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Diabetes, Mental Health, and Utilization of Mental Health Professionals Among Native Hawaiian and Pacific Islander Adults

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A thesis

submitted in partial fulfillment of the

requirements for the degree of

Master of Public Health

University of Washington

2019

Committee:

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Program Authorized to Offer Degree:

Global Health

University of Washington

Abstract

Diabetes, Mental Health, and Utilization of Mental Health Professionals Among Native Hawaiian and Pacific Islander Adults

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Objective:

We evaluated whether diabetes or borderline/prediabetes is associated with serious psychological distress, and whether contact with a mental health professional has an interacting effect on this association.

Methods:

We used data from the 2014 Native Hawaiian and Pacific Islander National Health Interview Survey, a cross sectional study of approximately 3,000 households across all 50 U.S. states. We used multiple logistic regression to examine the potential association between diabetes status and serious psychological distress among the 2,587 adult participants sampled. We also examined the potential interaction of mental health professional utilization on this association.

Results:

Reporting a diabetes diagnosis was associated with positive scoring for serious psychological distress, conditioned upon age, sex, partnership status, and educational levels. Adding the interaction effect of contact with a mental health professional did not have a statistically significant impact on this association.

Conclusions:

Mental health stigma, use of non-culturally relevant measures, and exclusion of informal mental support variables from research may influence both self-report and measurement of mental health symptomatology. These factors may suggest the need for culturally grounded measurement development among Native Hawaiian and Pacific Islanders.

Diabetes, Mental Health, and Utilization of Mental Health Professionals Among Native Hawaiian and Pacific Islander Adults

Mental health symptomatology is common among people living with or at risk for diabetes overall (CDC, 2018). Across communities of color, racial discrimination has been shown to add additional stressors that can potentially exacerbate mental health symptomatology among individuals living with diabetes (LeBron, Valerio, Kieffer, Sinco, Rosland, Hawkins, Espitia, Palmisano & Spencer, 2014; LeBron, Spencer, Kieffer, Sinco & Palmisano, 2019; Spencer, Kieffer, Sinco, Palmisano, Guzman, James, Graddy-Dansby, Two Feathers & Heisler, 2006; Walls, Aronson, Soper & Johnson-Jennings, 2014). For Native Hawaiian and Pacific Islanders in particular, race/ethnicity is a predictor for diabetes-related stress (Boden & Gala, 2018).

There are no national studies to date that examine the associations between diabetes, mental health symptomatology, and mental health professional utilization among NHPI populations. NHPI-specific national or local studies that evaluate whether mental health professional utilization buffers the relationship between diabetes status and mental health symptomatology is also lacking. In this study, we investigated the association between diabetes status and mental health symptomatology and examined mental health professional utilization as a potential interacting variable on this association.

Background

Approximately 1.2 million people living in the United States (U.S.) identify as Native Hawaiian and Pacific Islander (NHPI) alone or in combination with at least one other race, and represent about 0.4% of the nation's population (Hixson, Hepler & Kim, 2010). The Federal Office of Management and Budget define NHPI as people who culturally and ethnically descend

from Hawaii, Samoa, Guam, and other Pacific Islands (Galinsky, Zelaya, Similie & Barnes, 2017b). NHPI are among the populations in the U.S. experiencing the most rapid population growth rate (Narcisse, Felix, Long, Hudson, Payakachat, Bursac, McElfish, 2018), and they also bear a markedly higher burden of chronic diseases compared to both Asian Americans and the U.S. population as a whole (Wu & Bakos, 2017). While the disaggregation of NHPI data from their previous categorization within the Asian American race is on the rise, NHPI continue to be underrepresented in health research (Narcisse et al., 2018).

