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Acculturation and Bicultural Efficacy Effects on Chinese American Immigrants' Diabetes and Health Management

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Abstract

The primary goal of this study was to examine effects of bicultural efficacy, or perceived confidence in dealing with bicultural acculturation stressors, on type 2 diabetes management and health for first-generation, Cantonese-speaking, Chinese American immigrants (N=162) recruited for a larger community-based diabetes intervention study (Chesla et al., 2013). The current study also tested whether a new Bicultural Efficacy in Health Management (BEFF-HM) scale is a more robust predictor of diabetes and health outcomes than proxy (years in the U.S.) and general acculturation measures. Hierarchical regression analyses of cross-sectional data revealed that high BEFF-HM was significantly related to positive outcomes on five of six diabetes and health measures as hypothesized after accounting for participant characteristics, proxy and general acculturation measures, and social support. Proxy and general acculturation measures failed to predict any study outcome supporting our secondary hypothesis that BEFF-HM is a better predictor of Chinese American immigrants' diabetes and health management. An immigrant-focused research approach advances understanding of acculturation and bicultural efficacy effects on health by identifying key acculturation domains for study.

Keywords

acculturation; bicultural efficacy; diabetes; immigrant health; Chinese American

Chinese Americans have a 7.4% prevalence of type 2 diabetes compared to 2.9% for non-Hispanic Whites (Gupta, Wu, Young, & Perlman, 2011) and their diabetes risk occurs at lower body mass index levels than the general U.S. population due to genetic predisposition and visceral adiposity (Hsu et al., 2012; Rajpathak & Wylie-Rosett, 2011). Acculturation stress also heightens diabetes risk, particularly for recent immigrants, by increasing stress

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hormones contributing to visceral adiposity and insulin resistance (Lee, Brancati, & Yeh, 2011). Acculturation stress and related diabetes and health risks are of particular concern for Chinese Americans given that 70% are first-generation immigrants, most of whom have limited English language proficiencies (Shinagawa & Kim, 2008). Still, acculturation stress effects on Chinese American immigrants' diabetes risk and management are understudied and existing research (e.g., Gomez, Kelsey, Glaser, Lee, & Sidney, 2004; Kandula et al., 2008; Xu, Pan, & Liu, 2011) employs problematic proxy and general acculturation measures that potentially obscure acculturation influences on diabetes and health outcomes. The current study was based on a novel *immigrant-focused research approach* that clarifies the nature of acculturation and its effects on Chinese American immigrants' diabetes and health risks. This approach informed the development of the new Bicultural Efficacy in Health Management (BEFF-HM) scale used in this study to test whether bicultural efficacy is a more robust and distinct predictor of diabetes and health outcomes than proxy and general acculturation measures and social support.

Proxy and General Acculturation Measures: Conceptual and Methodological Limitations

Acculturation is "a multidimensional and dynamic process of cultural adjustment and adaptation arising from sustained contact between distinct cultures and involving different degrees of cultural learning, maintenance and synthesis that are dependent on individual, group and environmental factors" (Chun & Akutsu, 2008; Marin, Balls Organista, & Chun, 2003). Acculturation is multidimensional because cultural adjustment occurs in multiple areas of psychosocial functioning with potentially distinct adaptation outcomes. Acculturation is dynamic because cultural adjustment demands, including demands to maintain one's culture of origin or to adopt a new culture, can fluctuate across sociocultural contexts. Acculturation stress arises when such demands exceed one's coping skills, abilities and resources (Chun & Hsu, 2012).

Proxy acculturation measures comprise single demographic variables (e.g., years of U.S. residency, generational status, birthplace, language preference) that are crude estimates of acculturation and related stress because they do not directly measure acculturation domains or areas of psychosocial functioning involved with cultural adaptation (Zane & Mak, 2003). Lower acculturation levels and heightened acculturation stress are typically inferred for limited U.S. residency, more recent generational status, foreign birth and low English language preference. However, contingent changes in specific acculturation domains (e.g., related changes in cultural health beliefs and behaviors) are speculative (Salant & Lauderdale, 2003), contributing to mixed or contradictory findings. For instance, U.S. birth has been associated with higher body mass index (Gomez et al., 2004), but U.S. residency is unrelated to diabetes risk (Oster & Yung, 2010) and other relevant diabetes-related outcomes including health care utilization (Miltiades & Wu, 2008) for Chinese Americans.

