Association of Self-reported Discrimination and Suicide Ideation in Older Chinese Americans

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Abstract

Objectives—This study examines racial discrimination as a potential novel risk factor for suicide ideation among older Chinese Americans.

Design—Cross-sectional analysis.

Setting—This study drew on data collected in the Population-based Study of Chinese Elderly in Chicago.

Participants—Chinese older adults age 60+ in the Greater Chicago area (N = 3,157).

Measurements—30-day suicide ideation was a dichotomous variable, derived from items of the Physical Health Questionnaire (PHQ) and the Geriatric Mental State Examination-Version A (GMS-A). Self-reported discrimination was dichotomously coded, based on the Experiences of Discrimination instrument, which asks respondents whether they have ever experienced discrimination in nine situations because of their race/ethnicity/color.

Results—About 4.1% of the sample reported 30-day suicide ideation and 21.5% reported discrimination. Self-reported discrimination was significantly associated with suicide ideation before and after adjusting for covariates including socio-demographic characteristics; neuroticism; social relationships; and physical, cognitive, and mental health. In the fully adjusted model, those who reported discrimination had 1.9 times higher odds (OR = 1.9, 95% CI = 1.18–3.08, Wald χ^2 = 6.9, df = 1, p = .01) of suicide ideation than those who did not.

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Conclusions—Chinese American seniors who reported discrimination had almost a two-fold greater odds of 30-day suicide ideation compared with those who did not. Clinicians need to recognize the impact of discrimination on ethnic minority elders. For those who report experiencing discrimination, assessment of suicide risk may be necessary. Efforts to promote civil rights and reduce discrimination may also be a form of primary prevention of suicide.

INTRODUCTION

In 2015 older adults constituted 14.9% of the population, but accounted for 17.9% of all suicide deaths.[1] Aside from those who completed suicide, many more harbor *suicide ideation*, thoughts of or preoccupation with ending one's own life. If suicide ideation is addressed properly, many older adults may avoid suicide attempts, which are more lethal among older adults than they are among younger people.[2] This study examines self-reported racial discrimination, unfair treatment related to one's racial/ethnic group membership, as a potential novel risk factor for suicide ideation among older Chinese Americans.

Discrimination is believed to be an external stressor that impairs physical and mental well-being. Multiple mechanisms, including allostatic load, diminished self-worth, reduced sense of belonging, diminished participation in healthy behavior, and reduced access to opportunities for upward mobility, may be involved in causing the harm.[3,4] Studies demonstrate that discrimination is associated with many health outcomes considered risk factors for suicide in older adults,[5] including depression, anxiety, psychological distress, substance use, chronic illnesses, disease burden, and bodily pain.[4,6,7] Perceived discrimination has also been shown to be associated with loneliness,[8] a condition that indicates social disconnectedness which has been proposed to be a proximal cause of suicide thought.[9] A few studies, using younger samples, report significant associations between discrimination and suicide. One found that discrimination was related to suicide ideation among Latino and Asian college students,[10] and another reports that perceived discrimination was associated with suicide attempts in Latino and white youth.[12] No studies have examined the association between discrimination and suicidal behavior in older adults.

For three reasons we investigate older Chinese Americans in the present study. First, the prior literature on younger persons may not apply to older persons: Risk factors for suicide differ by age,[2] and response to discrimination may vary across the life course.[12] Second, many past studies of Asian Americans were conducted using aggregated samples. Such aggregation may mask important subgroup differences. Third, the Chinese American population is rising and aging quickly. In 2015, 4.1 million Chinese lived in the United States, up from 2.9 million in 2005.[13] About 11% of the Chinese American population was 65+ in 2010, and the proportion was expected to increase exponentially.[14] To date, little research has examined this growing elderly population.

