Poverty and Suicidal Ideation Among Hispanic Mental Health Care Patients Leading up to the COVID-19 Pandemic

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Abstract

Introduction: Suicide rates have risen in Hispanic communities since 2015, and poverty rates among Hispanics often exceed the national average. Suicidality is a complex phenomenon. Mental illness may not alone explain whether suicidal thoughts or behaviors will occur; it remains uncertain how poverty affects suicidality among Hispanic persons with known mental health conditions. Our objective was to examine whether poverty was associated with suicidal ideation among Hispanic mental healthcare patients from 2016 to 2019. **Methods:** We used de-identified electronic health record (EHR) data from Holmusk, captured using the MindLinc EHR system. Our analytic sample included 4,718 Hispanic patient-year observations from 13 states. Holmusk uses deep-learning natural language processing (NLP) algorithms to quantify free-text patient assessment data and poverty for mental health patients. We conducted a pooled cross-sectional analysis and estimated logistic regression models. **Results:** Hispanic mental health patients who experienced poverty had 1.55 greater odds of having suicidal thoughts in a given year than patients who did not experience poverty. **Conclusion:** Poverty may put Hispanic patients at greater risk for suicidal thoughts even when they are already receiving treatment for psychiatric conditions. NLP appears to be a promising approach for categorizing free-text information on social circumstances affecting suicidality in clinical settings.

Keywords

public health, suicide, poverty, social determinant, Hispanic-Americans, Latino populations

Introduction

Suicide is one of the leading causes of death in the United States, where over 40,000 lives have been lost to suicide in each of the past 9 years (Centers for Disease Control, 2020). While suicide has historically been more common in non-Hispanic white communities, Hispanic suicide rates increased by 26.7% from 2015 to 2020 (Centers for Disease Control, 2020), compared to a 0.1% rise in non-Hispanic suicide rates over the same period. Notably, the US Hispanic population is expected to double by 2060 (Colby & Ortman, 2014). Despite this population growth, suicide risks remain understudied for Hispanic populations in the United States (Brenes et al., 2022; Silva & Van Orden, 2018).

Suicide risks experienced by Hispanic populations are often driven by social determinants, including mental health stigma, discrimination, acculturation, and language or literacy challenges (Eghaneyan & Murphy, 2020; Flavin et al., 2018; Goldmann et al., 2017; Goldstein et al., 2022). Suicide risks can also vary across nationalities and immigration status (Goldstein & Wilson, 2022; Silva & Van Orden, 2018), as do lifetime suicidality rates (Borges et al., 2012). In contrast, close familial relationships and parental and familial bonding

have been related to suicide resiliency in Hispanic communities (Borowsky et al., 2001).

Poverty is often thought to exacerbate psychiatric symptoms and suicidal thoughts (Franklin et al., 2017; Sareen et al., 2011), and economic disadvantage may lead to social isolation and alienation, factors long-associated with suicide (Durkheim, 1952). This is particularly concerning for Hispanic populations because, on average, Hispanics in the United States experience poverty at greater rates than non-Hispanic white persons (Kaiser Family Foundation, 2020). Previous studies using

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area-level proxies for measuring poverty have demonstrated that Hispanic communities have higher suicide rates when they are economically worse off (Wadsworth & Kubrin, 2007). However, Martinez (2002, p. 133) has reasoned that "attachments to the world of work even through subsistence-paying jobs are part of the bond that fortifies Latino communities and helps them absorb the shock of widespread poverty." Although poverty has been associated with psychological distress in Hispanic adults (Becerra et al., 2015), it remains uncertain how poverty affects or exacerbates suicidal ideation in Hispanic persons with experiencing mental health conditions.

Psychological distress from economic problems and suicidal ideation are commonly presented in clinical settings. Our objective was to use real-world health data from a large sample of Hispanic mental health care patients to examine whether experiencing poverty was associated with suicidal ideation from 2016 through 2019, a period of increasing suicide rates in Hispanic populations leading up to the COVID-19 pandemic. We also sought to report whether natural language processing (NLP) is a useful strategy for categorizing free-text information on poverty among mental health patients.

