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Patterns and Stability over Time of Older Adults' Diabetes-related Beliefs

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Abstract

Objectives—We sought to identify coherent profiles of diabetes beliefs within discrete domains (ie causes, symptoms, consequences, self management, and medical management), and delineate consistency of belief profiles over one month.

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Human Subjects Approval Statement

The Wake Forest School of Medicine Institutional Review Board (FWA #00001435) approved all sampling, recruitment and data collection procedures.

Methods—Diabetes beliefs of rural-dwelling older adults were assessed with the Common Sense Model of Diabetes Inventory at baseline (N = 593) and one month later (N = 563).

Results—A discrete number of belief patterns were identified in each belief domain using latent class analysis. Belief patterns varied by the extent to which more popular or folk notions of diabetes encroached on biomedical understandings of the disease. Belief patterns were generally stable over time.

Conclusions—A manageable number of belief patterns can be identified and used to strengthen patient-centered care and, potentially, enhance diabetes management.

Keywords

Common Sense Model of Illness; diabetes beliefs; type 2 diabetes; older adultst

Patient-centered care has been at the forefront of effective diabetes management since its incorporation into the American Diabetes Association guidelines.¹ Unfortunately, clinicians and diabetes educators confront a daunting barrier to implementing a core tenet of patient-centered care into their everyday practice. Respect for individuals' beliefs, values, preferences, and needs is the basic foundation of patient-centered practice,² yet clinicians have few tools to make sense of the wide potential array of beliefs held about the disease.

Researchers have identified a wide variety of distinct beliefs about diabetes. Results from qualitative studies informed by the “explanatory models”³ perspective indicate that many adults across racial and ethnic groups believe diabetes is “caused” by having diabetes “in the family” and eating too many sweets as a child.^{4–6} Weller et al⁷ reported substantial consensus across several belief statements about diabetes among Latino patients with diabetes, community members without diabetes, and physicians. However, there were notable departures in many diabetes belief statements between physicians and non-physicians who were patients and community members. Grzywacz et al⁸ found remarkably consistent responses to many diabetes belief statements across Whites, African Americans, and American Indians about the symptoms and consequences of diabetes, but little consistency within and across ethnic groups in beliefs about the causes and medical management of the disease.

Although progress is being made in describing beliefs held about type 2 diabetes, the structure and stability of those beliefs remain under-studied. Several investigators have examined variation in specific belief statements; however, only one pilot study has delineated whether specific belief statements within a discrete belief domain (eg, “cause” of diabetes) cluster or co-vary to create meaningful belief profiles that differentiate individuals.⁹ Skinner et al¹⁰ identified reproducible belief profiles across several diabetes belief domains, but these profiles were based on a clinical trial sample with unknown generalizability outside of England and Scotland.

Systematic study of the beliefs held by individuals with type 2 diabetes is essential for patient-centered practice. Understanding patients' beliefs about type 2 diabetes is a necessary, albeit insufficient, criterion for respecting and accommodating those beliefs when creating a treatment plan for managing diabetes. The goal of this study was to improve

understanding of adults' beliefs about type 2 diabetes. To achieve this goal our exploratory analysis uses baseline and one-month followup data from a large, multi-ethnic sample of older adults with diabetes. Informed by both the Explanatory Models of Illness³ and the Common Sense Model of Illness^{11,12} frameworks, data are used to identify coherent profiles of beliefs within discrete belief domains including diabetes causes, symptoms, consequences, management, and medical management. This analysis also delineates consistency of identified belief profiles over one month.

METHODS

The data for this study are from a broader study of older adults' beliefs about diabetes. The first phase of the study was designed to elicit a comprehensive set of beliefs about diabetes¹³ that was subsequently used to construct a beta-version of an instrument to assess discrete beliefs about diabetes and to construct more complex "common sense models" of diabetes.⁸ The second phase of the study collected survey data at 2 time points 30 days apart to evaluate the consistency of participants' responses to diabetes belief items over a discrete period. The current study is based on data collected in the second project phase. Key features of the study design, including recruitment and data collection procedures are described elsewhere^{8,14,15} and summarized here.