General acculturation measures are more rigorous than proxy measures because they evaluate numerous acculturation domains that are more proximal or closer to the cultural adaptation process. The most widely used general acculturation measure for Asian

Americans – the Suinn Lew Asian Self-Identity Acculturation scale (SL-ASIA; Suinn, Ahuna, & Khoo, 1992) – evaluates ethnic media, food, music, friendship and social preferences, and cultural behaviors. However, conceptual and methodological limitations related to *sufficiency* and *saliency* of assessed acculturation domains can obfuscate theoretical linkages between acculturation and health outcomes (Chun, Chesla, & Kwan, 2011). Sufficiency refers to the number or scope of acculturation domains assessed while saliency pertains to whether the most relevant acculturation domains are measured to detect acculturation influences on target outcomes. Both must be considered to accurately comprehend acculturation effects on health, but are typically overlooked.

For Chinese Americans, higher SL-ASIA scores are associated with better quality of life in managing diabetes, perceived health (Fisher et al., 2004), and diabetes self-management practices (Xu et al., 2011). Still, conceptual links between acculturation and these diabetes-related outcomes are vague because the sufficiency and saliency of measured SL-ASIA domains were not critically examined. For example, the salience or relevance of cultural media and music preferences and ethnicity of friends to these diabetes outcomes is speculative. Given acculturation's multidimensional and dynamic features, additional and more proximal and salient acculturation domains affecting diabetes management and health (e.g., adapting to U.S. health care providers' communication, coping with new food choices) can be plausibly explored.

Immigrant-Focused Research Approach: Rationale and Description

Our prior interpretive study of Chinese American immigrants' acculturation, diabetes management, and health (Chun et al., 2011) addressed proximity, sufficiency and saliency of measured acculturation domains using a novel *immigrant-focused research approach*. Immigrant participants provided detailed narratives of their cultural adaptation experiences, identifying the broadest and most salient acculturation stressors directly affecting their daily management of diabetes and health. Three broad and interconnected acculturation domains were identified: maintaining family and social relations, utilizing the health care system, and dealing with a new language and lifestyle in the U.S. Immigrants framed these three domains as bicultural in nature, occurring in both "Western" and "Chinese" contexts of diabetes care. The first domain involved pressures to fulfill culturally-prescribed family roles and duties and to maintain family harmony. The second domain included learning how to use U.S. health care resources and services, while the third involved coping with a new American lifestyle, foods and English language barriers. Immigrants' narratives indicated that bicultural efficacy or confidence in their ability to cope with these bicultural acculturation stressors across these three domains benefitted their diabetes and health management or everyday management of their general health. This key finding informed the development of the new Bicultural Efficacy in Health Management (BEFF-HM) scale used in the current study.

Significance of Bicultural Efficacy to Diabetes and Health Management

Possible diabetes and health management benefits from bicultural efficacy are consistent with acculturation, biculturalism and second-culture acquisition theories. According to

acculturation theory (J. Berry, 2003; J. W. Berry, 2007), an integration acculturation strategy promotes health because valued heritage culture features are retained, pressures to assimilate are thwarted, and new cultural behaviors and beliefs facilitating adjustment are selectively and skillfully adopted. Similarly, biculturalism or bicultural competence involves appropriately applying dual modes of social behaviors (e.g., dual communication skills) to enhance self-determination and adjustment in different cultural contexts (LaFromboise & Rowe, 1983). Lastly, integration, biculturalism and bicultural competence are associated with the alternation model of second-culture acquisition in which positive bicultural adjustment results from altering behaviors for different contexts, forming meaningful bicultural relationships, and valuing and understanding both cultures (LaFromboise, Coleman, & Gerton, 1993). Confidence in being biculturally competent is known as bicultural efficacy, a concept grounded in Bandura's social cognitive learning theory of perceived self-efficacy (David, Okazaki, & Saw, 2009).

The interrelated constructs of bicultural efficacy, integration, biculturalism and bicultural competence are positively associated with Asian Americans' health and wellbeing (David et al., 2009; LaFromboise, Albright, & Harris, 2010; Nguyen & Benet-Martínez, 2013; Wei et al., 2010). However, potential benefits of bicultural efficacy for immigrants' diabetes and health management are not fully understood, including whether it confers distinct health benefits beyond those expected from social support, an established protective health factor (Gallant, 2003; Peyrot et al., 2014; Taylor, 2011).

