

Immigration Generation Status and its Association with Suicide Attempts, Substance Use, and Depressive Symptoms among Latino Adolescents in the USA

Juan B. Peña · Peter A. Wyman · C. Hendricks Brown ·
Monica M. Matthieu · Telve E. Olivares · Diana Hartel ·
Luis H. Zayas

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Abstract This study investigated the relation between suicide attempts and immigrant generation status using the Latino subset of the National Longitudinal Study of Adolescent Health, a school-based, nationally representative sample. This study also examined whether generation status predicted risk factors associated with elevated suicide behaviors, namely illicit substance use, problematic alcohol use, and depressive symptoms. Finally, hypothesizing that elevated depressive symptoms and substance use mediate the relation between immigrant generation status and suicide attempts among Latino adolescents, a path model was tested. Our findings revealed immigrant generation status was a determinant for suicide attempts, problematic alcohol use, repeated marijuana use, and repeated other drug use for Latino adolescents. US-born Latinos with

immigrant parents (i.e., second-generation youth) were 2.87 (95% CI, 1.34, 6.14) times more likely to attempt suicide, 2.27 (95% CI, 1.53, 3.35) times more likely to engage in problematic alcohol use, 2.56 (95% CI, 1.62, 4.05) times more likely to engage in repeated marijuana use, and 2.28 (95% CI, 1.25, 4.17) times more likely to engage in repeated other drug use than were foreign-born youth (i.e., first-generation youth). Later-generations of US-born Latino youth with US-born parents were 3.57 (95% CI, 1.53–8.34) times more likely to attempt suicide, 3.34 (95% CI, 2.18–5.11) times more likely to engage in problematic alcohol use, 3.90 (95% CI, 2.46, 6.20) times more likely to engage in repeated marijuana use, and 2.80 (95% CI, 1.46, 5.34) times more likely to engage in repeated other drug use than were first-generation youth. Results from the path analysis indicated that repeated other drug use may mediate the effect of generation status on suicide attempts.

J. B. Peña (✉) · M. M. Matthieu · L. H. Zayas
George Warren Brown School of Social Work,
Washington University in St. Louis,
1 Brookings Drive, Campus Box 1196,
St. Louis, MO 63130, USA
e-mail: JPena@wustl.edu

P. A. Wyman · T. E. Olivares
Department of Psychiatry,
University of Rochester Medical Center,
Rochester, NY, USA

C. H. Brown
College of Public Health–Epidemiology and Biostatistics,
University of South Florida,
Tampa, FL, USA

D. Hartel
Department of Epidemiology and Population Health,
Albert Einstein College of Medicine,
Bronx, NY, USA

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Introduction

Suicide is the third leading cause of death for adolescents between the ages of 15 and 19 years in the USA (CDC 2006). Differences exist between adolescents who attempt suicide and those who die by suicide (e.g., intent to die and lethality of chosen method). However, a history of suicidal behavior remains a salient predictor of repeated attempts and death by suicide (Gould et al. 2003). Because of the prevalence and gravity of suicidal behaviors, reduction of suicide attempts among adolescents is a national priority (Garrett Lee Smith Memorial Act 2004).

Despite the current national focus on suicidal behavior among youth, such as the Garret Lee Smith Memorial Act (PL 108-355), suicide attempts among Latino adolescents remain a major public health issue. Latino adolescents, especially females, report higher rates of suicide attempts compared with their white or African-American counterparts (Eaton et al. 2006). The US Latino population is large, young, and fast growing—reaching 14.4% of the total US population (42 million) in 2005 (US Census Bureau 2006). Without targeted prevention efforts, the high levels of suicidal behavior among Latino adolescents are likely to continue, placing considerable demands on their families as well as medical and psychiatric service systems.

Better understanding of immigrant generation status and its relation to suicidal behavior is needed to improve prevention efforts for Latino adolescents. Immigrant generation status is a useful and readily measured variable related to acculturation. Escobar and Vega (2000) define acculturation as “the processes of change in artifacts, customs and beliefs that result from the contact of societies with different cultural traditions or the results of such changes.” Although definitions for generation status are variable and can include categories such as “mixed parentage” to refer to those who have both foreign-born and US-born parents or “1.5 generation” to refer to foreign-born who arrived to the USA at a young age (Portes and Rumbaut 2001), we define first-generation as foreign-born and number each subsequent generation born in the USA sequentially (second-generation are the US-born children of at least one first-generation parent; later-generations are the children of US-born parents). Using this classification, approximately 39% of Latinos in the USA are first-generation, 29% are second-generation (having at least one first-generation parent), and the remaining 32% are later-generations (US Census Bureau 2002).