We know little about suicidal behavior in older Chinese Americans. Data from the Population-based Study of Chinese Elderly in Chicago (PINE), the largest epidemiological

study of older Chinese Americans to date, suggest that 2-week, 12-month, and lifetime rates of suicide ideation among older Chinese Americans were 3.5%, 4.8%, and 9.4%, respectively.[15] A study of Asian American adults (age 18+) reports that Chinese individuals were more likely to have lifetime suicide ideation than respondents in other Asian groups.[16] Regarding completed suicide, available statistics do not provide breakdowns for Chinese Americans. But Asians had the highest suicide rate (6.4/100,000) of all women age 65+ of all racial/ethnic groups in the United States during 2002–2009.[17] Among older men, the rate for Asians was 13.8/100,000, but whites had the highest rate at 33.2/100,000. Elder suicide rates are more than double in China than in the United States, reported at 34.5 and 16.6 per 100,000 among people age 65+ in recent years, respectively.[1,18]

Risk factors for suicide among Chinese American elders are largely unknown, but some insights might be gained from elders in China.[18–20] Socio-demographic risk factors for elder suicide in China include male gender, advanced old age, low education, financial strain, and —relatively unique to China—rural (vs. urban) residence. Psychiatric problems, particularly elevated depressive symptoms, and poor physical health, including disease burden and painful illnesses, are associated with suicidal behavior among older adults in China. Relationships with family, especially family conflict and family support, were considered important risk and protective factors for suicidal behavior among Chinese elders globally.

In this study, we focus on the relationship between self-reported discrimination and 30-day suicide ideation among older Chinese Americans. We hypothesize that those who report experiencing racial/ethnic discrimination are more likely to have 30-day suicide ideation. As prior research has demonstrated significant relationships between discrimination and risk factors of suicide in older adults,[4,6,8,21] we examine the extent to which social relationships, and physical and mental health account for the association between discrimination and suicide ideation. We expect discrimination to be significantly associated with suicide ideation, independent of those risk factors.

METHODS

Data and Sample

This analysis used data from the PINE study, which interviewed 3,157 Chinese adults age 60+ living in the Greater Chicago area.[22] The interviews were conducted in respondents' homes, using their preferred language (Chinese, English) and dialect (Cantonese, Taishanese, Mandarin, Teochew). Employing a community-based participatory research approach, the PINE team used social-service agencies, health clinics, faith-based organizations, senior apartments and social clubs that serve Chicago's Chinese community as recruitment sites. The PINE study was widely promoted in the local Chinese newspaper and through flyers in public places frequented by Chinese people. Of 3,542 eligible Chinese older adults approached, 3,157 participated, yielding a response rate of 89%. Demographic characteristics of the PINE sample were comparable to those from a random street-block census of the Chinese community in Chicago and the 2010 U.S. Census.[23] The University of Michigan Institutional Review Board approved the present study (HUM00115566).

Variables and Measures

*Suicide ideation in the past month (*i.e., *30-day suicide ideation)* was derived from two instruments. The first is item nine of the Patient Health Questionnaire (PHQ): "Thoughts that you would be better off dead, or of hurting yourself in some way" in the past two weeks.[24] Response categories include not at all (0), several days (1), more than half the days (2), and nearly every day (3). The second is the Geriatric Mental State Examination-Version A (GMS-A), a semi-structured interview designed for older persons.[25] Items include: "Have you ever felt suicidal or wished to be dead for at least two weeks in the last month?" and "Have you ever felt suicidal or wished to be dead sometime in the last month?" Endorsement of any GMS-A items, or responses ranging from 1 to 3 on the PHQ item, were classified as having 30-day suicide ideation. To test the robustness of our model, we repeated the analysis using 2-week suicide ideation (111 affirmative responses) as the dependent variable and the results (Supplemental Table 1) are similar to those reported below.

Self-reported discrimination was measured with the race/ethnicity-specific Experiences of Discrimination instrument.[26] It asks respondents whether they have experienced discrimination in nine situations because of their race/ethnicity/color. Situations include: at school, getting hired, at work, getting housing, getting medical care, getting service in stores or restaurants, getting credit/bank loan/mortgage, on street/in public settings, and from police/in courts. We operationalized discrimination as a dichotomous measure (1=any experiences, 0=no experience) in lieu of counting the experiences due to skewed distribution (mean = .29, SD = .66, range = 0–8).

Socio-demographic characteristics included age, gender, education, income, marital status, and years in the United States. Education was measured as years of schooling. Income was measured in 10 categories, from < \$5,000 (= 1) to \$100,000+ (= 10). Marital status had three categories: currently married/having a romantic partner, separated/divorced, and widowed.

