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# Ethnic and Gender Differences in Psychosocial Factors in Native Hawaiian, other Pacific Islanders, and Asian American Adults with Type 2 Diabetes

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## ABSTRACT

This study examined the differences between 207 Asians and Native Hawaiian, other Pacific Islanders (NHOPI) with type 2 diabetes among various psychosocial measures. Responses to five multivariable regression models including the Diabetes Quality of Life Questionnaire (DQOL) and Short Form -36® Health Survey (SF-36) were analyzed. Differences were determined by linear contrasts in the multivariate linear regression models after adjusted for multiple demographic and socioeconomic variables. Compared to Asians, NHOPIs perceived a lower impact of diabetes on their quality of life; highlighting differences in perceptions of self-efficacy and self-care activities. Females did better on their diet while males perceived better social support. Approaches to diabetes treatment decisions should include ethnic and cultural differences that may impact treatment outcomes.

**Keywords:** Diabetes, NHOPI, Asians, psychosocial factors, self-care

## INTRODUCTION

Diabetes mellitus is a chronic disease which requires lifelong changes and attention to lifestyle behaviors. It is increasing in severity and scope, especially in ethnic minorities and women (Center for Disease Control, 2011). Asian Americans are among the fastest growing racial and ethnic groups in the United States with a 68% increase prevalence rate of diabetes (McBean., Gilbertson, Li., & Collins, 2004) which is 60% higher than non-Hispanic whites, even after controlling for body mass index (BMI) (McNeely & Boyko, 2004). Disparities exist in the United States but there is little information on psychosocial factors of Native Hawaiian, other Pacific Islanders (NHOPI) and Asians with type 2 diabetes. Although these populations have been collectively grouped when examining chronic disorders, there are clear ethnic and cultural differences between Asian Americans and NHOPI and among the Asian subgroups. For example, data collected by the Hawaii Behavioral Risk Factor Surveillance System (Hawaii State Department of Health, 2009) found self-reported diabetes highest in Filipinos (11.3%), followed by Chinese (10.3%) and Hawaiians (9.9%). NHOPI are the indigenous people of Hawaii and other islands of Polynesia. Distinct physical as well as cultural differences between diverse ethnic groups require studies to analyze data separately based on ethnicity and gender.

While little has been reported relative to these ethnic groups, specifically NHOPI, in the United States, international studies have examined specific Asian ethnic groups, such as the Chinese (Wang & Matthews, 2010) or the Japanese (Sasai et al., 2010) in their native country. Others included only Asian-Indians (Misra & Lager, 2009) or combined Asian and Pacific Islanders groups (Sarkar, Fisher, & Schillinger, 2006). A few studies did include Native Hawaiians and other Asian Americans but did not compare them on similar factors (Kaholokula, Nacapoy, Grandinetti, & Chang, 2008; Kaholokula, Haynes, Grandinetti, & Chang, 2006; Mau et al., 2001). This study identified and compared gender, psychosocial and behavioral measures in these two ethnic groups. The information may be important to assist practitioners in identifying possible variables that could hinder treatment outcomes.

This cross sectional descriptive study reports on baseline characteristics of participants with type 2 diabetes who participated in a randomized clinical trial on a cognitive behavioral intervention. The goal of this study was to determine differences in characteristics and to examine ethnic and gender variations in psychosocial factors.

## METHODS

### Sampling Procedures

After IRB approval was obtained by the University's Committee on Human Studies (CHS#12473) letters were sent to all Asian and NHOPI patients from two practitioner-based endocrinology clinics. Inclusion criteria included the ability to speak and write English. The study excluded individuals who had physical difficulties that precluded participation in an exercise program. These conditions were crippling arthritis, joint replacements that limit movement, and neuromuscular disease with paralysis. Additionally, people with diabetic complications that limited or presented with difficulties in participating in the group process were excluded. These complications included severe eye disease or visual impairment; chronic renal failure and/or end stage renal disease requiring hemodialysis, peritoneal dialysis, or a transplant recipient; foot amputation; congestive heart failure; New York heart class III/IV; previous cerebral vascular accident (stroke) with residual paralysis; or other conditions that limited activities or reduced participation (malignancy, chronic hepatitis C, HIV disease).

