

Association Between Acculturation Modes and Type 2 Diabetes Among Native Hawaiians

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OBJECTIVE — To examine the association between acculturation modes (integrated, assimilated, traditional, and marginalized) and type 2 diabetes prevalence in Native Hawaiians.

RESEARCH DESIGN AND METHODS — Cross-sectional data were analyzed from 495 Native Hawaiians, including acculturation modes, diabetes status, triglycerides, fasting insulin, BMI, age, and education level. Acculturation modes were assessed using an eight-item cultural affiliation questionnaire.

RESULTS — Native Hawaiians in a traditional mode of acculturation were more likely to have type 2 diabetes (27.9%) than those in integrated (15.4%), assimilated (12.5%), or marginalized (10.5%) modes.

CONCLUSIONS — The higher prevalence of type 2 diabetes among Native Hawaiians in a traditional mode of acculturation could not be attributed to any of the sociodemographic or biological factors included in this study. We discuss the role of psychosocial factors as possible mediators in the relationship between acculturation modes and type 2 diabetes.

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Acculturation is believed to affect type 2 diabetes among certain U.S. ethnic groups because of lifestyle and environmental changes (e.g., diet, physical activity, and exposure to environmental stressors) (1,2). Previous studies have found an association between acculturation factors and type 2 diabetes among immigrant groups in the U.S. such as Arab Americans and Hispanics (3,4), but a dearth of such studies exists among Native populations. Native Hawaiians, the indigenous people of Hawai'i, have high type 2 diabetes prevalence and diabetes-related mortality rates that could be associated with acculturation factors (5).

Past studies of acculturation and type 2 diabetes used proxy factors of acculturation such as length of stay in the U.S., generational status, and language preference (3,4), which are not appropriate for Native populations. A relevant acculturation model for Native groups suggests that health status can differ across four modes of acculturation: integrated, high affiliation with ethnic heritage and mainstream culture; assimilated, high affiliation with mainstream culture only; separatist, high affiliation with ethnic heritage only (renamed here as traditional); and marginalized, low affiliation with both ethnic heritage and mainstream cul-

ture (6). We examined the association between these four acculturation modes and type 2 diabetes among Native Hawaiians.

RESEARCH DESIGN AND METHODS

Cross-sectional data from 495 Native Hawaiians (225 male, 270 female) who participated in the Kohala Health Research Project (KHRP), a community-based epidemiological study of diabetes and cardiovascular risk factors, were analyzed in this study. The KHRP's design and methods have been previously described(7).

Diabetes was determined using World Health Organization criteria of fasting blood glucose ≥ 126 mg/dl or 2-h postchallenge blood glucose ≥ 200 mg/dl (8). All participants, except those taking insulin or oral diabetic medication, underwent a 2-h, 75-g oral glucose tolerance test after a 10- to 14-h overnight fast. Only fasting blood samples were collected from those participants taking insulin or oral diabetic medication.

Acculturation modes were assessed using an 8-item cultural affiliation questionnaire designed by the KHRP. The questionnaire has two subscales, including a four-item ethnic cultural identity subscale and a four-item Western U.S. cultural identity subscale, designed to assess the degree of identity/affiliation with, feelings toward, and knowledge about each cultural group and the impact each cultural group has on lifestyle. A 5-point response scale was used for each item, ranging from 1, very knowledgeable, very positive, or very involved, to 5, not knowledgeable at all, very negative, or disinterested. Scores ≤ 12 on each subscale (median score 12, range 4–20) indicated higher levels of affiliation. Participants were considered integrated with scores ≤ 12 on both subscales, traditional with scores ≤ 12 on the ethnic subscale and > 12 on the western U.S. subscale, assimilated with scores > 12 on the ethnic subscale and ≤ 12 on the western U.S. subscale, and marginalized with scores > 12 on both subscales. Cronbach's α was 0.72 for each subscale, indicating good internal reliability estimates.

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Abbreviations: KHRP, Kohala Health Research Project.