The primary goal of this study was to test whether bicultural efficacy benefits Chinese American immigrants' daily management of their type 2 diabetes and health. It was hypothesized that high bicultural efficacy in coping with stressors across three key acculturation domains (maintaining family and social relations, utilizing the health care system, and dealing with a new language and lifestyle in the U.S.) would confer significant and distinct benefits to Chinese American immigrants' illness management and health extending beyond those expected from social support. Also, it was hypothesized that BEFF-HM would be a more robust predictor of diabetes health outcomes than proxy and general acculturation measures because it more effectively addresses proximity, sufficiency and saliency of measured acculturation domains.

Method

Participants

Study participants were first-generation (foreign-born) Chinese American immigrants with type 2 diabetes enrolled in a larger community-based diabetes intervention study in the San Francisco Bay Area, California in 2008–2011 (Chesla et al., 2013). Recruitment, sample criteria, and informed consent procedures were outlined in this larger study, which received Institutional Review Board approval from UCSF. All enrolled participants were assigned to a 4-month delayed treatment condition, with data collected at intake (Time 1), 8 weeks (Time 2), and 16 weeks (Time 3). At week 17, they entered the 6-week diabetes intervention. Post-intervention data were collected at 24 weeks (Time 4) and 32 weeks (Time 5). Of the original sample of 178 participants, Chesla et al. (2013) analyzed data for 145 participants with complete Time 1 through Time 5 data. In the present investigation, Time 1 data were

used for participant characteristics and covariates, and Time 3 data were used for all predictor and outcome variables, the only time point when all measures used in the current analyses were collected. One hundred and sixty-two participants had complete Time 1 and Time 3 data; thus, our current study's cross-sectional analyses and findings are based on these 162 participants.

Participant characteristics are summarized in Table 1. Of the 162 participants, average age at Time 1 was 60.96 years (*SD*=9.54) and average duration of diabetes diagnosis was 8.17 years (*SD*=6.97). About half (56%) of the sample was female, with a mean education level of 12.25 years (*SD*=4.34). Eighty-eight percent had a household income < $50,000, 73% were married, 13% were using insulin, 40% had taken a previous diabetes education class, and all reported Cantonese as their primary spoken language.

Measures

All measures were translated into Chinese, checked for cultural appropriateness by bilingual research team members and a bilingual Chinese American immigrant community advisory board, and demonstrated good reliability as described in the larger intervention study (Chesla et al., 2013).

Predictor variables

Proxy and general acculturation measures: Years living in the U.S. and the 21-item SL-ASIA scale (Suinn et al., 1992) were selected as proxy and general acculturation measures, respectively, because of their widespread use in acculturation research with Asian Americans (Chun, Balls Organista, & Marin, 2003). SL-ASIA items, rated on a 5-point scale, assess the acculturation domains of language, ethnic media, food, and friendship preferences, ethnic identification, and generational and residential status. Total SL-ASIA scale scores reflect overall acculturation levels with high scores indicating greater acculturation.

Social support (SS): Eight items were selected from the Social Provision Scale (Cutrona & Russell, 1987). Participants were asked to evaluate *current* relationships with friends, family members, co-workers, community members. Sample items include, "There are people you can depend on to help you if you really need it," and "There is no one you can turn to for guidance in times of stress." Participants rated items on a 4-point scale ranging from 1 (strongly disagree) to 4 (strongly agree). Negatively phrased items were reverse-coded, thus higher overall scale scores indicate more general social support.

Bicultural Efficacy in Health Management (BEFF-HM) scale: This 10-item scale was based on previous interpretive study findings on acculturation experiences affecting Chinese American immigrants' type 2 diabetes management and health (Chun et al., 2011) and demonstrated sound psychometric properties in our larger diabetes intervention study (Chesla et al., 2013). Participants used a 4-point scale that ranged from 1 (not at all sure) to 4 (very sure) to rate their perceived self-efficacy in coping with bicultural acculturation stressors affecting diabetes and health management across three acculturation domains: maintaining family and social relations, utilizing the health care system, and dealing with a

new language and lifestyle in the U.S. Scale items for these three acculturation domains are outlined in Table 2. In the current study, total BEFF-HM scores were used because we did not have sufficient sample size for meaningful confirmatory factor analysis of its three subscales. High scale scores signify high perceived bicultural self-efficacy in managing diabetes and overall health.

