Journal of Psychiatric Research 45 (2011) 512–518

Contents lists available at ScienceDirect

Journal of Psychiatric Research

journal homepage: www.elsevier.com/locate/psychires

Suicidal ideation and suicide attempts among Hispanic subgroups in the United States: 1991–1992 and 2001–2002☆

Enrique Baca-Garcia[a,b,c], M. Mercedes Perez-Rodriguez[d,e], Katherine M. Keyes[f], Maria A. Oquendo[a,b], Deborah S. Hasin[a,b], Bridget F. Grant[g,*], Carlos Blanco[a,b]

[a] New York State Psychiatric Institute, New York, NY 10032, USA
[b] Department of Psychiatry, College of Physicians and Surgeons, Columbia University, New York, NY 10032, USA
[c] Fundacion Jimenez Diaz Hospital, Autonoma University, CIBERSAM, Madrid, Spain
[d] Ramón y Cajal Hospital, CIBERSAM, Madrid 28034, Spain
[e] Department of Psychiatry, Mount Sinai School of Medicine, New York, NY 10029, USA
[f] Department of Epidemiology, Mailman School of Public Health, Columbia University, New York, NY 10032, USA
[g] Laboratory of Epidemiology and Biometry, Room 3077, Division of Intramural Clinical and Biological Research, National Institute on Alcohol Abuse and Alcoholism, National Institutes of Health, M.S. 9304, 5635 Fishers Lane, Bethesda, MD 20892-9304, USA

ARTICLE INFO

Article history:
Received 5 May 2010
Received in revised form
21 July 2010
Accepted 11 September 2010

Keywords:
Attempted suicide
Epidemiology
Prevalence
Health surveys
Ethnic groups
Age groups

ABSTRACT

Objective: To compare the prevalence of suicidal ideation/attempts among Hispanic subgroups in the US in 1991–1992 and 2001–2002, and identify high-risk groups.
Method: Data were drawn from the 1991–1992 National Longitudinal Alcohol Epidemiologic Survey (NLAES, $n = 42{,}862$) and the 2001–2002 National Epidemiological Survey on Alcohol and Related Conditions (NESARC, $n = 43{,}093$), two nationally representative surveys of individuals aged 18 years and older.
Results: 1) Puerto Ricans are the Hispanic ethnic subgroup with the highest rates of suicide attempts; 2) 45- to 64-year-old Puerto Rican women are a high-risk group for suicide attempts; 3) Over the 10 year period between the two surveys, the lifetime prevalence of suicide attempts significantly increased among 18- to 24-year-old Puerto Rican women and Cuban men, and among 45- to 64-year-old Puerto Rican men.
Conclusion: Hispanics in the US are not a homogeneous group. We identify high-risk groups among Hispanics. Specific interventions for subgroups of Hispanics at high risk for suicidal behaviors may be required.

1. Introduction

Suicide is one of the highest public health priorities worldwide, claiming approximately one million lives every year. Because as many as 50% of all individuals who commit suicide have attempted to take their lives previously, it behooves the field to identify those who attempt suicide and ideally prevent such behaviors. Yet, suicide prevention strategies are hampered, at least in part, by the scarcity of data on suicidal ideation and suicide attempts (WHO, 2000, 2002).

One important issue that is not well understood is the relationship between ethnicity and suicidal ideation and attempts. In several studies, non-Hispanic whites were found to have significantly higher risk for suicide attempts than other ethnic groups (Moscicki et al., 1988), such as Blacks (Baca-Garcia et al., 2010) and Hispanics (Sorenson and Golding, 1988). By contrast, two nationwide surveys did not find any significant relationship between race/ethnicity and suicide ideation or attempts (Kessler et al., 2005; Kessler et al., 1999). Moreover, several studies have reported rates of suicide ideation and attempts among some subgroups of Hispanics that are similar or even higher to those reported in White populations (Fortuna et al., 2007; Oquendo et al., 2004).

Although Hispanics are the largest and fastest growing racial/ethnic minority group in the US (U.S. Census Bureau, 2000) there is a dearth of data on suicide ideation and attempts among Hispanics. Barriers to examining rates of suicidal ideation and attempts among Hispanic ethnic subgroups in detail include: limited sample sizes, grouping of several Hispanic subgroups together, or differences in the age range of individuals included in

☆ The work was conducted at the Department of Psychiatry at Columbia University, New York, NY, USA. This work has not been previously presented.

* Corresponding author. Tel.: +301 443 7370; fax: +301 443 1400.
E-mail address: bgrant@willco.niaaa.nih.gov (B.F. Grant).

0022-3956/$ – see front matter © 2010 Elsevier Ltd. All rights reserved.
doi:10.1016/j.jpsychires.2010.09.004

previous studies (Joe et al., 2006; Kessler et al., 2005, 1999). Moreover, some studies have focused on Hispanic-only samples, thus preventing comparison of suicide ideation and attempt rates with other ethnic groups such as whites (Borges et al., 2009; Fortuna et al., 2007).