Diabetes and mental health are among the top reported health diagnoses among NHPI nationally (Galinsky, Zelaya, Barnes & Simile, 2017a). The 2014 Native Hawaiian and Pacific Islander National Health Information Survey, as the first national survey on NHPI, indicates that they are 2.4 times as likely to be diagnosed with diabetes compared to non-Hispanic Whites (17.6% and 7.3%, respectively) (Office of Minority Health, 2016). National prevalence (adjusted for sex) for diabetes among NHPI adults is 15.6%, greater than similar percentages for both U.S. adults as a whole as well as single-race Asian adults. 4.1% of NHPI (also adjusted for sex) also reported serious psychological distress in the past 30 days—greater than similar percentages among single-race Asian adults (Galinsky et al., 2017a). Earlier analysis of national Behavioral Risk Factor Surveillance System (BRFSS) revealed one-fifth of NHPI adults reported a depressive disorder diagnosis—higher than all other U.S. racial groups. Anxiety disorder was reported as second highest (15.7%), just behind American Indians/Alaska Natives (Cook, Chung & Ve'e, 2010). Such disproportionate figures are concerning, given the evidence of co-morbidity between diabetes and mental health among the overall U.S. population (CDC, 2018).

Within the U.S. as a whole, people with diabetes are at 2-3 times greater risk of experiencing depression and 20% more likely to experience anxiety compared to people without diabetes, yet only between one quarter to one half of people with diabetes are diagnosed and treated. Furthermore, one-third to one-half of people with diabetes experience diabetes distress, or feelings of discouragement, worry, frustration, or fatigue in daily diabetes care management (CDC, 2018). Racial/ethnic minorities may experience additional stressors related to demographics, discrimination, daily hassles, and support of health care providers that can exacerbate diabetes-related distress and lead to mental health symptoms (LeBron, Valerio, Kieffer, Sinco, Rosland, Hawkins, Espitia, Palmisano & Spencer, 2014; Spencer, Kieffer, Sinco, Palmisano, Guzman, James, Graddy-Dansby, Two Feathers & Heisler, 2006). One recent study of Latinos with diabetes found a positive association between racial/ethnic discrimination and depressive symptoms, and that such discrimination also mediated HbA1c levels through diabetes-related distress (LeBron, Spencer, Kieffer, Sinco & Palmisano, 2019). Among American Indians with Type II diabetes, prevalence of mental health symptomatology was positively associated with reports of hyperglycemia (Walls, Aronson, Soper & Johnson-Jennings, 2014). For NHPI individuals compared to White/Caucasians, race/ethnicity also has a significant and positive association with diabetes-related stress (Boden & Gala, 2018).

The literature also points to the important role of culture in shaping and developing treatment approaches. For example, Latinos who received a culturally relevant, theory-based community health worker intervention experienced a significant decrease in diabetes-related distress. This suggests the potential effectiveness of culturally appropriate, community-based mental health care provision for other ethnic/racial minorities such as NHPI (Spencer, Kieffer, Sinco, Piatt, Palmisano, Hawkins, LeBron, Espitia, Tang, Funnell & Heisler, 2018).

Furthermore, culturally based interventions are recognized as important when addressing overall NHPI health (Hurdle, 2002; Mokuau, 2011). These include culturally adapted diabetes interventions, which have shown promising results in addressing a range of health disparities (McElfish et al., 2019), as well as positive effects on improving diabetes self-management (Sinclair et al., 2013).

While no national-level, disaggregated survey data for NHPI with diabetes could be found regarding mental health diagnoses or utilization of mental health professionals to date, previous, more localized research illuminates the associations between diabetes and mental health symptomatology among NHPI. One sample of Native Hawaiians in North Kohala, Hawaii, found a significant association between HbA1c (at or above 7%) and depressive symptoms (adjusting for age, BMI, gender, and education, and excluding participants with a self-reported history of diabetes). They did not find a statistically significant relationship between diabetes history and depressive symptoms (adjusting for HbA1c). They also adjusted for other confounders including age, BMI, gender, and education, concluding that the diabetes/depression association may be partially influenced by neuroendocrinological health issues (Grandinetti, Kaholokula, Crabbe, Kenui, Chen, & Chang, 2000). There are also no studies to date that evaluate whether mental health professional utilization as a psychosocial variable could have an interacting effect on mental health symptomatology among those with diabetes. The strength of this association is hypothesized to vary as a function of such variables, and may have "direct clinical implications for the treatment of depressive symptoms in people with diabetes mellitus" (Kaholokula, Haynes, Grandinetti & Chang, 2003, p. 439).

