structural parameters⁽²²⁾ were removed.

This study was approved by the Ethics Committee of the Interdisciplinary Center for Graduate Studies of the Independent Popular University of Puebla, under the approval of the registration 108450-1M, and every questionnaire application demanded voluntary participation with the signature of the respondent on the consent form.

RESULTS

Over half of the participants were male (55.3%, n=136), almost 64% (n=157) of them were up to 35 years old. With regard to the intention of preventive behavior in the current year, 89.4% (n=220) of the participants intended to perform glucose measurement, 93.5% (n=230) intended to seek medical screening, and 75.6% (186) reported being willing to go to a diabetes prevention program.

The final model of PBI (Model III, Table II) showed a good fit to the data (CFI=0.95; BBNFNI=0.91; RMSEA=0.08) even with $\chi^2=149,847$, df (degrees of freedom)= 62 and p value <0.05. The criteria for convergent and discriminant validity were met for each subscale; however, two of the five coefficients of the hypothesized structural relationships were not statistically significant (Figure 2).

The results in Figure 2 indicate that, of the five latent variables studied, the attitude towards prevention was the largest contributor in explaining the CFI. A major concern resulting in preventing diseases such as diabetes through physical activity, change in eating habits and weight control, encourages the intention of adopting preventive behavior ($\beta=0.432$). In addition, subjective norms increased the IPB ($\beta=0.133$). Similarly, beliefs about reduction in diabetes risk supported indirectly and marginally the CFI ($\beta=0.100$), favoring the attitude toward prevention ($\beta=0.231$), which, in turn, led to greater intention to prevent the disease ($\beta = 0.432$).

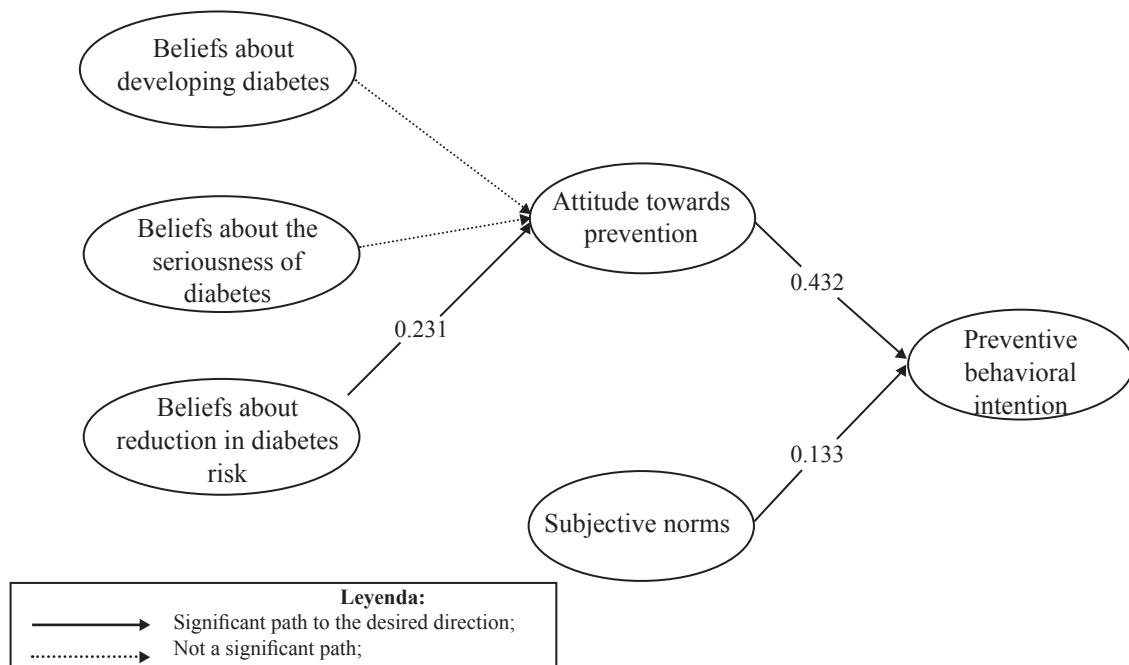


Figura 2 - Final version of the structural equations model for prediction of the IPB on diabetes in offspring of diabetic patients.

