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SELF-REGULATION THEORY AND THE MULTIGENERATIONAL LEGACY OF DIABETES

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Type 2 diabetes is a chronic condition that runs in families and requires self-care behavior (diet, physical activity, medication, and monitoring) in order to maintain good health. One aspect of self-care behavior is problem-solving about how and when to control blood sugar levels in order to prevent complications (ie. amputation, blindness, kidney failure). Diabetes self-care behavior has been shown to be associated with individuals' illness representations (cognitive and affect), or common sense models (ie. timeline, identity, causes, controllability, consequences, and emotions) of diabetes^{1,2,3,4,5}. Illness representations are part of self-regulation theory, which posits that two parallel components, cognitive and affective representations, drive problem-solving procedures to enable coping with a threatening situation¹. Individuals' illness representations are shaped by numerous information sources including memories of the experiences of family members who have lived with diabetes (what has been called a multigenerational legacy of diabetes)⁵. Individuals experiencing illness may hold perspectives that differ from that of a healthcare professional, especially if individuals' first impressions of the condition are established based on personal experience. Previous research demonstrated that illness representations are similar to those of family members who also had the condition and are associated with self-care behavior⁵. The purpose of this study was to lend further support to the practice-based theory multigenerational legacies of diabetes mellitus (MGLDM).

Type 2 diabetes is epidemic and largely associated with the consequences of lifestyle behaviors (ie: obesity and being sedentary). Diabetes has been shown to be linked to a hereditary predisposition. Many people are aware of the physical consequences of diabetes, such as heart attack, stroke, vision and limb loss.⁶ However, nearly all of the complications due to diabetes have been shown to be preventable with long-standing normalization of glucose levels.^{7,8} Recent advances in diabetes prevention, control, and complications-prevention have offered individuals with diabetes improved opportunities to manage their

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disease. Additionally, patients are expected to reduce known risks to prevent the onset of diabetes.⁹

One aspect of diabetes self-care behavior involves decision-making around whether and how to administer self-care; it is thus important for clinicians to understand how such self-care decisions are made. Many factors have been posited to influence the decision of whether to change behavior, such as lack of motivation, boredom, reverting to old habits, fear of hypoglycemia and weight gain, and health beliefs about outcomes of behavior.¹⁰ Yet, little is known about how a family member's experience with diabetes affects one's own lifestyle choice. There remains insufficient evidence concerning the specific impact of a multigenerational occurrence of diabetes on individuals' adaptation to diabetes self-management. It is important for clinicians to utilize communication techniques to assess individuals' perceptions of diabetes in order to effectively tailor lifestyle and therapeutic interventions.

Multigenerational Legacies of Diabetes

The emerging framework, *multigenerational legacies of diabetes*, was developed¹¹ using Rolland's^{12,13} concept of a multigenerational legacy of illness discussed in his Family-Systems-Illness and Disability Framework. The origin of the theory was informal, in that it began with anecdotal themes that emerged from the author's interactions with patients newly diagnosed with diabetes. The main themes that arose included (a) patients' awareness that diabetes runs in their family and (b) recollections of family members' beliefs about diabetes and its treatment. Scollan-Koliopoulos also recognized a pattern of patients' connecting their family members' experiences with self-care behavior and onset of complications with their own decisions about self-care behavior. In particular, patients' comments pointed to their implicit assumptions about the causes of diabetes and/or its complications, their anticipated onset of complications, perceptions of controllability of diabetes, and consequences of diabetes and its treatment with insulin as being based on the prior generation's experience with diabetes⁵.

