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Illness Beliefs Regarding the Causes of Diabetes among Latino College Students

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Abstract

This study examined the validity of the Klonoff and Landrine (1994) illness-belief scale when applied to Latino college students ($n=156$; 34% male, 66% female) at high-risk for future diabetes onset. Principal factor analysis yielded four significant factors – emotional, folk-beliefs, punitive, gene/hereditary – which accounted for 64.5% of variance and provided a culturally-relevant Latino perspective of the causes of diabetes. Additional analyses by age, gender, immigrant status and psychological acculturation revealed significant differences by age on the emotional and folk illness factors and a negative correlation between assimilation and endorsement of the emotional factor. The implication of these four illness factors for predicting health-related behaviors and health-outcomes among young Latinos was discussed as were recommendations for future research.

Keywords

health; diabetes; Latinos; cultural illness beliefs; college students

Diabetes is the seventh primary cause of disease-related deaths in the United States among all Americans (Centers for Disease and Control Prevention, 2007). It is associated with a number of negative health outcomes such as heart disease and stroke, high blood pressure, blindness, extremity amputations, kidney disease, nerve damage, and other chronic illnesses (Centers for Disease and Control Prevention, 2007). The direct medical and indirect expenditures attributed to diabetes in 2007 are estimated at \$174 billion (American Diabetes Association, 2008).

The incidence of diabetes is increasing at an alarming rate in the Latino community. According to the National Diabetes Education Program (2007), 2.5 million Latino/a Americans are afflicted with this disease. Latinos are almost two times more likely to have diabetes as compared to non-Latino Whites of similar age (Centers for Disease Control and Prevention, 2005). Latinos also tend to be diagnosed at younger ages – adolescence and young adulthood — and display more severe and debilitating forms of diabetes-related complications, making this disease a major health concern for this ethnic group (Brown, Harrist, Villagomez, Segura, Barton & Harris, 2002; Hatcher & Whittemore, 2007; National Institutes of Health, 2004; Neufeld, Raffel, Landon, Chen & Vadheim, 1998; Stern & Haffner, 1990). As reported by the National Center for Health Statistics (2005), diabetes is now the fifth deadliest disease among Latino Americans, surpassing that of the national average. Hereditary and psychosocial factors that contribute to obesity are cited as the main culprits for the soaring numbers of Latinos diagnosed with pre-diabetes and Type 2 diabetes in this country (Morales, Kington, Valdez, & Escarce, 2002; Stern & Haffner, 1990; Stern & Mitchell, 1995).

In an effort to respond to the Latino diabetic health crisis, the present study reports on the findings concerning the diabetes illness beliefs of Latino young adults. This study is part of a larger investigation regarding diabetes-related beliefs, behaviors, and health outcomes of Latino college students with a family history of diabetes but who were not personally diagnosed

with the disease. Because of the increased prevalence of diabetes among young Latinos, research examining illness beliefs of diabetes among those who are not yet afflicted with this chronic disease and for whom “diabetes onset may be delayed or prevented” is clearly warranted (Arcury, Skelly, Gesier & Dougherty, 2004, p. 2183).

Explanatory Models of Diabetes

Explanatory models of illness or illness representations refer to the health beliefs that people have regarding a particular disease, which is strongly influenced by culture (Fisher, Chesla, Skaff, Gilliss, Mullan, Bartz, Kanter, & Lutz, 2000; Landrine & Klonoff, 1992; Thackeray & Neiger, 2003). Those who have a common culture are likely to have their own unique set of explanatory beliefs of disease, which may differ from or include biomedical explanations for an illness (Arcury, Skelly, Gesier, & Dougherty, 2004; Jezewski & Poss, 2002; Kleinman, 1988). Culture provides a framework from which illness is interpreted as well as how symptoms can be experienced and the type of help-seeking behaviors that are sought from folk or biomedical practitioners (Chesla et al., 2000; Jezewski & Poss, 2002). Knowledge of explanatory models of illness within a specific cultural group is imperative for understanding and improving the health behaviors and health attitudes of its members (Fisher, Walker, Bostrom, Fischhoff, Haire-Joshu & Johnson, 2002).