Sampling and Recruitment

The research was conducted in 8 south-central North Carolina counties: Harnett, Hoke, Montgomery, Moore, Richmond, Robeson, Sampson, and Scotland. The goal of the sampling plan was to recruit 100 participants for each ethnic (African American, American Indian, and non-Hispanic White) by sex cell, with each cell having participants spread across educational attainment categories (less than high school, high school, more than high school). Study inclusion criteria included being age 60 years or older and having physician-diagnosed diabetes for at least 2 years. Individuals receiving dialysis were excluded.

Participant recruitment was designed to provide a representative sample. Participants were recruited using a site-based sampling strategy whereby individuals were recruited from various organizations and locations within each study county. The number of participants from each type of recruitment site included: 50 from community-based organizations such as veteran and civic groups, 39 from community events, 43 from churches, 11 from flyer postings, 92 from senior housing, 65 from senior centers, and 104 from congregate meal sites. Recruitment also included 165 participants from individual community members through word-of-mouth referral, and 24 participants from an existing participant database compiled from previous rural aging studies. Study staff members have conducted research in the study counties since 1996.^{16,17} Formal and informal community leaders provided support with study recruitment by introducing the study staff to recruitment locations and by verifying the legitimacy of the research project to elder participants.

Data Collection

Data collection was completed between June 2009 and February 2010. Each respondent was asked to complete 2 separate interviews at about one-month intervals: 593 participants

completed the first interview, and 563 participants completed both the first and second interview, for a 95% retention rate. Interviews were completed in participants' homes, unless they requested otherwise. Interviewers described the study procedures and obtained written informed consent. An incentive (\$10) was given for completing each interview.

Interviews consisted of an interviewer-administered, fixed response questionnaire. The interviews included the personal characteristics of age, ethnicity, marital status, employment status, education, income, and diabetes status.

Measures

The beta-version of the Common Sense Model of Diabetes Inventory (CSMDI) provided the primary source of information on diabetes beliefs.⁸ The CSMDI consisted of 94 individual belief items obtained from a multi-ethnic sample of rural-dwelling older adults reflecting several belief domains. The response options for each item were “agree,” “disagree,” or “don't know.” This analysis uses 28 of the original 94 items, based on previous analyses of items that effectively distinguish groups, while also adequately representing the core belief domains including cause, symptoms, management, medical management, and consequences.^{3,12} All but 3 items were coded to reflect consistency with current biomedical understanding of type 2 diabetes. If the belief statement contained content supported by clinical research, then “agree” responses were considered correct. By contrast, if the belief statement referenced content for which there is no clinical evidence or which contradicts clinical evidence, then “disagree” responses were considered correct. Three items could not be coded in this fashion; consequently, we report the number of “agree” responses.

Age was categorized into 3 groups (ie, 60–69, 70–79, 80+), and participant sex was documented. Participants were categorized as African Americans, American Indians, or Whites, based on self-report. Educational attainment was categorized as “low education” for participants who had not completed high school and “high education” for participants who had completed high school or greater, including having received a general equivalence degree (GED). The number of years the person had had diabetes was recorded and categorized (< 10 years and ≥ 10 years), and participants were asked if they ever attended a diabetes education class.

Analyses

Latent class analysis (LCA) was used to capture heterogeneity in belief patterns in each of the 5 main diabetes belief domains of the CSMDI. Although LCA has several applications, a common application is the grouping of individuals with similar beliefs into discrete classes.¹⁸ The optimal number of classes or belief patterns in each diabetes belief domain was determined by a statistical goodness-of-fit index, the Akaike Information Criterion (AIC), which is derived from the data. This exploratory analysis was conducted using the program Latent GOLD v4.5 (Statistical Innovation, Belmont, MA). The stability of belief patterns was assessed using the Euclidean distance measure to compare classes obtained from the second time point to the closest classes at the first time point.