Neuroticism was used to indicate personality traits. The measure consists of six items derived from the NEO Five-Factor Inventory (Cronbach's alpha or α = .64).[27]

Social relationships had three components: positive family support, negative family interaction, and loneliness. Positive family support was assessed by two items: opening up to family members and relying on them for help (α = .76). Negative family interaction was assessed by another two items: family members make too many demands and criticize them (α = 60). Loneliness was assessed using a three-question survey derived from the Revised University of California at Los Angeles Loneliness Scale.[28] The questions asked about feeling a lack of companionship, left out of life, and isolated from others (α = .78).

Health factors included physical, cognitive, and mental health status. Physical health was indicated by two variables—disease burden and bodily pain. The former was measured by the number of diseases, among nine (e.g., heart disease, diabetes, cancer), that respondents had received a professional diagnosis. We assessed pain using a single item: How much bodily pain have you had during the past 4 weeks? Response ranged from none (1) to very severe (6). Cognitive status was assessed by the Chinese Mini-Mental State Exam (C-MMSE) which has been validated in Chinese older adults in Hong Kong.[29] Mental health

was indicated by clinically significant depressive symptoms (hereafter, *depression*) and anxiety symptoms. Depression was assessed with eight items (excluding item nine) of the Patient Health Questionnaire (PHQ-8), which ask respondents about depressive symptoms experienced in the previous two weeks (e.g., little interest or pleasure in doing things; α = . 82).[24] PHQ-8 scores were sum of the eight items. Depression was defined as PHQ-8 scores 10 or higher (= 1). Anxiety was assessed by the Hospital Anxiety and Depression Scale-Anxiety (HADS-A).[30] The scale included seven items (e.g., felt tense or wound up) rated on a 4-point scale (α = .80).

Data Analysis

We used chi-squared analyses and t-tests to compare those who reported 30-day suicide ideation and those who did not on all study variables. Logistic regression, with 30-day suicide ideation as the dependent variable, was then conducted. We first estimated the association between discrimination and suicide ideation adjusting for socio-demographic characteristics and neuroticism. Then we examined how the addition of each of these three sets of variables: social relationships, physical health and cognitive function, and mental health indicators, in the model influenced the estimate of discrimination. The last model included all covariates so to examine the association between discrimination and suicide ideation independent of other risk factors for suicide. We used complete case analysis (N = 2,893) for the logistic regression analysis. The participants we dropped (n = 264, 8.4% of original sample), compared to the analyzed sample, were likely to be older, women, widowed, have lower education, and have been in the U.S. for a longer time. Statistical significance was set at p < .05 (2-tailed). Multicollinearity was not found to be an issue in our models. Stata 14 was used for all analyses.[31]

RESULTS

Participants averaged 72.3 years old; more than half (57.7%) were female and 72% were married or had a romantic partner (Table 1). On average, respondents had 8.7 years of schooling and had lived in the U.S. for about 20 years. About 4.1% (n = 129) of the sample had 30-day suicide ideation and about 21.5% (n = 671) reported discrimination.

Bivariate Correlations between Suicide Ideation and Other Study Variables

Table 2 shows bivariate associations. Those reporting discrimination were significantly more likely than those who did not to have 30-day suicide ideation (Pearson χ^2 = 18.3, df = 1, p < .001). In addition, those reporting suicide ideation and those not were significantly different in almost all covariates: The former were more likely to be older, female, widowed, and have lower education and income, higher levels of neuroticism, weaker social relationships (fewer positive and more negative family interactions, greater loneliness), more physical health problems (disease burden and bodily pain), lower cognitive function, and more mental health problems (anxiety symptoms and depression).