There have been some efforts by researchers to delineate explanatory models of diabetes that are unique to the Latino population. It should be noted that with the exception of two studies (i.e., Arcury et al, 2004; Weller, Baer, Pachter, Trotter, Glazer, Garcia de Alba Garcia, & Klein, 1999), this research has centered on Latinos already afflicted with Type 2 diabetes and who are undergoing medical treatment. Such studies have relied primarily on ethnographic methodologies (i.e., structured interview questionnaires) to address the health beliefs of Latinos with Type 2 diabetes, their views regarding the nature and causes of the disease, the impact of the disease on quality of life, and the potential benefits of medical treatment and self-care health management. The findings of these studies point to a common set of health beliefs that Latinos have regarding diabetes. In general, they show that Latinos perceive diabetes to be a very serious illness and explain the disease process in terms of actual symptoms experienced (i.e., fatigue, irritability, or numbness in feet) and changes in lifestyle caused by diabetes (interference with work or household duties). They are likely to present both biomedical (i.e., due to genetic, dietary, or lifestyle factors) and religious explanations for understanding the causes of the disease. Also highlighted in the literature is that Latinos tend to underscore the importance of emotional factors as causes for the disease, to describe feelings of social isolation (lack of support and understanding from family and friends), and may have a fatalistic orientation regarding the course of the disease. Finally, although Latinos recognize the importance of preventive health behaviors (i.e., exercise and diet) and medical treatment (i.e., taking insulin) in managing diabetes, there are tendencies to give equal or more credence to folk remedies as treatment alternatives (Anderson, Goddard, Garcia, Guzman, & Vasquez, 1998; Arcury et al., 2004; Coronado, Thompson, Tejeda, & Godina, 2004; Hatcher & Whittemore, 2007; Hunt, Valenzuela, & Pugh, 1997; ¹⁹⁹⁸; Jeweski & Poss, 2002; Poss & Jezewski, 2002; Quatromoni, Milbauer, Posner, Carballeira, Brunt, & Chipkin, 1994; Rivera, 2003; Weller et al., 1999).

Accordingly, the literature on explanatory models of diabetes among Latinos suggests that there are two general systems of illness representations that influence the way Latinos conceptualize this disease. One set of beliefs points to a biomedical explanation for understanding the causes of diabetes and the second to a socio-cultural representation of folk beliefs for interpreting the disease (Coronado et al., 2004). In this study we attempted to explore in greater depth Latinos' socio-cultural understanding of disease that encompassed emotional, natural, interpersonal, supernatural, and religious etiological dimensions of illness as an

explanatory model for diabetes (Landrine & Klonoff, 1992). This was done in an effort to delineate a more culturally constituted representation of diabetes among Latino young adults that diverged from the more commonly used biomedical explanatory models of disease— i.e., the common sense model of illness that points to disease identity, consequence, control/cure, and timeline as important dimensions (Hagger & Orbell, 2003; Leventhal, Meyer, & Nerenz, 1980). Hence, the study was directed specifically at Latino college students with a family history of diabetes but who themselves were not afflicted with the disease.

Limitations of Previous Research on Diabetes Illness Beliefs

In general, there is a paucity of research on explanatory models of diabetes illness beliefs among college students. With the exception of a few studies (e.g., Klonoff & Landrine, 1994; Turk, Rudy & Salovey, 1986) that have included college students as sample participants, the little research conducted to date has focused on students afflicted with Type 1 diabetes. These studies examine the difficulties faced by such persons in maintaining good health control and in adapting to living with the disease as independent young adults (Mellinger, 2003; Miller-Hagan & Janas, 2002; Wdowik, Kendall, Harris, & Auld, 2001). Hence, to our knowledge, there have been no systematic studies conducted concerning the health beliefs of diabetes among Latino college students who present a high-risk profile for developing the disease. Previous empirical studies centering on Latinos' health beliefs have relied on community samples comprised primarily of middle-aged persons afflicted with diabetes thereby limiting the generalizability of the reported findings to college-age non-diabetics. The present study aimed to fill this void by examining Latino college students' cultural beliefs regarding the causes of diabetes and delineate a socio-cultural representation of diabetes among those not yet afflicted.