RESULTS

Over half of the sample (51.8%) was aged 60 to 69 years, 37.4% of participants were aged 70 to 79, and the remaining participants were over 80 years of age. Over half of the sample (61.7%) was female (Table 1). The ethnic composition of the sample was approximately balanced, because of the study design required by the parent project: approximately onethird of the sample was African-American, 31% of the sample was American Indian, and the remainder of the sample was white. Over one-third of participants (36.7%) reported having less than a high school education, and another one-third reported graduating from high school with no further formal education; the remainder reported having some formal education beyond high school. Many participants (30.0%) reported household earnings below federal poverty thresholds for the household size, and over half of the sample reported having been diagnosed with diabetes 10 or more years ago. There were no discernible differences in the composition of the recruited sample and the subsample from which the follow-up data were obtained approximately one month later.

Structure and Stability of “Cause” Beliefs

Table 2 provides a complete listing of the belief items, the results of the latent class analysis, and the relative size of each class. Latent class analyses of the 6 “cause” beliefs indicated that a 3-class solution provided the best fit to the Time 1 data. Class 1 is characterized by adherence to several cause beliefs consistent with a biomedical understanding of diabetes, except for 2 beliefs (Belief 2 and Belief 3) attributed to weight (see Figure 1, Panel A). Thus, Class 1 is labeled “Weak Biomedical” because of the ambiguous understanding about the role of body weight in contributing to diabetes. Class 2 is characterized by some beliefs that are consistent with known risk factors for diabetes (Belief 1 and Belief 2), but participants in this class also hold beliefs that are inconsistent with a biomedical understanding of the disease (Belief 5 and Belief 6). Class 2 is labeled “Popular Risk” because participants endorse both well-established biomedical risk factors for diabetes and empirically unsupported risk factors for the disease. Finally, Class 3 is characterized by specific cause beliefs pertaining to the role of sweets in early life (Belief 5) and individual tolerances for or vulnerability to diabetes (Belief 6). Otherwise, expressed beliefs generally lack consistency with biomedical understanding of diabetes. Consequently, Class 3 is labeled “Tolerance/Vulnerability” because their beliefs about early exposure to sweets and differential vulnerability are consistent with biomedicine, but their beliefs about other potential causes diverge from biomedicine.

A 3-class solution also provided the best fit to the cause belief data from Time 2. Classes 1 and 2 at Time 2 were highly similar to those described at Time 1 (Figure 1, Panel B). However, the pattern of responses contributing to Class 3 shifted substantially. Whereas beliefs about the role of weight (Belief 2 and Belief 3) and heredity/genetics (Belief 1 and Belief 4) in the etiology of diabetes were held by few members of Class 3 at Time 1, they were held by most members of Class 3 at Time 2.

Structure and Stability of “Symptoms” Beliefs

A 2-class solution provided the best fit to the data for the 6 items assessing beliefs about diabetes symptoms (Figure 1, Panel C). Class 1 is characterized by a high percentage of participants expressing beliefs about diabetes symptoms that have a basis in biomedical understanding of diabetes, and generally few participants expressing beliefs about diabetes symptoms that have no biomedical basis (Belief 11 and Belief 12). Class 2 has substantially lower levels of agreement with items that have a biomedical basis (Belief 7, Belief 8, Belief 9, Belief 10), and larger agreement with items that have no biomedical basis. Class 1 is, therefore, labeled “Strong Biomedical Understanding of Symptoms” and Class 2 is labeled “Weak Biomedical Understanding of Symptoms.”

Analyses of the data obtained at the follow-up visit indicated that a 2-class solution was also the best fit to the symptoms belief data at Time 2. The classes identified at Time 2 were virtually identical to those described for the symptoms beliefs at Time 1 (Figure 1, Panel D). The most notable shift in diabetes symptoms belief was for the item attributing thirst to diabetes (Belief 10): at Time 1 the minority of members of class 2 held this belief, whereas the majority of members of class 2 held this belief at Time 2.