Self-Regulation Theory and Illness Representations

According to Leventhal, Leventhal, and Cameron, illness representation refers to procedures, and affect involved in illness self-regulation. Illness representation is a component of Leventhal et al.'s larger perceptual control theory, which posits that problem-solving components of the self-regulation process involve (1) an individual's view or representation of the status of a health problem, (2) an individual's plans and tactics to control the threat of the health problem, and (3) an individual's appraisal of the consequences of his or her efforts to cope with the problem. This process is driven by attributes (characteristics of a perception) of illness representation. Attributes of the illness representation that are applicable to diabetes include (1) identity (symptoms and labels to define it), (2) timeline (beliefs regarding development and duration of disease), (3) causes of threat (external agents, internal susceptibilities, behavior), (4) anticipated or experienced consequences (physical, emotional, social, economic), (5) controllability (self-treatment, expert intervention and affect).¹

The relevance of a multigenerational legacy of diabetes to problem-solving and coping is based on the assumption that individuals follow heuristic short cuts when choosing a behavior.^{14,15,16} The short cuts are likely to be influenced by emotional reactions (fear, sadness) associated with the memories of a family member's experiences with diabetes in the context of one's own perceptions of vulnerability for the consequences of diabetes. Intuitive or emotional responses play a key role in human decision-making contrary to traditional assumptions that emphasize analytic processes in choice behavior.^{17,18,19,20} Personal experience with diabetes will influence one's self-care decision-making in positive or negative ways. One is predisposed to particular attitudes about diabetes in the context of a family history of the illness. Attitudes guide appraisals of diabetes and its treatment options through activation of memory^{21,22} of family member's experiences. Additionally, individuals who observe family members taking care of their diabetes may assume their memories are exact replicas of the reality of diabetes self-care, not realizing that in actuality the memories are laden with subjective elements such as judgment, inference, emotion, and perception.^{23,24,25} Memories of others will influence the shaping of one's own illness representation, which may or may not accurately represent the timeline, identity, causes, controllability, and consequences of diabetes.

If one believes that they are well informed about diabetes based on memories of a family member then they will be less likely to assimilate new information or the new information may provide a sense of uncertainty or conflict. For example, studies show that even when experience has resulted in being ambiguous or is uninformative, that people are unable to distinguish this and assume they have learned a lot from experience²⁶ which, may influence choice.²⁷ In fact, it is possible that some decisions made by those with a legacy of diabetes are intuitive, based on memory of observing others and routinely implemented.^{28,29}

Thus, it is possible that individuals with a legacy of diabetes may require a different approach to educational interventions, such as probing about the substance of family memories of diabetes in order to increase awareness of the ways in which experience and intuition influence one's self-care behavior (ie: Learning from experience³⁰). Research on judgment and decision theory have shown that perceived risk of the knowledge of a family history of diabetes provides an objectiveness and experience to how one undertakes prevention measures³¹. It is not known, though, how perceived risk of development of a disease or its complications influences self-care behavior decision-making. Illness representations of those with a family history of diabetes may be different from those with no pre-existing vicarious experience.³²

Testable Propositions

Proposition 1—If individual illness representations of diabetes are shaped by numerous sources, including healthcare providers and social interactions than family members with the condition serve as a source of information that shapes one's illness representation.

Proposition 2—If individuals' illness representations are influenced by family members' representations and experiences with diabetes, than healthcare providers' standardized

information needs to be assimilated into the individuals' preexisting representation of diabetes.

Proposition 3—If family members with diabetes serve as a source of information that shapes illness representations, than those with a family history of diabetes are likely to have different illness representations than those without a family history of diabetes.

Central Hypothesis—The central hypothesis used to test the theoretical propositions was that individuals who attended the same standardized diabetes education self-management program will have differences in their illness representations depending upon whether or not they had a family history of diabetes.

The following hypotheses were tested: (1) those with a family history of diabetes will have a different illness representation of diabetes than those with no family history. We expect those with a family history of diabetes to have higher scores on emotional reactions and to perceive that diabetes has a high level of consequences; and (2) illness representation constructs will be associated with self-care behavior such that those with a family history of diabetes with high scores on emotional reactions and consequences being likely to have lower self-care scores.