In addition, it is surprising to note that the literature examining the role acculturative influences on Latinos' explanatory models of diabetes is quite scant (Brown, Harrist, Villagomez, Segura, Barton, & Hanis, 2000). However, through the process of acculturation individuals' health-related beliefs, values, and behaviors are likely to change to become more like the mainstream society which researchers believe contributes to the large variations observed among Latinos in both positive and negative health outcomes (Giachello, 1997; Perez-Escamilla & Putnik, 2007). This study responded to this concern by including a measure of psychological acculturation to identify within group differences in folk beliefs of diabetes as a function of a person's socio-cultural orientation to the United States (i.e., assimilation/US orientation, integrated/bicultural orientation, traditional/Latino orientation, and marginal). The examination of psychological acculturation was important given the recent literature review article by Perez-Escamilla and Putnik (2007) on diabetes health-related behaviors of Latinos, where they discussed that a major limitation of prior work in this area has been the use of static and simplistic measures of acculturation, i.e., years lived in U.S., English proficiency, or generational status. They argue that the use of such proxy variables as indicators of acculturation fail to capture the complexities of this process which most likely account for the inconsistencies documented across Latino health-related outcome studies. Likewise, in another recent review article by Haller, Sanci, Sawyer, & Patton (2008) of young persons' general illness beliefs and the beliefs of the young afflicted with a chronic illness (i.e., Type I diabetes and asthma), also noted that this body of work has failed to sufficiently explore the important relationship between acculturation, ethnicity, and explanatory models of illness.

Purpose of Study

In a prior research study conducted by Klonoff and Landrine (1994), the factor structure for the folk beliefs about the causes of diabetes and five other diseases (AIDS, the common cold, hypertension, lung cancer, and headaches) were examined. This study identified four factors or illness dimensions believed to cause these diseases. More specifically, principal components

analyses resulted in four factors that captured a folk system model of illness beliefs among college students—emotional, punitive, natural, and mystical retribution. Unfortunately, due to the small number of ethnic minority college students included in this study (a total 58 ethnic minority students comprised of African-, Mexican- and Asian-Americans), the generalizability of this earlier investigation to Latinos is limited and warrants further examination. The present investigation was carried out as a partial replication of Klonoff and Landrine's (1994) study. In the current analysis, the factor structure for the causes of diabetes was explored with a sample of non-diabetic Latinos with a family history of the disease. Thus, the primary goal was to examine the factor structure found in our analyses with that of prior research in an effort to generate a health-related instrument that captured the common sense folk beliefs of diabetes among Latinos who are at risk for the onset of Type 2 diabetes. Furthermore, no prior studies have been conducted on Latinos' illness representations of diabetes that also considered psychological acculturation and the socio-cultural variables of gender and age (participants' ages ranged from 18 to less than 60 years) within the same study. Yet scholars in the field underscore the significance of examining within group variations due to acculturation and have shown that gender and age are also likely to moderate illness beliefs and health-related outcomes (Arcury et al., 2004; Perez-Escamilla & Putnik, 2007). Hence, the second goal of this investigation was to examine differences in Latinos' cultural folk beliefs regarding the causes of diabetes as a function of psychological acculturation, immigrant status, age, and gender.

Method

Participants

Participants were 156 Latino college students (34% male and 66% female) from a four-year university in southern California. Half of the sample (50.4%) self-identified themselves as being of Mexican origin, 22.3% as Latino, 21.1% as Hispanic, and 6.2% as Central American. In regard to generational status, 21% of Latino participants reported being first generation, 65% second generation, and 15% third or more generations in the United States. The age of the participants ranged from 18–60 ($M = 23.3$ years, $SD = 6.78$) with 57% of the sample being between the ages of 18–21, 19% 22–24 years and 25% 25 years or older. The median family income reported by the participants ranged from US\$25,001 to \$35,000. Approximately half the sample (53%) worked full-time and lived (57%) with parents. Approval for this study was obtained from the Institutional Review Board (IRB) at the university where the data was collected.

Only students identified as at risk for Type 2 diabetes were recruited for this study. Participants were identified as being at high-risk for developing Type 2 diabetes because they had a blood relative currently diagnosed with the disease. None reported having diabetes. The majority of participants (42.3%) reported having a parent with Type 2 diabetes, 31.4% a grandparent, 14.1% a sibling, and 12.2% an aunt/uncle. Table 1 summarizes the health profile of participants by gender on several health indicators. The health status of participants was measured using the Body Mass Index (BMI) and the "Diabetes Risk Test" (www.diabetes.org). The BMI was used as an objective measure of whether participants were underweight, normal weight, overweight or obese. The mean BMI score for the total sample was 26.7 (considered overweight) with 57.7% of the sample classified as overweight and/or obese and 56.3% of Latinas and 60.3% of Latinos falling under this classification. Only 38.5% of the sample was classified to be at a healthy weight. The "Diabetes Risk Test" developed by the American Diabetes Association (www.diabetes.org) which identifies individuals to be at a low, moderate, or high risk for diabetes was used to quantify persons' level of risk. Of the total sample, 30.7% were "low risk," 44% were "low to moderate risk," and 25.3% were "high risk." Based on this test a greater percentage of females were identified to be at "moderate" and "high" risk for