Despite the common use of immigrant generation status as a proxy for acculturation, Rogler and colleagues (1991) caution that other factors such as socioeconomic status also may be associated with immigrant generation status. Rumbaut and Portes (2001) note that contextual and demographic characteristics such as socioeconomic status associated with a particular immigrant cohort can affect the life opportunities or level of discrimination immigrants encounter in the USA. Acculturation, conceptualized as a complex multidimensional process, can occur unevenly across immigrant generations and does not exclude the possibility of biculturalism (Chun et al. 2003). Nonetheless, generation status has come to be acknowledged as one of the more important variables related to acculturation (Escobar and Vega 2000).

The association between immigrant generation status, suicide, and suicidal behavior has been replicated in representative samples of Latinos. First-generation Latinos have had lower rates of completed suicide compared with

US-born generations across several national and regional cohorts (Singh and Hiatt 2006; Sorenson and Shen 1996, 1999). Additionally, rates for suicide attempts among first-generation Latina females (ages 12 to 17) were lower than for US-born generations of Latina females in a national sample (SAMHSA 2003). However, only limited inferences regarding reasons for the observed reductions in suicidal behaviors of first-generation youth can be drawn on past findings without a broader discussion of three scientific areas of study in the literature: (1) risk factors for suicidal behavior, (2) empirically derived associations between risk factors and generation status, and (3) conceptual models regarding the relation between acculturation and mental health.

Among the many risk factors influencing adolescent suicidal behavior (e.g., family history, peers, stress), depression, problematic alcohol use, and illicit drug use are three of the most important. The strong association between these three factors and suicide attempts among adolescents has been replicated across multiple studies (Gould et al. 2003). Because all three factors are also serious public health concerns in their own right, researchers have started to examine their relation with immigrant generation status.

Evidence is growing that immigrant generation status is related to mental health outcomes including alcohol use, illicit substance use, and depression. Studies have found first-generation Latino youth and adults have lower rates of alcohol and drug use, substance use disorders, depressive symptoms, and depressive disorders than US-born generations (Cervantes et al. 1990; Gilbert 1987; Gilbert and Alcocer 1988; Gilbert and Cervantes 1986a,b; Grant et al. 2004; Harris 1999; Vega et al. 2004). Although findings related to substance use and abuse have been replicated across adult and adolescent populations, lower rates of depression for first-generation Latinos have mainly been found in adult populations. These results suggest that problematic alcohol use, illicit drug use, and depressive symptoms may partially account for the elevated rates of suicidal behavior among US-born generations of Latinos. However, this hypothesis remains to be tested empirically.

Several conceptual models have been proposed to explain why first-generation Latinos have better mental health outcomes than US-born generations, including suicide and its related risk factors of substance use and depression. We cluster these models into three types that we refer to as (1) the Protective Culture Model, (2) the Intergenerational Acculturation Conflict Model, and (3) the Resilient Immigrant Model. These models are not mutually exclusive. Their descriptions below are not meant to be comprehensive reviews, but rather brief overviews.

The Protective Culture Model suggests that aspects of Latino culture decrease risk for suicide or protect against

factors associated with suicide. This model has been discussed in various forms, including that by Durkheim (1952), who argued that Catholic countries have lower rates of suicide than Protestant countries because they have greater levels of social and family bonds. Others make similar arguments regarding Latino culture—that high levels of family and social support are protective against suicidal behavior or reduce the effect of other risk factors, such as acculturation stress (Canino and Roberts 2001; Range et al. 1999). Portes and Rumbaut (2001) also discuss how maintaining elements of Latino culture, especially within ethnic enclaves, protects against factors such as racism and reduces the likelihood of drug involvement among youth. This model also suggests that protective cultural attributes dissipate with time spent in the USA, thus offering a possible explanation for lower rates of suicide attempts as well as drug and problematic alcohol use among first-generation youth compared with later-generations.

The Intergenerational Acculturation Conflict Model posits that when the distance in acculturation between parent and child is large, intergeneration conflict or role reversal can occur, leading to behavioral problems and distress among youth. This model has been described by Phinney et al. (2000) as intergenerational value discrepancies, by Szapocznik and Williams (2000) as intercultural/intergenerational conflict, and by Portes and Rumbaut (2001) as dissonant acculturation. This model may explain why first-generation youth have lower rates of suicidal behavior and other problems compared to their second-generation counterparts who on average have greater exposure to the USA. However, if this model is applicable to suicidal behavior we would also expect that US-born Latino youth with US-born parents should have lower rates of suicidal behavior than their second-generation counterparts. Unfortunately, the distinction between second- and later-generations of US-born Latinos has largely been unexamined for suicidal behavior because many studies collapse all US-born generations into a single category.