Methods

Using two American Diabetes Association recognized diabetes education programs in the Metropolitan New Jersey/New York area, individuals were recruited from a promotional mailing list used to market educational programs (Site A) and develop new surveys (Site B) for a cross-sectional descriptive study. At Site A the mailing list was of people with type 1, 2, and gestational diabetes interested in attending educational programs. Individuals on the list were mailed a letter by the Center's staff that explained the research study and were asked to return a postcard if they had type 2 diabetes and were interested in joining the study. At Site B, the individuals on the mailing list were sent a letter asking them to call to "opt out" of the study, otherwise they would receive surveys in the mail and be asked to complete them. Informed consent forms were included with each survey packet. Volunteers were offered a \$5 donation to either the American Diabetes Association or the Juvenile Diabetes Foundation (Site A) or \$20 (Site B) as a token of appreciation based on site preference for their completing a packet of surveys by mail. The study was approved by the Institutional Review Board at Teachers College, Columbia University and the University of Medicine and Dentistry of New Jersey.

Sample

The response rate for Site A was 4% and for Site B was 24%. Table 1 depicts the attributes and characteristics of the sample, which included 50 respondents with a family history of diabetes and 50 with no family history of diabetes (all via self-report). The sample was mainly older in age (71–80 years), White race, and income levels clustered below \$15,000 and over \$70,000 per annum. Those reporting a family History of diabetes had an earlier initial onset of a diagnosis of diabetes than those with no family history to report, with 15% developing diabetes below the age of 50 compared to only 3% of those reporting no family

history ($p=.046$). The self-reported last date of attendance at a diabetes education class was: 16.7% ($n=14$) in the past 6-months and within the past month, 14.3% ($n=12$) between 6-months and 1-year ago, and 38.1% ($n=32$) over 1-year ago.

Measures

Participants were asked to complete a packet of surveys that included a measure of illness representation, diabetes self-care behavior, and participant attributes. Those with a family history of diabetes were also asked to complete surveys about what they remembered about family members who had diabetes and their risk perception, which is reported on elsewhere.^{4,5}

The Illness Perception Questionnaire

Data was collected from the Revised Illness Perception Questionnaire—Diabetes Version. The data are continuous with 5-point, Likert-term response sets (strongly agree to strongly disagree). The survey was developed by Moss-Morris, Weinman, Petrie, et al.³³ and the diabetes version was adapted by Skinner et al.³⁴ The survey has 38 items, and constructs were identified using principal components analysis. Internal consistency reliability was evidenced by Cronbach's alphas of .79–.89 on a sample of 711 patients. Test-retest correlations were between .46 and .88. Various versions of the survey have been used in over 57 studies. Validity studies considered fatigue and attrition due to the large number of items, and fatigue was determined not to be a problem. Scollan-Koliopoulos expanded the consequences construct to include eight social items that tap stigma and inhibited disclosure (see the Preliminary Studies section)¹¹. The structure of the new items was examined using exploratory factor analysis and can be used as two separate constructs. Internal consistency reliability was over .80 for the new social consequences subscale. Examples of sample items include rating ones agreement with the following statements: “I have the power to influence my diabetes,” “My diabetes makes me feel angry,” and “My diabetes will last a short time.”

Self-Care Behavior

Diet; Physical activity; Glucose monitoring; Foot care; Pill and/or insulin adherence. Data will be collected from the Summary of Diabetes Self-Care Behavior (SDSC), the most widely used self-care measure for assessing diabetes-regimen adherence. The survey was originally developed by Toobert, Hampson, and Glasgow (2000) and has been expanded since its inception to include foot care behavior.³⁵ Generally, the survey measures levels of self-care by self-report over the preceding 7 days. There are a total of five constructs with inter-item correlations of .20–.77 (average .47) depending upon the samples studied. Impression management, self-deception, and social desirability were considered during item development. Test-retest data show a moderate correlation of .40. The 19-item survey takes no more than 15-minutes to complete and is sensitive to change in self-care behavior over a one-week time-frame.³⁵ Self-care behavior is highly variable, thus reliability tends to be low and each behavior is treated as a separate independent variable.