developing diabetes in the future, with 28% of females compared to 20% of males in the “high risk” category. A *t*-test analysis on the diabetes risk scores by gender confirmed that female participants were at significantly greater risk of developing diabetes than were males, $t(101) = 2.32, p. <.05$.

Study Design

The findings to be reported represent a partial analysis of a larger National Institutes of Health funded project that examines the health beliefs, behavioral patterns, and health outcomes of Latino college students who are at risk for Type 2 diabetes. The Health Belief Model (HBM) addresses factors influencing the linkage between health knowledge, attitudes, beliefs, and behaviors. The HBM postulates that individuals' health behaviors are influenced by illness beliefs, perceptions of health risk and views regarding taking preventive action. In this study we chose to examine Latino folk beliefs regarding the causes of diabetes within a socio-cultural framework that considered age, gender, immigrant status, and acculturative differences.

Measures

Sociodemographic Data—Sixteen items were used to describe the sample profile. For example, respondents were asked to report on ethnicity, gender, age, family income, generational status, and health profile related to BMI and NIH diabetes risk score.

Psychological Acculturation—The AHIMSA Scale (Unger, Gallaher, Shakib, Ritt-Olson, Palmer, & Johnson, 2002) consists of eight items that tap into a person's socio-cultural orientation (i.e., Anglo, Bicultural/Integrated, or Hispanic) to life in a multicultural society. Sample items of the AHIMSA Scale include: “I am most comfortable being with people from;” “My favorite music is from;” and “The way I do things and the way I think are from” The scale is scored by counting endorsements of each item separately for each response category resulting in four separate variables. Endorsing *United States* reflects “assimilation,” endorsing the *country where my family is from* reflects “separation,” endorsing *both countries* reflects “integration” and endorsing *neither* reflects “marginalization.” Scores on the four resulting variables range from 0 to 8 with higher scores indicating positive endorsement of the variable. For example, AHISMA produces a variable score on assimilation. The four variables are related to socio-cultural acculturation.

Causes of Illness—Participants completed the 14-item causes of illness questionnaire developed by Klonoff & Landrine (1994). Items regarding the potential causes of diabetes were scored on a 5-point scale with the end points being 1 (*definitely false*) and 5 (*definitely true*). Higher numbers indicated that participants' considered the item as a cause of diabetes. Principal component analyses conducted by these authors on their sample of college students revealed four factors of illness representations that comprised the following dimensions: emotional (anxiety, anger, stress, relationships), punitive (own fault, sin, sexual activity, punishment), natural (germs/infection, accidental, and cold/drafts), and mystical retribution (God's will, punishment, bad blood, and genes/heredity). Cronbach alpha reliability indices for the four factors of illness scales were not reported.

Procedure

The participants were recruited through flyers and announcements in classrooms, clubs, and organization meetings. The criterion for inclusion in the study was that participants were Latino and have a parent, aunt/uncle, sibling, and/or grandparent diagnosed with Type 2 diabetes. Potential participants were contacted and screened by a research assistant and those that qualified were scheduled for an appointment to complete a self-administered paper-and-pencil questionnaire.

Participants signed an informed consent prior to answering the questionnaire which took approximately 45 minutes to complete. A researcher was available to answer participants' questions otherwise interaction was kept to a minimum. Each participant was paid US\$15 for taking part in the study. As part of the debriefing procedure, each participant viewed a short educational film provided by the NIH and received brochures on the causes and preventions of diabetes. All participants were treated in accordance with the ethical standards stipulated by the American Psychological Association (American Psychological Association, 2002).

Results

Factor Analysis

Principal components analysis with varimax (orthogonal) rotation was used to examine the factor structure of the 14-item causes of illness survey. Using eigen-values greater than one to select the number of factors resulted in a four-factor solution accounting for 64.5% of explained variance. The common variance for the four-factor solution was 36.39, 11.04, 9.29, and 7.82% respectively with eigen-values ranging from 1.10 to 5.09. The rotated factor solution is presented in table 2.