Both Native Hawaiian and non-Native Hawaiian psychologists have called for an increased study of Native Hawaiian mental health in response to the gap in empirical work on this issue. Particularly, they have highlighted the importance of ethnic identity and cultural practices in interventions (Winerman, 2004). One potential challenge to both research and mental health care utilization among NHPI compared to the general U.S. public may lie in the higher levels of social stigma toward conceptions of mental health as a Westernized notion (Subica, Aitaoto, Sullivan, Henwood, Yamada & Link, 2019; Yamada, Vaivao & Subica, 2019). The Westernized notion is often considered incongruent with Indigenous conceptions of mental wellness. Grounded in holistic, interconnected principles of mind, body and spirit connection, mental wellness is cultivated within family relationships and spiritual and land-based practices, since land is seen as more than a physical location and as a source of physical, psychological and spiritual nourishment essential to well-being (McCubbin & Marsella, 2009; Mokuau, 2011, Yamada, Vaivao & Subica, 2019). Thus, NHPI seek mental health support through family, spirituality, and cultural sources (McCubbin & Marsella, 2019; Yamada, 2019). Therefore, it is crucial for researchers and practitioners understand the impacts of colonization and resulting historical trauma on NHPI social determinants of health, as well as the potentially protective role of culture in addressing mental health issues within the NHPI community (McCubbin & Marsella, 2009; Subica et al., 2019).

Empirical studies based on national level health data are emerging and can provide a source of data from which culturally appropriate studies can be drawn. The Native Hawaiian and Pacific Islanders National Health Interview Survey (NHPI NHIS) revealed important information about the current health status of the NHPI population across the nation. While health care access and utilization as a whole (Zelaya, Galinsky, Simile & Barnes, 2017) and, more

specifically, of emergency department and outpatient services have been analyzed (Narcisse et al., 2018) from the NHPI NHIS, the association between diabetes and mental health symptomatology as well as the effects of mental health professional utilization have not yet been examined at the national level. In this study, we hypothesized a positive association between having diabetes and/or borderline/prediabetes and serious psychological distress. We also hypothesized that that individuals with diabetes or borderline/prediabetes who had utilized a mental health professional services would be less likely to score positively for serious psychological distress.

Methods

As the first-of-its-kind federal population-level study designed to evaluate the health of NHPI across the United States, the NHPI NHIS used the annual, cross-sectional NHIS as a survey instrument for data collection. The NHIS is a program of the National Center for Health Statistics (NCHS), which is part of the U.S. Centers for Disease Control and Prevention (CDC). As both the largest national household survey and the primary source of health information data in the U.S., it is used to collect data on health status and conditions, disability, risk factors, health service access and utilization, health insurance coverage, immunizations, and health-related behaviors (CDC, 2017). The NHPI NHIS resulted from a combination of progression on federal policies surrounding data collection guidelines and advocacy from Native Hawaiian, Pacific Islander, and Asian American health researchers, leaders and community organizations. These leaders recognized the need for disaggregation of NHPI from the single Asian and Pacific Islander racial and ethnic category in order to reduce the suppression of important health distinctions between groups (Wu & Bakos, 2017). Concurrently, to address the methodological challenges of including small sample sized populations such as NHPI in large-scale national

surveys like the NHIS, the NCHS and Office of Minority Health used the American Community Survey as a sampling frame (Wu & Bakos, 2017). Stratified multi-stage area probability sampling was used by the NCHS to ensure NHPI were properly represented among the larger U.S. population (Narcisse et al., 2018). For the NHPI NHIS, interviewers received cultural awareness, sensitivity and outreach training, and materials for communications with participants (i.e., advance notice and thank you letters) were tailored to be culturally appropriate. Beyond these specific cultural adaptations designed to increase engagement with hard-to-reach, small populations such as NHPI, the NHPI NHIS followed all other standard protocols in order to ensure comparability of results with those of the standard NHIS (Wu & Bakos, 2017).