The Resilient Immigrant Model suggests that the immigration process favors the inclusion of individuals with relatively high resiliency and good mental health over those who lack resiliency or who have mental health problems. This explanation has been offered as a potential reason why immigrants tend to have better mental health outcomes than their US-born counterparts (Burnam et al. 1987; Vega et al. 1998, 2004).

Study Aims

From a nationally representative sample of Latino middle and high school students, this study examined the relation between the categories of immigrant generation status (first-,

second-, and later-generations) and suicide attempts, problematic alcohol use, repeated marijuana use, repeated other drug use, and depressive symptoms. We also examined problematic alcohol use, repeated marijuana use, repeated other drug use, and depressive symptoms as factors that mediate the relation between immigrant generation status and suicide attempts. We controlled for multiple contextual and demographic characteristics in our analyses. Although we did not test the validity of the models discussed above we examined their consistency with our results.

Methods

The National Longitudinal Study of Adolescent Health (Add Health) is a prospective cohort study that followed a nationally representative sample of 7th- through 12th-grade students from US public and private schools into early adulthood. Our study is based on analysis of data from the wave 1 in-home interviews of participants administered from April 1995 to December 1995. A total of 20,745 adolescents completed the in-home interviews. A parent respondent, usually the mother, also completed a survey that included information on family demographics. Interviews were conducted in Spanish for both adolescent and parent respondents when necessary. In addition, census data were matched to respondents. A detailed description of the Add Health study has been published elsewhere (Harris et al. 2003).

Our study sample ($N=3135$) included respondents who: (1) self-reported as being of Hispanic or Latino origin; (2) had at least one residential parent; and (3) reported parental birthplace. The majority of the sample was of Mexican descent (58.6%). The next two largest groups were youth of Puerto Rican descent (13.1%) and Cuban descent (6.4%). The remainder of the sample was categorized as descendents of other Hispanic countries (22.2%) or of two or more Hispanic countries (1.1%). There were 25.6% first-generation ($n=793$), 34.8% second-generation ($n=1,281$), and 39.5% later generations ($n=1061$) in the sample. First-generation youth were significantly older (mean age, 16.0 years) than second-generation youth (mean age, 15.4 years) and later-generations of youth (mean age, 15.3 years).

Measure

Demographic Variables Familial country of origin (Mexican-American, Puerto Rican, Cuban-American, or Other Hispanic) was based on adolescents' self-report. Respondents from multiple Latino countries of origin were classified into a fifth category: Bi-ethnic Hispanic. Age was calculated in years from date of birth and the interview date. Gender was self-reported. Urban residency and residential poverty, defined as the proportion of those in the census

block living below the poverty line, were determined using US census data matched to adolescent respondents. Family structure was assessed by participants' self-report of having two biological parents at home. Welfare status was based on an affirmative response by either the adolescent or the parent that the family was currently on welfare. Having at least one residential parent with a high school education also was based on either the adolescent or the parental respondent's self-report of educational level.

Immigrant Generation Status Each participant was assigned one of three immigrant generation categories from the adolescent's report of the location of birth as well as the birthplace of his or her parents. The categories were (1) *first-generation*, or born outside the USA; (2) *second-generation*, or born in the USA with at least one residential parent born outside the USA; and (3) *later-generations*, or born in the USA with residential parents born in the USA. To facilitate multiple pair-wise comparisons, three separate dichotomous variables representing each immigrant generation category were created and coded as 1=yes or 0=no.

Problematic Alcohol Use Problematic alcohol use (dichotomous) was measured by responses to seven questions indicating recurring impairment in functioning attributable to alcohol use. Youth were asked "Over the past 12 months, how many times has each of the following things happened: (1) got into trouble with parents because you had been drinking; (2) had problems at school or with school work because you had been drinking; (3) had problems with friends because you had been drinking; (4) had problems with someone you were dating because you had been drinking; (5) did something you later regretted because you had been drinking; (6) got into a sexual situation that you later regretted because you had been drinking; or (7) got into a physical fight because you had been drinking?" Responses for each item included: 0=never, 1=once, 2=twice, 3=three to four times, 4=five or more times. Adolescents with a twice or greater response to any item, or a once or greater response to two or more items, were coded as engaging in problematic alcohol use.