As recommended by Turk et al., (1986), the criteria for retaining an item for a given scale was that it must show "convergent validity defined as a correlation $\geq .45$ with at least one factor and discriminant validity considered satisfactory if the magnitude between the highest and the second highest factor correlations was $\geq .15$ " (p. 460–461). The only exception made regarding high cross-loadings of items on more than one factor was for two items; "accidental" retained under factor 2 and "sexual activity" retained under factor 3 based on their theoretical and empirical validity regarding the underlying meaning of each of these dimensions. Inter-correlations between the four factors retained revealed significant associations between emotional and folk beliefs ($r = .535, p < .01$), emotional and punitive beliefs ($r = .441, p < .01$), and punitive and folk beliefs ($r = .486, p < .01$), indicating that these factors are conceptually related yet distinct ($r < .80$) illness belief dimensions. No association was found between the gene/hereditary and the other three illness factors.

Similar to the findings of Klonoff and Landrine (1994), anxiety, anger, stress, and relationships had high loadings (all loadings $> .55$) on the first factor. As in prior research, this four item factor was labeled "emotional" and achieved an alpha reliability of .85.

The second factor consisted primarily of items that were labeled natural and mystical retribution in the prior study. The "mystical retribution" items that had the highest loadings on the second factor were: bad blood and God's will. The "natural" items that loaded on this factor were: cold/drafts, germs/infection, and accidental. In contrast to the findings of the prior study, items that loaded separately on "mystical retribution" and "natural" loaded on a single factor in the current study. This five item factor (cold/drafts, bad blood, God's will, accidental, and germs/infections) was labeled *folk beliefs* and conceptualized as reflecting common cultural views (cold/drafts, bad blood, and germs) and/or inexplicable explanations (God's will and accidental) for the causes of diabetes ($\alpha = .75$).

Three items that were labeled as punitive in the prior study had their highest loading on the third factor in the current study. The items that had their highest loadings on the third factor were: own fault, sin, and punishment. In the current study, sexual activity loaded highly on this factor as well as on factor 2 (folk beliefs), but was retained under the punitive dimension based on theoretical validity. Hence, factor 3 in this study consists of the same four items as those found in the prior Klonoff and Landrine investigation ($\alpha = .58$).

The fourth factor in this study included a single item. Genes/heredity had its highest loading on the fourth factor with no cross-loadings above .30 on the remaining factors. This final factor was labeled genes/heredity. Unlike the Klonoff and Ladrone study, this item did not load under natural consequences.

Correlational Analysis—Bivariate correlations were used to examine the relationship between the four causes of beliefs subscales with socio-cultural acculturation. The analyses were carried out with three of the four AHISMA subscales. Due to the small number of participants endorsing “marginalization”, no analyses were carried out with this variable. Only one of the analyses was significant. Assimilation was negatively correlated with the emotional subscale ($r = -.16, p < .05$). Participants that scored higher on assimilation were less likely to endorse emotional beliefs as a cause of diabetes.

Multivariate Analysis of Variance—Three oneway MANOVAs were carried out to examine the relationship between age, gender, and generational status with the four causes of disease subscales. The multivariate test with age as the independent variable and the four causes of disease subscales as the dependent variables was significant. The univariate tests for the emotional [$F(2, 153) = 6.99, p < .01$] and folk beliefs [$F(2, 153) = 10.15, p < .001$] subscales were significant. Scheffe post-hoc tests revealed a significant difference between 22 to 24 year-olds and participants older than 25 for the emotional subscale. Participants who were 22 to 24 year olds ($M = 3.02$) were more likely to endorse emotions as a cause of diabetes compared to participants older than 25 ($M = 2.16$). Scheffe post-hoc tests conducted on folk beliefs showed a significant difference between participants 21 and younger ($M = 2.24$) and 25 and older ($M = 1.64$). There was also a significant difference between participants 22 to 24 years old ($M = 2.24$) and participants 25 and older. The two younger age groups were more likely to endorse folk beliefs as a cause of diabetes.

The multivariate tests for gender and US versus foreign born with the four causes of disease subscales were not significant.