Data Analysis

Using GPOWER an a priori sample size was determined to be 100 to provide 80% power to detect a difference between groups on illness representation constructs using a student's T-tests and regression analyses with up to 3 predictors of self-care behaviors (each used as a single dependent variable).³⁶ Sheffé methods along with a modified Bonferroni correction to control for type 1 error rate.³⁷ Cases with over two missing items per subscale were deleted from the analysis. Using SPSS version 12.0, descriptive data was estimated by calculating means and standard deviations and analysis of variance for participant attributes for those illness representation constructs for which significant differences using T-tests were detected.³⁹ Regression models were built using the illness representation constructs that were found to significantly differ between groups for the entire sample. "Do not know" and "Not prescribed" responses were not included in analyses.

Findings

Descriptive Statistics

Illness representation scores on the attributions about the causes of diabetes were slightly higher for those with a family history of diabetes than those without it on the perception of heredity, emotional state, and alcohol and smoking behavior. Table 2 shows the percentages of causal attributions by family history of diabetes status.

Hypothesis Test (1)

Using Student's t-tests between two groups, those with and those without a family history of diabetes, significant differences were detected on the scores that tap illness representations of personal control ($p=.001$), treatment control ($p=.001$), emotional representations ($p=.048$), and illness coherence (understanding) ($p=.043$). Analysis of variance was then conducted to identify differences in subgroup characteristics for the illness representation constructs personal/treatment control, emotional representations, and illness coherence (understanding). Older Hispanics ($p=.047$) tended to differ from Non-Hispanics on scores on personal control ($p=.019$) and emotional representations ($p=.013$). No other significant differences were found. The description of statistics for the two groups on the illness representation constructs are depicted in table 3. Unexpectedly, for those with a family history of diabetes, the mean scores for personal and treatment control were on average higher for those with no family history, which could be considered to be a more accurate illness representation of diabetes. However, those with a family history of diabetes scored higher on emotional representations and lower on coherence (understanding), which would indicate inaccurate illness representations of diabetes. In other words, those with a family history of diabetes are more likely to perceive their diabetes as upsetting, depressing, causing fear, anger, anxiety, and worry according to our measure. Furthermore, our participants with a family history of diabetes reported having less understanding of their own diabetes and feeling it is unpredictable. No significant group differences were identified for the other illness representation constructs.

Hypothesis Test (2)

The illness representation constructs personal/treatment control, emotional representations, and illness coherence (understanding) regressed on each self-care behavior as a single dependent variable. The illness representation constructs explained 35% variance in dietary adherence ($F(4, 51) = 6.9, p < .000$) with personal control contributing some unique variance ($\beta = -.57, p < .00$). Thus, those who perceive more personal control and treatment control are likely to follow a diet in the context of perceived poor emotional representations and illness coherence. Additionally, the illness representation constructs explained less than 1% of the variance in glucose monitoring ($F(4, 57) = 2.52, p = .05$). In this case, lower scores on perceived treatment control and lower scores on illness coherence (understanding) in the context of high scores on emotional representations and high scores on personal control result in more glucose monitoring. Table 4 shows the Beta values and confidence intervals that explain our interpretations. The variance of other self-care areas was not explained by the illness representations of this sample.

Discussion

In this study, accuracy of diabetes information was controlled for by recruiting participants who have all had diabetes education from a standardized curriculum. One could assume all participants were provided with information that would shape an accurate illness representation. The findings support our assumptions that what is learned from the family may not necessarily be extinguished with knowledge delivery.