Repeated Marijuana Use Repeated marijuana use (dichotomous) was measured by the following item, "During your life, how many times have you used marijuana?" Youth were asked to fill in the actual number of times this substance was used. Youth with a response of twice or more were coded as engaging in repeated marijuana use.

Repeated Other Drug Use Repeated other drug use (dichotomous) was measured by the following items. "During your life, how many times have you used (1) cocaine; (2) inhalants (such as glue or solvents); (3) illegal

drugs such as LSD, PCP, ecstasy, mushrooms, speed, ice, and heroin, or pills without a doctor's prescription?" Youth were asked to fill in the actual number of times the substances were used during past month. Youth with a response of twice or more on any of the above items were coded as engaging in repeated other drug use.

Depressive Symptoms Depressive symptoms (continuous) were measured using an abbreviated version of the Center for Epidemiologic Studies Depressive Symptoms Scale (CES-D). The CES-D measures the frequency that an individual has experienced a series of depressive symptoms in the past week: 0=never or rarely to 3=most of the time or all the time. Add Health has 18 items from the original 20-item CES-D instrument as well as a nineteenth item from a modified version of the CES-D originally used on adolescent populations by Garrison et al (1991). Of these 19 items, 5 have been shown to have external validity across generation status and multiple ethnicities in adolescents (Perreira et al. 2005). These five items focus on depressive affect and include (1) you could not shake off blues, even with help from your family and your friends; (2) you felt depressed; (3) you were happy (reverse coded); (4) you felt sad; and (5) you felt life was not worth living. The sum of these five items was used, and the range of possible scores was 0 to 15. Factor analysis on these five items confirmed that they do indeed measure a single factor in this sample and that the factor loadings for the single factor solution were greater than 0.5 for all items. Cronbach's alpha for the five items used in this study was 0.78.

Suicide Attempts Suicide attempts in the past 12 months (dichotomous) were assessed by the question, "During the past 12 months, how many times did you actually attempt suicide?" Because of skip patterns in the interview, suicide attempts were only queried for adolescents who reported thinking about suicide during the past 12 months. Thus, all adolescents in this sample who reported that they had attempted suicide also reported suicide ideation. For the remainder of this report, the discussion of the variable "suicide attempts" refers to these youth who both had attempted and thought about suicide in the past year.

Statistical Analysis

Stata Release 8 (StataCorp, College Station, TX, 2003) and Mplus version 4.2 (Muthén & Muthén, Los Angeles, 2006) were used to conduct all the analyses. A sandwich standard error estimator was used to take clustering into account. Results for all analyses reported were adjusted for weighting and the stratified cluster design of Add Health using procedures recommended by Chantala and Tabor (1999).

Logistic or linear regression models were used, depending on outcome scale, to estimate age-adjusted rates/means for problematic alcohol use, repeated marijuana use, repeated other drug use, depressive symptoms, and suicide attempts and to compare these rates by generation status. To account for factors that may be associated with generation status, we next examined the adjusted odds ratios (ORs) and confidence intervals (CIs) for generation status after entering age, familial country of origin, gender, having two biological parents at home, parental education, welfare status, urban residency, and residential poverty as one block of covariates. To avoid experimental-wise error from multiple group comparisons, we used two strategies. First, an omnibus test was used to examine if generation status was significantly related to the outcome. We used the Wald chi-square test estimated by Mplus because it is appropriate for complex survey designs (Muthén and Muthén 1998–2007). Second, we examined the significance of pair-wise comparisons using the Bonferroni–Holm or Holm adjustment. Although other more conservative tests are available, such as the Bonferroni adjustment, research by Aickin and Gensler (1996) suggests that the Holm adjustment is less prone to error than the more conservative Bonferroni approach. We also used the Wald chi-square test and the Holm adjustment to test moderation by examining the significance levels of two-way interaction terms added to our models (e.g., gender \times second generation, gender \times later generations).