Of the few studies that have examined rates of suicide ideation and attempts among different Hispanic ethnic subgroups, the bulk have found significant differences across subgroups (Fortuna et al., 2007; Monk and Warshauer, 1974; Oquendo et al., 2004; Ungemack and Guarnaccia, 1998). The most consistent finding is a higher rate of lifetime suicide attempts among Puerto Ricans, and a lower rate among Cuban Americans (Fortuna et al., 2007; Monk and Warshauer, 1974; Oquendo et al., 2004; Ungemack and Guarnaccia, 1998). However, one study did not find significant differences in rates of suicidal ideation or attempts across Hispanic subgroups after adjusting for demographic, psychiatric and sociocultural factors (Fortuna et al., 2007).

In a prior report (Baca-Garcia et al., 2010), we compared the prevalence of suicidal ideation and attempts in the US in 1991–1992 and 2001–2002, and identified sociodemographic groups at increased risk for suicidal ideation and attempts. We observed that, despite prevention and treatment efforts, the lifetime prevalence of suicide attempts remained unchanged (Baca-Garcia et al., 2010).

The present study extends the existing literature in several ways. We used large samples (the two largest nationally representative epidemiological surveys with data on these issues conducted to date in the US); we analyzed the main Hispanic subgroups separately; we were able to use whites as a comparison group (since we had data on the white general population gathered in the same surveys); we included all adult age groups (18 years and older) in the analyses; and, we performed analyses over two time points. In order to achieve this, we examined suicidal ideation and attempts among Hispanic ethnic subgroups in detail using data from the 1991–1992 National Longitudinal Alcohol Epidemiologic Survey ([NLAES] $n = 42{,}862$) and the 2001–2002 National Epidemiological Survey on Alcohol and Related Conditions ([NESARC] $n = 43{,}093$) (Grant et al., 1992; Grant et al., 2003), the two largest nationally representative epidemiological studies conducted to date in the US. Specifically our goals were to: 1) Compare the prevalence of suicidal ideation and attempts among Hispanic ethnic subgroups in the US in 1991–1992 and 2001–2002, to investigate temporal changes; 2) Identify sociodemographic and ethnic subgroups of Hispanics at high risk for suicidal ideation and attempts.

2. Method

2.1. Samples

The National Institute on Alcohol Abuse and Alcoholism (NIAAA) NLAES ($n = 42{,}862$, 1991–1992), and the NESARC ($n = 43{,}093$, 2001–2002), are nationally representative samples of the adult population of the US, as described previously (Grant et al., 1992, 1994, 2003, 2004a,b). The sample design and field methods were nearly identical, as has been described previously (Compton et al., 2004). The target population was the US general population, 18 years and older. The NESARC and NLAES overall response rates were 81% and 90%, respectively. Fieldwork, including structured training and supervision for the in-person interviews for both surveys was carried out by the United States Bureau of the Census under NIAAA staff supervision.

NLAES and NESARC respondents were informed in writing about the nature of the survey, the statistical uses of the survey data, the voluntary aspect of participation, and the federal laws that rigorously provided for the strict confidentiality of identifiable survey information. Those respondents consenting to participate after receiving this information were interviewed. The research protocols, including informed consent procedures, received full ethical review and approval from the US Census Bureau and US Office of Management and Budget. As noted previously (Compton et al., 2004), there were minor differences in the mode of administration of the surveys e.g., whether interviewers recorded the information on paper or directly into a computer. In both surveys, data were adjusted to account for oversampling and respondent and household response and to be representative of the US population on a range of sociodemographic characteristics at the time of the study.

2.2. Diagnostic assessment of suicidal behaviors

The NLAES and NESARC included identical questions to assess lifetime suicidal behaviors. NLAES and NESARC respondents were asked the following questions: “During that time when your mood was at its lowest/you enjoyed or cared the least about things, did you: 1) think about committing suicide?; 2) attempt suicide?” We used the first question to assess a lifetime history of suicidal ideation, while the second was used to assess a lifetime history of suicide attempt. A relevant difference between the NLAES and the NESARC is that the questions related to suicidal ideation and suicide attempt were posed only to those who screened into the major depressive episode section in the NESARC survey, while all respondents in the NLAES were assessed for suicidal ideation and suicide attempt. To screen into the major depressive episode section, subjects had to answer yes to one of these two questions: 1) “In your entire life, have you ever had a time when you felt sad, blue, depressed, or down most of the time for at least 2 weeks?” or 2) “In your entire life, have you ever had a time, lasting at least 2 weeks, when you didn’t care about the things that you usually cared about, or when you didn’t enjoy the things you usually enjoyed?”. To ensure equality of measurement across the NLAES and NESARC, the present study focused on suicide-related behaviors of individuals who screened into the depression section of the AUDADIS-IV interview in either survey. In the NLAES survey 33.8% of respondents screened into the depression section of the interview; in the NESARC survey, 31.7% of respondents screened in.