Methods

Data

We used de-identified electronic health record (EHR) data from Holmusk, captured using the MindLinc EHR system through routine clinical care across 23 behavioral health systems, including inpatient and outpatient settings, from the following states: Arizona, Colorado, Connecticut, Georgia, Illinois, Indiana, Missouri, New York, North Carolina, Pennsylvania, South Dakota, Virginia, and Wisconsin. Clinicians often document suicidal ideation using free-text notes rather than standardized diagnostic codes (Anderson et al., 2015). This approach often lacks standardization and makes it challenging to identify patients who experience suicidal thoughts in research. To overcome this limitation, Holmusk uses deep-learning NLP algorithms to quantify free-text patient assessment information and information about social circumstances. The Supplemental material provides information about Holmusk and MindLinc EHR system.

Analytic Sample

For each year, we included all Hispanic patients seen for any mental health service who had free-text patient assessment and social circumstance information coded in the Holmusk database. Conducting complete case analysis, we examined 4,718 Hispanic patient-year observations from 2016 through 2019 (representing 3,551 unique Hispanic mental health patients).

Variables

Our dependent variable was a binary indicator equal to 1 if a patient experienced suicidal ideation in a calendar year and 0 if the patient did not experience suicidal ideation, derived from a Mental Status Examination. Our explanatory variable was a binary indicator equal to 1 if a patient experienced poverty during the year and 0 if the patient did not experience poverty, organized according to Axis IV categories from the Multiaxial Assessment workflow used to describe psychosocial and environmental factors affecting a patient.

Both variables were constructed using free-text clinical assessment notes from mental health practitioners using Holmusk's NLP algorithms (Mukherjee et al., 2020). For example, if a clinician observed or learned that a patient experienced poverty, poverty would be documented in the patient's record, then coded numerically by the deep-learning NLP approach. Additional details about the NLP approach are provided in the Supplemental material.

To adjust for potential confounding factors, we included additional covariates available in the Holmusk database: age, gender, and years of education for each patient-year.

Analysis

We conducted a pooled cross-sectional analysis with the patient-year as the unit of analysis. We performed a chi-square test and estimated multivariable logistic regression models to examine the relationship between experiencing poverty and suicidal ideation during a calendar year. Our baseline logistic regression model adjusted for year to account for different patient population distributions across years (model 1). A second logistic regression model adjusted for our additional covariates (model 2). For ease of interpretation, we present the logistic regression model coefficients as the odds a patient in our study experienced suicidal ideation in a calendar year.

Data were analyzed using Holmusk's NeuroBlu Research platform (Holmusk, 2022). The Institutional Review Board at the University of Utah deemed this study of anonymized data as nonhuman-subject research (IRB_00146399). A waiver of informed consent was obtained prior to study by Holmusk (WCG-IRB Reference #1-1470336-1).

Results

In our analytic sample, about 18.0% (n = 847) of Hispanic mental health patients experienced suicidal ideation, and 19.1% (n = 903) of the patients experienced poverty. About 21.2% (n = 191) of Hispanic mental health patients who experienced poverty also experienced suicidal ideation, compared to 17.2% (n = 656) of the patients who did not experience poverty ($p < .01$). Table 1 further describes the characteristics of our analytic sample.

Estimates from our baseline logistic regression model showed Hispanic patients who experienced poverty had 1.38 greater odds of having suicidal thoughts in a given year than Hispanic patients who did not experience poverty ($p < .001$; Table 2; model 1). After further adjusting for age, gender, and years of education, we estimated that Hispanic mental health patients who experienced poverty had 1.55 greater odds of having suicidal thoughts in a given year than

Table 1. Characteristics of the Pooled Analytic Sample: 2016 to 2019.

	Full sample (n = 4,718)	Patients who experienced suicidal ideation (n = 847)	Patients who did not experience suicidal ideation (n = 3,871)
Poverty, n (%)			
Experienced poverty	903 (19.1)	191 (22.6)	712 (18.4)
Did not experience poverty	3,815 (80.9)	656 (77.4)	3,159 (81.6)
Sex, n (%)			
Male	2,315 (49.1)	333 (39.3)	1,982 (51.2)
Female	2,403 (50.9)	514 (60.7)	1,889 (48.8)
Age in years (SD)	29.08 (16.57)	26.88 (15.54)	29.56 (16.77)
Years of education (SD)	6.89 (6.79)	7.93 (6.62)	6.66 (6.81)

Notes. Authors' analysis of Holmusk data from 2016 to 2019. These characteristics are summarized for the full analytic sample (column 1), the patients who experienced suicidal ideation (column 2), and the patients who did not experience suicidal ideation (column 3). Sex and poverty are described as counts for each category, and percentages for each category are shown in parentheses. Unadjusted mean values are shown for the age and years of education variables over the study period, with standard deviations in parentheses.