Path analysis was used to estimate the direct and indirect effects of generation status on suicide attempts using Mplus (see Fig. 1). Based on previous research findings, our model included suicide attempts as the outcome and problematic alcohol use, repeated marijuana use, repeated other drug use, and depressive symptoms as intermediate risk factors. Immigrant generation status was modeled as being a distal determinant of suicide attempts and its intermediate risk factors. We included the demographic and contextual factors mentioned above as covariates for immigrant generation status in our path model (covariates are not depicted in Fig. 1). We also modeled bidirectional relations between each of the four proposed mediating factors (problematic alcohol use, repeated marijuana use, repeated other drug use, and depressive symptoms) to account for possible associations. The weighted least squares estimator was used (WLSMV) for our path model (Muthén and Muthén 1998–2007) to allow the estimation of standard errors for indirect effects, the modeling of bidirectional relations for categorical outcomes, and the inclusion of fit indices such as CFI/TFI and RMSEA. With this estimator, regression coefficients for categorical outcomes are equivalent to probit model results. Although logistic regression models use a different type of estimator, the substantive differ-

ences between probit and logistic model are generally indistinguishable (Long 1997).

Although our sample had a modest amount of cases with missing data—less than 7% combined across all study variables—we followed the recommendation of Collins et al. (2001) to use an inclusive multiple imputation strategy for missing data. Based on her study results, she concludes that this inclusive strategy is currently the best available option to eliminate or minimize bias related to the different causes of missing data. For our analysis ten datasets were created using the ICE function in Stata (Royston 2005). Variables used to impute datasets included those from our model as well as auxiliary variables that were either correlated with those in our model (e.g., delinquency, alcohol use) or potentially related to missingness (e.g., indicators related to social desirability). Analyses of these ten datasets were performed using the “Type=Imputed” function in Mplus which calculates parameter estimates and standard errors across datasets (Muthén and Muthén 1998–2007).