The NHPI NHIS included a sample of approximately 3,000 households across all 50 states and the District of Columbia, in which at least one NHPI person resided during the year of 2014. The NHPI NHIS used an in-person survey with at least one household member of any age who self-reported as NHPI, whether alone or in combination with at least one other race (Wu & Bakos, 2017). NHPI were randomly selected from within these households to respond to the NHPI NHIS (Galinsky et al., 2017b). A more detailed description of the parent survey design methodology can be found in on the NCHS Survey Description publication (CDC, 2017). This study involved secondary data analysis from the 2014 NHPI NHIS. It focused on a sub-sample of the total 2,587 adults who identified NHPI as their primary race (whether NHPI alone or in combination with one or more other races), and who self-reported having a diabetes diagnosis (n=381), borderline/prediabetes (n=95), or reported not having diabetes or borderline/prediabetes (n=2111).

Measures

Serious psychological distress was our dependent variable, with a composite of six questions asking the frequency with which respondents felt "sad," "nervous," "restless or fidgety," that "everything was an effort," or "worthless during the past 30 days." Response options were displayed as a Likert scale (1=all of the time, 5=none of the time) (CDC, 2017), and were coded from 0-4 for a total range of 0-24 on the serious psychological distress scale (Galinsky et al., 2017a). A score of 13 or higher categorized participants as experiencing serious psychological distress (Kessler, 2003; Kessler, Barker, Colpe, Epstein, Gfroerer, Hiripi, Howes, Normand, Manderscheid, Walters, & Zaslavsky, 2003). *Diabetes status*, the predictor variable, required respondents to self-report "yes," "no," or "borderline or prediabetes" in response to whether they had been told by a doctor or other health care professional that they have "diabetes or sugar diabetes" (CDC, 2017). We examined all three categories as predictors (Galinsky et al., 2017b). Finally, *having seen or spoken to a mental health professional in the past year* was the interacting variable, and required a "yes" or "no" response (Baron & Kenny, 1986; CDC, 2017). Mental health professionals listed included a psychiatrist, psychologist, psychiatric nurse, or clinical social worker.

We also controlled for several covariates. *Sex* was predetermined as "male" or "female," and we recoded it from 1 and 2 to 0 and 1, respectively. *Age* was originally continuous, and we recoded it to be dichotomous ("54 and below"=0; "55 and above"=1). *Level of education completed* was originally divided into six categories: "12th grade or less (no high school diploma)", "high school graduate/GED recipient," "some college, no degree," "Associate degree (occupational, technical, vocational, or academic), "Bachelor's degree," and "Master's, professional, and/or doctoral degree." It was the only variable pulled from the "person data"

dataset into the "adult data" dataset, and we recoded it into dichotomous categories ("high school/GED and below"=0; "some college and above"=1). Finally, *marital status* was originally divided into five categories: "married," "widowed," "divorced or separated," "never married," and "living with a partner." We recoded it into dichotomous categories ("not partnered"=0; ("partnered"=1).

Analyses

We used R (R Core Team, 2019) for statistical analyses. We re-coded all "refused," "not ascertained,", and "don't know" responses to variable questions as missing data that were not counted in the analysis. For our descriptive analysis, we calculated percentages for categorical variables. For our inferential analysis, we used multivariate logistic regression to investigate the association between diabetes and serious psychological distress outcomes, as well as to examine mental health professional utilization as an interacting variable on this association. We used a chi-square to test the association among all covariates and the outcome variable in order to determine independence and use in our model. In model 1, we regressed sex, age, educational level, and partnership status on serious psychological distress. In model 2, we regressed no diabetes and borderline/prediabetes (diabetes as reference category) on serious psychological distress, controlling for all of the aforementioned covariates. In model 3, we removed the diabetes variables, and added having utilized mental health professional services to all of the same covariates regressed on serious psychological distress. In model 4, we brought no diabetes and borderline/prediabetes (diabetes as reference group) back in as independent variables, controlling for all other aforementioned covariates. In model 5, we added an interaction term (Baron & Kenny, 1986) between no diabetes and borderline/prediabetes (diabetes as reference group) and controlled for all aforementioned covariates. To examine the association between the

dichotomous (i.e., no diabetes versus diabetes combined with borderline/prediabetes) and trichotomous versions of the diabetes variables across the models, we also used a likelihood ratio test and found no significant difference (p = 0.231). This finding supported our choice of using the trichotomous version of the diabetes variable to capture important qualitative differences between being borderline/prediabetic and having diabetes. We reported results of our inferential analysis using 95% confidence intervals and a α=0.05 as our threshold for statistical significance.