Multivariate Logistic Regression Results

Without any adjustment, the odds of having 30-day suicide ideation for those who reported discrimination were more than two times of those who did not (OR = 2.19, 95% CI = 1.48 –

3.24, Wald χ^2 = 15.4, df = 1, p < .001). After controlling for neuroticism and sociodemographic characteristics including age, gender, education, income, marital status, and years in the U.S. (Table 3, Model 1), those reporting discrimination still had 2.2 times higher odds of having 30-day suicide ideation (y-standardized coefficient[a] = .54, Wald χ^2 = 12.5, df = 1, p < .001). Using Model 1 as the base model, adding social relationship variables in the model reduced the y-standardized coefficient for discrimination by about 20% (y-standardized coefficient = .43, Wald χ^2 = 7.95, df = 1, p = .005; Model 2, Table 3). The y-standardized coefficient here represents differences between those reporting and not reporting discrimination in log odds of suicide ideation in standard deviation units. When physical health and cognitive function variables were added to Model 1, the coefficient for discrimination was reduced about 13% (y-standardized coefficient = .47, Wald χ^2 = 10.18, df = 1, p = .001; Model 3). But the entry of mental health indicators including anxiety symptoms and depression had little effects on the association between discrimination and suicide ideation (y-standardized coefficient = .57, Wald χ^2 = 13.1, df = 1, p < .001; Model 4). The final model (Model 5) adjusts for all covariates including sociodemographic characteristics, neuroticism, social relationships, and physical, cognitive, and mental health indicators. Discrimination was associated with 1.9 times higher odds (y-standardized coefficient = .4, Wald χ^2 = 6.9, df = 1, p = .01) of suicide ideation in the fully adjusted model.

Table 3 also shows that after adjusting for all other independent variables, age, positive family support, loneliness, pain, anxiety symptoms, and depression were significantly associated with 30-day suicide ideation (Model 5). Specifically, for each year older, the odds of having 30-day suicide ideation increased 4%. Older Chinese adults with more positive family support were less likely to harbor suicidal thoughts; whereas those feeling greater loneliness, having more severe pain and anxiety symptoms, and suffering from depression were more likely to have suicide ideation.

DISCUSSION

We found that 4.1% of the sample had 30-day suicide ideation. In comparison, 2.7% of Americans age 50+ reported 12-month suicide ideation in 2013.[32] The relatively high rate in the PINE sample may be due partly to measurement of suicide ideation. In particular, item-9 of the PHQ may have picked up both passive (death wishes) and active suicide ideation. However, from a clinical perspective, passive suicide ideation is still of great concern.[33] Previous studies indicate that PHQ item-9 predicts suicide attempts and suicide deaths over 30 days and over one and two years in adult outpatients.[34,35] More importantly, our analysis shows that 30-day suicide ideation is significantly associated with self-reported discrimination in older Chinese Americans, independent of socio-demographic characteristics, neuroticism, social relationships, and physical, cognitive and mental health.

While our study expands the literature about the role discrimination plays in suicide ideation, it is necessary to understand the findings in cultural context. The current cohort of

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[a]In logistic regression, the variance of the dependent variable changes when additional variables are entered to the model. The y-standardized coefficient maintains the same scaling of the dependent variable (i.e., standard deviation) across nested models.

older Chinese Americans is comprised primarily of immigrants; their culture emphasizes interpersonal harmony and honor. Among older Chinese Americans, discrimination encounters may not only invoke a sense of alienation and helplessness, and they may mean loss of face and honor, which is particularly distressful for Chinese.[36] Assimilation difficulty, cultural beliefs, and family pride may preclude them from seeking help. Consequently they may come to see suicide as a viable alternative.[37] It has also been suggested that the Chinese culture is relatively permissive regarding suicide, justifying it in moral terms such as "redeeming oneself from disgrace."[19] Such cultural attitudes may increase Chinese older adults' susceptibility to suicide ideation when dealing with discrimination-associated stress. Given cultural differences among racial/ethnic groups in the United States, it is possible that the association between discrimination and suicide ideation varies across racial/ethnic groups. Indeed, a meta-analysis reports that effect size of the association between racism and depression among Asian Americans was significantly larger than that among African Americans, and the former had the largest effect size of all racial/ethnic groups studied.[4]

In the logistic regression models, we found that social relationships account for some of the association between self-reported discrimination and suicide ideation. But caution is needed in interpreting the finding. It may be due to confounding bias, for example, people with weak social relationships may be more likely to interpret unpleasant encounters as discriminatory as well as having high suicide risks. It is also possible that experiences of discrimination affect interpersonal behaviors or perceptions of social relationships, which then affect suicide ideation. More research is needed to understand how social relationships play a role in the association between discrimination and suicide ideation.