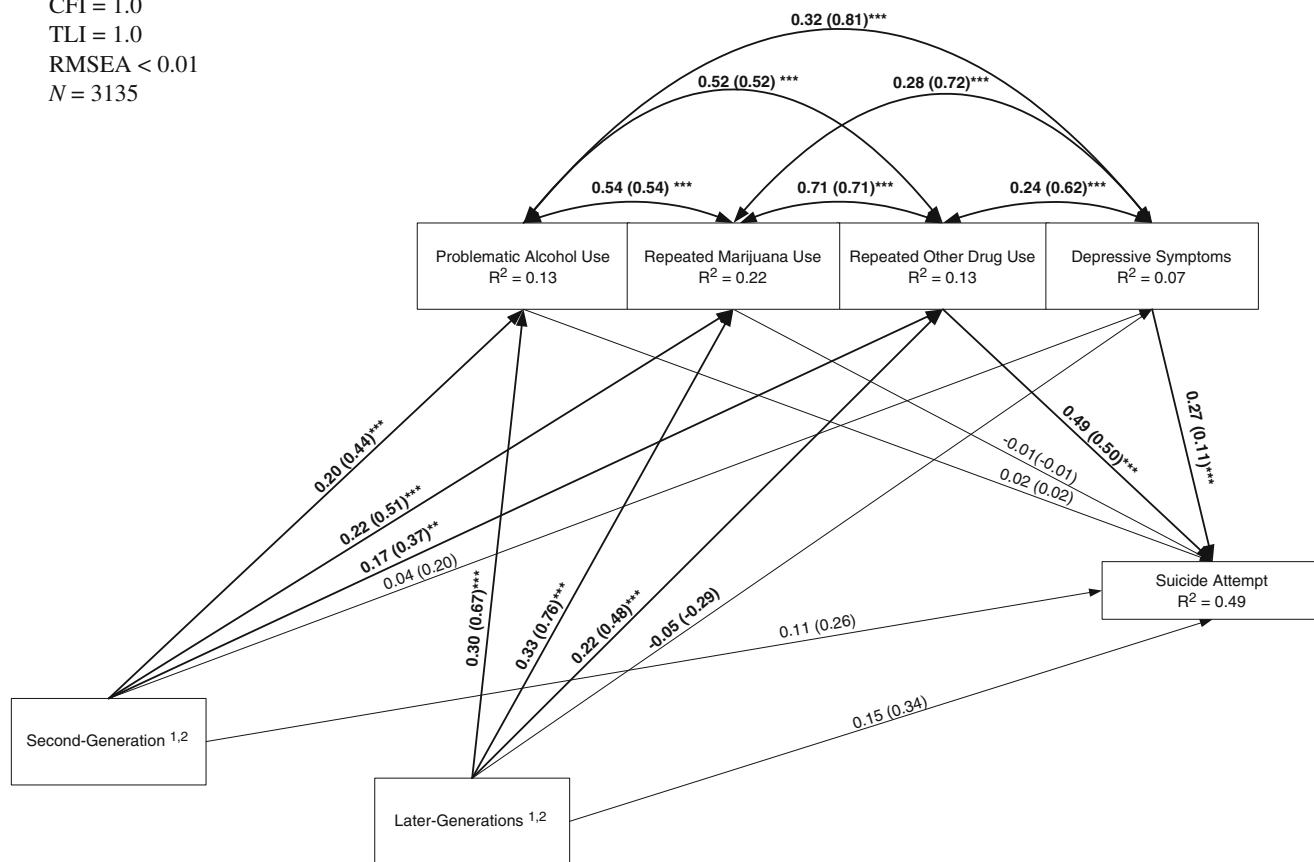
Results

As summarized in Table 1, a number of differences were found between youth of different generation status on personal and familial socio-demographic characteristics. Among the notable differences were that parental education increased across all three immigrant generation categories from 46.0% of first-generation youth to a high of 85.0% for youth of later-generations. The distribution of those considered of Other Hispanic descent (i.e., those not from Mexican, Puerto Rican, or Cuban descent) increased up to 39.2% for first-generation youth compared with only 18.2% for second-generation youth and 14.8% for youth of later generations. First-generation youth resided in areas with higher residential poverty (mean poverty rate of 22.7 per 100) compared with youth of later generations (15.4 per 100). Youth from later-generations were also less likely to reside in urban areas (73.2%) than were first-generation (92.2%) or second-generation youth (90.8%). In contrast to the pattern of decreasing hardship with higher generation status, second-generation adolescents were the most likely to have two biological parents living at home (66.1%) while youth of later-generations (41.7%) were the least likely.

Relation Between Immigrant Generation Status and Suicide Attempts, Problematic Alcohol Use, Repeated Marijuana Use, Repeated Other Drug Use, and Depressive Symptoms

Immigrant generation status was significantly related to suicide attempts (Wald chi-square=7.89, $df=2$, $p=0.019$), problematic alcohol use (Wald chi-square=43.73, $df=2$, $p<$

Number of free parameters 81
 CFI = 1.0
 TLI = 1.0
 RMSEA < 0.01
 N = 3135



Note: Standardized regression coefficients are reported with the unstandardized regression coefficients in parenthesis. Statistical significance is noted with the following notations: * = $p \leq 0.05$, ** = $p \leq 0.01$, *** = $p \leq 0.001$

1. Reference group is first generation youth
2. Adjusted for age, gender, familial country of origin, parental education, urban residency, residential poverty, welfare status, and two biological parents at home.

Fig. 1 Path model for immigrant generation status, suicide attempt, and intermediate risk factors

0.001), repeated marijuana use (Wald chi-square=69.97, $df=2$, $p<0.001$), and repeated other drug use (Wald chi-square=18.72, $df=2$, $p<0.001$) when adjusting for age. However, it was not significantly related to depressive symptoms (Wald chi-square=3.48, $df=2$, $p=0.175$). Table 2 includes estimated rates/means for suicide attempts, problematic alcohol use, repeated marijuana use, repeated other drug use, and depressive symptoms across generation status when age is centered at 15 years old. First-generation youths had lower age-adjusted rates for suicide attempts (1.7%) than did later-generations (4.9%). Rates for problematic alcohol use increase across generation status (6.9% for first-generation youth, 14.3% for second-generation youth, and 21.6% for later generations), as do rates for repeated marijuana use (7.9%, 17.9%, and 32.5%, respectively) and repeated other drug use (3.3%, 7.8%, and 12.7%, respectively). All pair-

wise comparisons for these three substance use variables were significant.

Gender and familial country of origin were examined as possible moderators for suicide attempts by generation status. Although males and females reported different overall rates of suicide attempts (1.6% and 5.6% respectively, $t=4.24$, $p<0.001$), post-hoc analysis revealed no gender by immigrant generation status interaction effects for any of the outcomes (i.e., the effects of generation status on outcomes did not vary by gender). Furthermore, a second post-hoc analysis revealed no Mexican-American by immigrant generation interactions for any of the outcomes. Mexican Americans were the only group with sufficient adolescents in all three generation groups to permit a comparison. Because we found no variation in generation effects by Mexican heritage, and the other

Table 1 Demographic characteristics and their associations with immigrant generation status