Results

Table 1 displays the results of the descriptive analysis. The majority of respondents reported no diabetes (81%), while only 15% and 4% reported a diabetes or borderline/prediabetes, respectively. By sex, respondents who reported no diabetes and those who reported diabetes were nearly split in half, while those that reported borderline/prediabetes were slightly more likely to be female (58%). Regarding educational status, those reporting positive diabetes and borderline/prediabetes diagnoses were nearly split in half, while those not reporting diabetes tended to have somewhat higher educational levels (59%). Overall, those who had partners tended to have higher percentages of diabetes (71%) and borderline/prediabetes (56%) than those who were not partnered. The largest discrepancies were among the mental health variables. Only 7% of diabetes, 6% of borderline/prediabetes, and 4% of no diabetes respondents scored positively for serious psychological distress. Furthermore, 7% of diabetes, 8% of no diabetes, and 15% of borderline/prediabetes had utilized a mental health professional in the past year. The relationship between diabetes status and having utilized a mental health professional is statistically significant (p-value = 0.031) using a chi-square test.

Table 1. Demographic Characteristics of NHPI Living in the US by Diabetic Status

Participant characteristics	**Diabetes status (N = 2587[a])**		
	Yes	**No**	**Borderline/prediabetes**
Total by diabetes status	381 (15%)	2111 (81%)	95 (4%)
Sex			
Male	193 (51%)	997 (47%)	40 (42%)
Female	188 (49%)	1114 (53%)	55 (58%)
Age			
18-54	132 (35%)	1521 (72%)	50 (53%)
55+	249 (65%)	590 (28%)	45 (47%)
Educational Status			
High school/GED & below	195 (52%)	866 (41%)	44 (46%)
Some college & above	183 (48%)	1240 (59%)	51 (54%)
Partnership Status			
Not partnered	109 (29%)	745 (36%)	41 (44%)
Partnered	264 (71%)	1349 (64%)	53 (56%)
Serious Psychological Distress			
Yes	25 (7%)	77 (4%)	6 (6%)
No	342 (93%)	1975 (96%)	87 (94%)
Saw mental health professional			
Yes	26 (7%)	159 (8%)	14 (15%)
No	351 (93%)	1935 (92%)	81 (85%)

[a] One person responded "refused" and two people responded "don't know" to the diabetes status questions. These individuals were coded as missing and were not counted in the analysis.

After we ran descriptive analyses, we ran chi-square tests on each of the variables with the outcome variable to assist in our choice of covariates. Table 2 shows the results of the multiple logistic regressions. We exponentiated our coefficients for greater ease in interpretation. The first model included age, sex, partnership status, and educational status. Having a partner and at least some college experience and higher predicted less serious psychological distress. Model 2 added the diabetes measures. Not having a diabetes diagnosis, having a partner and at least some college experience and higher predicted less serious psychological distress. Model 3 excluded diabetes measures, and included the mental health professional measure. Not seeing a mental health professional, having a partner and at least some college experience or higher predicted less serious psychological distress. Model 4

included all previously mentioned terms. Those who did not have diabetes were half as likely to experience serious psychological distress compared to those who did, adjusting for all other covariates. Model 5 added the interaction between having seen a mental health professional and the diabetes measures. While our previous chi-square tests revealed statistical significance for both the diabetes and the mental health therapist variables, adding the mental health therapist variable as an interaction effect on diabetes renders the previous statistically significant association no longer significant.