There were 1,891 individuals with type 2 diabetes identified through the clinic database

or referred personally by the endocrinologists that met the inclusion/exclusion criteria. Because the sample included participants who would be divided into an intervention and a control group consistency in pre-intervention measures based on existing knowledge and behaviors were assured with standardized information at a baseline. Pre-selected participants who already had standardized training in diabetes self-management; able to self-monitor their blood glucose (SMBG), keep daily records, and understand food and calorie concepts, were required for inclusion in this intervention study. Only baseline data from this group was used for analysis in this report. Among the 1,891 individuals, 631 were found eligible and invited to participate, of which 207 were enrolled after follow up calls. A detailed discussion of recruitment and enrollment procedures is in press. Assessments occurred at the clinic site or research site in a medical arts building during the years 2006-2009.

**Participant Characteristics**

All individuals with diabetes between the ages of 18 and 76 years and able to provide consent were eligible regardless of hyperglycemia treatment. Ethnicity of participants was self reported. Asians primarily included Japanese, Filipino, and Chinese participants, while mixed-Hawaiians made up the main NHOPI group. Mixed ethnicity participants consisted of mixed Asian including Asian/Asian, Asian/Hawaiian, Asian/Caucasian, Pacific Islander/Caucasian; and mixed Hawaiian including Hawaiian/Asians, Hawaiian/Caucasian, and Hawaiian/Pacific Islander.

**Theoretical Model**

The theoretical model guiding this study was the social cognitive framework (Bandura, 1977) which takes into account personal factors, behaviors, and environmental factors. These were operationalized with measures for personal factors including health beliefs, depression, and perceptions of self efficacy. The measures for behaviors included self care activities. The measure for environmental factors included a measure of social support. Healthy People 2020 initiatives such as health equity, reducing health disparities and improving health for all groups highlight the importance of understanding and identifying differences in ethnic groups.

**Measures**

Participants completed and signed consent forms before demographic information was collected and a brief 15-question medical knowledge pretest of diabetic information was administered to determine equivalency of participant's knowledge. The following health and clinical measures were obtained at baseline:

1. Diabetes Quality of Life Measure (DQOL) is a 46-item multiple-choice assessment for adolescents and adults with insulin-dependent diabetes mellitus (DCCT, 1988). Although not all subjects were insulin dependent, subscales that were related to this were omitted. Satisfaction with quality of life, impact of diabetes, diabetes worry, and social/vocational worry are rated from 1 (very satisfied or no impact/no worry) to 5 (very dissatisfied or very impacted/worried). Convergent validity was established using the Symptom Checklist for the diabetes worry and social/vocational worry scales; the affect Balance Scale for correlation with global satisfaction; and the Psychosocial Adjustment to Illness Scale for correlation with the impact scale. The internal consistency of the DQOL measure in the Asian and NHOPIs groups based on Chronbach's alpha was good at 0.78. The DQOL scores range from 0 to 100 with higher scores indicating better quality of life.
2. The General Health subscale of the Medical Outcome Study 36-Item Short-Form Health Survey (SF-36) assesses self-appraised general health. It consists of five items (Chronbach's alpha=0.78) rated on a five-point scale. The SF-36 was designed to

measure functioning and well-being in people 14 years and older (Ware & Sherbourne, 1992). The SF-36 scores have a range from 0 to 100 with higher score defining a more favorable health state.

3. Depression assessment utilized the Center for Epidemiologic Studies-Depression (CES-D) scale, a 20 item, self-report scale designed to measure current depressive symptomatology including depressed mood, feelings of guilt and worthlessness, helplessness and hopelessness, psychomotor retardation, loss of appetite, and sleep disturbance (Radloff & Teri, 1986). The CES-D has been used with Native Hawaiian populations and its validity supported use as an appropriate tool to screen for depression among adolescents of Native Hawaiian and other minority (Kaholokula et al., 2006; Prescott et al., 1998). The internal consistency of the CES-D scale in our NHOPI population is satisfactory at 0.82 according to Chronbach's alpha. The CES-D scores have a range between 0 and 60. High scores on the CES-D indicate high levels of distress. A score $\geq 4$ suggests a clinically significant level of psychological distress.
4. The Summary of Diabetes Self-Care Activities (SDSCA) questionnaire is a self-report measure of the frequency of completing different self care activities over the preceding seven days (Toobert & Glasgow, 1994). These activities include diet, exercise, glucose testing and medication taking in a 12-item instrument. (Chronbach's alpha = 0.69) The SDSCA scores range from 0 to 7 with higher values indicating better self-care activities.
5. *Self Efficacy*: The Multidimensional Diabetes Questionnaire (MDQ) is theoretically linked to a social learning perspective of diabetes and designed to provide a comprehensive assessment of diabetes-related cognitive and social factors with Chronbach's alpha at 0.72 for our NHOPI population (Talbot, Nouwen, Gingras, Gosselin, & Audet, 1997). All subscales have a range from 0 to 6 except self-efficacy and outcome expectancies that have a range from 0 to 100. For all subscales, higher values indicate a better self-efficacy score.