	Total (N=3,135)	1st gen, N=793 25.6 (25.3)	2nd gen, N=1,281 34.8 (40.9)	Later gen, N=1,061 39.5 (33.8)	Wald χ^2	$p \leq$
Weighted % (unweighted %)						
Female	49.1 (50.0)	52.0 (49.9)	48.0 (50.3)	48.2 (49.9)	1.69	0.430
Mexican-American	58.6 (49.9)	49.1 (35.6)	58.7 (53.7)	64.7 (56.0)	3.80	0.149
Puerto Rican	13.1 (17.8)	4.2 ^a (6.6)	12.2 ^b (14.8)	19.8 ^c (29.7)	25.92	0.001
Cuban-American	6.4 (15.8)	7.6 ^a (28.4)	9.6 ^a (18.7)	2.8 ^b (2.8)	7.40	0.025
Other Hispanic	22.2 (15.9)	39.2 ^a (29.5)	18.2 ^b (11.3)	14.8 ^b (11.3)	18.94	0.001
Bi-ethnic Latino	1.1 (1.2)	–	1.3 (1.6)	1.6 (1.8)	0.20	0.656
2 Res Bio Parents	52.8 (53.1)	51.9 ^a (50.9)	66.1 ^b (65.0)	41.7 ^c (40.4)	40.32	0.001
HS Ed. Parent	65.9 (66.4)	46.0 ^a (52.6)	59.0 ^b (59.3)	85.0 ^c (85.4)	63.31	0.001
Welfare	22.3 (20.9)	21.5 (22.7)	23.3 (20.6)	22.0 (19.9)	1.02	0.601
Urban Residency	84.2 (86.7)	92.2 ^a (92.6)	90.8 ^a (92.2)	73.2 ^b (75.8)	30.05	0.001
Weighted mean (unweighted mean)						
Age	15.5 (16.0)	16.0 (16.4) ^a	15.4 (15.9) ^b	15.3 (15.7) ^b	9.57	0.008
Residential Poverty	18.6 (16.6)	22.7 (20.8) ^a	19.1(15.8) ^{a,b}	15.4 (14.4) ^b	12.66	0.00

A significant Wald chi-square indicates a demographic difference by generation status. Significant pair-wise comparisons are noted in the table by superscripts. Percentage or means that do not share the same superscript within a row are different from each other after Holm adjustment

countries of origin had too few adolescents in one or more generation groups to provide a useful comparison, we did not stratify any analysis by country of origin. However, we continued to use familial country of origin as a control variable.

Immigrant generation status remained significantly related to suicide attempts (Wald chi-square=9.66, $df=2$, $p=0.008$), problematic alcohol use (Wald chi-square=31.17, $df=2$, $p \leq 0.001$), repeated marijuana use (Wald chi-square=33.17, $df=2$, $p < 0.001$), and repeated other drug use (Wald chi-square=9.49, $df=2$, $p=0.009$) even after adjusting for all covariates. As with the age-adjusted rates for the outcomes, the adjusted ORs and 95% CIs suggest that these risk behaviors vary significantly by immigrant generation status in Latino adolescents (see Table 3). Compared with first-generation adolescents, later-generations (excluding second) were more likely to attempt suicide (OR, 3.57; CI, 1.53, 8.34), engage in problematic alcohol use (OR, 3.34; CI, 2.18, 5.11), engage in repeated marijuana use (OR, 3.90; CI, 2.46, 6.20), and engage in repeated other drug use (OR, 2.80; CI, 1.46, 5.34). Additionally, compared with first-generation adolescents, second-generation youth were more likely to attempt suicide (OR, 2.87; CI, 1.34, 6.14), engage in problematic alcohol use (OR, 2.27; CI, 1.53, 3.35), engage in repeated marijuana use (OR, 2.56; CI, 1.62, 4.05), and engage in repeated other drug use (OR, 2.28; CI, 1.25, 4.17). Later-generations were also more likely to engage in problematic alcohol use (OR, 1.47; CI, 1.03, 2.10) and repeated marijuana use (OR, 1.53; CI, 1.10, 2.11) than were second-generation youth. The linear regression beta coefficient for depressive symptoms was -0.49 (CI, -0.92 ,

-0.05) for later-generations when second-generation youth were the reference group. Although the unadjusted P value for this comparison was less than 0.05, this comparison became nonsignificant after a Bonferroni–Holm adjustment was performed. Additionally the omnibus test for generation status and depressive symptoms remained nonsignificant (Wald chi-square=4.94, $df=2$, $p=0.085$).