Diabetes management outcomes

Diabetes quality of life (DQOL): Two subscales of this measure were selected for the current study: Satisfaction and Impact (Jacobson, de Groot, & Samson, 1994). DQOL-Satisfaction (DQOL-S) is a 15-item scale that assesses satisfaction living with diabetes, including leisure time, treatment, sleep and social relationships. Items are rated 1 (very dissatisfied) to 5 (very satisfied), and scores are totaled such that higher scores indicate greater satisfaction living with diabetes. DQOL-Impact (DQOL-I) measures the degree to which diabetes interrupts, restricts or upsets persons with type 2 diabetes in their everyday lives. Scores of 1 (never) to 4 (very often) on the 20 items are totaled, with higher scores indicating greater negative impact or daily disruption by diabetes.

Diabetes distress (DD) scale: This 17-item scale assesses the degree to which participants were troubled by diabetes in four areas: disease management, emotional illness demands, access to medical care, and interpersonal support (Polonsky et al., 2005). Participants rated from 1 (not a problem) to 6 (a very serious problem) on how troubled they were by each issue, rather than whether it was present in their lives. Higher scores indicate greater distress.

Health outcomes

Short-Form Health Survey (SF-36): (Ware & Sherbourne, 1992). The 5-item general health perceptions scale from the SF-36 was used. On one item, general health is evaluated on a 5-point scale from 1 (excellent) to 5 (poor). On the other four items, a 5-point scale ranging from 1 (definitely true) to 5 (definitely false) included such items as, “I am as healthy as anybody I know” and “I expect my health to get worse.” Higher scale scores indicate better general health.

Center for Epidemiological Studies-Depression (CES-D) scale: (Radloff, 1977). Depressive symptoms were assessed with this 20-item scale. A 4-point rating ranging from 1 (rarely or none of the time) to 4 (most or all of the time) is used to evaluate symptoms such as “feeling depressed,” “feeling lonely,” and “feeling that people dislike me” during the past 4 weeks. Item scores are summed with higher scale scores indicating more depressive symptomatology.

Glycemic control: A laboratory measure of hemoglobin A1c (HbA1c) was used as a measure of glycemic control over the past 3 months. All participants had their blood drawn by and tested in a single laboratory (Quest Diagnostics). HbA1c indicates the percentage of hemoglobin, a protein in one’s red blood cells that carries oxygen that is linked with glucose. Higher HbA1c levels indicate worse glycemic control. Normal HbA1c levels for those without diabetes are 5%, whereas a person with frequent uncontrolled diabetes may

have a level above 9%. A target HbA1c goal for non-pregnant adults with diabetes is <7% (American Diabetes Association, 2015)

Results

Psychometric properties of predictor and outcome measures are shown in Table 3. All measures had good internal reliability (standardized alpha ≥ .80), and had significant variances ($p < .001$). Scores indicate a reasonably healthy population of Chinese American type 2 diabetes patients with some evidence of depressive symptoms and moderate diabetes distress. Sixteen-week average HbA1c was 7.09% (SD=1.15), slightly higher than the clinically established goal of <7%.

Regression analyses were conducted to determine whether the BEFF-HM scale significantly predicted diabetes management and health outcomes after accounting for participant characteristics (age, gender, years of education, marital status, previous diabetes education, and diabetes severity indicated by insulin treatment and diabetes diagnosis duration), proxy (years living in U.S.) and general (SL-ASIA) acculturation measures, and social support. Time 1 data were used for participant characteristics and Time 3 data were used for all predictor and outcome variables. Using SPSS (v. 19) software, separate hierarchical regression models were specified for each outcome. Participant characteristics were entered in the first step to control for their effects on study outcomes. Proxy and general acculturation measures and social support were entered on the second step because they were hypothesized to exert some nonspecific and indirect influences on study outcomes. BEFF-HM was entered in the final step because it was hypothesized to have the most robust association with bicultural acculturation stressors affecting diabetes and health management. There was no evidence of multicollinearity among the predictor variables in any analysis. All tolerance values were greater than .60 and all variable inflation factor [VIF] values were less than 1.7. Common rules of thumb indicate potential multicollinearity problems at tolerance values of less than .20 and at VIF values of greater than 5.0 (O'Brien, 2007).