Discussion

The factor structure that emerged in this investigation provided a partial replication of the illness beliefs dimensions obtained in the original Klonoff and Landrine (1994) study. It too revealed a mainly non-biomedical perspective regarding the causes of illness, or specifically diabetes, among a sample of Latino college students who are at a heightened-risk for the future onset of this disease. The four illness beliefs identified accounted for 64.5% of explained variance among young Latinos and yielded subscales with minimal to strong reliability according to Robinson, Shaver, and Wrightman's (1991) criteria for evaluating social psychological measures. Furthermore, an examination of how the four illness beliefs varied as a function of psychological acculturation and socio-cultural variables (i.e., age, gender, and US versus foreign born) revealed only a few within group differences among Latinos. This suggests that the identified factors represent culturally-relevant and meaningful illness beliefs regarding the causes of diabetes among at-risk young Latinos. More specifically, the obtained factor structure delineates a culturally constituted representation of diabetes causation that deviates from more mainstream explanatory models of disease and that is applicable for use among young Latinos.

The first factor, *Emotional*, was the strongest dimension that emerged among at-risk Latino students as a causal explanation for diabetes. More specifically, experiencing negative emotional reactions (stress, anger, or anxiety) were seen as precipitating factors in diabetes acquisition. This finding is consistent with previous qualitative studies of diabetes illness beliefs among Latinos with diabetes which point to analogous negative emotions as potential

triggers for disease onset and progression—stress or stressful life events, worry or *mortificación*, anger or *coraje*, and fright or *susto* (Coronado et al., 2004; Poss & Jesewski, 2002). As discussed in Hatcher and Whittermore's (2007) integrative literature review of diabetes beliefs, a common cultural illness belief among Latinos is that strong or intense negative emotions make a person susceptible to diabetes. Furthermore, the fact that the "relationships" item loaded on this factor suggests that diabetes illness causation was construed by participants as having an interpersonal dimension and not viewed solely in "intrapersonal" terms. This finding corroborates past anthropological research which indicates that many non-European American cultures tend to explain illness causation as an interpersonal process (Landrine & Klonoff, 1992). Hence, in line with Latinos' core cultural scripts associated with *personalismo* (i.e., strong emphasis on interdependent, cohesive and hierarchically orientated interpersonal relationships that center on family and community), illness beliefs about diabetes were cast within an emotional and interpersonal context (Santiago-Rivera, Arredondo, & Gallardo-Cooper, 2002).

The second factor, *Folk Beliefs*, included a constellation of items that pointed to quasi-natural (bad blood, germs/infection, cold/drafts), supernatural (God's will) and inexplicable (accidental) reasons as an explanatory model for the causes of diabetes. These are in line with previous documented Latino folk beliefs of disease etiology such as hot/cold schemas of illness (*cold/drafts*), and that having a weak constitution (*bad blood*, exposure to *germs/infection*) increases a person's "individual susceptibility" to certain types of diseases such as diabetes (see Poss & Jezewski, 2002). These beliefs center on natural environmental forces such as exposure to excess cold and heat or germs and a person's illness susceptibility as cultural explanations for disease causation (Santiago-River et al., 2002). Furthermore, consistent with previous research of Latino illness beliefs, this factor clearly has a religious/mystical dimension to it which underscores the strong interrelationship that exists between illness explanations and spirituality for this cultural group. As noted by Santiago-Rivera and colleagues (2002), "Latinos often invoke their belief in a higher power as a way of making meaning, particularly of unfortunate events, such as ... illness [and] the expression *si Dios quiere* (if it is God's will) is often used" (p. 45). Hence, this factor shows the interplay between common cultural beliefs of disease, religion (*God's will*), and mystical explanations (bad things just happen, it's unexplainable or *accidental*) for disease etiology.

The *Punitive* dimension that emerged is consistent with previous anthropological studies of non-European American cultures (Landrine & Klonoff, 1992) regarding the causes of illness. Such cultures often view illness as deriving from violations to social norms and/or self-indulgent lifestyles that are perceived as sinful. This illness belief identified the person as being at fault for the cause of the disease which he or she has brought upon himself/herself because of behavioral excesses. There is a "mystical retribution" overtone to this factor in that a person ultimately pays for his/her negative behaviors and that past/current transgressions can trigger the expression of a disease as a form of *punishment* (Klonoff & Landrine, 1994). As noted by Arcury and colleagues (2004), prior qualitative studies support this cultural belief among Latinos who report that a "self-indulgent lifestyle (excessive alcohol and sugar consumption)" is seen as one causal pathway to diabetes (p. 2184).