**Data Analysis**

Baseline variables were summarized as frequencies by Asian or NHOPI ancestry. Differences in means of psychosocial and clinical measures between the ethnic groups were tested using two sample t-tests. Differences in proportions between the ethnic groups were tested using two sample t-tests and chi-square tests. Differences between participants of Asian or Hawaiian ancestry and between genders were estimated using multivariate linear regression models adjusted for age, marital status, smoking status, occupations, and other baseline measurements. Age was entered as a continuous variable; gender as an indicator for female or male gender; and ethnicity, education, income, marital status, and occupation were included using multiple indicators for selected categories. Questionnaire responses were the regression outcomes.

## RESULTS

The baseline characteristics of 207 Asian and NHOPI individuals with type 2 diabetes is presented in Table 1 with noted mean age of 57.6 years, more females than males (113 females and 94 males), 70% married, over 50% with professional and technical occupations, and nearly 80% with post-high school education. Based on self-reported ethnicity, there were 150 Asians, and 57 NHOPIs enrolled who were primarily part-Hawaiians. Although baseline characteristics between Asian and NHOPI groups were generally similar, there was a significant difference in their educational attainment level. There were more Asians with post-high school graduate

education than NHOPIs (88.1% vs. 61.1%, p<0.001). Asians had higher income level than NHOPIs (68.9% vs. 44.9% for income level $45,000 and above, p=0.03).

**Table 1: Baseline characteristics of Asian and Native Hawaiian, other Pacific Islander (NHOPI) participants**

| Baseline Measurements | Total (%) N=207 | Asians[1] (%) N=150 | NHOPI[2] (%) N=57 | p-value |
|---|---|---|---|---|
| Mean age in years | 57.6 ± 10.9 | 58.8 ± 11.0 | 55.0 ± 10.7 | 0.12 |
| Gender | | | | 0.20 |
| Female | 113 (54.6%) | 79 (57.7%) | 27 (47.4%) | |
| Male | 94 (45.4%) | 58 (42.3%) | 30 (52.6%) | |
| Marital status | | | | 0.27 |
| Single | 26 (12.9%) | 20 (14.8%) | 5 (8.9%) | |
| Married | 141 (69.8%) | 95 (70.4%) | 37 (66.1%) | |
| Separated/divorced/widowed | 35 (17.3%) | 20 (14.8%) | 14 (25.0%) | |
| Smoking Status | | | | 0.44 |
| Smoker | 20 (10.0%) | 16 (11.0%) | 4 (7.3%) | |
| Non-smoker | 181 (90.0%) | 130 (89.0%) | 51 (92.7%) | |
| Occupational status | | | | 0.33 |
| Professional, managerial | 68 (35.1%) | 52 (40.0%) | 16 (29.6%) | |
| Technical, clerical, sales | 34 (17.5%) | 22 (16.9%) | 8 (14.8%) | |
| Service | 21 (10.8%) | 11(8.5%) | 9 (16.7%) | |
| Other[3] | 71 (36.6%) | 45 (34.6%) | 21 (38.9%) | |
| Education | | | | <0.001 |
| Less than 12th grade | 19 (9.5%) | 7 (5.2%) | 10 (18.5%) | |
| High school graduate | 22 (11.0%) | 9 (6.7%) | 11 (20.4%) | |
| Some college/associate | 65 (32.5%) | 42 (31.1%) | 19 (35.2%) | |
| Bachelor's degree | 55 (27.5%) | 41 (30.4%) | 11 (20.4%) | |
| Graduate school | 39 (19.5%) | 36 (26.7%) | 3 (5.6%) | |
| Income | | | | |
| $24,999 or less | 31 (16.2%) | 18 (13.6%) | 11 (22.5%) | |
| $25,000-$49,999 | 43 (22.5%) | 23 (11.2%) | 16 (32.6%) | |
| $45,000-$69,999 | 40 (20.9%) | 30 (22.7%) | 7 (14.3%) | |
| $70,000 and above | 77 (40.3%) | 61 (46.2%) | 15 (30.6%) | 0.03 |

