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Making sense of diabetes: cultural models, gender and individual adjustment to Type 2 diabetes in a Mexican community

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Abstract

This study was conducted among Type 2 diabetes patients attending Social Security clinics in Guadalajara, Mexico. The goals were to describe cultural models of diabetes causation, assess gender-related differences, and analyze the relationship between cultural knowledge and the status of diabetes control. In the first stage, open-ended interviews were conducted with 28 participants. On the basis of the themes elicited, a series of scenarios describing the causes of diabetes were constructed. In the second stage of the study, 46 individuals were asked to rate each of the scenarios on a 3-point scale. A cultural consensus model was used to analyze the scenario interviews to evaluate the level of cultural sharing, estimate each individual's level of cultural knowledge, and validate cultural themes about the causes of diabetes. Multiple regression analysis was used to estimate the relationship between cultural knowledge and the status of diabetes control. The results demonstrated that participants shared a single cultural model of diabetes causality that emphasized emotional and environmental explanations of diabetes. Women shared more knowledge than men. Better diabetes control was related to a higher level of cultural knowledge. The results suggest that diabetes prevention and care efforts should include community participation. It is important to increase male participation in health care. Psychological assistance and stress management education should become a part of health care services for individuals with Type 2 diabetes.

Keywords: Type 2 diabetes; Mexico; Gender; Cultural models; Cultural consensus model; Qualitative and quantitative methods

Introduction

Type 2 diabetes is an extremely serious problem in Mexico. It affects about 8% of the adult population (King, Aubert, & Herman, 1998) and is the third most common cause of death in people over 45 years of age (Phillips & Salmeron, 1992). In the Social Security hospitals in Guadalajara, where this research was carried out, Type 2 diabetes was the leading cause of death (IMSS, 2000).

Illness-related knowledge is an important factor in research about diabetes management strategies and outcomes. Studies of the diabetes-related knowledge have produced a rich empirical literature. One perspective is represented by quantitative studies that use a standardized knowledge test approach (Bautista-Martinez et al., 1999; Garay-Sevilla et al., 1995; Valadez-Figueroa, Aldrete-Rodriguez, & Alfaro-Alfaro, 1993). In such studies, individual knowledge about diabetes is evaluated compared to a "correct" biomedical model of the disease. This approach allows one to determine how knowledge relates to the social and clinical characteristics of individual patients. However, this approach is limited because it is not designed to evaluate insider perspectives and meanings.

Another approach builds on qualitative methods and seeks to gain understanding of lay perspectives or health beliefs about diabetes in various cultural groups

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(Arganis-Juárez, 1998; Cohen, Tripp-Reimer, Smith, Sorofman, & Lively, 1994; Greenhalgen, Helman, & Chowdhury, 1998; Hagey, 1984; Hunt, Valenzuela, & Pugh, 1997, 1998; Lang, 1990; Mercado-Martinez & Ramos-Herrera, 2002; Pierce & Armstrong, 1996; Schoenberg, Amey, & Coward, 1998; Thompson & Gifford, 2000). These qualitative studies generate an in-depth understanding that is lacking in other approaches to investigation. However, there are some important limitations. First, qualitatively based studies tend to assume cognitive homogeneity and behavioral sharing, and they rarely address the issue of intracultural variation (Carey, 1993; Pelto & Pelto, 1975). Second, there are very few studies that examine how lay perspectives or health beliefs relate to individual health consequences. In summary, the major limitations of the qualitative research approach stem from its inability to make a systematic connection between the cultural, social and individual aspects of human behavior. Theoretical and methodological innovations in the area of cognitive anthropology address these shortcomings.

Cognitive anthropology defines culture as shared information and knowledge (D'Andrade, 1984). It builds on the concept of a cultural model that can be defined as a highly schematized representation of some cultural domain. Cultural models not only label and describe the world, but also elicit desires and can have a motivational force (Strauss & Quinn, 1997). These models are "kept" in individual minds, and they generate much of each individual's knowledge. However, sharing is what makes these models truly cultural as opposed to idiosyncratic (Dressler & Bindon, 2000).

Cultural consensus analysis (Romney, Weller, & Batchelder, 1986) provides a theoretical and methodological solution to study cultural sharing and intracultural diversity. First, cultural consensus analysis determines the degree to which a set of informants share knowledge of some cultural domain. If knowledge is shared, it is reasonable to infer that people are all drawing on a single cultural model of that domain. Second, it provides a "culturally best" estimate of the correct answer to each question asked of the informants. Third, cultural consensus analysis estimates how much each individual's responses correspond to the group shared responses (the level of cultural knowledge).

Illness-related knowledge is a complex cultural domain that entails risk and causal factors, illness complications and treatment strategies. However, it has been observed that causal beliefs often form a core of medical knowledge (Price, 1987; Finkler, 1991). Causal explanations provide meaning to human suffering, and have an important role in shaping illness behavior. Causes are typically identified by retrospectively examining past events that might relate to the symptoms. It has been suggested that memory is powerfully affected by cultural categories and that when formulating causal explanations, an individual draws on cultural knowledge, or a "pool" of culturally shared information and meanings that are typically mediated through social interactions (Chrisman & Kleinman, 1983). This study aims to describe cultural knowledge of diabetes causality shared by Type 2 diabetes patients in a large metropolitan area in Mexico.