Table 2. Predictors of Serious Psychological Distress Among Diabetic NHPI Living in the US Who Saw or Talked to Mental Health Professional in the Past 12 Months

Participant Characteristics	Model 1 OR (95% CI)	Model 2 OR (95% CI)	Model 3 OR (95% CI)	Model 4 OR (95% CI)	Model 5 OR (95% CI)
No diabetes		0.500*** (0.327, 0.763)		0.485*** (0.309, 0.761)	0.717 (0.308, 1.668)
Borderline/prediabetes		0.859 (0.390, 1.891)		0.548 (0.233, 1.290)	0.781 (0.223, 2.729)
Ages 55+	1.102 (0.793, 1.531)	1.107 (0.796, 1.540)	0.995 (0.708, 1.400)	1.004 (0.713, 1.413)	1.001 (0.711, 1.409)
Female sex	0.892 (0.628, 1.268)	0.751 (0.518, 1.090)	0.916 (0.636, 1.319)	0.757 (0.512, 1.121)	0.770 (0.521, 1.139)
Partnered	0.555*** (0.400, 0.770)	0.542*** (0.390, 0.754)	0.644** (0.457, 0.908)	0.626** (0.443, 0.883)	0.626** (0.444, 0.883)
Some College +	0.514*** (0.368, 0.716)	0.530*** (0.380, 0.740)	0.486*** (0.344, 0.686)	0.508*** (0.358, 0.720)	0.502*** (0.354, 0.714)
No mental health professional			0.102*** (0.071, 0.146)	0.102*** (0.071, 0.146)	0.155*** (0.066, 0.364)
No diabetes, no mental health professional					0.590 (0.228, 1.526)
Borderline/prediabetes, no mental health professional					0.605 (0.104, 3.533)
Intercept	0.087*** (0.062, 0.121)	0.157*** (0.096, 0.259)	0.538** (0.349, 0.829)	1.026 (0.564, 1.866)	0.743 (0.319, 1.732)

Note: OR = odds ratio; CI = confidence interval

*$P < 0.1$; **$P < 0.05$; ***$P < 0.01$

Discussion

In this study, we hypothesized that there would be 1) an association between having a diabetes diagnosis and serious psychological distress, and that 2) having seen or talked to a

mental health professional would have an interacting effect on this association. Consonant with our first hypothesis that diabetes status was associated with serious psychological distress controlling for age, sex, marital status, and education status, people with diabetes were more likely to report serious psychological distress (model 4). These findings are reflected in national data surrounding the overall diabetes and increased likelihood of experiencing depression, anxiety, or diabetes distress (CDC, 2018). They were also reflected in American Indian data that showed a positive association between mental health symptoms and hyperglycemia (Walls et al., 2014) as well as localized data among Native Hawaiians that showed that high HbA1c levels were associated with depressive symptoms (Grandinetti et al., 2000). Furthermore, while having seen a mental health professional was not the predictor of interest for model 4, its statistical significance reveal that those who did see a mental health professional were around 10% more likely to have greater serious psychological distress. These results are also supported by a recent study (which included NHPI in its sample) that found that heightened diabetes-related stress was significantly and positively associated with seeking/receiving mental health treatment (Boden & Gala, 2018).

However, our second hypothesis—that having seen a mental health professional influences the association between diabetes status and serious psychological distress—did not have a statistically significant impact on a respondent's likelihood of scoring positive for serious psychological distress (model 5). While model 5 does show that those who don't report a diabetes or borderline/prediabetes diagnosis are around 41% and 40% (respectively) less likely to score positively for serious psychological distress than those who do have these diagnoses and do see a mental health professional, these associations are not statistically significant. However, these findings could illuminate another possible interpretation. First, given high levels of social

stigma associated with mental health (Subica et al., 2019; Yamada et al., 2019), self-report of mental health symptomatology may be less likely among NHPI. Within the NHIS, the NHPI study is the largest and only existing national health dataset of its kind, yet those who have seen a mental health professional are just a fraction of the sample—between 7 to 15% across those who do and do not have diabetes or borderline/prediabetes. National data among the general population similarly reveals that while mental health treatment is typically effective in reducing symptomatology, use of mental health treatment services among people with diabetes is nationally low (between one quarter and one half) (CDC, 2018). Yet, there is a shortage of mental health professionals in NHPI communities (Look, Trask-Batti, Mau & Kaholokula, 2013; Yamada et al., 2019), let alone those who are perceived as linguistically and culturally responsive (Yamada et al., 2019). Second, the Westernized nature of the serious psychological distress measure may be incongruent with NHPI cultural conceptions of mental wellness (McCubbin & Marsella, 2009). This is possibly reflected in the 4% (no diabetes), 6% (borderline/prediabetes) and 7% (diabetes) response rates of the sample that scored positively to having symptoms of serious psychological distress. Third, NHPI may also seek out other informal sources of mental health support through spirituality/religion and family relationships (Yamada et al., 2019), as well as a range of traditional healing practices (McCubbin & Marsella, 2009), yet these variables are often excluded from research studies. Thus, mental health stigma, potential cultural deficits in the serious psychological distress measure, and the exclusion of variables that account for non-Western-centric mental health supports, with small subsample of those who responded positively to the independent, dependent and potentially interacting variables could help explain the lack of significant results.