Hierarchical regression results for diabetes management outcomes are presented in Table 4. For participant characteristics, longer diabetes diagnosis duration was related to greater DQOL-S ($B = .18$, $p = .02$) and using insulin was related to higher DQOL-I ($B = 4.14$, $p = .04$). Together, proxy and general acculturation measures and social support were significantly related to DQOL-S ($R^2 = .31$, significance of F change < .0001) and DQOL-I ($R^2 = .11$, significance of F change = .004). Inspection of partial correlations for individual predictors indicated that this was largely due to the effect of social support on these outcomes - that is, participants with more social support had higher DQOL-S and lower DQOL-I. Proxy and general acculturation measures and social support were not significantly related to diabetes distress.

After accounting for participant characteristics, proxy and general acculturation measures and social support, BEFF-HM was significantly related to all diabetes management outcomes. Participants with higher BEFF-HM reported higher DQOL-S ($R^2 = .45$, significance of F change < .0001), lower DQOL-I ($R^2 = .16$, significance of F change = .003), and less diabetes distress ($R^2 = .11$, significance of F change = .02).

Hierarchical regression results for health outcomes are presented in Table 5. In regards to participant characteristics, attendance at a previous diabetes education class was related to poorer general health ($B = -2.07$, $p = .003$). Younger age ($B = -.04$, $p < .001$), using insulin ($B = .73$, $p = .01$), and longer diabetes diagnosis duration ($B = .05$, $p = .0004$) were significantly related to higher HbA1c.

Proxy and general acculturation measures and social support as a group were significantly related to depression ($R^2 = .20$, significance of F change = .001) and HbA1c ($R^2 = .27$, significance of F change = .02). Partial correlations for individual predictors showed that this was mostly attributable to social support; participants with more social support had less depression and lower HbA1c values. Proxy and general acculturation measures and social support were not significantly related to general health.

BEFF-HM was significantly related to all health outcomes except HbA1c after accounting for participant characteristics, proxy and general acculturation measures, and social support. Participants with higher BEFF-HM reported better general health ($R^2 = .18$, significance of F change = .002) and less depression ($R^2 = .30$, significance of F change < .001).

Discussion

In support of our main hypothesis, high bicultural efficacy significantly predicted greater satisfaction living with type 2 diabetes, less negative illness impact on daily lives, less distress over diabetes management demands, better self-assessed health, and less depressive symptoms in our immigrant sample, after accounting for participant characteristics, proxy and general acculturation measures, and social support. The non-significant relationship between bicultural efficacy and HbA1c may be attributed to participants' relatively good glycemic control. Lastly, proxy (years in the U.S.) and general (SL-ASIA) acculturation measures did not predict any of our study outcomes, supporting our secondary hypothesis that the new BEFF-HM scale is a better predictor of Chinese American immigrants' diabetes management and health.

Although social support is a widely established protective health factor, it was positively related to only one of our study outcomes -satisfaction in living with diabetes. Past research suggests that Asian Americans may prefer and benefit from social support without explicitly disclosing distress due to concerns over loss of face and burdening others (Kim, Sherman, & Taylor, 2008). Because our social support measure focuses on multiple types of social support, including emotional and general support, more specific and culturally-preferred forms of support for Chinese American immigrants may plausibly exert greater influence on their diabetes management and health.

Our study demonstrates that Chinese American immigrants' diabetes and health management occur across diverse cultural contexts with distinct bicultural acculturation stressors and interrelated bicultural skills demands. Bicultural efficacy's salutary effects can thus be attributed to adaptive processes of bicultural competence, biculturalism and an integration acculturation strategy to resolve these demands and mitigate acculturation stress. In the BEFF-HM scale, cultural maintenance demands include preserving close family ties

and fulfilling family roles while cultural learning involves understanding new U.S. health care resources, normative patient-provider role repertoires, a new American diet and lifestyle, and English language skills. Immigrant participants' perceived confidence in simultaneously and skillfully meeting these bicultural demands was essential to effective management of their diabetes and overall health.