It has been noted that illness explanations are dynamic; individuals routinely evaluate symptom change, treatment responses, and overall experience with care, and modify the construction of their illness accordingly (Chrisman & Kleinman, 1983; Hunt et al., 1998). Given the fact that formulation of illness explanations co-occurs with ongoing illness experiences and adjustment to its management and control, an important question arises—how does the level of culturally shared knowledge about diabetes causality relate to adjustment to diabetes control? In research about diabetic compliance, it is often assumed that more biomedically "correct" knowledge should translate into better diabetes care (Beléndez & Méndez, 1995). Lay health beliefs, on the other hand, are often considered as misconceptions that are obstacles for proper adherence to medical recommendations (de Keijzer, 1992). However, research conducted in Mexico that used standardized instruments to measure diabetes-related knowledge revealed a paradoxical situation, where more biomedically "correct" knowledge shared by the patients or their family members related to poorer diabetes control (Bautista-Martinez et al., 1999; Valadez-Figueroa et al., 1993). Cultural consensus analysis allows one to examine how cultural knowledge of diabetes causality—that may be very different from biomedical notions of the disease—relates to diabetes control.

Gender is one of the important social categories in examining diabetes-related knowledge. Research in Mexico suggests that diabetic men receive more social support than diabetic women to take care of their illness (Mercado & Vargas, 1989) and that women are much more active providers of this support than men (Robles-Silva & Mercado-Martínez, 1993). However, research conducted in Mexico and among Mexican Americans that used standardized instruments to assess diabetes-related knowledge, does not examine or does not find gender differences (Bautista-Martinez et al., 1999; Brown et al., 2000; Garay-Sevilla et al., 1995). Furthermore, cultural studies often build on the information provided by women and tend to overlook possible gender differences in health knowledge (Anderson, Goddard, Garcia, Guzman, & Vazquez, 1998; Weller et al., 1999). Using cultural consensus analysis, gender-related intracultural variation in lay knowledge about diabetes causation can be examined.

Cultural consensus analysis has been used to study diabetes-related knowledge in four Latino communities in the US, Guatemala, Mexico (Weller et al., 1999), and

among Aboriginal Canadians (Garro, 1995, 1996). Different from the research of Weller et al. (1999), this study focuses on cultural knowledge about diabetes causation shared by Type 2 diabetes patients. In addition, it was conducted in a single community, thereby allowing a more precise description of cultural knowledge. Furthermore, the study uses a modification of the original consensus model suggested by Caulkins, Trosset, Painter, and Good (2000) which permits a more consistent integration of quantitative and qualitative methodologies. In most of the original applications of cultural consensus model, the analysis was based on a list of separate concepts that described a cultural domain, but would be unable to provide more in-depth meaning. Caulkins et al. (2000) suggested the use of "scenarios," or brief, "experience-near" descriptions from everyday life that illustrate the key components of the inferred cultural model. In other words, the scenario technique uses themes that capture meanings and relationships within a specific cultural domain.

The purpose of this study is to build on cultural consensus analysis and scenario interviews to understand: (a) cultural model of diabetes causation; (b) the level of cultural sharing; (c) gender-related differences in cultural knowledge, and (d) the relationship between cultural knowledge and diabetes control.

Research setting

Guadalajara is the second largest city in Mexico and currently has a population of over three million people. It is located in the western part of the country which is considered one of the most prosperous regions. Guadalajara started growing rapidly after World War II, and now it is an important industrial center.

The Social Security system in Mexico is managed by the government-run *Instituto Mexicano del Seguro Social* (Mexican Social Security Institute, or IMSS), and it covers disability and old age insurance, and provides medical benefits for the economically active population working in the formal private sector. About 50% of the population is eligible for social security benefits, and IMSS is the major public and health agency in Mexico, supplying primary, secondary and tertiary health care to working people throughout the country.

Most of the study participants attended one of two Social Security clinics that served part of the *Sector Libertad*, which is the largest and most densely populated neighborhood in the city. Much of the migrant population that contributed to the rapid growth of Guadalajara in the '40s and '60s settled in this part of the city (Padilla-Dieste & Niembro-Díaz, 1990). *Sector Libertad* is considered a working class neighborhood, although socio-economic diversity of its population has been increasing.

Methods

In the first stage, qualitative research was conducted. In the second stage, more structured consensus model interviews were conducted, and some demographic and clinical information was gathered. Second stage interview data were analyzed quantitatively. The study was approved by the University of Alabama Institutional Review Board. Informed consent was obtained from each participant. The purpose of the study was explained to participants who were assured that the information they provided was confidential. In addition, individuals were reminded that their participation was voluntary and would not affect the health care services they receive. All interviews, instrumentation, and qualitative analysis were conducted in Spanish by the author.

First stage: qualitative research

In-depth qualitative interviews were conducted with 28 individuals in various community and hospital settings to obtain a broad understanding of the meanings and experiences of diabetes among Type 2 diabetes patients. Participant recruitment was facilitated by an interdisciplinary research unit at one Social Security clinic. Medical assistants or community volunteers identified a number of adult individuals who had been diagnosed with Type 2 diabetes. They were approached and invited to participate in the study. An attempt was made to design a representative sampling frame (Handwerker, 1998) to reflect differences in life experiences related to age, gender, educational level and diabetes duration.

Participants were allowed to tell the story of their illness in their own words and in no particular order, but a checklist of semi-structured prompting questions (e.g., How did you learn that you had diabetes? What do you think caused your diabetes?) was used to make sure that the domains of diabetes causes, complications, and self-care behaviors were covered at some stage by all participants. The average time of the interview was about 1 h.