Structure and Stability of “Consequence” Beliefs

A 2-class solution provided the best fit to the data for the 4 items assessing beliefs about the consequences of diabetes (Figure 1, Panel E). Class 1 is characterized by a large percentage of individuals who believed that diabetes interferes with the body’s ability to fight infection (a belief consistent with biomedicine), but few have biomedically consistent beliefs about diabetes’ potential contribution to high blood pressure. Thus, Class 1 is labeled “Ambiguous Biomedical.” Class 2 is characterized by the majority of participants holding beliefs about the consequences of diabetes that are consistent with biomedicine (Belief 13 and Belief 14), and generally low agreement that full-time employment makes it difficult for people with diabetes. Thus, Class 2 is labeled “Biomedical.”

A 2-class solution also provided the best fit to the consequences beliefs data obtained at Time 2. The consequence belief classes identified at Time 2 were virtually identical to those described at Time 1 (Figure 1, Panel F).

Structure and Stability of “Self Management” Beliefs

Analysis of the 7 “self management” beliefs indicated that a 3-class solution provided the best fit to the Time 1 data. Class 1 is characterized by several beliefs that are consistent with a biomedical understanding of managing diabetes (Figure 1, Panel G). Over 50% of respondents in Class 1 responded to 5 of the 6 beliefs about consequences in a way that is consistent with biomedicine. Thus, Class 1 is labeled “Biomedical.” Class 2 is similar, but diverges from Class 1 in having a more ambiguous understanding of the importance of managing dietary sugar (Belief 19) and sweets (Belief 21) in the diet. Class 2 participants understand that discrete types of sugars are processed differently, but nonetheless, a sizeable percentage of Class 2 participants held beliefs about “staying away from sweets” (Belief 21) that are inconsistent with biomedicine. Further, a low percentage of Class 2 participants held beliefs about “blood sugar going up and down for no reason” (Belief 22); these beliefs were

consistent with a biomedical understanding of the disease. Thus, Class 2 is labeled “Inconsistent Biomedical.” Class 3 is labeled “Mixed Lay-Biomedical Manage” because beliefs are consistent with biomedicine for 3 items, but responses to 3 different items reflect beliefs that are not consistent with biomedicine.

A 3-class solution also provided the best fit to the management beliefs data obtained at Time 2. The management belief classes identified at Time 2 were virtually identical to those described at Time 1 (Figure 1, Panel H).

Structure and Stability of “Medical Management” Beliefs

Analysis of the 5 medical management beliefs indicated that a 3-class solution provided the best fit to the Time 1 data. Class 1 is labeled “Non-Biomedical” because responses to 4 of the 5 belief items were not consistent with biomedical recommendations for diabetes medications (Figure 1, Panel I). Classes 2 and 3 are similar: responses to 4 of the 5 items reflect beliefs that are consistent with biomedicine. However, they differ in that responses to Belief 26 (“low blood sugar can be managed by adjusting medication”) are generally consistent with biomedical advice in Class 2, whereas for Class 3, beliefs about general day-to-day tinkering with medicines are generally inconsistent with biomedicine. Thus, Class 2 is labeled “Advocated Management” (assuming that “low blood sugar” is not something that is generally linked to medication). Class 3 is labeled “Personal Choice Management” because of the comparatively strong belief that individuals should tinker with their medication (Belief 25 and Belief 28).

A 3-class solution also provided the best fit to the medical management belief data from Time 2. Class 2 at Time 2 is similar to that described for Time 1 and labeled “advocated management” (Figure 1, Panel J). There are notable shifts in the pattern of responses for Classes 1 and 3. Whereas the pattern of responses for Class 1 at Time 1 diverged from biomedical understanding of diabetes on all 5 items, at Time 2 the majority of individuals in Class 1 responded in a manner consistent with biomedicine on 3 of the 5 items. Conversely, the pattern of responses for Class 3 at Time 1 indicated that many (typically the majority of) individuals reported beliefs consistent with biomedicine on all 5 items; at Time 2 the dominant pattern of responses is that Class 3 members expressed beliefs that diverge from or contradict biomedical recommendations for medical management on all 5 items.

DISCUSSION

Research to date provides a fragmented and incomplete view of adults’ beliefs about diabetes. Several investigators have provided rich descriptions of diabetes beliefs in specific segments of the population.^{4–6,19,20} Others have shown the greatest divergence in diabetes beliefs between patients and healthcare providers.⁷ Theory suggests that diabetes beliefs can be organized into a discrete number of belief domains, such as “causes” and “consequences” of diabetes;^{11,12} however, little research has considered belief patterns within these domains.⁹ Further, no previous research has studied the stability of diabetes-beliefs over time. A clear understanding of the basic structure and stability of adults’ diabetes beliefs is essential for delivering patient-centered care.