Our study findings have important clinical implications. Health care providers working with Chinese American type 2 diabetes patients should evaluate bicultural stressors in the three identified acculturation domains. For the family domain, this includes inquiring whether daily diabetes care is affected by family roles, obligations, and duties, especially because Chinese American immigrants may frame their diabetes as a family rather than an individual health issue (Chesla & Chun, 2005; Chesla, Chun, & Kwan, 2009). In regards to the U.S. health care domain, Chinese American immigrants may be reluctant to question or challenge their medical providers (Sue & Sue, 1999), thus providers should normalize and encourage mutual patient-provider dialogue about diabetes and its treatment. Diabetes care challenges with unfamiliar American foods, lifestyle changes, and English language difficulties should also be evaluated in the language and lifestyle domain. Emphasizing balance in diet rather than strict control (Chesla et al., 2009; Chun & Chesla, 2004) and holistic diabetes care for both medical and emotional needs (Chun et al., 2011) are also culturally appropriate clinical recommendations for this ethnic group.

Our study findings support bicultural efficacy and skills development in immigrant health interventions as emphasized in past studies (e.g., Bacallao & Smokowski, 2005; Ying, 2009). In our larger diabetes management intervention study (Chesla et al., 2013), Chinese American immigrants' bicultural efficacy significantly improved after a 6-week cognitive-behavioral group intervention involving problem-solving, communication, interpersonal, and conflict resolution skills for bicultural family and social challenges to illness management. Our bicultural "Chinese-Western" approach to managing health and cognitive-behavioral techniques to develop and actively practice bicultural competencies in Cantonese-language group sessions likely contributed to our positive results. Meta-analytic research findings similarly show health benefits from active, problem-focused diabetes coping skills and strategies (Duangdao & Roesch, 2008).

Finally, our new conceptualization and measure of bicultural efficacy in health management have important research implications. The BEFF-HM scale was developed using a novel immigrant-focused research approach to identify and evaluate key acculturation domains and bicultural skills that Chinese American immigrants themselves deemed important to their daily diabetes and health management. In contrast, most studies employ a general theoretical approach in which measured acculturation domains are either unspecified, as seen for proxy measures, or assumed *a priori* to be adequate and relevant to their study sample and health outcomes, as is the case for general acculturation measures. In both instances, vague theoretical linkages between acculturation and study outcomes are presumed, critical analyses of measured domains are absent, and the cultural contexts in which acculturation transpires are disregarded. Consequently, this predominant general theoretical approach has produced confusing, mixed or non-significant findings. Proxy and general acculturation measures in the current study, for instance, incorrectly indicated no acculturation influences

on health. The immigrant-focused approach advances acculturation measurement and research by addressing proximity, sufficiency and saliency of measured acculturation domains and identifying relevant health-promoting bicultural skills in immigrants' daily lives. This new approach thus strives for a more fine-tuned, targeted and contextual understanding of acculturation influences on immigrant health as advocated extensively in the past (e.g., Chun, Balls Organista, & Marin, 2003), but has been lagging in research practice.

Limitations to the current study include the exclusive focus on Cantonese-speaking immigrants. We targeted this immigrant group given the historical significance and widespread use of this dialect in San Francisco and surrounding locales from which we recruited our participants. Linguistic, cultural and other sociodemographic differences affecting acculturation, diabetes and health may exist for Mandarin-speaking and U.S.-born Chinese Americans. Also, those exhibiting poorer glycemic control than our study sample may face distinct acculturation and diabetes care challenges. Lastly, we excluded individuals with advanced type 2 diabetes-related medical problems and those with type 1 diabetes, which also limits generalizability of our study findings.

Future directions for research include identifying alternative or more salient acculturation domains affecting diabetes and health for diverse Chinese American samples, including for more acculturated Chinese Americans. Future research may also test the validity and reliability of BEFF-HM and confirm its three-factor structure with larger and different Asian American samples. The three key acculturation domains assessed by this measure may be salient and sufficient for those with similar acculturation levels, collectivistic social orientation, interdependent views of the self, family-centered health behaviors and concerns, and bicultural daily living and health care contexts.

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Table 1

Participant Characteristics (N=162)

Characteristic	*n*	%	*M*	SD	Range
Age (years)			60.96	9.54	36.00–83.00
Education (years)			12.25	4.34	2.00–30.00
Duration of diabetes diagnosis (years)			8.17	6.97	0.37–31.96
Sex					
Male	72	44			
Female	90	56			
Annual household income < $50,000	141	88			
Married	118	73			
Primary language spoken - Cantonese	162	100			
Insulin treatment	21	13			
Previous diabetes education program	65	40			

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Table 2

Bicultural Efficacy in Health Management (BEFF-HM) Scale Items

Item
Maintaining Family and Social Relations in the U.S.
To have family closeness and interpersonal warmth in your daily life.
To maintain close ties and relationships in your family.
To deal with family expectations and obligations.
Utilizing Health Care System in the U.S.
To schedule an appointment with a doctor.
To receive the health care that you need.
To communicate your health concerns with your doctor.
To understand your doctor's medical advice and health recommendations.
Dealing with New Language and Lifestyle in the U.S.
To deal with unfamiliar American foods.
To deal with a new lifestyle in America.
To cope with situations in which the English language is a barrier.