2.3. Assessment of race/ethnicity

Race/ethnicity was assessed similarly in the NLAES and NESARC surveys. Respondents were asked to self-report Hispanic or Latino origin, and additionally given flashcards and asked to identify country of origin or descent. We divided all those reporting any Hispanic or Latino origin into the five most prevalent Hispanic ethnic subgroup based on self-reported origin or descent: Mexican (NLAES = 1384, NESARC = 4245), Puerto Rican (NLAES = 312, NESARC = 962), Cuban (NLAES = 188, NESARC = 431), and other (NLAES = 930, NESARC = 2670).

2.4. Statistical analysis

2.4.1. Trends in rates of lifetime suicide attempts and suicidal ideation without attempts

To identify trends between the time of the NLAES and the NESARC, we compared the rates of lifetime suicide attempts and suicidal ideation without attempts in the NLAES and the NESARC for all Hispanic ethnic subgroups stratified by age and sex.

Because the combined standard error of two means (or percents) is always equal or less than the sum of the standard errors

of those two means, we conservatively consider two confidence intervals (CIs) that share a boundary or do not overlap to be significantly different from one another (Agresti, 2002).

2.4.2. High-risk groups for suicide attempt and suicidal ideation without attempts

We defined as "high-risk groups for suicide attempt" those groups whose lower bound of the 95% CI for the lifetime prevalence of suicide attempts was higher than the higher bound of the 95% CI in the full NESARC sample, i.e., higher than 2.6% (the lifetime prevalence of suicide attempts in the full NESARC sample was 2.4, 95% CI 2.2–2.6) (Baca-Garcia et al., 2010). This is a conservative definition of high-risk group since the full sample, by including the high-risk group, had a higher prevalence estimate of suicide attempt than it would have had if the high-risk group had been excluded.

By analogy, we defined "high-risk groups for suicidal ideation without attempts" as those groups whose lower bound of the 95% CI for the prevalence of suicidal ideation without attempts was higher than the higher bound of the 95% CI for the prevalence of suicidal ideation without attempts in the full NESARC sample, i.e., higher than 6.6% (the lifetime prevalence of suicide ideation without attempts in the full NESARC sample was 6.1 (5.7–6.6) (Baca-Garcia et al., 2010)).

To better understand which factors may mediate the relationship between ethnic subgroup and lifetime rates of suicide attempts, we performed regression analyses adjusting for survey (NLAES vs. NESARC), depression, sex, age, income, education, urbanicity, region, marital status, and nativity (US- vs. foreign-born).

All analyses were conducted with SUDAAN, a statistical software package that is suitable for analyses of studies with complex survey designs.

3. Results

3.1. Suicide attempts

3.1.1. Trends in rates of lifetime suicide attempts

The rate of suicide attempts among 18- to 24-year-old Puerto Rican women and Cuban men, and among 45- to 64-year-old Puerto Rican men significantly increased between the time of the NLAES and the NESARC (Table 1).

3.1.2. High-risk groups for suicide attempt

Puerto Ricans were the Hispanic ethnic subgroup with the highest rates of lifetime suicide attempts in both the NLAES and the NESARC. In the NESARC, the rates of suicide attempt among Puerto Ricans were significantly higher than among whites and among any other Hispanic ethnic subgroup except the "other" group. Mexicans had significantly lower rates of suicide attempt compared to Puerto Ricans, but not whites in the NESARC. Cubans had significantly lower rates of suicide attempt than Puerto Ricans and whites in the NESARC (Table 1, rows labeled "Total").

After age and sex stratification, 45- to 64-year-old Puerto Rican women in the NESARC (but not in the NLAES) were the only high-risk group identified (the lower bound of the 95% CI for the lifetime prevalence of suicide attempts was higher than the higher bound of the 95% CI in the full NESARC sample – Table 1, bottom row "Full sample", i.e., higher than 2.6%). However, their risk was not significantly different to that observed among white women in the same age group. Among Hispanic male respondents in the NLAES and NESARC, there were no high-risk groups (Table 1).

After adjusting for survey (NLAES vs. NESARC), depression, sex, age, income, education, urbanicity, region, marital status, and nativity (US- vs. foreign-born), there were no significant differences in the risk for suicide attempt among Mexicans and Cubans

Table 1
Lifetime prevalence of suicide attempt by age and Hispanic subcategory in the NLAES and NESARC, stratified by sex (data for whites is presented in italics for comparison purposes for each age group and for the total sample including all age groups – labeled "Total"; the rates in the full sample are shown at the bottom of the table – labeled "Full sample").