A discrete number of belief patterns within each domain of diabetes belief emerged from the exploratory latent class analyses. Results from this multiethnic sample indicated the “symptoms,” and “consequence” domains of diabetes each have 2 discernible belief patterns, whereas the “cause,” “management,” and “medical management” domains each have 3 discernible belief patterns. These results are consistent with a growing body of research suggesting remarkable consistency in beliefs about diabetes across diverse groups. Grzywacz et al,⁸ for example, noted few differences among Whites, African Americans, and American Indians in beliefs about the symptoms and consequences of diabetes. Similarly, Weller et al⁷ remarked about the substantial overlap in diabetes beliefs among patients, community members without diabetes, and physicians in both Mexico and Texas. Like these previous studies, the discrete number of belief patterns in each belief domain suggests substantial overlap in the way older adults think about diabetes.

The delineation of discrete belief patterns in each belief domain is a unique contribution of this study. Although a previous study used similar analytic techniques to identify and label groupings of diabetes beliefs within belief domains,⁹ the sample was based on a small (N=95) non-generalizable sample. However, like the previous study, the belief patterns identified in this larger and more generalizable sample fundamentally varied based on their consistency with biomedical understanding of diabetes. For example, the 3-class solution for the “cause” domain of diabetes reflected a biomedical model of diabetes, albeit weakly because of confusion about the role of body weight in the etiology of the disease, a second model that reflected a combined biomedical and popular (non-biomedical) beliefs, and a third model that represented a largely non-biomedical understanding of diabetes. It is noteworthy that Weller et al’s⁷ study of Latinos found that familiarity with biomedical understanding of diabetes was the primary basis that differentiated beliefs about the disease. The “symptoms,” “consequences,” “management,” and “medical management” domains had similar belief profiles that fundamentally reflected variation around a biomedical understanding of the disease. The consistency of the identified belief patterns in this and previous research offer promise that individuals can be placed into coherent and discernible groups.

A final contribution of this study is evidence indicating that belief patterns were generally stable across time. Belief patterns identified for the “consequence” and “management” domain were virtually unchanged across the 30-day period separating the first and second assessments. The belief patterns for the “symptom” domain were stable, although one item about “thirst” had a notably different response across the 2 observations. The general continuity of these domains is consistent with previous research suggesting substantial withinand between-group consistency in beliefs, particularly in the “consequence” and “symptom” belief domains.⁸ The belief patterns emerging from the “cause” and “medical management” domains were notably less stable across time. The “cause” domain had 2 stable belief patterns; however, inconsistent responses about the role of body weight in the onset of diabetes undermined the stability of the third belief pattern in this domain. A portion of this instability may be partially attributed to the relatively small percentage of individuals in the third class at Time 1. The “medical management” domain had one stable belief pattern reflecting a biomedical understanding of diabetes, but 2 belief patterns were inconsistent between the first and second observation. The generally poorer stability of

belief patterns in the “cause” and “medical management” domains likely results from the lack of consistent beliefs within and across ethnic groups.⁸ The lack of consistency in these domains also reinforces the theoretical premise that personal experiences are a strong force in creating and maintaining beliefs about disease,¹² recognizing that few individuals have direct experience in labeling the “cause” of a disease and that there is substantial heterogeneity in the way patients and providers discuss day-to-day management of diabetes.^{21,22}

In conclusion, the results of this study improve understanding of diabetes-related beliefs among older adults. Latent class analyses revealed a discrete number of belief profiles within each domain of diabetes beliefs. In most cases the profiles represented variation in biomedical understanding of the disease, particularly adherence to more popular or folk notions of diabetes. Results also indicated that identified belief profiles were largely stable across a one-month period, although there were some exceptions to this stability, particularly in the “cause” and “medical management” belief domains, where there is substantial opportunity for individuals to have different direct experiences to shape these beliefs. Each of these findings contributes to the scientific understanding of diabetes beliefs, and in doing so, they equip healthcare providers to engage better in patient-centered care, which is an essential element of effective diabetes management.