Depression and anxiety explain very little the discrimination-suicide ideation association. But they are significant correlates of suicide ideation, even after adjusting for other covariates. A prior study of Asian American adults found that perceived discrimination is significantly correlated with lifetime suicide ideation and attempt, adjusting for depressive and anxiety disorders.[16]. Among physical and cognitive health indicators, pain is the only one significantly associated with suicide ideation and the variable accounting for some of the discrimination-suicide ideation association. However, the same caution mentioned above applies here. Overall, the findings suggest that physical and mental health problems are not likely the major pathways linking discrimination and suicide ideation.

In sum, the finding that self-reported discrimination increases risks of suicide ideation independent of known risk factors of suicide among older adults is novel. We also found that age, loneliness, pain, anxiety symptoms, and depression are significant risk factors; positive family support is a protective factor, of suicide ideation in older Chinese Americans. These findings are largely consistent with the literature on elder suicide in China and the U.S.[5,19,20]

Several limitations of the study should be noted. First, it is possible that suicide ideation shapes reports of discrimination. People with suicidal ideation may be preoccupied with negative thoughts and may interpret some social interactions as discriminatory. We tried to minimize the possibility that measurement of suicide ideation precedes experiences of discrimination by using 30-day suicide ideation as the dependent variable. However, the

cross-sectional data do not permit the evaluation of temporal order or causal relationship. Second, suicide ideation is likely to be under-reported, as death and suicide are taboo subjects in Chinese culture.[38] Third, our measurement of self-reported discrimination may be biased, particularly under-reporting bias given that interpersonal and inter-group harmony a is core Chinese cultural value.[10] Additionally, participants' response to the questions on the Experiences of Discrimination instrument may be influenced by experiences of other forms of discrimination, such as age discrimination. Finally, our sample was drawn from the older Chinese American population in a Midwestern city and may not reflect experiences of those in rural areas and other parts of the country. We may also have under-estimated the prevalence of suicide ideation as the participants dropped from the analysis, compared to the analyzed sample, were more likely to be older, women, low educated and widowed—characteristics associated with suicide ideation risks.

Despite these caveats, our study has several notable strengths. First, it is one of few studies with large samples of an older Asian American group. Thus, it overcomes a key problem limiting past studies: a sample large enough to reliably study the relatively rare outcome of recent suicide ideation. Second, by focusing on the specific subgroup of Chinese Americans, this study avoids some heterogeneity biases that occur in studies aggregating multiple Asian American groups into a single category. Third, this study improves on past studies of discrimination and mental health by controlling for personality traits (neuroticism) which may be common causes between reports of discrimination and suicide ideation. Most prior studies control for demographic factors, but relatively few control for personality measures. Moreover, we estimated the effects of discrimination on suicide ideation independent of known risk factors for suicide in older adults including loneliness, depression, anxiety and physical health problems.

This is the first study to report associations between discrimination and suicide ideation in older adults. Further research is needed to understand their relationship in different racial/ethnic groups of older adults. In particular, longitudinal studies are needed to clarify causal relationships, understand linking mechanisms, and identify factors that can buffer adverse effects of discrimination on suicidal behavior. Such efforts would provide important information for suicide prevention in ethnic minority elderly populations. Moreover, the relationship between suicide ideation and other forms of discrimination such as ageism should be examined, considering that older people have high rates of suicide in many parts of the world.[39]

Although our findings are preliminary, they have potential implications for clinical practice. First, clinicians need to recognize their racial/ethnic stereotypes and the impact of discrimination on ethnic minority elders. Implicit stereotypes are particularly challenging; detection requires diligent self-reflection. Second, it takes a certain level of knowledge to recognize ambiguous encounters as discrimination. Clinicians may provide psycho-education to help older clients—particularly racial/ethnic minority clients—identify discrimination, reduce self-doubt, feel less isolated, and learn appropriate coping strategies. Third, clinicians should validate older adults' experience when they share discrimination encounters: Ageism may play a role in responding to discrimination accounts. Finally, older adults reporting discrimination experiences may need suicide risk assessment. Clinicians

should be aware of racial/ethnic differences in self-disclosure of suicide ideation. Asian Americans have been referred to as "hidden ideators" unlikely to disclose suicide ideation without prompting.[38]