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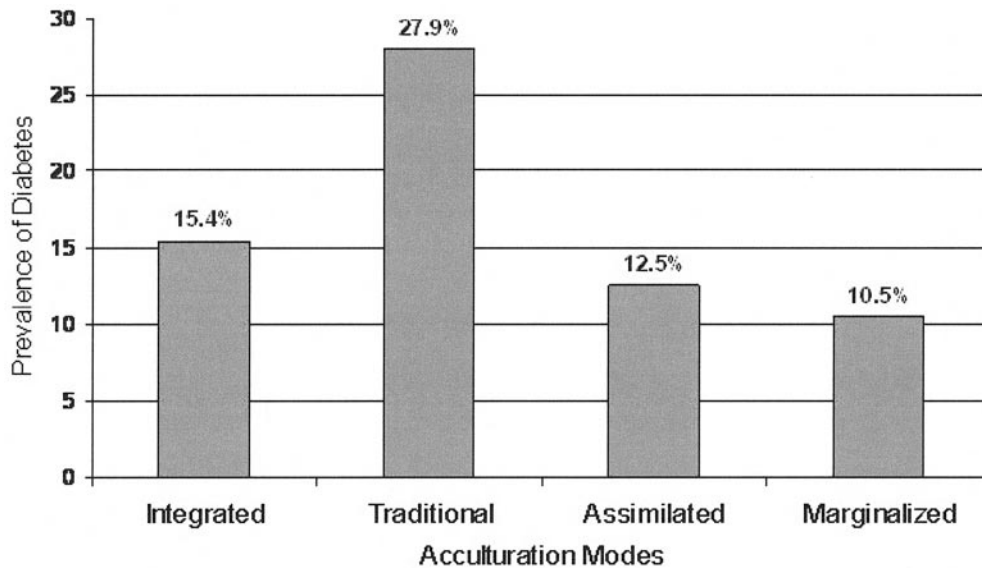


Figure 1— Prevalence of type 2 diabetes in Native Hawaiians across four acculturation modes.

Age, education level, BMI (calculated as the weight in kilograms divided by the square of height in meters), degree of Native Hawaiian ancestry, triglycerides, and fasting insulin were selected from the KHRP dataset to examine as possible confounders for inclusion in our analysis. These specific factors were chosen because they have been identified as correlates of diabetes in Native Hawaiians (7). Degree of Native Hawaiian ancestry was based on self-reported (ascertained from an interview) blood quantum categories of 100, 75, 50, 25, and <25%. These factors were adjusted for in a logistic regression model examining the effects of acculturation modes on diabetes status (0 = no diabetes, 1 = diabetes) if they were found to have a significant association ($P \leq 0.05$) with both diabetes status and acculturation modes based on bivariate analyses (ANOVA and χ^2). JMP statistical software, version 6.0.2, was used for data analysis (SAS Institute).

RESULTS— The majority of the participants were integrated ($n = 382$, 77.2%), followed by traditional ($n = 86$, 17.4%), marginalized ($n = 19$, 3.8%), and assimilated ($n = 8$, 1.6%). Significant differences in type 2 diabetes status were observed across acculturation modes [$\chi^2 = (3,495) 7.71$, $P = 0.05$], with the traditional mode having more cases of diabetes ($n = 24$, 27.9%), followed by the integrated ($n = 59$, 15.4%), marginalized ($n = 2$, 10.5%), and assimilated ($n = 1$, 12.5%) modes (Fig. 1). Of the potential confounders examined, increased age ($F = 55.58$, $P < 0.0001$), higher BMI

($F = 26.64$, $P < 0.0001$), triglycerides ($F = 24.39$, $P < 0.0001$), and fasting insulin ($F = 25.38$, $P < 0.0001$) were significantly associated with having diabetes, but only education level was significantly associated with acculturation modes [$\chi^2 = (9,495) 28.19$, $P < 0.001$]. None of the potential confounders examined were significantly associated with both diabetes status and acculturation modes.

A logistic regression model was used to calculate the odds ratio (OR) and CI and also as a post hoc analysis to determine which modes significantly differed in diabetes prevalence. The results showed that participants with traditional mode were more likely to have type 2 diabetes [OR 2.12 (95% CI 1.23–3.65)] ($P = 0.01$) compared with integrated mode (reference group). There were no significant differences in diabetes status between integrated mode and assimilated and marginalized modes.

CONCLUSIONS— Native Hawaiians in the traditional mode of acculturation had a greater prevalence of type 2 diabetes than those in the integrated, assimilated, and marginalized modes that could not be attributed to any of the sociodemographic or biological factors included in this study. These findings suggest that psychosocial or other factors associated with the traditional mode of acculturation not accounted for in this study may increase the risk for type 2 diabetes among Native Hawaiians in this mode of acculturation.

Research in other ethnic groups

found that people in the traditional and marginalized modes have greater acculturative stress (e.g., depression and greater perceived discrimination) than those in the integrated and assimilated modes (9). Studies also show that people with depression, a common response to environmental stressors, have a 37% increased risk of type 2 diabetes (10). One hypothesis needing investigation is that Native Hawaiians in the traditional mode may experience more psychosocial or environmental stressors than Native Hawaiians in the other three modes, thus increasing their risk for type 2 diabetes.

Inferences from our study should be limited to comparisons between the integrated and traditional modes due to small sample sizes among the assimilated and marginalized groups. There appears to be adequate statistical power to detect differences between the integrated and traditional modes, given the effect size (OR 2.12) found for their association and the fact that these two modes combined make up 94.6% of our entire sample.

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