It is interesting to note that the genes/heredity dimension resulted as a single item factor within this study. One plausible explanation for this finding is participants' objective knowledge of their heightened risk for diabetes because of family history. As noted by DiLorenzo and colleagues (2006), "having an afflicted first-degree relative is the strongest predictor of a person's lifetime risk of acquiring the disease" and knowledge of one's "objective risk has been found to contribute to individuals' perceived risk for diabetes" (DiLorenzo, Schnur, Montgomery, Erblich, Winkel, & Bovbjerg, 2006, p. 37). Hence, the genetic component stood alone as an explanatory model for diabetes among students who knew they were at a heightened

risk for diabetes. This interpretation is also supported by a number of qualitative studies regarding illness beliefs of diabetes causation with samples of diabetics which indicate that Latinos understand that diabetes has a hereditary or genetic basis (e.g., Arcury et al., 2004; Weller et al., 1999; Alcozer, 2000). Furthermore, young people today are likely to be exposed to bio-medical and scientific explanations of disease through health-related university courses and media outlets where genetic explanations are presented as causal factors in certain diseases (Haller et al., 2008). Therefore this factor may represent a combination of objective knowledge of personal risk for diabetes among study participants and greater exposure via academic learning and media exposure to the role of genes and hereditary as etiological agents in diabetes. The fact that the gene/hereditary factor did not correlate with the other cultural illness belief factors substantiates this assumption.

As noted previously, an examination of the four illness beliefs of diabetes by psychological acculturation, US versus foreign born, gender, and age revealed few with-in group variations among at-risk Latino college students. In regard to psychological acculturation, less assimilated participants scored higher on the emotional/relationship factor and were more likely to endorse this illness belief as an explanatory causal model of diabetes than were more assimilated Latinos. Furthermore, age differences were observed on the emotional/relationship and folk belief factors with traditional college-age students (18–24) scoring higher on these two dimensions than non-traditional college-age students (25–48 years plus). These findings suggest that perhaps younger Latino students were more heavily influenced by familial cultural views of diabetes in forming their personal illness beliefs about this disease than were older returning Latino students. This interpretation is supported by Haller and colleagues (2008) who reported that younger-aged persons seem to rely “closely on other people’s concepts of illness and their causes” (p. 445). Albeit the differences identified were not many, taken together they speak to the importance of considering the role that acculturation and socio-cultural variables may play in potentially modifying young Latinos’ illness beliefs.

In conclusion, the factor structure that emerged in this study departs from a primarily person-centered biomedical view of disease to one that was more interpersonally-centered and reflects the interplay between a person’s emotional responses, illness-related behaviors and consequences, the natural and supernatural (Landrine & Klonoff, 1992). Hence, this instrument can provide future researchers with a brief yet culturally-relevant illness belief questionnaire that is applicable for Latinos which includes both biomedical (gene/hereditary) and cultural explanations (emotional/relationships, folk beliefs, and punitive) regarding the causes of diabetes (e.g., Arcury et al., 2004; Jewiski & Poss, 2002).

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Biographies

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Table 1

Health Profile of Participants

Variable	Total Sample	Males	Females
BMI Range	17.50 – 41.60		
Weight Status			
Underweight	3.8%	.0%	5.8%
Healthy Weight	38.5%	39.6%	37.9%
Overweight	34.0%	35.8%	33.0%
Obese	23.7%	24.5%	23.3%
Diabetes Risk Score			
Low Risk (0–2)	30.7%	44%	24%
Low/Moderate Risk (3–9)	44.0%	36%	48%
High Risk (10+)	25.3%	20%	28%

Table 2

Principal Components Analysis of the Causes of Illness Scale for Attributions of Diabetes

Cause of Diabetes	Factors			
	Emotional	Folk Beliefs	Punitive	Gene/Heredity
Anxiety	.851			
Anger	.841			
Stress	.822			
Relationships	.578			
Cold/drafts		.727		
Bad blood		.671		
God's will		.660		
Germes		.649		
Sexual Activity			.400	
Accidental		.541		
Own fault-			.746	
Sin			.629	
Punishment			.598	
Genes/heredity				.915
Eigen value	5.09	1.55	1.30	1.10
Percent variance	36.36	11.04	9.29	7.82