All interviews were tape-recorded and transcribed verbatim. Transcriptions were verified comparing the audiotape to the text. HyperResearch (Researchware, 1998), a qualitative data analysis software package, was used to assist with consistent application of codes. The transcribed texts were subject to line-by-line analysis, and research codes for emergent categories were generated to index text that referred to specific themes. This process is called "open coding" in the grounded

theory approach to the analysis of qualitative data (Strauss & Corbin, 1990). Open coding is based on inductive approach, which allows exploration of the pre-existing notions about the phenomena, leading to new discoveries. Open codes on topics relevant to diabetes causation were searched, compared, and text concerning relevant themes was summarized.

On the basis of the elicited themes, a series of scenarios about diabetes causation were constructed that were used for systematic interviewing in the second stage of the study. A scenario can be defined as a brief, one or two-sentence, description that illustrates identified themes related to diabetes causation (Caulkins et al., 2000). To make sure that scenarios conveyed the intended meaning, they were pre-tested with a small group of diabetes patients. The final list included 21 scenarios on diabetes causation (Table 1).

Second stage: consensus analysis

The participants were recruited in a single clinic and interviewed while they were waiting for their medical appointment. Social workers or medical assistants identified adult individuals who were diagnosed with Type 2 diabetes. They were approached and invited to participate in the study. During the informed consent procedures, participants were asked for permission to review their medical records for the most recent fasting

Table 1
Answer key scores and rank order of scenarios (scenario number in parentheses) on diabetes causation used in the second stage interviews

Rank	Scenario	Answer key score
1	(9) Don José became diabetic because of a fright that he experienced when somebody tried to rob their house. He got very frightened, and because of that he got diabetes	2.93
2	(11) Señora Elena became diabetic because she had so many angry spells in her life. Her husband used to upset her a lot. She suffered so much with him that she became diabetic	2.88
3	(17) Before there was not as much diabetes because food was more healthy. And now everything is contaminated, processed, with preservatives	2.79
4	(10) Señora Veronica became diabetic when her daughter passed away, and from the grief she got diabetes	2.77
5	(14) Now there are so many people with diabetes because we live in a large city with lots of pressures, lots of hurry; before there were not so many people, or so much traffic, and life was more peaceful	2.73
6.5	(15) There are many pressures in our times. Due to monetary problems, and lack of jobs, people get anxious and worried, and because of that there are more people with diabetes	2.69
6.5	(12) These days there are many people with diabetes. People in the olden days did not have so much diabetes	2.69
8	(13) There are so many people with diabetes these days because they consume lots of fat, lots of pork	2.68
9	(6) There are different types of diabetes, some hereditary, others from angry spells, and others from frights or other things	2.65
10	(8) Señora Elena is diabetic, and she is a very fat lady. Most likely her diabetes comes from fatness	2.61
11	(4) Señora Elena says that her diabetes is hereditary, because her father was diabetic, and he died from that	2.51
12	(21) Before there were not that many people with diabetes because people used to walk more. Now many jobs are sedentary, and people exercise less	2.50
13	(3) Señora Ceci thinks that she developed diabetes because she used to eat lots of sweets, lots of chocolate, and things like that	2.36
14	(2) Señor Jose thinks that his diabetes is caused by what he used to eat. He was used to eating a lot. And most likely this was one of the causes	2.23
15	(5) Señor Alvarez has doubts that his diabetes is hereditary, because his parents developed diabetes when they were old. Because of that he thinks that his diabetes does not come from his parents	2.11
16	(1) Señor Toño used to drink a lot and most likely this was the cause of his diabetes	2.06
17	(16) Nowadays there are many people with diabetes because of the pollution and smog in large cities	1.90
18	(7) Señor Tacho became diabetic because of one very strong medicine that he had taken for another illness	1.66
19	(18) Señor Javier developed diabetes 2 years ago, and his wife has had diabetes for 10 years now. None of his parents was diabetic, and so he thinks that he most likely got his diabetes from his wife	1.17
20.5	(19) Señora Juana became diabetic because she used to eat a lot of vegetables and fruit	1.07
20.5	(20) Señor José became diabetic because he had a very peaceful life, without any worries, without anything	1.07

blood glucose results. A purposeful sampling frame was used. An attempt was made to assure that a sufficient number of men and women were recruited.

Cultural consensus analysis does not require a random sample, and it is possible to obtain stable results with a fairly small group of informants. According to Romney et al. (1986), in order to have a 95% confidence level, a stringent criterion for the proportion of items classified correctly (95% validity), and assuming that participants would have 0.5 level of cultural knowledge, a sample had to include at least 17 participants. The sample included 24 women and 22 men and was sufficient to conduct cultural consensus analysis separately for the data generated by men and women.

On average, each interview lasted about 45 min. The interview protocol included scenario-type questions, and a number of questions on demographic and clinical information. To avoid introducing order bias, scenarios were read to each participant in a random order. The participants had to rate each of the scenarios on a 3-point scale. A situation described in the scenario that was considered very true and common was rated "3", somewhat true, or possibly true, was "2", and, not true at all/not common, was "1". Participants were instructed that scenarios are not questions about their personal experiences, and that when evaluating each scenario, they should think in general terms about situations that they have seen or heard in their social environment.

After the interview, patient's medical records were checked for the most recent fasting blood glucose results, which were used as a measure of individual adjustment to diabetes control. The Social Security clinics, where this research was carried out, conduct monthly fasting blood glucose tests for diabetic patients to monitor their diabetes control. Testing of glycosylated hemoglobin (HbA_{1c}) concentration, a more reliable measure of long-term diabetes control, was not available to the patients at the time.