Those with a family history appropriately acknowledged that heredity was causal in the development of their diabetes. Acknowledging one's vulnerability based on a hereditary predisposition may influence self-care decision. This notion is supported by the research on judgment and decision-theory, which has shown that perceived risk of the knowledge of a family history of illness provides an objectiveness and experience to how one undertakes prevention measures.³¹ Illness representation scores on the attributions about the causes of diabetes were slightly higher for emotional state, alcohol, and smoking behavior as well for those in the family history group. It is possible that these traits and behaviors were causal attributions applied to family members who had diabetes, but may in fact be how they coped with the condition. If an individual has similar traits and behaviors, he/she may tend to take on the same causal attributions for the development of his/her own diabetes⁴⁰.

Emotionality and perceptions of control are the most prominent illness representations of those with a family history of diabetes in this sample. In our sample, perceptions of both personal and treatment control are higher for those with a family history than for those with no family history. This finding, albeit unexpected, makes sense if one considers the older age of the sample who may have witnessed a family member's experiences with diabetes during a time when there was very little in terms of self-monitoring tools and treatment options. Consequently, those with a family history may believe that diabetes is controllable in comparison to what they remember being available for their family members. Those with no family history may know less intimately the advances in treatment options to care for diabetes, and may even take for granted that they have always been available. This explanation seems plausible if one considers that both emotional representations and

understanding of diabetes scores were lower for those with a family history compared to those with no family history. It makes sense that an older generation of people with diabetes may remember negative consequences of diabetes and learned coping styles from family member's that may influence their emotional representations. Illness representations have an impact on the psychological adjustment to chronic illness.⁴¹ Although little is known about the self-care effort of the participants in conjunction with risk perceptions, it is also possible that individuals made an effort to change their chances of developing diabetes based on their knowledge of family history and experience disappointment or self-blame for not altering the course of their health. Some individuals with a legacy of diabetes may feel responsible for not taking preventive measures and may have an "I should have known better" attitude perceived by themselves or caused by feedback from others. This can be supported by the emerging evidence of a stigma of diabetes in those with a legacy of diabetes.⁵

Although all the participants received education, it is possible that the understanding of diabetes for a patient with a family history may be less accurate due to the assimilation of pre-existing ideas with new ideas. Legacies of diabetes may include the myths, tales or stories passed through families that may or may not be accurate⁴². Hispanic individuals may have higher emotional representations of diabetes and perceive that diabetes is uncontrollable compared to non-Hispanics.

Primary findings in this study include support for the notion that those who perceive more personal control and treatment control are likely to follow a diet in the context of perceived poor emotional representations and illness coherence (understanding). Those who don't understand their diabetes due to its unpredictability may in response experience more anxiety, depression, and/or anger and subsequently approach coping with a "take charge" attitude resulting in higher perceived personal and treatment control over diabetes. It makes sense that these individuals are likely to follow a diet as a means of gaining control. Perhaps emotional reactions stem from needing to follow a diet (ie: a burden). What is less clear is why in this sample these individuals did not demonstrate degrees of physical activity or medication adherence concordant with perceptions of diabetes. However, it is possible that many of these patients only controlled their diabetes with diet having not even been prescribed medication and/or insulin, or exercise. Sample size limitations prevent detecting small effects in these areas, especially since we eliminated those with "Not prescribed" and "Don not know" responses from each analysis.

Not testing glucose in the context of these perceptions may be supported by our additional finding that poor perceived treatment control and illness coherence in the context of positive emotional representations and high felt-perceived control result in more glucose monitoring. Perhaps those with poor emotional representations are unable to handle knowing what their blood sugars are actually doing (ie: denial). Belief one's treatment is not controlling his/her diabetes and feeling confused by one's symptoms may prompt testing. Additionally, finding variability in glucose values in those who test may cause confusion. Belief in "the need" to test in those with perceived high control would naturally result in more self-monitoring of blood glucose.