Age	Race/Ethnicity	Total (females and males)		Female		Male	
		NLAES % (95% CI) ($N = 42862$)	NESARC % (95% CI) ($N = 43093$)	NLAES % (95% CI) ($N = 25043$)	NESARC % (95% CI) ($N = 24575$)	NLAES % (95% CI) ($N = 17819$)	NESARC % (95% CI) ($N = 18518$)
18–24 years	Mexican	3.0 (1.2–4.8)	3.2 (1.6–4.8)	4.5 (1.6–7.4)	5.4 (2.1–8.7)	1.4 (0.0–3.0)	1.2 (0.2–2.2)
	Puerto Rican	2.8 (0.0–8.1)	5.0 (1.5–8.5)	0.0 (0.0–0.0)	8.4 (1.7–15.1)	4.9 (0.0–14.3)	1.3 (0.0–3.8)
	Cuban	4.3 (0.0–12.5)	1.7 (0.5–2.9)	12.1 (0.0–33.7)	0.0 (0.0–0.0)	0.0 (0.0–0.0)	2.9 (1.9–3.9)
	Other	4.4 (0.5–8.3)	3.7 (0.6–6.8)	2.4 (0.0–5.7)	2.3 (0.3–4.3)	6.3 (0.0–13.4)	4.7 (0.0–10.2)
	Whites	*4.1 (3.3–4.9)*	*3.9 (3.1–4.7)*	*5.1 (3.7–6.5)*	*5.1 (3.7–6.5)*	*3.2 (2.4–4.0)*	*2.7 (1.7–3.7)*
25–44 years	Mexican	2.8 (1.4–4.2)	1.1 (0.7–1.5)	3.0 (1.4–4.6)	1.6 (0.6–2.6)	2.5 (0.1–4.9)	0.7 (0.3–1.1)
	Puerto Rican	4.9 (1.4–8.4)	3.3 (1.3–5.3)	4.8 (1.1–8.5)	5.4 (1.5–9.3)	4.9 (0.0–11.0)	1.0 (0.0–2.2)
	Cuban	4.3 (0.0–9.6)	1.0 (0.2–1.8)	8.6 (0.0–18.8)	1.6 (0.2–3.0)	0.0 (0.0–0.0)	0.4 (0.0–1.4)
	Other	2.3 (0.7–3.9)	2.1 (0.9–3.3)	2.9 (0.5–5.3)	3.1 (1.5–4.7)	1.6 (0.0–3.6)	1.1 (0.0–2.5)
	Whites	*2.9 (2.5–3.3)*	*3.1 (2.7–3.5)*	*3.6 (3.2–4.0)*	*4.0 (3.4–4.6)*	*2.3 (1.9–2.7)*	*2.3 (1.7–2.9)*
45–64 years	Mexican	2.7 (0.3–5.1)	1.5 (0.5–2.5)	3.0 (0.0–6.9)	2.0 (0.6–3.4)	2.4 (0.0–5.3)	1.0 (0.0–2.0)
	Puerto Rican	1.8 (0.0–3.8)	7.1 (4.0–10.2)	3.7 (0.0–7.8)	6.7 (2.8–10.6)	0.0 (0.0–0.0)	7.4 (2.1–12.7)
	Cuban	0.8 (0.0–2.4)	1.5 (0.0–3.3)	1.3 (0.0–3.8)	3.3 (0.0–7.0)	0.0 (0.0–0.0)	0.0 (0.0–0.0)
	Other	4.1 (0.0–8.2)	2.3 (0.9–3.7)	5.3 (0.0–12.4)	2.8 (0.6–5.0)	2.9 (0.0–6.8)	1.7 (0.0–3.5)
	Whites	*2.1 (1.7–2.5)*	*2.1 (1.7–2.5)*	*2.5 (1.9–3.1)*	*2.8 (2.2–3.4)*	*1.7 (1.3–2.1)*	*1.5 (1.1–1.9)*
65 years and older	Mexican	0.0 (0.0–0.0)	1.4 (0.0–2.8)	0.0 (0.0–0.0)	1.8 (0.0–3.6)	0.0 (0.0–0.0)	0.9 (0.0–2.3)
	Puerto Rican	2.2 (0.0–6.3)	2.0 (0.0–4.0)	3.2 (0.0–9.7)	3.6 (0.3–6.9)	0.0 (0.0–0.0)	0.0 (0.0–0.0)
	Cuban	2.7 (0.0–7.4)	0.6 (0.2–1.0)	0.0 (0.0–0.0)	0.0 (0.0–0.0)	5.9 (0.0–16.7)	1.2 (0.8–1.6)
	Other	0.6 (0.0–1.8)	0.5 (0.0–1.1)	0.9 (0.0–2.7)	0.9 (0.0–1.9)	0.0 (0.0–0.0)	0.0 (0.0–0.0)
	Whites	*0.5 (0.3–0.7)*	*0.6 (0.4–0.8)*	*0.6 (0.4–0.8)*	*0.9 (0.5–1.3)*	*0.3 (0.0–0.7)*	*0.2 (0.0–0.4)*
Total (all age groups)	Mexican	2.7 (1.7–3.7)	1.7 (1.1–2.3)	3.2 (1.8–4.6)	2.5 (1.5–3.5)	2.2 (0.8–3.6)	0.9 (0.5–1.3)
	Puerto Rican	3.5 (1.3–5.7)	4.4 (3.0–5.8)	3.5 (1.5–5.5)	6.0 (3.8–8.2)	3.5 (0.0–7.2)	2.7 (0.9–4.5)
	Cuban	2.8 (0.6–5.0)	1.1 (0.5–1.7)	4.0 (0.3–7.7)	1.5 (0.3–2.7)	1.5 (0.0–4.2)	0.7 (0.3–1.1)
	Other	3.0 (1.6–4.4)	2.3 (1.3–3.3)	3.1 (0.9–5.3)	2.7 (1.7–3.7)	2.8 (0.8–4.8)	1.9 (0.5–3.3)
	Whites	*2.4 (2.2–2.6)*	*2.4 (2.2–2.6)*	*2.9 (2.5–3.3)*	*3.1 (2.7–3.5)*	*1.9 (1.7–2.1)*	*1.7 (1.5–1.9)*
Full sample	*(All races)*	*2.4 (2.3–2.6)*	*2.4 (2.2–2.6)*	*2.9 (2.7–3.1)*	*3.0 (2.8–3.2)*	*1.9 (1.7–2.1)*	*1.6 (1.4–1.8)*