DISCUSSION

The application of the model of reasoned action to the offspring of patients with type 2 diabetes led to the identification of beliefs about reduction in diabetes risk, attitudes toward prevention, and subjective norms as important aspects to explain the intention to adopt preventive behaviors concerning the disease development. Prevention efforts seem to work better supported by processes in social change integrated by the synergy of behavioral theory and application of concepts and methods towards health promotion, in order to generate positive changes in the chosen audience⁽²³⁾.

Theories of behavior change contribute to more clearly understanding of the specific health behaviors in the environmental context in which they occur, play a critical role in the process of planning social marketing programs and health interventions⁽²⁴⁾, so that the theory of change helps to explain why a health program works. This paper has considered the theory of reasoned action as the axis of behavioral change intention under the prediction of a behavior performance from the intention to make it, and its determination arising from attitudes and subjective norms⁽²⁵⁾.

The results show that only the beliefs about reduction in diabetes risk do impact the attitude towards prevention. This implies that respondents know their chances of contracting the disease, since one of the parents has become ill, and this positively affects their willingness to prevention. However, neither the beliefs about the perceived seriousness nor the ones concerning the onset of the disease have an effect on such attitude. Several studies have shown that Mexican diabetic patients attribute their disease mainly to a fright or a strong emotion, inappropriate dietary practices, their family background, and poor functioning of the body, but also a large number of people do not recognize the cause for diabetes onset⁽²⁶⁾.

This accentuates the necessity to raise awareness in the population about the severity of the disease and nourish preventive attitudes and actions, considering that a better understanding of health beliefs on the part of the audience is key in creating culturally appropriate health services⁽²⁷⁾.

It was proved that both attitudes toward prevention and subjective norms impact the intended preventive behavior. The attitude represents an individual evaluation of the perceived benefits and disadvantages for the adoption of a certain behavior, and studies show that attitudes are a good predictor of the intention to behave in a certain way^(28,29). Because diabetes prevention is associated with substantial changes in lifestyle, the development of positive attitudes toward physical activity is required, along with weight

control and improvement of eating habits⁽⁶⁾. Furthermore, as subjective norms are based on the approval or disapproval of a behavior by family and friends, a person will act in line with the behavior that one thinks will get the approval of those individuals⁽³⁰⁾.

The results of one study⁽³¹⁾ demonstrate that within the social representation, the family and the patient himself are seen as responsible for monitoring and supporting the control and preservation of the diabetic individuals' quality of life.

Adjustments related to the care and lifestyle of a diabetic person affects both the sick people and those who share their lives⁽³²⁾. Respondents in this study indicated preventive interest, especially in relation to the measurement of glucose and medical check-ups. On the other hand, additional activities are required to complement prevention, since it has been shown that the adoption of a multidisciplinary approach, including exercise and nutritional control, has an effect on glycemic control. Experience shows that the majority of patients in Mexico do not often see a doctor, at least not until they start to have complications that result in metabolic disorder⁽⁴⁾.

CONCLUSION

This study shows that intentions to perform preventive behaviors should focus on psychosocial aspects, mainly on the development of a positive attitude, sustained on beliefs about reducing the risk of being affected by the disease, and on subjective norms of the offspring of diabetic individuals, in order to influence on the intention to adopt preventive measures.

It was found that knowledge supported by beliefs about developing diabetes and the severity of disease did not impact the attitude of diabetic people's offspring towards prevention, though there is credibility in reducing the risk of getting the disease so that it can be used as a means of promoting health in view of influencing the attitude towards prevention of diabetic individuals' offspring.

Moreover, both the attitude towards prevention and subjective norms are predictors of the intention to perform preventive behaviors, meaning that by emphasizing health promotion focused on them, the possibility of welfare and quality of life of a population at risk of getting the disease is thus increased.

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