Limitations

There were several limitations inherent to this data set. Its cross-sectional design prohibited the possibility of investigating the temporal relationship between diabetes as an exposure and serious psychological distress as an outcome. Furthermore, its reliance on self-reported data could have introduced selection bias (i.e., potentially excluding those who chose not or could not respond) and information bias of study variables (i.e., mismeasurement or misclassification of study variables via recall bias or courtesy bias via the respondent's answering questions based on perceived interviewer expectations). Also, there were no additional questions in the dataset that assess other causes of psychological distress (e.g., other recent trauma in the past 30 days) that could have been adjusted for in the regression. Furthermore, the NHPI NHIS, as a publicly available dataset, excludes geographical details such as zip codes, state of residence or urban/rural setting, eliminating the possibility of considering settings-based health care distinctions by community and reducing potentially important variables for which to adjust (Narcisse et al., 2018). These limitations in the design posed greater risk for confounding.

Additionally, the small number of respondents who correspond positively to the independent, dependent and interacting variables gave limited statistical power to the estimation of the interaction, which thereby limited the model's ability to capture potential effects of the interaction. Consequently, the ternary nature of the interaction coupled with the scarcity of observations made the interaction somewhat imprecise. In addition, the statistically significant association between having seen a mental health professional and the serious psychological distress outcome variable could have further contributed to the interaction term's lack of statistical significance (Boden & Gala, 2018). These factors combined with potential

measurement error based on the aforementioned mental health stigma and lack of culturally relevant measurement tools (McCubbin & Marsella, 2019; Subica et al., 2019), could have contributed to the lack of statistical significance for our hypothesized interaction.

Future studies could collect both cross-sectional and longitudinal data from a larger sample of people with diabetes and serious psychological distress. Geographical details and additional variables targeting mental health status could be included. Furthermore, use of factor analysis, specifically latent class analysis, could help build a stronger latent structure from which to better account for measurement error, thereby allowing us to develop a measure that may provide more accurate and robust results. The development of culturally relevant measures of mental wellness by engaging community members in building constructs of mental wellness through use of community based participatory research approaches (McCubbin & Marsella, 2009; Panapasa et al., 2012) as well as including culturally grounded help seeking variables such as use of traditional healing practices (Subica et al., 2019; Yamada et al., 2019) in mental health research are important steps in this direction. Such approaches would respond to NHPI scholars' and clinicians' calls for more research to examine these relationships (Kaholokula et al., 2003; Winerman, 2004) as an initial step toward building this body of literature.

Public Health Implications

This study provides an initial glimpse into the mental health symptomatology and treatment of NHPI with diabetes, or borderline/prediabetes. It is the first to provide national estimates of associations between diabetes and mental health as comorbid heath conditions, as well as of mental health care utilization by NHPIs. Researchers, policy-makers, and practitioners should focus efforts on ensuring that mental health care services for NHPI with diabetes are culturally grounded and relevant to the NHPI population. This could increase the odds of mental

health care utilization and effective treatment for this population. By conducting exploratory research that examines the discourse surrounding mental health and well-being within the NHPI community, we can further understand cultural perspectives surrounding wellness. This could help reduce stigma that could impede access to and quality of care, and further support culturally relevant measurement development. Accordingly, assessing availability of and access to culturally appropriate treatment could be crucial in building the necessary infrastructure to improve mental health outcomes among NHPI with diabetes or borderline/prediabetes. While much work remains to be done, this study took initial steps in this direction.

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