respectively compared to whites in the full sample. Puerto Ricans had significantly lower lifetime risk for suicide attempt than whites (OR = 0.55, 95% CI = 0.39–0.78). After stratifying by age, Puerto Ricans aged 45–64 years had significantly lower risk for suicide attempt than whites (OR = 0.36, 95% CI 0.19–0.69).

3.2. Suicidal ideation

3.2.1. Trends in rates of suicidal ideation without attempts

Among 25- to 44-year-old Mexican females, the rates of suicide ideation without attempts decreased significantly between the NLAES and the NESARC (Table 2).

3.2.2. High-risk groups for suicide ideation without attempts

Puerto Ricans were the Hispanic ethnic subgroup with the highest rates of lifetime suicide ideation without attempts in both the NLAES and the NESARC. In the NLAES, the rate of suicide ideation without attempts among Puerto Ricans was significantly higher than among Cubans. In the NESARC, the rate of suicide ideation without attempts among Puerto Ricans was significantly higher than among Mexicans. In both the NLAES and the NESARC, the rates of suicide ideation without attempts among Puerto Ricans and whites were not significantly different. Mexicans and Cubans in the NLAES and Mexicans in the NESARC had significantly lower rates of suicide ideation without attempts compared to whites (Table 2, rows labeled "Total").

After sex and age stratification, there were no high-risk groups for suicide ideation without attempts among Hispanics after comparing their rates with those found in the whole sample (Table 2, bottom row "Full sample").

4. Discussion

Our study had four major findings: 1) Puerto Ricans were the Hispanic ethnic subgroup with the highest rates of lifetime suicide attempts, which were significantly higher than among whites, Mexicans and Cubans in the NESARC; 2) Puerto Rican women aged 45- to 64 are a high-risk group for suicide attempts; and 3) Although the lifetime prevalence of suicide attempts remained unchanged among the overall Hispanic sample (Baca-Garcia et al., 2010), the rate of suicide attempts among 18- to 24-year-old Puerto Rican women and Cuban men, and among 45- to 64-year-old Puerto Rican men significantly increased between 1991–1992 and 2001–2002; 4) After adjusting for several covariates, Puerto Ricans had significantly lower lifetime risk for suicide attempt than whites. After age stratification, only Puerto Ricans aged 45–64 years had significantly lower risk for suicide attempt than whites.

Confirming prior studies (Fortuna et al., 2007; Monk and Warshauer, 1974; Oquendo et al., 2004; Ungemack and Guarnaccia, 1998), we found higher crude rates of suicide attempts among Puerto Ricans (4.4%, 95% CI 3.0–5.8%) than among whites (2.4%, 95% CI 2.2–2.6%) and other Hispanic subgroups living in the US. Our study extends previous findings by documenting the rising rates of suicide attempts among 18- to 24-year-old Puerto Rican women and 45- to 64-year-old Puerto Rican men. The lifetime prevalence of suicide attempts among Puerto Ricans was almost double the rate observed among whites, with 2.2% more lifetime attempts among Puerto Ricans compared to whites. Given that suicide attempts are the strongest predictor for completed suicide, these findings are of clear public health relevance.

Our findings of high rates of suicide attempts among Puerto Ricans are consistent with previous findings of higher rates of major depression and other psychiatric disorders than other Hispanic ethnic groups (Alegria et al., 2007; Oquendo et al., 2001, 2004). Fortuna et al., (2007) observed that lifetime DSM-IV psychiatric diagnoses were associated with an increased risk of lifetime suicidal ideation and suicide attempt among Hispanics. However, other authors found no differences in the risk for major depression among Puerto Ricans with and without a lifetime history of suicide attempt, suggesting that the high rate of suicide

Table 2
Lifetime prevalence of suicidal ideation without attempts by age and Hispanic subcategory in the NLAES and NESARC (data for whites is presented in italics for comparison purposes for each age group and for the total sample including all age groups – labeled "Total"; the rates in the full sample are shown at the bottom of the table – labeled "Full sample").