[1] Japanese (N= 76); Filipino (N= 28); Other Asians- Chinese (N= 20), Korean (N= 6), SE Asian (N= 1), Other (N= 1); Mixed Asians (N= 10); Unknown (N= 8)
[2] Mixed Hawaiians (N= 57)
[3] Other (agricultural, fishery, forestry, craft and repair; operators, miscellaneous)

Assessment of quality of life and general health measures at baseline showed significant differences between Asians and NHOPIs. As compared to Asians, NHOPIs scored significantly lower on the DQOL for diabetes impact (p<0.001), social worries (p=0.03), and diabetes worries (p=0.02), and on the SF-36 for physical (p<0.01) and social function (p<0.01), and emotional limitations (p=0.02) (Table 2). The scores for the DQOL and SF-36 ranged 1% to 18% lower for NHOPIs and there were no significant differences in depression assessment by CES-D scale.

Measures of adherence were similar between Asians and NHOPIs, except NHOPIs had higher scores on the MDQ for inference (p=0.001), severity (p=0.03), positive reinforcement (p=0.02), and misguided reinforcement (p=0.03) (Table 2). The difference in inference, severity, positive reinforcement, and misguided reinforcement ranged between 18% - 54% between groups.

**Table 2: Differences in baseline psychosocial factors between Asians and Native Hawaiian, other Pacific Islanders (NHOPI) participants with type 2 diabetes.**