Table 2. Odds Ratios From Multivariable Logistic Regression Models Estimating the Relationship Between Poverty and Suicidal Ideation in the Pooled Analytic Sample: 2016 to 2019.

	Model 1		Model 2	
Variable	Odds ratio	95% CI	Odds ratio	95% CI
Experienced poverty	1.38**	1.14, 1.65	1.55**	1.28, 1.88
Age (years)			0.98**	0.98, 0.99
Sex				
Male			Reference	
Female			1.68**	1.44, 1.96
Education (years)			1.03**	1.02, 1.04
Year				
2016	Reference		Reference	
2017	1.43**	1.19, 1.71	1.39**	1.16, 1.67
2018	1.75**	1.38, 2.20	1.77**	1.40, 2.24
2019	1.66**	1.31, 2.10	1.76**	1.39, 2.23

Notes. Authors' analysis of Holmusk data from 2016 to 2019. We established an a priori significance level of 0.05.
** A statistically significant difference at a level <0.001. Both models analyzed 4,718 observations.
CI: confidence interval.

Hispanic patients who did not experience poverty ($p < .001$; model 2). We also found that female patients were more likely than males to have suicidal thoughts, when adjusting for all other factors including poverty (adjusted odds ratio = 1.68, $p < .001$).

Discussion

Suicide is a complex public health problem with biological, psychological, and social contributors. Mental illness is a particularly salient suicide risk factor. One recent study found that over half (60.5%) of Hispanic patients experienced depression in 2 years prior to a suicide attempt (Messias et al., 2022). However, Hispanic persons are often less likely to utilize mental health services compared to non-Hispanic white persons (Walker et al., 2015). Although psychotherapy and pharmacological treatment may help prevent suicide (Mann et al., 2005), our findings suggest that experiencing poverty

may put Hispanic patients at greater risk for suicidality even when they are already receiving treatment for mental illness. These findings underscore the need for further research on identifying risk factors that overlap with and exacerbate the relationship between mental health and suicidality in Hispanic communities.

Measuring social risk factors in clinical settings can be challenging. To that end, our study suggests that deep-learning NLP is a promising method for categorizing free-text information on poverty and perhaps other adverse social circumstances that many Hispanic patients experience. At the health system level, quantifying and characterizing social risk factors for suicidality may help mental health clinicians understand how patterns of poverty or other social disadvantages can affect Hispanic mental health patients' risk for self-harm. These capabilities may help inform who receives targeted risk screening for suicidal thoughts or behaviors, ideally through a population-centered and culturally tailored approach (Brenes, 2023;

Watling et al., 2020). These efforts will be even more important in 2023 and beyond. The COVID-19 pandemic exacerbated financial concerns and mental health risks in Hispanic populations (Krogstad et al., 2022); Hispanic survey respondents were significantly more likely to report having suicidal thoughts at the beginning of the pandemic than non-Hispanic white respondents (Czeisler et al., 2020).

Our study had limitations. First, we could not account for patients' country of origin or immigration status. Hispanic suicide risk may vary by country of origin and between US-born and foreign-born populations (Brenes et al., 2022; Silva & Van Orden, 2018). The effects of economic disadvantage may differ depending on Hispanic patients' immigrant status (Wadsworth & Kubrin, 2007). Second, free-text clinical assessment data are not coded or available for all patients in the Holmusk database. Third, no information was provided on the length of time patients lived in poverty prior to the year of treatment. Still, we examined a large sample of patient-year observations; our estimates of the relationship between poverty and suicidality were robust to different bivariate and multivariable statistical model specifications. Nevertheless, our findings may not be generalizable beyond the patients and 13 states represented in this study. Finally, this was not a causal analysis, and the statistical relationships we identified must be interpreted cautiously.

Conclusions

We examined de-identified EHR data on 4,718 Hispanic patient-year observations from 2016 through 2019 across 13 states. We conducted a pooled cross-sectional analysis to examine the relationship between experiencing poverty and suicidal ideation during a calendar year. Hispanic mental health patients who experienced poverty had significantly greater odds of having suicidal thoughts in a given year than patients who did not experience poverty. These findings suggest that poverty can put Hispanic patients at greater risk for suicidal thoughts. Our findings also suggest that NLP is a promising method for categorizing free-text information on social circumstances affecting suicidality in clinical settings.

Declaration of Conflicting Interests

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Supplemental Material

Supplemental material for this article is available online.

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