Age	Race/Ethnicity	Total (females and males)		Female		Male	
		NLAES % (95% CI)	NESARC % (95% CI)	NLAES % (95% CI)	NESARC % (95% CI)	NLAES % (95% CI)	NESARC % (95% CI)
18–24 years	Mexican	6.6 (3.5–9.7)	4.1 (2.3–5.9)	5.6 (2.1–9.1)	6.4 (3.3–9.5)	7.6 (2.1–13.1)	2.0 (0.4–3.6)
	Puerto Rican	13.8 (0.5–27.1)	12.1 (1.9–22.3)	4.7 (0.0–11.4)	3.8 (0.0–7.7)	20.7 (0.0–42.3)	21.3 (0.0–43.3)
	Cuban	0.0 (0.0–0.0)	0.0 (0.0–0.0)	0.0 (0.0–0.0)	0.0 (0.0–0.0)	0.0 (0.0–0.0)	0.0 (0.0–0.0)
	Other	8.2 (3.7–12.7)	4.3 (2.1–6.5)	9.0 (2.3–15.7)	5.3 (2.4–8.2)	7.4 (1.7–13.1)	3.5 (0.4–6.6)
	Whites	*10.8 (9.8–11.8)*	*8.1 (6.9–9.3)*	*11.2 (9.8–12.6)*	*8.9 (7.1–10.7)*	*10.4 (8.8–12.0)*	*7.3 (5.7–8.9)*
25–44 years	Mexican	4.8 (3.0–6.6)	2.0 (1.2–2.8)	6.9 (4.4–9.4)	2.6 (1.4–3.8)	2.8 (0.4–5.2)	1.6 (0.6–2.6)
	Puerto Rican	6.5 (2.4–10.6)	8.7 (6.0–11.4)	6.9 (1.8–12.0)	9.6 (6.3–12.9)	6.1 (0.0–12.6)	7.8 (2.9–12.7)
	Cuban	1.7 (0.0–5.0)	6.4 (0.0–16.4)	3.5 (0.0–10.2)	10.2 (0.0–28.4)	0.0 (0.0–0.0)	2.5 (0.0–7.4)
	Other	4.2 (2.6–5.8)	3.8 (2.4–5.2)	4.9 (2.5–7.3)	3.4 (1.8–5.0)	3.4 (1.2–5.6)	4.3 (1.9–6.7)
	Whites	*10.7 (10.1–11.3)*	*7.2 (6.4–8.0)*	*11.4 (10.6–12.2)*	*8.7 (7.7–9.7)*	*10.0 (9.2–10.8)*	*5.6 (4.8–6.4)*
45–64 years	Mexican	3.3 (1.1–5.5)	3.8 (2.4–5.2)	3.2 (0.7–5.7)	4.8 (2.4–7.2)	3.4 (0.0–6.9)	2.6 (0.8–4.4)
	Puerto Rican	6.2 (0.1–12.3)	5.8 (2.3–9.3)	7.4 (0.0–14.8)	4.9 (1.0–8.8)	5.0 (0.0–14.6)	6.8 (0.0–13.7)
	Cuban	3.6 (0.0–8.5)	0.2 (0.0–0.8)	3.5 (0.0–10.2)	0.0 (0.0–0.0)	3.8 (0.0–10.7)	0.5 (0.0–1.5)
	Other	5.3 (2.2–8.4)	3.3 (1.7–4.9)	5.9 (2.0–9.8)	4.2 (1.8–6.6)	4.6 (0.0–9.7)	2.5 (0.7–4.3)
	Whites	*7.3 (6.7–7.9)*	*8.2 (7.4–9.0)*	*8.8 (7.8–9.8)*	*9.6 (8.4–10.8)*	*5.6 (4.8–6.4)*	*6.7 (5.7–7.7)*
65 years and older	Mexican	0.5 (0.0–1.3)	1.8 (0.0–3.6)	0.9 (0.0–2.3)	2.3 (0.0–4.8)	0.0 (0.0–0.0)	1.0 (0.0–2.4)
	Puerto Rican	4.1 (0.0–12.7)	3.9 (0.0–8.2)	6.0 (0.0–18.5)	6.9 (0.0–14.2)	0.0 (0.0–0.0)	0.0 (0.0–0.0)
	Cuban	0.0 (0.0–0.0)	3.9 (0.0–12.1)	0.0 (0.0–0.0)	7.1 (0.0–20.8)	0.0 (0.0–0.0)	0.0 (0.0–0.0)
	Other	1.1 (0.0–2.7)	2.4 (0.0–4.9)	1.6 (0.0–4.0)	2.4 (0.0–5.9)	0.0 (0.0–0.0)	2.3 (0.0–6.0)
	Whites	*3.1 (2.5–3.7)*	*3.3 (2.7–3.9)*	*3.4 (2.8–4.0)*	*3.7 (2.9–4.5)*	*2.8 (2.0–3.6)*	*2.7 (1.9–3.5)*
Total (all age groups)	Mexican	4.7 (3.3–6.1)	2.8 (2.2–3.4)	5.5 (3.7–7.3)	3.9 (2.7–5.1)	3.8 (2.0–5.6)	1.8 (1.2–2.4)
	Puerto Rican	7.9 (3.8–12.0)	8.0 (5.3–10.7)	6.5 (3.0–10.0)	7.3 (4.8–9.8)	9.4 (2.1–16.7)	8.7 (3.6–13.8)
	Cuban	1.7 (0.0–3.7)	3.5 (0.0–8.6)	2.3 (0.0–5.4)	6.0 (0.0–15.2)	1.0 (0.0–3.0)	1.1 (0.0–3.3)
	Other	4.9 (3.5–6.3)	3.7 (2.7–4.7)	5.6 (3.6–7.6)	3.8 (2.6–5.0)	4.3 (2.3–6.3)	3.5 (1.9–5.1)
	Whites	*8.4 (8.0–8.8)*	*6.9 (6.5–7.3)*	*9.0 (8.6–9.4)*	*8.0 (7.4-8.6)*	*7.8 (7.2–8.4)*	*5.7 (5.1–6.3)*
Full sample	*(All races)*	*9.7 (9.3–10.0)*	*8.4 (7.8–8.9)*	*8.2 (7.8–8.6)*	*7.1 (6.5–7.7)*	*6.9 (6.5–7.3)*	*5.1 (4.7–5.5)*