| | Combined | | Asians | | NHOPI | | Difference[1] (SE) | p-value |
|---|---|---|---|---|---|---|---|---|
| Measures | N | Mean (SD) | N | Mean (SD) | N | Mean (SD) | | |
| **DQOL** | | | | | | | | |
| Satisfaction | 205 | 61.6 (16.5) | 148 | 61.7 (16.8) | 57 | 61.3 (15.9) | -0.41 (2.58) | 0.87 |
| Impact | 205 | 74.4 (13.0) | 148 | 76.3 (12.2) | 57 | 69.6 (14.0) | -6.70 (1.98) | <0.001 |
| Social worries | 203 | 85.2 (21.1) | 146 | 87.5 (18.4) | 57 | 79.2 (26.2) | -8.35 (3.26) | 0.03 |
| Diabetes worries | 205 | 73.2 (22.7) | 148 | 75.8 (19.7) | 57 | 66.3 (28.3) | -9.49 (3.49) | 0.02 |
| **SF-36** | | | | | | | | |
| Physical function | 205 | 71.9 (27.5) | 148 | 75.0 (26.1) | 57 | 63.9 (29.6) | -1.07 (4.22) | <0.01 |
| Health limitations | 205 | 67.3 (40.8) | 148 | 70.3 (39.2) | 57 | 59.6 (44.3) | -10.62 (6.33) | 0.10 |
| Emotional limitation | 205 | 76.3 (38.1) | 148 | 80.2 (35.6) | 57 | 66.1 (42.5) | -14.10 (5.87) | 0.02 |
| Fatigue | 205 | 57.4 (20.1) | 148 | 58.9 (18.2) | 57 | 53.5 (24.1) | -5.41 (3.12) | 0.13 |
| Emotional well being | 205 | 78.3 (15.3) | 148 | 79.4 (14.2) | 57 | 75.6 (17.9) | -3.73 (2.38) | 0.16 |
| Social function | 205 | 81.3 (23.4) | 148 | 84.5 (20.8) | 57 | 72.8 (27.6) | -11.74 (3.56) | <0.01 |
| Pain | 205 | 70.5 (24.5) | 148 | 72.4 (23.1) | 57 | 65.4 (27.1) | -7.02 (3.79) | 0.07 |
| General health | 205 | 52.9 (20.7) | 148 | 53.8 (19.5) | 57 | 50.5 (23.4) | -3.26 (3.22) | 0.31 |
| **MDQ** | | | | | | | | |
| Interference | 205 | 3.1 (1.0) | 148 | 2.9 (1.0) | 57 | 3.5 (1.1) | 0.53 (0.16) | 0.001 |
| Self-efficacy | 205 | 61.8 (24.6) | 148 | 61.8 (23.3) | 57 | 62.0 (27.9) | 0.25 (3.84) | 0.95 |
| Severity | 205 | 1.3 (1.5) | 148 | 1.1 (1.4) | 57 | 1.7 (1.8) | 0.60 (0.24) | 0.03 |
| Social support | 205 | 2.5 (1.3) | 148 | 2.5 (1.2) | 57 | 2.6 (1.6) | 0.14 (0.21) | 0.55 |
| Positive reinforcement | 195 | 2.5 (1.9) | 143 | 2.3 (1.8) | 52 | 3.0 (2.1) | 0.72 (0.30) | 0.02 |
| Misguided reinforcement | 195 | 2.1 (1.8) | 143 | 1.9 (1.7) | 52 | 2.6 (1.9) | 0.64 (0.29) | 0.03 |
| Outcome expectancies | 205 | 91.8 (17.4) | 148 | 93.2 (14.1) | 57 | 88.2 (23.6) | -5.01 (2.69) | 0.14 |
| **SDSCA** | | | | | | | | |
| General diet | 204 | 3.6 (1.4) | 147 | 3.7 (1.4) | 57 | 3.6 (1.4) | -0.08 (0.21) | 0.71 |
| Specific diet | 204 | 3.5 (1.3) | 147 | 3.4 (1.3) | 57 | 3.7 (1.3) | 0.34 (0.20) | 0.09 |
| Blood glucose | 204 | 4.5 (2.5) | 147 | 4.6 (2.4) | 57 | 4.2 (2.5) | -0.39 (0.38) | 0.31 |
| Foot care | 204 | 3.6 (1.5) | 147 | 3.5 (1.6) | 57 | 3.7 (1.5) | 0.15 (0.24) | 0.52 |
| Diet days | 204 | 3.6 (2.3) | 147 | 3.7 (2.2) | 57 | 3.5 (2.6) | -0.16 (0.36) | 0.66 |
| Medications | 204 | 4.9 (2.0) | 147 | 4.9 (1.9) | 57 | 4.8 (2.2) | -0.05 (0.31) | 0.87 |
| CES-D | 206 | 10.1 (8.9) | 149 | 9.3 (8.5) | 57 | 12.0 (9.7) | 2.67 (1.38) | 0.05 |

[1]Negative values indicate that NHOPI had lower scores than Asians

To explore the potential disparity within Asians and NHOPI groups, the responses of Japanese, Filipino, mixed Asian and Other Asians such as Chinese and Korean were separately analyzed. The CES-D scores among different ethnic groups and between males and females were assessed by the general linear model after adjusting other demographic variables such as age, marital status, smoking status, occupations, and other baseline measurements such as MDQ, SDSCA, BMI, and SF-36 (Table 3). Compared to Japanese, mixed Asian (estimated $\beta$ = -8.42, p=0.01) had significantly lower depression scores, and no significant differences were found among NHOPI, Filipino, or other Asians. No statistically significant difference in depression was found between males and females.

**Table 3: Ethnicity and gender differences in psychosocial factors from general linear model (n=207)**

| Health Measures | | Estimated coefficients | Standard error | p-value |
|---|---|---|---|---|
| CES-D[1] | | | | |
| | NHOPI | -0.10 | 1.94 | 0.96 |
| | Filipino | 1.90 | 2.36 | 0.43 |
| | Mixed Asian | -8.42 | 3.15 | 0.01 |
| | Other Asian | -3.72 | 2.45 | 0.14 |
| | Japanese | 0 | | |
| | Male | -3.20 | 1.92 | 0.11 |
| | Female | 0 | | |
| SDSCA[2] | | | | |
| self-care activity on blood glucose and medication | NHOPI | 0.15 | 0.29 | 0.61 |
| | Filipino | 0.75 | 0.32 | 0.02 |
| | Mixed Asian | 0.36 | 0.48 | 0.47 |
| | Other Asian | -0.05 | 0.39 | 0.91 |
| | Japanese | 0 | | |
| | Male | 0.03 | 0.26 | 0.92 |
| | Female | 0 | | |
| SDSCA[2] | | | | |
| diet | NHOPI | -0.41 | 0.30 | 0.17 |
| | Filipino | -0.20 | 0.35 | 0.58 |
| | Mixed Asian | -0.18 | 0.50 | 0.73 |
| | Other Asian | -0.56 | 0.39 | 0.16 |
| | Japanese | 0 | | |
| | Male | -0.53 | 0.25 | 0.04 |
| | Female | 0 | | |
| MDQ[3] | | | | |
| general perceptions of diabetes and related social support | NHOPI | 0.05 | 0.24 | 0.84 |
| | Filipino | -0.02 | 0.28 | 0.94 |
| | Mixed Asian | 0.71 | 0.38 | 0.07 |
| | Other Asian | 0.22 | 0.32 | 0.50 |
| | Japanese | 0 | | |
| | Male | 0.58 | 0.19 | <0.01 |
| | Female | 0 | | |