Note. All scale items begin with, "How sure are you that you can do what you need:"

Table 3

Psychometric Properties of Measures (at 16 Weeks)

	α	*M*	*SD*	Range
Predictor variables				
Bicultural Efficacy in Health Management (BEFF-HM)	.80	29.10	3.81	20.00–40.00
Proxy acculturation measure (Years in U.S.)		18.29	11.74	0.10–52.00
General acculturation measure (SL-ASIA)	.81	1.83	.40	1.05–2.95
Social support (SS)	.87	3.06	.45	1.88–4.00
Diabetes management outcomes				
Diabetes Quality of Life – Satisfaction (DQOL-S)	.89	50.15	7.56	34.00–73.00
Diabetes Quality of Life – Impact (DQOL-I)	.83	42.45	7.86	25.00–66.00
Diabetes Distress (DD)	.95	2.61	1.03	1.00–5.71
Health outcomes				
Short-Form Health Survey (SF-36)	.82	14.02	4.44	5.00–25.00
Center for Epidemiological Studies – Depression (CES-D)	.94	27.91	11.96	0.00–46.00
HbA1c		7.09	1.15	5.30–12.60

Note. All variances statistically significant ($p < .001$)

Table 4

Hierarchical Regression Results for Participant Characteristics, Proxy and General Acculturation Measures, Social Support and Bicultural Efficacy Related to Diabetes Management Outcomes

	R^2	Sig. *F* Change	*B*	SE of *B*	Partial Corr.	*t*	Sig. *t*
DQOL-S							
Step 1:	.12	**.004**					
Age			.08	.05	.10	1.58	.12
Sex[a]			−1.77	1.02	−.10	−1.73	.09
Yrs education			.11	.12	.06	.96	.34
Marital status[b]			−.56	1.13	−.03	−.49	.62
Insulin treatment[c]			−.98	1.54	−.04	−.64	.52
Previous diabetes education class[d]			−.08	.96	−.005	−.08	.93
Diabetes diagnosis duration			.18	.07	.14	2.39	**.02**
Step 2:	.31	**<.0001**					
Yrs in U.S.			.0002	.05	.0003	.004	.99
SL-ASIA			.20	1.47	.01	.14	.89
SS			3.70	1.21	.18	3.05	**.003**
Step 3:	.45	**<.0001**					
BEFF-HM			.90	.15	.37	6.12	**<.001**
DQOL-I							
Step 1:	.03	.72					
Age			−.03	.07	−.04	−.52	.61
Sex[a]			.06	1.32	.003	.04	.97
Yrs education			−.06	.15	−.03	−.43	.67
Marital status[b]			1.91	1.46	.10	1.31	.19
Insulin treatment[c]			4.14	1.98	.16	2.10	**.04**
Previous diabetes education class[d]			.77	1.23	.05	.62	.54
Diabetes diagnosis duration			−.09	.10	−.07	−.97	.33
Step 2:	.11	**.004**					
Yrs in U.S.			−.06	.06	−.07	−.93	.36

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	R^2	Sig. *F* Change	*B*	SE of *B*	Partial Corr.	*t*	Sig. *t*
SL-ASIA			1.60	1.89	.06	.85	.40
SS			−2.49	1.56	−.12	1.59	.11
Step 3:	.16	**.003**					
BEFF-HM			−.56	.19	−.22	−2.98	**.003**
DD							
Step 1:	.06	.19					
Age			−.02	.01	−.13	−1.73	.09
Sex[a]			.15	.18	.07	.85	.39
Yrs education			−.01	.02	−.03	−.42	.68
Marital status[b]			.11	.20	.04	.55	.58
Insulin treatment[c]			.33	.27	.10	1.24	.22
Previous diabetes education class[d]			−.22	.17	−.10	−1.30	.19
Diabetes diagnosis duration			−.01	.01	−.04	−.46	.65
Step 2:	.08	.32					
Yrs in U.S.			−.005	.01	−.05	−.60	.55
SL-ASIA			.13	.25	.04	.52	.60
SS			−.07	.21	−.02	−.31	.76
Step 3:	.11	**.02**					
BEFF-HM			−.06	.03	−.18	−2.33	**.02**

Note. B, SE of *B*, partial correlation, *t*, and significance of *t* values were taken from the final equation.