Consensus analysis was performed using ANTHROPAC (Borgatti, 1996). Other statistical analysis was performed using SPSS. The cultural consensus routine in ANTHROPAC conducts factor analysis on all the informants with scenarios as units of observation. Three unrotated factors are extracted. If the ratio between the first and second eigenvalues is greater than 3:1, there is a single-factor solution, or a "cultural" level of agreement. The higher the ratio, the more cultural sharing there is. To make a decision about the cultural sharing, it is important to take into account average level of cultural knowledge, standard deviation and the percentage of the variance explained by the first factor.

First, consensus analysis was performed on all participants and separately for men and women. Rank-order correlation was calculated to assess the similarity between the answer key scores generated by men and women. Second, data on participants' cultural knowledge scores were analyzed. ANTHROPAC estimates a cultural knowledge score for each participant based on his or her loading on the first factor. Higher loading indicates a higher level of cultural knowledge. The level of knowledge shared by men and women was compared using *t*-test. Diabetes control was coded as a categorical variable. Participants who had blood glucose levels lower than 140 mg/dl comprised the good diabetes control group. Participants who had blood glucose levels between 140 and 200 mg/dl comprised the moderate control group, and individuals who had blood glucose levels greater than 200 mg/dl were coded into the poor diabetes control group. Multiple regression analysis was used to examine how individual cultural knowledge scores relate to diabetes control. The mean and standard deviation of cultural knowledge for each diabetes control group were calculated to illustrate graphically how knowledge relates to diabetes control in men and women.

Third, the content of the cultural model was examined. The consensus analysis module in ANTHROPAC derives a culturally correct answer key from the factor scores (a weighted average of all responses, giving higher weight to the most competent informants). This allows one to determine which of the themes or scenarios best describe the cultural model of diabetes causation.

Results

Characteristics of study participants

In the first stage, 28 participants were interviewed; 14 of them were women. The age ranged from 39 to 87 years, with a mean about 64 years. The sample included individuals whose education varied from no school to a university degree. Thirteen participants lived in a nuclear family, eleven in an extended family, and four lived alone. The majority were married, three were separated or divorced, and six were widowed. The mean duration of diabetes was around 12 years. Data obtained from 28 individual qualitative interviews was used to construct the scenarios and describe a cultural model of diabetes causation.

In the second stage, 46 individuals were interviewed; 24 were women. The mean age was about 59 years. The individuals were of various educational backgrounds. The majority were married, six were divorced or separated, and eight widowed. There were 25 individuals who lived in a nuclear family and 16 in an extended family. Five participants lived alone. The mean duration of diabetes was around 12 years. The majority of the participants were in very poor diabetes control. The

mean level of fasting blood glucose was 195.84 (±70.04) mg/dl.

Cultural sharing, gender differences, and diabetes control

Cultural consensus analysis revealed that the ratio between the first and second eigenvalues was 4.34:1, with more than 74% of the variance explained by the first factor, and the average level of cultural knowledge being 0.64 (±0.19) (Table 2). This level of agreement is consistent with the existence of a single cultural model shared by the participants.

When consensus analysis was performed on all 46 participants, the mean knowledge score for women was 0.72 (±0.17), while for men it was 0.55 (±0.18). This difference is statistically significant ($t = 3.27$, $df = 44$, $p < 0.01$). To further examine gender differences, consensus analysis was repeated separately for men and women. For women, the ratio between the first and second eigenvalues was 6:1, indicating a high level of agreement. In the case of men, the ratio was 3.1:1, indicating agreement, but much lower than among women (Table 2).

Table 2
Consensus analysis of 21 scenarios on diabetes causation

Participants	Ratio between the first and second eigenvalues	Variance explained by the first factor (%)	Average level of cultural knowledge
Total, $n = 46$	4.34	74.3	0.64 (±0.19)
Women, $n = 24$	6.00	80.3	0.72 (±0.18)
Men, $n = 22$	3.10	65.1	0.55 (±0.18)

To assess gender differences in the content of cultural knowledge, a rank-order correlation between the men's and women's answer key scores was calculated. Spearman's rho was 0.91 ($p < 0.01$) suggesting that men and women shared the same cultural model of diabetes causation. However, there was a much higher level of cultural sharing among women than among men.

The study participants maintained very poor control of their diabetes. There were only four individuals (8.7%) who had blood glucose levels below 110 mg/dl, which is considered optimal diabetes control. In addition, 20 (43.5%) individuals had blood glucose levels higher than 200 mg/dl, which is considered very poor control (MNOM, 1999). Since the blood glucose levels in this population had a skewed distribution, diabetes control was coded as a categorical variable (good, moderate, and poor control), and multiple regression analysis was performed. First, the regression of cultural knowledge scores on sex and diabetes control was performed. In the second model, interaction effects between sex and diabetes control were taken into account. As seen in Table 3, individuals who had better diabetes control had a higher level of cultural knowledge. The association was more apparent in women than in men. A visual representation of association between the cultural knowledge scores and diabetes control in men and women is presented in Fig. 1.

A cultural model of diabetes causation

Cultural consensus analysis calculates a "culturally best" estimate of the correct answer to each question asked of the participants. Table 1 presents the answer key scores and rankings of 21 scenarios used in the

Table 3
Regression of cultural knowledge scores in diabetes causation on sex and diabetes control group[a] variables

Variable	β	p	Model p	Multiple R^2
Model 1			<0.01	0.27
Sex (women vs. men)	0.43	<0.01		
Diabetes control 1 (moderate vs. good)	−0.36	0.04		
Diabetes control 2 (bad vs. good)	−0.32	0.07		
Model 2			<0.01	0.40[b]
Sex (women vs. men)	0.58	<0.01		
Diabetes control 1 (moderate vs. good)	−0.35	0.04		
Diabetes control 2 (bad vs. good)	−0.31	0.07		
Interaction 1 (sex and diabetes control 1)	0.35	0.05		
Interaction 2 (sex and diabetes control 2)	−0.05	0.76		

[a] Diabetes control groups: good = fasting blood glucose less than 140 mg/dl, moderate = between 140 and 200 mg/dl, bad = more than 200 mg/dl.