[1] The general linear models for CES-D is adjusted for age, marital status, smoking status, occupations, and other baseline measurements such as MDQ, SDSCA, BMI, and SF-36.

[2] The general linear models for SDSCA is adjusted for age, marital status, smoking status, occupations, and other baseline measurements such as MDQ, CES-D, BMI, and SF-36.

[3] The general linear models for MDQ is adjusted for age, marital status, smoking status, occupations, and other baseline measurements such as SDSCA, CES-D, BMI, and SF-36.

For self-care activity on blood glucose and medication, Filipinos with diabetes had significantly more self-care activities on blood glucose and medication compared to Japanese (estimated $\beta = 0.75$, $p=0.02$), and no significant differences of self-care activities on blood glucose and medication were found in Hawaiian, mixed Asian, and other Asians.

For diabetes self-care activities (SDSCA), females performed significantly better in diet than males (estimated $\beta = -0.53$, $p=0.04$). For general perceptions of diabetes and related social support in self efficacy (MDQ), males had significantly better perception and related social support than females (estimated $\beta = 0.58$, $p<0.01$). There was no significant gender difference in the other measurements.

## DISCUSSION

The disproportionately high rate of chronic illnesses such as type 2 diabetes, a behaviorally challenging disease, among Asian, Native Hawaiian and other Pacific Islander participants, underscores the need to assess psychosocial differences for a targeted intervention program. The low scores on the diabetes impact and social worries subscales of the DQOL indicate that NHOPIs, as compared to Asians, perceived less impact of diabetes on their lives regardless of educational attainment. This may be due to their kinship system with a social structure that provides support through their "ohana" or family rather than from other ethnic groups. NHOPIs may be less concerned about diabetes and its effect on the quality of life because these issues may not be considered a high priority among their families. Another explanation for the difference between NHOPI and Asian perceptions may be the collectivistic nature of the Asian culture which places pressure from one's peers to behave in a manner similar or acceptable to them, including in health care.

The DQOL results were similar to the results on the SF-36 scales where NHOPs scored lower in the areas of Physical function, Health and Emotional limitations, Fatigue, and Pain. In other words they reported fewer problems in these areas. This is contrary to Bean, Cundy and Petrie's findings (2007) that Pacific islanders would perceive diabetes to be less serious and more distressing. However, their study compared only South Asians (Indian, Fiji Indian, Sri Lankan, Pakistani or Bangladeshi) and Polynesians (Samoan, Tongan, Cook Islands, Maori, Niuean, or Tokelauan) unlike our group of primarily Japanese, Chinese, Filipino, Korean and Native Hawaiians. Our results could be further indications of the process of acculturation and positive effect of social support for NHOPIs.

Asians and NHOPIs did not differ on the CES-D Questionnaire. Assessment of depression did not show any differences between the two groups. Others have shown differences in the depression scale between Hawaiians and Asians in a smaller number of patients with diabetes (Kaholokula et al., 2006). However, their findings did not take into consideration the differences in baseline characteristics such as education level or income. A more recent report (Kaholokula et al. 2008) proposed that acculturative stress may promote depression and perceived discrimination are associated with a more traditional model of acculturation. Thus, level of acculturation may also be a moderating factor in the lack of expression of depressive features for this group.