attempt in Puerto Ricans may be caused by other factors besides the presence of other lifetime psychiatric diagnoses (Oquendo et al., 2004). For example, Puerto Ricans are more likely than other Hispanic subgroups to have been US-born (they are also born US citizens since Puerto Rico is a US territory) (Alegria et al., 2008; Ungemack and Guarnaccia, 1998), and have higher levels of acculturation (Alegria et al., 2008) all of which have been linked to increased risk for psychiatric disorders and suicide attempts (Fortuna et al., 2007). They also are more likely to be unmarried, unemployed, and to live below the poverty level, factors also associated with suicide attempts (Landale and Hauan, 1996; Ungemack and Guarnaccia, 1998).

Studies of mainly Puerto Rican samples have suggested that the process of acculturation and the consequent shifting in family and sex roles may particularly affect young women (Fortuna et al., 2007; Zayas et al., 2005). According to this model, the suicide attempts result from a developmental conflict between the adolescent's need for autonomy (in identity and sexuality) and her profound regard for family unity that arises from "familism" ("the centrality of the family in the institutional structure of Latin American societies and the governing role of the family in the individual's life and behavior") (Zayas et al., 2005).

Initiation of sexual behavior and childbearing at an earlier age among some subgroups of Puerto Rico women compared to among other Hispanic ethnic subgroups (Landale and Hauan, 1996; Orshan, 1996) may contribute to limit their socioeconomic achievement, thus perpetuating a cycle of disadvantage (Landale and Hauan, 1996). Another consequence of the high rates of adolescent premarital childbearing is the disproportionately high rate of marital disruption and female-headed households among Puerto Ricans in the US compared to those in Puerto Rico (Landale and Hauan, 1996; Ungemack and Guarnaccia, 1998). Indeed, among Puerto Ricans, higher rates of suicide attempts have been found to be associated with young age, not being married, unemployment and poverty (Ungemack and Guarnaccia, 1998). All the above factors may contribute to the increase in suicide attempts among young Puerto Rican women, in which the typical suicide attempts have been described as impulsive efforts to escape stressful situations, often through overdose, which are related to disturbances in family relations, frequently with a spouse or mother (Zayas et al., 2005).

High rates of alcohol and substance abuse and dependence may contribute to the rising prevalence of suicide attempts among 45- to 64-year-old Puerto Rican men. The prevalence of drug and alcohol use may be higher among Puerto Ricans than among other Hispanic ethnic groups in the US (Velez and Ungemack, 1995). Although the highest rates of abuse and dependence are among those in their 20s, the decline in the rates with age is not as steep as in the US population, thus putting older Puerto Ricans (40–59-years-old) at higher risk of abuse and dependence than the US general population (Caetano et al., 2008).

The finding that 45- to 64-year-old Puerto Rican women are at high risk for suicide attempts may be related to the effect of multiple risk factors for depression, including high rates of chronic diseases such as asthma and diabetes, low socioeconomic class, minority status, female sex, and social isolation (Weingartner et al., 2002). Anxiety disorders have also been associated with suicidality among older Puerto Ricans (Diefenbach et al., 2004). Moreover, among older Puerto Rican women there is a high prevalence of "ataques de nervios" (Guarnaccia et al., 1993; Weingartner et al., 2002), a culture-specific syndrome. "Ataques de nervios" usually occur directly in response to an acute stressor and may begin with uncontrollable crying and screaming. "Ataques de nervios" often result in impulsive behaviors, including suicide attempts and gestures, in response to the despair felt as a result of the stressful event (Guarnaccia et al., 2003; Oquendo, 1995; Ungemack and Guarnaccia, 1998).

The relationship between Puerto Rican ethnicity and lifetime risk for suicide attempts changed drastically after adjusting for survey (NLAES vs. NESARC), depression, sex, age, income, education, urbanicity, region, marital status, and nativity. This extends prior studies reporting that ethnic differences in rates of suicidal behavior observed when comparing the crude rates were largely explained by mediating factors such as mental disorders (Kessler et al., 1999). The higher crude rates of lifetime suicide attempts observed among Puerto Ricans appear to be largely explained by sociodemographic and clinical factors. The results of the present study highlight some modifiable factors (e.g., depression) that are potential targets for public health interventions aimed at decreasing suicide risk.