IMPLICATIONS FOR HEALTH BEHAVIOR OR POLICY

Although the results of this exploratory research require replication, they have solid implications for clinicians seeking to use patient-centered diabetes care. Perhaps most useful is the finding that a discrete number of belief patterns characterize the way most older adults think about diabetes. By becoming familiar with these belief patterns, clinicians will be able to identify belief profiles better for individual patients and adjust educational initiatives and treatment regimens appropriately. For example, whereas a clinician may be able to go straight into treatment alternatives with individuals with a strong biomedical understanding of diabetes symptoms, basic education may be necessary for those with a weak biomedical understanding. Despite some inconsistencies in the relative stability of diabetes belief profiles, the fact that many diabetes profiles remained stable over time is also useful for enhancing patient-centered care, as it provides clinicians with a counterfactual for differential diagnosis. If an individual who has historically had a strong biomedical understanding of diabetes medical management has recently reported inconsistent behavior, this could reflect: (1) a shift in medical management beliefs; (2) confusion resulting from a new underlying condition; or (3) a potential polypharmacy complication. Recognizing that biomedically informed beliefs about medical management are largely stable, a clinician may pursue other routes for determining the source of poor management behavior.

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Figure 1.
Percentage of Participants Within each Class Identified by Latent Class Analysis at 2
Observations Separated by One Month Whose Response to Belief Statements are Consistent
with a Biomedical Understanding Diabetes

Table 1

Sample Characteristics at Recruitment and One-month Follow-up Interview

Personal Characteristics	Baseline (N = 593)		One-month Follow-up (N = 563)	
	N	%	N	%
Age				
60 to 69 years	307	51.8	290	51.5
70 to 79 years	222	37.4	212	37.7
80 years or older	64	10.8	61	10.8
Sex				
Male	227	38.3	215	38.2
Female	366	61.7	348	61.8
Ethnicity				
African American	199	33.5	189	33.6
American Indian	182	30.7	169	30.0
White	212	35.8	205	36.4
Education				
Less than high school	217	36.7	205	36.5
High school	200	33.8	189	33.6
More than high school	175	29.6	168	29.9
Household Economic Status				
Below federal poverty level	174	30.0	169	30.5
Above federal poverty level	407	70.1	385	69.5
Diabetes Duration				
Less than 10 years	227	40.1	211	39.2
10 or more years	339	59.9	328	60.9

Table 2

Diabetes Beliefs by Belief Domain; the Proportion^a of Participants at Time 1 and Time 2 Whose Response to a Belief Item is Consistent with Biomedical Understanding of Diabetes

Belief	Diabetes Cause					
	Time 1 (N = 593)			Time 2 (N = 563)		
	Class 1	Class 2	Class 3	Class 1	Class 2	Class 3
Proportion ^a	58.2%	36.7%	5.1%	46.9%	41.0%	12.1%
1. Diabetes runs in families.	100.0%	88.2%	33.5%	94.4%	93.8%	99.9%
2. Being overweight makes people get diabetes.	30.1%	72.8%	16.2%	19.6%	76.5%	75.9%
3. <i>Weight does not cause diabetes because thin people also get diabetes.</i>	73.9%	82.6%	99.6%	92.0%	86.6%	30.6%
4. <i>Diabetes can't be hereditary because not everyone in a family gets it.</i>	30.1%	71.9%	78.5%	34.7%	77.5%	13.8%
5. <i>Some people get diabetes because they ate too many sweets when they were young.</i>	12.1%	68.6%	13.0%	9.9%	72.6%	44.3%
6. <i>Everyone is born with diabetes but it develops at different times for different people.</i>	18.1%	71.0%	33.3%	16.9%	66.4%	14.2%
Diabetes Symptoms						
Proportion ^a	81.8%	18.2%	--	56.7%	43.3%	--
Time 1 (N = 593)						
Class 1	Class 2	Class 3	Class 1	Class 2	Class 3	Class 3
7. Feeling nervous is a sign of low blood sugar.	93.1%	68.1%	--	96.8%	71.0%	--
8. People with diabetes have tingling in their feet due to high blood sugar.	93.2%	51.9%	--	93.5%	76.9%	--
9. Having to go to the bathroom often at night is caused by diabetes.	87.2%	46.5%	--	92.7%	62.4%	--
10. Diabetes makes people feel thirsty all the time.	80.1%	25.5%	--	83.6%	58.3%	--
11. <i>Blood sugar will go up if you eat too many "white" foods.</i>	86.9%	77.2%	--	93.1%	81.6%	--
12. <i>Falling down is a sign of diabetes.</i>	62.3%	17.3%	--	67.5%	30.1%	--
Diabetes Consequences						
Consequence Belief Domain						
Time 1 (N = 593)						
Class 1	Class 2	Class 3	Class 1	Class 2	Class 3	Class 3
Proportion ^a	70.2%	29.8%	--	63.4%	36.6%	--