The assessment of adherence also showed differences between Asians and NHOPIs. These included significantly higher perceptions of severity and interference among NHOPIs which may also be a side effect of too much support. This could become burdensome for patients and interfere with their self management of diabetes. Gender differences are also noted in Asian and NHOPI groups. Females performed better in diet than males and males had better

perception and related social support than females. Reviews on recent articles on sex or gender differences related more to control of risk factors and clinical differences. A study with Korean immigrants with type 2 diabetes (Choi, 2009) also found the positive impact of family support on glucose outcome was significantly stronger in men than in women, even after other factors were taken into consideration. Misra and Lager (2009) also reported that females felt greater burden and restriction in their social interactions, less leisure time flexibility, lower knowledge of the disease, a less positive outlook, more difficulty with self management behaviors and dietary adherence, but higher social support than males. However, these findings were a mix of different ethnic groups than the present study and no gender differences in NHOPIs were found in the published literature. Social support has been found to serve as a mediator of treatment effects on self-effiacy and self-regulation (Anderson, Winett, Wojcik, & Williams, 2012; Nakahara, Yoshiuchi, Kumano, Hara, Suematsu, & Kuboki, 2006) and as such may have a differential influence on behaviors in different genders. Because of the confounding findings in different ethnic groups, gender and ethnic differences need to be taken into account when interventions for type 2 diabetes patients are tailored for Asians and NHOPIs.

The limitation of this study is the relatively small population of Hawaiians and other Pacific Islanders participating in this study as compared to Asians, limiting the generalizability of the results. Although there were statistically significant findings in some measures of quality of life and adherence among NHOPIs, not all sub-categories addressed by the questionnaires showed consistency in the findings. The self reported data and cross sectional design further limit any causal inferences. There were also some differences found between the two ethnic groups and despite corrections made for these differences, having a greater number of individuals in the study could have provided more consistent findings within the DQOL assessment. Furthermore, when looking at subgroups, the cultural diversity within the mixed Asians could have resulted in differences in the findings. Despite the heterogeneity within the Asian populations, a strength of this study was the subgroup analyses which compared data among the Asian groups. Although the sample sizes were small for the sub-group analyses, interesting differences were found for the Asian subgroups.

## CONCLUSION

Several significant differences were found between the health statuses of Asians and NHOPIs with type 2 diabetes living in Hawaii. The results of the multivariable regression models highlight differences in perceptions of self-efficacy and self-care activities among participants with type 2 diabetes among the different ethnic groups and between genders. These results suggest that approaches to diabetes and health care treatment decisions should take into account ethnic and gender differences. The impact of these differences on the effects of interventions for self-management in Asians and Native Hawaiian and other Pacific Islanders need further study.

### Key Messages

Findings from this study and others have indicated that culture and ethnicity play a key role in health status, disease perception, and management. Clearly, future studies with larger sample sizes of disaggregated ethnic groups are needed to determine key factors, which influence health and disease. From this and the scientific evidence, culturally competent and tailored interventions can target factors which may then institute behavioral change.

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## REFERENCES

Anderson, E., Winett, R., Wojcik, J., & Williams, D. (2012). Social cognitive mediators of change in a group randomized nutrition and physical activity intervention. *Journal of Health Psychology,* 15 (1): 21-32.

Bandura, A. (1977). Self-efficacy: Toward a unifying theory of behavior change. *Psychological Review*; 84: 191-212.

Bean, D., Cundy, T., & Petrie, K. (2007). Ethnic differences in illness perceptions, self-efficacy and diabetes self care. *Psychology and Health*, 22 (7): 787-811.

Centers for Disease Control and Prevention National Center for Chronic Disease Prevention and Health Promotion. (2011). Diabetes: Successes and opportunities for population-based prevention and control at a glance 2011. Retrieved from http://www.cdc.gov/chronic disease/resources/publications/AAG/ddt.htm

Choi, S. E. (2009). Diet-Specific Family Support and Glucose Control Among Korean Immigrants With Type 2 Diabetes. *Diabetes Educator*, 35 (6): 978-985.

DCCT Research Group. (1988). Reliability and validity of a diabetes quality-of-life measure for the diabetes control and complications trial. *Diabetes Care, 11*(9), 725-732.