[a]1=female; 0=male.

[b]1=married; 0=unmarried.

[c]1=yes; 0=no.

[d]1=yes; 0=no.

DQOL-S=Diabetes Quality of Life-Satisfaction; DQOL-I=Diabetes Quality of Life-Impact; DD=Diabetes Distress; SL-ASIA=Suinn-Lew Asian Self-Identity Acculturation; SS=Social support; BEFF-HM=Bicultural Efficacy in Health Management.

Table 5

Hierarchical Regression Results for Participant Characteristics, Proxy and General Acculturation Measures, Social Support and Bicultural Efficacy Related to Health Outcomes

	R^2	Sig. *F* Change	*B*	SE of *B*	Partial Corr.	*t*	Sig. *t*
SF-36							
Step 1:	.09	.09					
Age			.02	.04	.03	.46	.64
Sex[a]			−1.48	.74	−.15	−2.01	.05
Yrs of education			.07	.08	.06	.81	.42
Marital status[b]			−.86	.81	−.08	−1.05	.30
Insulin treatment[c]			−1.41	1.10	.002	−1.28	.20
Previous diabetes education class[d]			−2.07	.69	−.22	−3.01	**.003**
Diabetes diagnosis duration			.05	.05	.06	.86	.39
Step 2:	.12	.17					
Yrs in U.S.			.001	.03	.003	.03	.97
SL-ASIA			−.12	1.06	−.01	−.11	.91
SS			.32	.87	.03	.37	.72
Step 3:	.18	**.002**					
BEFF-HM			.34	.11	.24	3.19	**.002**
CES-D							
Step 1:	.11	**.01**					
Age			−.13	.09	−.10	−1.44	.15
Sex[a]			2.29	1.79	.09	1.28	.20
Yrs of education			−.02	.20	−.01	−.11	.91
Marital status[b]			−3.23	1.98	−.13	−1.63	.11
Insulin treatment[c]			2.90	2.69	.07	1.08	.28
Previous diabetes education class[d]			1.47	1.67	.06	.88	.38
Diabetes diagnosis duration			−.16	.13	−.09	−1.24	.22
Step 2:	.20	**.001**					
Yrs in U.S.			.06	.08	.05	.72	.48

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	R^2	Sig. *F* Change	*B*	SE of *B*	Partial Corr.	*t*	Sig. *t*
SL-ASIA			−1.02	2.57	−.03	−.40	.69
SS			−3.26	2.12	−.10	−1.53	.13
Step 3:	.30	**<.001**					
BEFF-HM			−1.15	.26	−.31	−4.46	**<.001**
HbA1c							
Step 1:	.22	**<.001**					
Age			−.04	.01	−.31	−4.37	**<.001**
Sex[a]			.23	.18	.09	1.25	.21
Yrs of education			.001	.02	.002	.03	.97
Marital status[b]			.06	.20	.02	.31	.76
Insulin treatment[c]			.73	.28	.18	2.57	**.01**
Previous diabetes education class[d]			−.14	.17	−.07	−.82	.42
Diabetes diagnosis duration			.05	.01	.26	3.62	**.0004**
Step 2:	.27	**.02**					
Yrs in U.S.			.02	.01	.13	1.78	.08
SL-ASIA			−.48	.26	−.13	−1.84	.07
SS			−.42	.22	−.13	−1.90	.06
Step 3:	.27	.79					
BEFF-HM			−.01	.03	−.02	−.27	.79

Note. B, SE of *B*, partial correlation, *t*, and significance of *t* values were taken from the final equation.

[a]1=female; 0=male.

[b]1=married; 0=unmarried.

[c]1=yes; 0=no.

[d]1=yes; 0=no.

SF-36=Short-Form Health Survey; CES-D=Center for Epidemiological Studies-Depression scale; HbA1c=glycosylated hemoglobin; SL-ASIA=Suinn-Lew Asian Self-Identity Acculturation; SS=Social support; BEFF-HM=Bicultural Efficacy in Health Management.