[b] Increment of R^2 from Model 1 to Model 2 is statistically significant, $p < 0.03$.

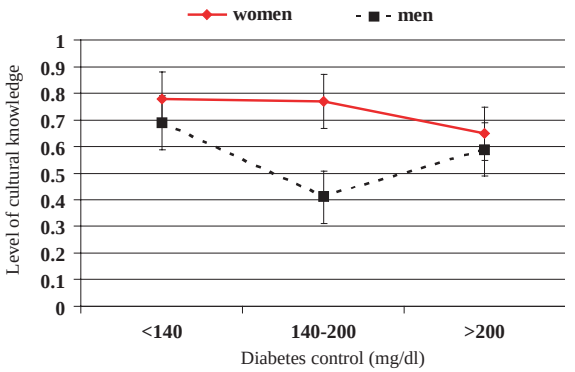

Fig. 1. Association between diabetes control and cultural knowledge in diabetes causation in men and women.

second stage consensus-type interviews. Answer key scores provide verification and refinement of the themes inferred from the first stage qualitative interviews. For example, consensus analysis revealed that such causal explanations of diabetes as strong medication (scenario 7) and contiguousness (scenario 18) that were cited in the first stage qualitative interviews, received very low answer key scores (Table 1). This suggests that these scenarios had little salience in the communally shared model of diabetes causality. In the following discussion, first stage qualitative interview data are used to describe a cultural model of diabetes causation, and consensus analysis results are used to verify cultural themes.

Emotional distress

Emotional distress was one of the most important themes in the local understanding of the causes of diabetes. Even though in the first stage qualitative interviews some participants suggested that both negative and positive emotions may cause diabetes, the onset of diabetes was typically related to some distressful, painful and/or upsetting life circumstances. Positive emotional events were cited merely as a theoretical possibility, and none of the participants related their own diabetes or other known cases of diabetes to some joyful or pleasant emotional experience.

Susto, or a deep sudden unexpected fright, was one of the most often mentioned emotional states in the stories of diabetes causation. For example, a 66-year-old woman, who was diagnosed with diabetes about three years ago, explained it in the following way:

> I think it happened when I received a message that…Well, my son is a taxi driver…and one day he had an accident. They called and told me not to worry, that nothing happened to him. But I said "No, they are probably lying, he might be dead". And I got frightened, I got so frightened….

In most of such stories, the state of fright would be provoked by some unexpected, unfortunate, traumatizing experience that in some way would threaten the life and well being of the person involved.

Anger or fury was another emotional state that was often mentioned in the stories about diabetes causation. Typically, these angry spells were the result of conflicts in the family, workplace or other interpersonal situations. In other cases, diabetes was related to a deep sadness, pain or sorrow caused by death or illness of a loved one. For example, a 69-year-old woman described a very vivid memory of how she became diabetic more than 15 years ago:

> I became diabetic after the death of my daughter, the oldest one. She was in the hospital, because she had problems with her pregnancy, and so we took her to this hospital over there…And so she was there. And I went to visit her, and she was very sick, very sick…I went to see her on Friday. On Saturday they call me from the hospital and tell me that she had a cardiac arrest and is dead…Oh my God…I felt such a terrible pain…I felt like I was dying…And this all affected me so much, that it made me diabetic…It made me diabetic….

In most of such stories, diabetes emerges as an accident, or as a result of an unfortunate event. Yet there are other cases where diabetes-provoking emotions were more chronic in nature. In such stories, there is no specific event that provoked fright, anger, anxiety or pain. Rather, these negative emotions are long-term, sometimes lifetime experiences. For example, a 77-year-old woman who had diabetes for about 20 years, commented, "I became diabetic because me and my mother-in-law, we used to quarrel so much. She used to make me angry all the time…and I think it was because of that".

Stories about emotional distress causing diabetes were very prominent in the first-stage qualitative interviews. Second stage interviews included four scenarios that related diabetes to some emotional events (Table 1). The scenario on fright (9) received the highest answer key score. The scenario on anger (11) was rated second, and the scenario on pain (10) was fourth. A scenario that described an inverse situation where diabetes was related to a worry-free life (20) was almost unanimously rated as untrue. In other words, consensus analysis confirmed that issues related to emotional distress were the most salient themes in the local cultural model of diabetes causality.

It is all because of the times that we are living in…

In the first-stage qualitative interviews, diabetes was described as a very common condition; however, some participants remembered times when diabetes was a rather rare disease. In the second stage interviews, a scenario that described diabetes as a "new" disease (12), was rated sixth, which suggests that individuals shared an understanding that the problem of diabetes in their communities is a relatively recent phenomenon that did not exist to such an extent in previous generations. In most of the interviews, observations that diabetes is a new disease would be followed by an attempt to explain the differences between the present times and earlier days. These explanations related diabetes to environmental changes and extended to a critique of contemporary ways of life.

Several participants discussed profound changes that took place in the rapidly growing city of Guadalajara. The picture of peaceful and healthy lifestyles in "old" Guadalajara contrasted sharply with complaints about crowded and insecure existence, heavy traffic, and high crime rates in the present-day city. According to these stories, the challenge of urban life was one of the major sources of stress and tension which participants linked to contemporary increases in diabetes. The second stage interviews included a scenario that asked about life in a large urban center (14). This scenario was rated fifth (Table 1), which suggests its salience in the local cultural model of diabetes causality.