Limitations of this study include the prospective nature of the research design, the inequality in the monetary value of the incentives offered, and the novelty of research being conducted at Site A in addition to the differences in recruitment procedures by site. Analyses of self-care behavior by group were not conducted given the limitations in sample size. However, precious existing evidence suggests that perceptions of control are associated with medication adherence in those with a family history of diabetes who have diabetes themselves⁵. Illness representation constructs have been shown to predict self-care (blood glucose monitoring, dietary adherence, physical activity, and medication adherence), glycemic control, quality of life, and well-being in samples with Type 2 diabetes^{2,3,43,44,45,46,47,48}.

Behavioral interventions for patients with diabetes may need to be tailored based upon the accuracy of one's illness representation, which will likely differ based on contextual experience such as having a multigenerational legacy of diabetes or cultural identity. Diabetes is epidemic and linked to a hereditary predisposition. Furthermore diabetes has been occurring at an earlier age of onset⁴⁹. Clinicians may benefit patients with diabetes by helping them to create a self-awareness of how a legacy of diabetes may influence their own illness representation, which is shown to be associated with important diabetes outcomes such as self-care behavior, glucose control, and coping. Some patients with a family history of diabetes may believe diabetes is controllable, yet experience emotional effects that result from a lack of accurate understanding of the disease. Given the findings in this sample that emotional representations were prominent, clinicians are urged to include screening for depression and the impact of the patient's emotional state on coping and self-care behavior.

Clinicians may need to spend more time focusing on interventions to alter the emotional representations and coherence (understanding) of those who have a family history of diabetes. Research has shown that illness representations can be altered through effective patient-provider communication⁵⁰. Meanwhile, assessing for the accuracy of perceptions of personal and treatment control for those with no prior experience with diabetes should not be underscored as they are likely to have children at risk for diabetes whose own illness representations of diabetes are being shaped.

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Table 1

Comparison of sample descriptive statistics.

Characteristic N (%)	No Family History	Family History
Age Range		
21–30	None	1 (2.4)
31–40	None	2 (4.9)
41–50	2 (5.0)	3 (7.3)
51–60	3 (7.5)	12 (29.3)
61–70	1 (27.5)	10 (24.4)
71–80	21 (52.5)	12 (29.3)
81–90	3 (7.5)	1 (2.4)
Age of Diabetes Onset		
21–30	1 (2.6)	2 (5.0)
31–40	None	2 (5.0)
41–50	2 (5.1)	11 (27.5)
51–60	12 (30.8)	12 (30.0)
61–70	12 (30.8)	7 (17.5)
71–80	10 (25.6)	6 (15.0)
81–90	2 (5.1)	None
Hispanic Ethnicity	3 (7.3)	3 (7.3)
Race		
Black	9 (22.5)	10 (24.4)
White	30 (75.0)	23 (56.1)
Asian	None	2 (4.9)
Mixed Race	1 (2.5)	5 (12.2)
Education Level		
8 th –9 th Grade	1 (2.6)	None
12 th Grade/GED	9 (23.7)	10 (23.8)
Technical/Trade	4 (10.5)	4 (9.5)
Some College/Trade	11 (28.9)	12 (28.6)
4-years College	13 (31.0)	16 (38.1)
Income Level		
<\$20,000	4 (10.5)	3 (7.3)
\$20–29,000	6 (15.8)	3 (7.3)
\$30–39,000	2 (4.8)	2 (4.9)
\$40–49,000	3 (7.1)	4 (9.8)
\$50–59,000	1 (2.6)	4 (9.8)
\$60–69,000	None	7 (17.1)
>\$70,000	14 (36.8)	11 (26.8)

* Not all values equal 100 due to missing data and do not wish to answer responses.

Table 2

Comparison of attributes of causes of participants' own diabetes.