The increasing rate of suicide attempts among 18- to 24-year-old Cuban in 2001–2002 compared to 1991–1992 men may be the result of increasing levels of acculturation among the younger cohorts of Cubans, which are more likely to be US-born and have higher levels of acculturation. Acculturation has been shown to modulate the risk of suicidal behavior among Hispanics (Escobar et al., 2000; Fortuna et al., 2007), with higher levels of acculturation (Escobar and Vega, 2000) associated with increased risk for suicidal ideation and/or attempts. The prevalence of psychiatric and substance use disorders is higher among US-born Hispanics than among recent Hispanic immigrants (Alegria et al., 2006). Among a sample of Cubans, those born in the US reported higher rates of substance use disorders (Alegria et al., 2008). Thus, the mechanism behind the increase in suicide attempts among young Cuban men may be related to the loss of culturally-influenced coping strategies and cultural values, such as moral objections to suicide (Fortuna et al., 2007; Oquendo et al., 2005).

Moreover, the relationship between immigration and suicidal behaviors is likely complex and influenced by many factors besides those mentioned above. For example, having a family member in the United States increased the risk for suicidal ideation and attempts among Mexicans living in Mexico, and that a younger age (<12 years) at the time of immigration to the US increased the risk for suicide ideation among Mexican immigrants (Borges et al., 2009).

This study has the limitations of most large epidemiological surveys. First, the assessment of suicidal ideation and attempts relied on lay interviews, and was not confirmed by the use of medical records. Second, because NLAES and NESARC sampled only civilian households and group quarters with populations 18 years and older, information was not available on adolescents, the homeless or individuals in prison, or undocumented immigrants. Third, the questions related to suicidal ideation and suicide attempts were asked to all respondents in the NLAES, but only to those who screened into the depression section of the NIAAA Alcohol Use Disorder and Associated Disabilities Interview Schedule-DSM-IV Version (AUDADIS-IV) (Grant et al., 2001). For that reason, examining the role of other mental disorders in the relationship between suicidal behavior and Hispanic subgroups is outside the scope of the present study. To adjust for this, we limited our NLAES analysis to those individuals who screened into the depression section of the AUDADIS. However, the number of individuals who did not screen into the depression section in the NLAES and reported a suicide attempt was very low (less than 0.1% of the NLAES sample), suggesting that restriction is unlikely to have changed our pattern of results. It would have been useful to conduct some sub-analyses in the NLAES on differences across socioeconomic variables and psychiatric disorders between those respondents who endorsed suicidal ideation and attempts and said 'yes' to the depression screeners and those who were

excluded from the study. However, we did not have sufficient power to do this.

Fourth, the fact that for several ethnic groups the rates of suicidal ideation and attempts were 0% among some age and gender subgroups may be an accurate estimate of reality (i.e., extremely low rates in these subgroups) but may also reflect a limitation of the assessment instrument to identify suicidal behaviors in these ethnic subgroups; alternatively, it may be a consequence of the small sample size in some of the categories. Fifth, the lethality of the suicide attempt was not assessed, limiting our ability to assess its severity.

Despite these limitations, the NLAES and the NESARC are the two largest epidemiological surveys to date to provide information about suicidal ideation and suicide attempts in the US. Hispanics in the US are not a single, homogeneous group. We identify specific high-risk groups among Hispanics. There is a need to develop interventions for specific subgroups of Hispanics at high risk for suicidal behaviors. Future studies need to analyze the effect of factors such as nativity, psychiatric diagnoses and socio-economic status on the relation between ethnicity and suicidal behaviors.

Role of funding source

The National Longitudinal Alcohol Epidemiologic Survey and the National Epidemiologic Survey on Alcohol and Related Conditions were sponsored by the National Institute on Alcohol Abuse and Alcoholism and funded, in part, by the Intramural Program, NIAAA, National Institutes of Health. The NIH had no further role in study design; in the collection, analysis and interpretation of data; in the writing of the report; and in the decision to submit the paper for publication. Additional support was provided by Alicia Koplowitz Foundation (Dr. Baca-Garcia), Instituto de Salud Carlos III, CIBERSAM and the Spanish Ministry of Health (Drs. Baca-Garcia and Perez-Rodriguez), NIH grants DA019606, DA020783, DA023200, DA023973, MH076051, MH082773 and CA133050 (Dr. Blanco) and AA014223 (Dr. Hasin), the American Foundation for Suicide Prevention (Dr. Blanco), and the New York State Psychiatric Institute (Drs. Blanco, Hasin and Oquendo).

Contributors

Drs. Grant, Baca-Garcia and Oquendo contributed to the conceptualization of the study; Drs. Blanco, Hasin and Perez-Rodriguez analyzed the data, Drs. Baca-Garcia and Blanco and Ms. Keys wrote the first draft of the manuscript. All authors contributed to subsequent reviews of the paper and Dr. Grant collected the data.

Conflict of interest

Each author declares that there are no conflicts of interest in the submission and publication of this manuscript.

Acknowledgement

There is no acknowledgement for this submission.

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