Study participants also suggested that high unemployment and deteriorating economic conditions in Mexico were important sources of stress and anxiety that may eventually lead to diabetes. For example, a 62-year-old woman who worked as a high school teacher for most of her life and was diagnosed with diabetes when she was 42, commented:

> Including this devaluation of *peso* and all that…I think that this affected us a lot. Because there still are some people who haven't been able to recover from this economic situation, right? And I also had serious problems. The only problems that I have ever had at home were economic problems. And you get anxious, no matter how much you try to control it. Because you always have to give something to eat to your children, and the purchasing value of the money gets weaker and weaker. And of course, you get worried. I think that this is one of the issues that have really increased the prevalence of this illness.

A scenario relating diabetes causation to economic problems and unemployment (15) was rated sixth (Table 1), which suggests that it is recognized as one of the most important cultural themes.

Another important cultural theme related the causes of diabetes to environmental degradation in terms of deteriorating quality and nutritional value of available food products. According to the participants, foods that were available to people in earlier days were natural, clean and healthy, compared to present day foods, which are all processed, unnatural, and contaminated with chemical fertilizers, synthetic additives, and preservatives. This fundamental change in food production, according to the local understanding, is one of the most important contributors to the current plague of diabetes. For example, a 69-year-old woman who became diabetic about 15 years ago, discussed the relationship between processed foods and diabetes in the following way:

> It is all because of what we eat, everything contaminated, everything horrible that there is. And before it wasn't like that…People who lived on the farms, they never had diabetes, because they ate healthier things than here. Here all is real filth…this milk is simply water, just powdered…Everything, everything here is bad…And over there, they had fresh, just killed meat... And people ate better, and that is why they never had diabetes, because they had a different way of nutrition….

Consensus analysis revealed that this theme (17) received the third highest rating in the cultural model of diabetes causality (Table 1), which suggests its importance in the local cultural model of diabetes etiology.

In the first stage interviews, some individuals also mentioned air pollution as a possible cause of diabetes. However, consensus analysis revealed that this theme (16) was not rated as an important cause of diabetes (Table 1).

In summary, environmental explanations were among the most salient themes in the cultural model of diabetes causation. Themes about hectic life in a big city (14) and economic problems (15) relate to the first group of themes about emotional events, in that they attribute diabetes causes to stress and anxiety produced by modern ways of living.

Behavioral factors

In the first stage qualitative interviews, individuals talked about how personal behavioral choices might relate to diabetes causation. There were some participants who thought that high-fat foods, alcohol, obesity, eating in excess, and lack of physical activity might contribute to diabetes. Other participants believed that eating a lot of sweets and sugar might be a possible cause of diabetes. For example, a 60-year-old woman, who used to work in a hospital as a supply manager, and

was diagnosed with diabetes about eight years ago, explained:

> So, all of the suppliers used to bring me boxes of chocolate, and I have always liked chocolate. The other sweets I don't like that much, but chocolate…No, the fact is that I used to eat a lot of chocolate. I used to save those boxes, and sometimes the whole day I would be walking around and eating chocolate. And also having soft drinks…So, after I finished working…more or less two years after I finished working, I got this pain in one kidney. I got very sick.

However, discussions about diet, exercise and obesity were sporadic and not as salient as stories about emotional events. The second stage scenario interviews provided a better evaluation of these themes. Consensus analysis revealed that the scenario about the excessive consumption of high-fat foods and pork (13) was eighth, and was rated the highest in this group of scenarios. A scenario on obesity (8) was tenth. A scenario on sedentary lifestyles (21) received a score of 2.50 and was rated as a somewhat less salient theme. Finally, eating a lot of sugary foods (3), alcohol (1), and excessive eating (2) were the least salient themes in the group of scenarios on behavioral factors. A scenario on an inverse situation that related diabetes to eating a lot of fruits and vegetables (19) was almost unanimously rejected (Table 1).

In summary, scenarios on eating high-fat foods (13), obesity (8), and lack of physical activity (21) received fairly high ratings in the model of diabetes causation. Nevertheless, as seen in Table 1, behavioral issues were rated as less important causes of diabetes compared to emotional distress or some environmental factors.

Is diabetes hereditary or not?

Some participants believed without question that their diabetes was hereditary. However, for many individuals heredity was a puzzling concept that they tended to talk about with a certain degree of uncertainty or disbelief. For example, a 68-year-old man who used to work at the local church office commented, "They say that it is hereditary, but I don't know. Before my mother, we did not have anyone in our family with diabetes".

Furthermore, some individuals believed that diabetes is not hereditary when it is developed later in life. Only in the cases where it manifests itself at an earlier age, heredity is a more plausible explanation. For example, a 66-year-old man, who used to work as a construction worker and had diabetes for about 12 years, discussed the hereditary nature of diabetes in the following way:

> Who knows, for example, those who are sick from a young age, I think that in such cases it is possible that diabetes comes from heredity, no? Or how would you think, if a little girl has diabetes since a very young age, and diabetes that is severe…What would you think in such case? I think that it can be hereditary …Such a young person and already having diabetes …What kind of angers, what kind of drinking, what other things could there be? So, it is most likely that there is diabetes that is hereditary….