Attribution	Family History									
	No					Yes				
	M	SD	N	n	%	M	SD	N	n	%
Stress	3	1.31	39	17	40	3	1.50	40	18	43
Hereditary	2.1	1.10	39	3	7	3.8	1.07	39	26	62
Germ	1.6	.67	39	4	9	1.8	1.05	40	3	8
Diet	3.8	.81	40	29	69	3.6	1.18	40	28	67
Chance	2.0	.88	39	1	2	1.9	.92	40	3	7
Poor Medical Care	2.2	.98	39	4	9	2.5	1.78	40	6	14
Pollution	1.8	.77	39	1	2	1.9	.82	40	1	2
Behavior	3.2	1.16	40	21	50	3.2	1.34	40	20	48
Negativity	2.2	1.00	39	3	7	2.3	1.10	40	7	17
Family Problems	2.8	1.09	39	4	9	2.2	1.14	40	6	14
Overwork	1.9	.80	38	2	5	2.2	1.12	40	6	14
Emotional State	2.2	1.1	40	4	9	2.3	1.21	40	8	19
Aging	3.1	1.1	39	19	45	3.1	1.22	40	18	33
Alcohol	2.0	1.13	39	6	14	2.3	1.33	38	10	24
Smoking	2.1	1.13	39	5	12	2.2	1.2	40	9	21
Accident	1.6	.71	39	1	2	1.8	.82	42	1	2
Personality	2.1	1.09	39	5	12	2.1	1.15	42	7	17
Immunity	2.2	.98	37	4	9	2.1	.94	42	3	7

Note: % and n values represent those who agree or strongly agree on attribute as a cause.

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Table 3
Description of Statistics for Comparison between Groups for Illness Representation Constructs.

Illness Representation Construct	Family History					
	Yes			No		
	M	SD	N	M	SD	N
Personal Control	22.81	2.72	42	20.84	1.9	42
Treatment Control	16.65	2.35	42	15.31	2.7	42
Emotional	15.67	4.88	42	14.77	4.03	42
Coherence	12.92	3.73	41	13.73	3.56	41

Note: Values do not equal 50 for each group due to missing data.

Table 4
Results of Regression Analyses for Illness Representation Constructs that Differ by Family History Status for Self-Care Behaviors.

Variable	B	SE B	β	R ²	Sig
Predictors of Dietary Behavior (N=56)					
Personal control	.05 (CI±-.20 to .30)	.13	.04*	.35	.00
Treatment control	.15 (CI±-.09 to .40)	.12	.14		
Emotional	.08 (CI±-.03 to .20)	.05	.17		
Coherence (understanding)	-.16 (CI±-.24 to -.09)	.03	-.57		
Predictors of Physical Activity (N=56)					
Personal control	.04 (CI±-.12 to .21)	.08	.07	.10	.23
Treatment control	.06 (CI±-.09 to .22)	.07	.11		
Emotional	.03 (CI±-.04 to .10)	.03	.11		
Coherence (understanding)	-.04 (CI±-.09 to .01)	.02	-.26		
Predictors of Glucose Monitoring (N=62)					
Personal control	.04 (CI±-.13 to .23)	.09	.06	.15	.05
Treatment control	-.10 (CI±-.28 to .07)	.08	-.15		
Emotional	-.06 (CI±-.14 to .01)	.03	-.23		
Coherence (understanding)	-.03 (CI±-.08 to .01)	.02	-.18		
Predictors of Pill Adherence (N=42)					
Personal control	-.06 (CI±-.20 to .07)	.07	-.15	.15	.18
Treatment control	-.07 (CI±-.22 to .07)	.07	-.16		
Emotional	-.04 (CI±-.10 to .01)	.02	-.29		
Coherence (understanding)	.02 (CI±-.04 to .08)	.03	.11		
Predictors of Insulin Adherence (N=20)					
Personal control	.12 (CI±-.19 to .45)	.15	.25	.08	.85
Treatment control	-.01 (CI±-.22 to .21)	.10	-.01		
Emotional	-.04 (CI±-.16 to .07)	.05	-.25		
Coherence (understanding)	.05 (CI±-.07 to .18)	.06	.30		

CI=95% confidence interval for beta.

* p=/.05

** p=/.01