13.	Diabetes makes it difficult for your body to fight infection.	86.9%	62.4%	--	88.7%	72.3%	--
14.	<i>Diabetes causes high blood pressure.</i>	84.1%	44.7%	--	84.1%	53.0%	--
15.	It is difficult for people with diabetes when they have a full-time job. ^b	50.6%	20.6%	--	65.9%	16.8%	--
16.	Diabetes has serious financial consequences. ^b	92.5%	85.5%	--	95.4%	77.8%	--
Diabetes Self Management							
		Time 1 (N = 593)			Time 2 (N = 563)		
Belief	Proportion^a	Class 1	Class 2	Class 3	Class 1	Class 2	Class 3
17.	Stress makes your blood sugar go up.	42.7%	36.0%	21.3%	48.6%	36.6%	14.9%
18.	Managing the size of each meal helps control diabetes.	79.5%	99.8%	90.1%	87.5%	92.7%	94.4%
19.	The body processes sugar in fruits and vegetables differently than sugar in sweets and starches.	94.7%	99.9%	91.0%	94.8%	90.3%	98.1%
20.	<i>Drinking lots of water helps to flush extra sugar out of the body.</i>	64.3%	94.0%	29.1%	68.9%	88.1%	32.5%
21.	<i>The only thing people with diabetes need to know is to stay away from sweets.</i>	75.3%	96.1%	92.0%	76.7%	93.7%	82.9%
22.	<i>Blood sugar often goes up and down for no reason.</i>	11.7%	52.6%	16.0%	4.3%	72.3%	4.0%
23.	Doing household chores is enough exercise for someone who has diabetes. ^b	49.1%	88.9%	92.5%	53.9%	76.0%	93.4%
		8.1%	35.3%	56.2%	5.6%	47.1%	63.1%
Diabetes Medical Management							
		Time 1 (N = 593)			Time 2 (N = 563)		
Belief	Proportion^a	Class 1	Class 2	Class 3	Class 1	Class 2	Class 3
24.	<i>Taking extra medical helps to manage high blood sugar.</i>	64.6%	35.3%	--	52.6%	47.4%	--
25.	<i>People should adjust their diabetes medication depending on how they feel each day.</i>	48.7%	71.8%	--	32.8%	85.1%	--
26.	<i>Low blood sugar can be managed by adjusting medication.</i>	27.3%	63.2%	--	14.4%	60.9%	--
27.	<i>Medical treatment cures diabetes.</i>	39.6%	92.7%	--	70.1%	92.3%	--
28.	<i>Taking extra medication makes it OK to eat something sweet.</i>	9.1%	77.9%	--	11.5%	63.4%	--
		17.7%	43.4%	--	5.8%	53.2%	--

Note.

^a Probabilistic not observed estimates of the proportion of Participants whose response is consistent with a biomedical understanding of diabetes. Italicized items are coded such that a "disagree" is considered consistent with biomedical understanding of diabetes.

^b Reflect salient beliefs that cannot be coded as being consistent or inconsistent with a biomedical understanding of diabetes.