Given these diverse interpretations of heredity as a cause of diabetes, it was not surprising to find that diabetes was described as a disease that can have multiple causes. In some cases diabetes can be caused by heredity; in other cases it can be caused by strong emotional experiences or other contributing factors. Interestingly, a scenario about the existence of multiple causal mechanisms of diabetes (6) was ninth, and the heredity scenario (4) was 11th. A scenario describing that diabetes is not hereditary when a person's parents developed diabetes later in life (5) received a score of 2.11 (Table 1), which suggests that participants doubted whether diabetes is in fact hereditary when one's parents developed it in old age. In summary, a cultural model of diabetes causation included a conceptualization of heredity in some cases, but it was a far less salient theme than emotional distress or some environmental explanations.

Discussion and conclusions

Cultural model of diabetes causation

Consensus analysis revealed that individuals shared a single cultural model of diabetes causality. These results are consistent with research conducted on diabetes-related beliefs in four Latino communities which found that homogenous beliefs were present in all four communities, and homogeneity increased with the increasing exposure to the illness (Weller et al., 1999).

Issues related to emotional distress were among the most prominent themes in the cultural model of diabetes etiology. These results are similar to research conducted in a marginal community in Guadalajara, which also found that in personal accounts of diabetes causation, emotional factors were the most prominent themes (Mercado-Martinez & Ramos-Herrera, 2002). Furthermore, research shows that in Mexico emotions play an important role in the explanations of various health problems (Fabrega, 1974; Finkler, 1998; García de Alba García, De Munck, Salcedo Rocha, Vargas, & Garro, 1998).

The most common emotional experience that was related to the onset of diabetes is *susto*, or a sudden deep fright. In Hispanic America this emotional state is also related to the folk illness called soul loss, magical fright

or *susto* (Gillin, 1948; Rubel, 1998). It has been suggested that the *susto* syndrome will appear as a consequence of an episode in which an individual is unable to meet the expectations of his/her own society for a social role in which he or she has been socialized (Rubel, 1998). In the diabetes stories shared by the study participants, fright was often linked to an extremely traumatizing event, a near-death experience, where a threat of death was unexpected, or an accident, thereby disrupting the normal order of things.

Besides fright, other emotional experiences, such as angry spells and frustrations as well as sadness, sorrow or pain, were also cited as very plausible explanations of diabetes causality. Interestingly, the experience of pain or sorrow was rated as somewhat less important than the experiences of fright and anger, which might suggest that some types of negative emotions are more strongly tied to diabetes than others. Additional research in Mexico also suggested that different emotions may be causally related to different types of illnesses (Fabrega, 1974; García de Alba García et al., 1998).

Diabetes was described as a relatively new disease that did not exist to such an extent in previous generations. Indeed, epidemiological findings clearly demonstrate that in the second half of the twentieth century there was a very significant increase of Type 2 diabetes in Mexico and around the globe (Escobedo-de la Peña & Santos-Burgoa, 1995). For many participants, this increase related to the complex environmental and social changes that they have experienced in the course of their personal lives. After World War II, Guadalajara grew rapidly, basically due to internal migration and industrialization. This rapid growth created many problems of urban transportation, pollution, unemployment and insecurity (Arroyo-Alejandre & Velázquez, 1990). Industrial development and modernization in Mexico, as in many other places, brought unequal economic and political systems, deteriorating job markets and increasing inequality. Since the 1980s, Mexico has experienced several economic crises that increased economic insecurity and poverty (Escobar-Latapí, 1990). According to culturally shared understanding described in this study, these profound changes associated with urban growth and economic insecurities brought anxieties and worries to the lives of many and are responsible for the rising rates of Type 2 diabetes.

Another important cultural theme related diabetes causality to deteriorating quality and nutritional value of available food products. Consensus analysis revealed that this cultural theme was rated as high as the scenarios on emotional distress. In the discourse about processed food products, diabetes was related to inadequate nutrition and diet. However, this cultural theme is different from behavioral explanations of diabetes because it does not imply personal responsibility for developing the disease.

Even though emotional distress and environmental issues were the most salient themes, heredity and behavioral factors, especially high fat foods, obesity and lack of physical activity were also present in the lay understanding of diabetes causality. This suggests that public health promotion of healthy lifestyles should not meet much cultural resistance. However, the issue of alcohol consumption might need a different approach. According to public health research, alcohol abuse is one of the most important risk factors for developing diabetes in men (Monterrosa, Haffner, Stern, & Hazuda, 1995). However, in the local cultural model described here, the issue is not recognized as an important cause of diabetes.

In summary, according to the cultural model of diabetes causation shared by the local community of diabetic patients, diabetes is a relatively new disease that can be related to very different causal mechanisms. The issues of emotional distress, societal changes and deteriorating quality of modern food products take the most salient place in the lay model. Conversely, a biomedical definition of diabetes causation emphasizes individual responsibility and focuses on very different priorities. Heredity, obesity and behavioral issues, such as high-fat diets and low physical activity, are considered the main risk factors for developing Type 2 diabetes (MNOM, 1999).

Research conducted in various non-western cultural groups finds that diabetes etiologies are often related to broader societal and environmental changes (Garro, 1995; Lang, 1990; Thompson & Gifford, 2000; Greenhalgen et al., 1998). Furthermore, the salience of emotional distress and environmental changes in the cultural model of diabetes causality calls attention to research on psychosocial stress and its role in the processes of chronic health conditions. Previous research demonstrates that chronic psychosocial stress related to major stressful life events, acculturation and socio-economic inequalities in modern societies is linked to the increased risk for developing Type 2 diabetes (Dressler, Bindon, & Gilliland, 1996; Mooy, de Vries, Grootenhuis, Bouter, & Heine, 2000; Scheder, 1988; Szathmary & Ferrell, 1990).