CONCLUSIONS

This study identifies discrimination as a risk factor for suicide ideation among older Chinese Americans. Findings suggest that health professionals should take seriously minority older adults' reports of discrimination as potential risk factors for suicide and other mental health problems. Moreover, data imply that efforts to promote civil rights and reduce discrimination may be a form of primary prevention.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

Acknowledgments

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Highlights

- Self-reported discrimination is significantly associated with suicide ideation in older Chinese Americans.

- The association is independent of known risk factors for suicide among older adults including neuroticism, loneliness and depression.

- Efforts to promote civil rights and reduce discrimination may be a form of primary prevention of suicide.

Table 1

Descriptive Statistics of Study Variables

Variable	Mean ± SD	N (%)	Range	Valid N
30-day suicide ideation (yes)		129 (4.1)	0–1	3,128
Self-reported discrimination (yes)		671 (21.5)	0–1	3,123
Age (in years)	72.3 ± 8.3		60–105	3,157
Gender (female)		1,822 (57.7)	0–1	3,157
Education (in years)	8.7 ± 5.1		0–26	3,138
Income	1.9 ± 1.1		1–10	3,121
Marital status Married Separated/Divorced Widowed		2,242 (71.5) 128 (4.1) 766 (24.4)	0–1 0–1 0–1	3,136
Years in US	20.0 ± 13.1		1–88	3,152
Neuroticism	14.1 ± 4.0		6–30	3,098
Positive family support	4.9 ± 1.2		2–6	3,143
Negative family interaction	2.2 ± .6		2–6	3,140
Loneliness	.6 ± 1.2		0–6	3,127
Disease burden	1.9 ± 1.4		0–7	3,157
Bodily pain	2.4 ± 1.5		1–6	3,157
Cognitive function	25.3 ± 4.7		0–30	3,048
Anxiety symptoms	9.7 ± 3.3		7–28	3,067
Depression (PHQ-8 >= 10)		229 (7.4)	0–1	3,099

Table 2

Characteristics of Participants with and without 30-day Suicide Ideation

	30-day Suicide Ideation		Test Value (df)	p-value
	Yes **N = 129**	**No** **N = 2,999**		
Self-reported discrimination, N (% yes)	47 (36.7)	620 (20.9)	$\chi^2 = 18.3$ (1)	< .001
Socio-demographics & personality				
Age, mean (SD)	74.5 (8.8)	72.1 (8.2)	t = −3.2 (3,126)	.001
Gender, N (% female)	99 (76.7)	1,704 (56.8)	$\chi^2 = 20.1$ (1)	< .001
Education, mean (SD)	7.6 (5.4)	8.8 (5.0)	t = 2.6 (3,115)	.01
Income, mean (SD)	1.7 (.7)	2.0 (1.2)	t = 3.8 (159)[a]	<.001
Marital status, N (% Married Separated/Divorced Widowed	67 (52.3) 8 (6.3) 53 (41.4)	2,158 (72.4) 120 (4.1) 701 (23.5)	$\chi^2 = 24.6$ (2)	< .001
Years in US, mean (SD)	21.4 (12.6)	19.9 (13.2)	t = −1.3 (3,121)	.20
Neuroticism, mean (SD)	17.8 (5.0)	14.0 (3.9)	t = −8.5 (131)[a]	< .001
Social relationships				
Positive family support, mean (SD)	4.3 (1.3)	4.9 (1.2)	t = 5.3 (3,119)	< .001
Negative family interaction, mean (SD)	2.4 (.8)	2.2 (.5)	t = −3.0 (133)[a]	.003
Loneliness, mean (SD)	2.1 (2.0)	0.5 (1.1)	t = −8.8 (128)[a]	< .001
Health factors				
Disease burden, mean (SD)	2.3 (1.5)	1.9 (1.4)	t = −3.6 (3,126)	< .001
Bodily pain, mean (SD)	3.4 (1.6)	2.3 (1.5)	t = −8.4 (3,126)	< .001
Cognitive function, mean (SD)	23.5 (5.4)	25.4 (4.6)	t = 3.6 (123)[a]	< .001
Anxiety symptoms, mean (SD)	14.0 (5.0)	9.5 (3.0)	t = −10.1 (128)[a]	< .001
Depression, N (% yes)	56 (45.2)	173 (5.8)	$\chi^2 = 269.1$ (1)	< .001