Hawaii State Department of Health. (2009). Hawaii Behavioral Risk Factor Surveillance System, 2008. Retrieved from http://hawaii.gov/health/statistics/brfss/brfss2009/brfss09.html

Kaholokula, J.K., Haynes, S.N., Grandinetti, A., & Chang, H.K. (2006). Ethnic differences in the relationship between depressive symptoms and health-related quality of life in people with type 2 diabetes. *Ethnicity & Health, 11*(1), 59-80. doi:10.1080/13557850500391287

Kaholokula, J.K., Nacapoy, A.H., Grandinetti, A., & Chang, H.K. (2008). Association between acculturation modes and type 2 diabetes among Native Hawaiians. *Diabetes Care, 31*(4), 698-700. doi:10.2337/dc07-1560

Mau, M.K., Glanz, K., Severino, R., Grove, J.S., Johnson, B., & Curb, J.D. (2001). Mediators of lifestyle behavior change in Native Hawaiians: Initial findings from the Native Hawaiian diabetes intervention program. *Diabetes Care, 24*(10), 770-775. doi: 10.2337/diacare.24.10.1770

McBean, A.M., Gilbertson, D.T., Li, S., & Collins, A.J. (2004). Differences in Diabetes Prevalence, Incidence, and Mortality among the Elderly of Four Racial/Ethnic Groups: Whites, Blacks, Hispanics, and Asians. *Diabetes Care, 27*(10), 2317-2324.

McNeely, M.J., & Boyko, E.J. (2004). Type 2 diabetes prevalence in Asian Americans: Results of a national health survey. *Diabetes Care,* 27(1), 66-69. doi: 10.2337/diacare.27.1.66

Misra, R., & Lager, J. (2009). Ethnic and gender differences in psychosocial factors, glycemic control and quality of life among adult type 2 diabetic patients. *Journal of Diabetes and*

*its Complications, 23*(1), 54-64. doi:10.1016/j.jdiacomp.2007.11.003

Nakahara, R., Yoshiuchi, K., Kumano, H., Hara, Y., Suematsu, H., & Kuboki, T. (2006). Prospective study on influences of psychosocial factors on glycemic control in Japanese patients with type 2 diabetes. *Psychosomatics*, 47: 240-246.

Prescott, C.A., McArdle, J.J., Hishinuma, E.S., Johnson, R.C., Miyamoto, R.H., Andrade, N.N.,…Carlton, B.S. (1998). Prediction of major depression and dysthymia from CES-D scores among ethnic minority adolescents. *Journal of the American Academy of Child and Adolescent Psychiatry, 37*(5), 495-503. doi:10.1097/00004583-199805000-00012

Radloff, L.S., & Teri, L. (1986). Use of the center for epidemiological studies-depression scale with older adults. *Clinical Gerontology, 5*(1-2), 119-136. doi:10.1300/J018v05n01_06

Sarkar, U., Fisher, L., & Schillinger, D. (2006). Is self-efficacy associated with diabetes self-management across race/ethnicity and health literacy? *Diabetes Care*, *29*(4), 823-829. doi:10.2337/diacare.29.04.06.dc05-161

Sasai, H., Sirenchi, T., Iso, H.., Irie, F., Otaka, M., Tanaka, K.,…Muto, T. (2010). Relationship between obesity and incident diabetes in middle-aged and older Japanese adults: The Ibaraki prefectural health study. *Mayo Clinic Proceedings*, *85*(1), 36-40. doi:10.4065/mcp.2009.0230

Talbot, F., Nouwen, A., Gingras, J., Gosselin, M., & Audet, J. (1997). The assessment of diabetes-related cognitive and social factors: The multidimensional diabetes questionnaire. *Journal of Behavior Medicine, 20*(3), 291-312.

Toobert, D.J., & Glasgow, R.E. (1994). Assessing diabetes self-management: The summary of diabetes self-care activities questionnaire. In C. Bradley (Ed.), *Handbook of psychologyand diabetes: A guide to psychological measurement in diabetes research* (pp. 351-375). Amsterdam, Netherlands: Harwood Academic Publishers.

Wang, J., & Matthews, J.T. (2010). Chronic disease self-management: Views among older adults of Chinese descent. *Geriatric Nursing, 31*(2), 86-94. doi:10.1016/j.gerinurse.2009.11.001

Ware, J.E., Jr., & Sherbourne, C.D. (1992). The mos-36-item short-form health survey (SF-36): Conceptual framework and item selection. *Medical Care, 30*(6), 473-481.