Despite the existing evidence, the medical model of diabetes prevention and care disregards environmental and psychosocial influences on human health and illness and builds on a very individualistic vision of health. The cultural model of diabetes causation shared by the Type 2 diabetes patients in the studied Mexican community highlights the limitations of such individualistic focus for the prevention and care of Type 2 diabetes.

Gender differences

The study results demonstrate that men and women in the community share the same cultural model of

diabetes causality. However, women have a much higher level of cultural knowledge than men do. According to the theory of cultural sharing, expertise in a cultural domain co-develops with the involvement in the cultural system (Holland, 1992). The observed gender differences in cultural knowledge suggest that diabetic men in the studied community have fewer social interactions on the issues related to their diabetes, and they display less involvement, identification and expertise in that area. It has been noted that in Mexico men play a very passive role in the household production of health (Menéndez, 1993). Current findings suggest that men are less active and knowledgeable even in their personal ailment.

One may expect that similar gender-related differences in cultural knowledge would exist in many different communities, since many cultural groups socialize women as primarily responsible for family well-being and health (Browner, 1989). However, research among aboriginal Canadians that used cultural consensus analysis did not find gender differences (Garro, 1996), which suggests that even though gender roles in relation to health seem to have many similarities across different cultural contexts, they nevertheless are culturally specific.

These gender differences in diabetes-related knowledge have important implications for health care delivery and practice. There must be an effort to increase male participation in health promotion and care, which would have beneficial effects both for men and for women.

Cultural knowledge and individual adjustment to diabetes

The study results indicate that those individuals who were in better diabetes control also had more cultural knowledge about diabetes causation, and the relationship was stronger in women than in men. The results seem to provide an explanation for research conducted in Mexico which found that more biomedically "correct" knowledge related to poorer diabetes control (Bautista-Martinez et al., 1999; Valadez-Figueroa et al., 1993). From the lay point of view, the biomedical model, especially in the area of diabetes causes and risk factors, is not complete because it does not address psychosocial and environmental issues, which are the most salient themes in the local cultural model.

Due to the cross-sectional nature of the study, it is hard to establish the causal direction in the observed relationship between the knowledge and diabetes control. Nevertheless, several possible explanations could be considered. First, a higher level of cultural knowledge signifies more involvement and more social interactions on issues related to diabetes. It means a more active posture in terms of trying to understand the illness and do something about it. This explanation is also supported by the fact that the relationship between knowledge and the status of diabetes control was more apparent among women than men. Previous research suggests that in Mexico women are expected to be health care providers for others, as well as self-reliant and active in their own illness (Menéndez, 1993). As a result, not only do women have higher levels of cultural knowledge, but also this knowledge has a more direct relationship to their illness status. In other words, a higher level of cultural knowledge relates to a higher level of self-actualization, which might lead to a more adaptive behavior and better health.

Second, the observed relationship between the level of cultural knowledge and diabetes control is very intriguing in the context of research on health consequences of cultural consonance. Cultural consonance examines the level of actual, practical adherence to the cultural norms (Dressler & Bindon, 2000). This research indicates that lack of cultural consonance, or the inability to live up to the cultural ideals, is a stress-producing condition which affects health (Dressler, Balieiro, & Dos Santos, 1997, 1999; Dressler & Bindon, 2000). In a similar manner then, a low level of cultural knowledge, or incongruity between the personal views and the communally shared views, may also be a stress-producing situation. In fact, research suggests that migrants in new cultural settings could experience "cultural incongruity" between their "native" systems of meanings and the systems of meaning in the community to which they have moved. This incongruity could then lead to confusion in social interactions, which could be stressful and lead to poor health (Cassel, Patrick, & Jenkins, 1960). In relation to diabetes knowledge, an individual whose views and understandings of his or her illness causation are more compatible with others in the social environment, may feel more adjusted, accepted and "normal" about the ailment. In contrast, an individual who has different perceptions may experience a sense of social isolation and poorer adjustment to diabetes.

In summary, higher level of cultural knowledge may signify a more active and involved posture in relation to illness, which may lead to more adaptive behaviors. On the other hand, inconsistency between personal and culturally shared views may be a stress-producing situation, which eventually leads to poorer health outcomes. Further research is needed to explain the relations between cultural knowledge about diabetes and individual health consequences. Nevertheless, we can draw important conclusions that successful adjustment to diabetes control relates to higher level of cultural knowledge, which suggests that diabetes prevention and care efforts should include community knowledge, participation, and ownership.

Research limitations and implications

The study results are limited to the population attending Social Security clinics in a large urban center. Further research should include individuals who do not attend Social Security clinics, use glycosylated hemoglobin, a better measure of long-term diabetes control, and be broader in scope to examine other sources of intracultural variation, including variability within genders. In addition, a longitudinal study design would allow one to examine the causal relationship between the cultural knowledge about diabetes causation and individual health consequences.

Nevertheless, the study results suggest several important implications for diabetes prevention and care. First, considering the importance of emotional distress in the lay model of diabetes causality, it is very important to include psychological assistance and stress-management education in diabetes prevention and care. Since a higher level of cultural knowledge relates to better diabetes control, it is important to create prevention and treatment approaches that would include peer-education, community volunteers and informal social gatherings. Third, gender-related inequalities that are reflected in the differential distribution of diabetes-related knowledge present another important challenge for diabetes care efforts. It has been suggested that gender equity in health lies in reconstruction of masculinity to make it healthier for both men and women (Doyal, 2000). This is a challenging task, however, since it requires changing some fundamental aspects of human behavior. Nevertheless, an effort has to be made to encourage male participation in health care. Finally, diabetes prevention requires broader social policies and actions that would address such issues as deteriorating job markets, economic insecurity, and quality of food products.

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