Note. Figures and statistics presented are based on cases with valid values on the variables involved. Categorical variables are analyzed using χ^2 statistics and continuous variables are analyzed using independent samples t-tests.

[a] Unequal variances (Welch) t-test is used.

Table 3

Association Between Self-reported Discrimination and 30-day Suicide Ideation (N = 2,893)

	Model 1 OR (95% CI), p-value	Model 2 OR (95% CI), p-value	Model 3 OR (95% CI), p-value	Model 4 OR (95% CI), p-value	Model 5 OR (95% CI), p-value
Self-reported discrimination (omitted: no)	2.22 (1.43, 3.44), <.001	1.95 (1.22, 3.09), .005	2.08 (1.33, 3.26), .001	2.34 (1.48, 3.71), <.001	1.9 (1.18, 3.08), .01
Socio-demographics & personality					
Age	1.04 (1.02, 1.07), .002	1.04 (1.02, 1.07), .003	1.04 (1.01, 1.07), .01	1.04 (1.01, 1.07), .01	1.04 (1.01, 1.07), .01
Gender (omitted: male)	1.65 (1.03, 2.65), .04	2.03 (1.24, 3.01), .005	1.46 (.91, 2.36), .12	1.38 (.84, 2.25), .21	1.57 (.94, 2.6), .08
Education	.98 (.94, 1.02), .39	.96 (.92, 1), .07	1 (.95, 1.05), .95	1 (.93, 1.01), .17	.96 (.92, 1.01), .16
Income	.71 (.53, .94), .02	.73 (.54, 1), .05	.73 (.55, .98), .04	.78 (.58, 1.05), .1	.81 (.6, 1.1), .19
Marital status (omitted: married) Separated/Divorced Widowed	1.87 (.84, 4.18), .12 1.62 (.99, 2.64), .06	1.37 (.59, 3.2), .47 1.13 (.68, 1.9), .63	1.59 (.7, 3.61), .26 1.2 (.93, 2.5), .1	2.07 (.9, 4.75), .09 1.51 (.9, 2.52), .11	1.43 (.6, 3.44), .42 1.16 (.68, 1.98), .58
Years in US	1 (.98, 1.02), .99	1 (.99, 1.01), .41	1 (.98, 1.02), .81	1 (.98, 1.02), .93	1 (.98, 1.01), .62
Neuroticism	1.2 (1.15, 1.26), <.001	1.11 (1.06, 1.17), <.001	1.19 (1.13, 1.24), <.001	1.05 (.99, 1.11), .09	1.0 (.97, 1.08), .43
Social relationships					
Positive family support		.78 (.67, .91), .001			.8 (.68, .94), .01
Negative family interaction		1.3 (1, 1.69), .05			1.3 (.98, 1.71), .07
Loneliness		1.53 (1.36, 1.73), <.001			1.29 (1.13, 1.48), <.001
Physical health & cognitive function					
Disease burden			1.04 (.9, 1.19), .6		1.05 (.9, 1.21), .54
Bodily pain			1.35 (1.18, 1.54), <.001		1.27 (1.1, 1.46), .001
Cognitive function			.97 (.93, 1.02), .19		1 (.95, 1.05), .94
Mental health					
Anxiety symptoms				1.15 (1.09, 1.22), <.001	1.11 (1.05, 1.18), <.001
Depression				3.82 (2.25, 6.46), <.001	2.7 (1.58, 4.59), <.001

Note.

[a] Models 1–5 are logistic regression models.

[b] OR: Odds Ratio; 95% CI: 95% Confidence Interval. Wald tests (df = 1) are used.