The ORs and regression betas for covariates when all variables were entered into the model are shown in Table 3. Besides immigrant generation status, age and residing at home with two biological parents were the variables most consistently related to the outcomes of the study. Age was a risk factor for problematic alcohol use (OR, 1.27; CI, 1.17, 1.38), repeated marijuana use (OR, 1.27; CI, 1.16, 1.38), repeated other drug use (OR, 1.14; CI, 1.05, 1.24), and depressive symptoms (regression beta, 0.14; CI, 0.05, 0.22). Residing at home with two biological parents decreased risk for suicide attempts (OR, 0.34; CI, 0.18, 0.64), repeated marijuana use (OR, 0.43; CI, 0.29, 0.64), repeated other drug use (OR, 0.57; CI, 0.38, 0.86), and depressive symptoms (regression beta, -0.59 ; CI, -0.85 , -0.33). Males also were less likely to attempt suicide (OR, 0.25; CI, 0.13, 0.47) and had lower rates of depressive symptoms than females (regression beta, -0.90 ; CI, -1.23 , -0.57). Compared with Mexican-Americans, Puerto Ricans were less likely to engage in problematic alcohol use (OR, 0.53; CI, 0.33, 0.88). Other Hispanics were also less likely to engage in repeated marijuana use than Mexican-Americans (OR, 0.67; CI, 0.46, 0.98). While parental education was related to a decreased risk for depressive symptoms (regression beta, -0.29 ; CI, -0.55 , -0.03) it was also associated with an increased risk for engaging in repeated marijuana use (OR,

Table 2 Age adjusted percentage for outcomes by generation status (age=15)

	First-generation	Second-generation	Later-generation	Wald χ^2	$p \leq$
Suicide attempt	1.7% ^a	3.4% ^{a,b}	4.9% ^b	7.89	0.019
Problematic alcohol use	6.9% ^a	14.3% ^b	21.6% ^c	43.73	0.001
Repeated marijuana use	7.9% ^a	17.9% ^b	32.5% ^c	69.97	0.001
Repeated other drug use	3.3% ^a	7.8% ^b	12.7% ^c	18.72	0.001
Depressive symptoms-mean	2.9	3.0	2.6	3.48	0.175

A significant Wald chi-square indicates a difference of the outcome by generation status. Significant pair-wise comparisons are noted in the table by superscripts. Percentage or means that do not share the same superscript within a row are different from each other after Holm adjustment

1.62; CI, 1.16, 2.26) and repeated other drug use (OR, 1.74; CI, 1.14, 2.66). Additionally, results from these models suggest that contextual factors such as welfare, residing in urban areas, and residing in areas with higher levels of residential poverty were not related to the outcomes after adjusting for other variables in the model. The one exception was residential poverty, which was related to a decreased risk for engaging in repeated other drug use (OR, 0.18; CI, 0.04, 0.90).

Path Analysis

A path model was tested to examine if the more proximal variables of problematic alcohol use, repeated marijuana use, repeated other drug use, and depressive symptoms served as mediating variables between generation status and suicide attempts. For this analysis, first-generation youth remained the reference group and no comparisons between later- and

second-generation youth were undertaken because previous analysis indicated no significant differences between these two groups for suicide attempts.

Model fit indices suggest that our model fit the data well. A CFI/TLI cutoff of ≥ 0.96 and an RMSEA cutoff of ≤ 0.05 indicate good model fit for binary outcomes (Yu 2002). The CFI/TLI value for the model tested in Fig. 1 was 1.0, and the RMSEA was less than 0.01. The R^2 values in our model were 0.49 for suicide attempt, 0.13 for problematic alcohol use, 0.22 for repeated marijuana use, 0.13 for repeated other drug use, and 0.07 for depressive symptoms.

Figure 1 includes regression coefficients and their significance levels for each pathway in our model (except for those of covariates). To facilitate comparability of results across different pathways or combination of pathways, we have reported fully standardized regression coefficients in the text. The interpretation of fully standardized coefficients is that for a standard deviation increase of the independent

Table 3 Adjusted odds ratio, regression betas, and 95% CI for suicide attempt and related risk factors

	Odds ratio				Regression betas
	Suicide attempt	Problematic alcohol use	Repeated marijuana use	Repeated other drug use	Depressive symptoms
Later-gen vs. 1st gen	3.57 (1.53, 8.34) ^a	3.34 (2.18, 5.11) ^a	3.90 (2.46, 6.20) ^a	2.80 (1.46, 5.34) ^a	-0.29 (-0.65, 0.07)
2nd gen vs. 1st gen	2.87 (1.34, 6.14) ^a	2.27 (1.53, 3.35) ^a	2.56 (1.62, 4.05) ^a	2.28 (1.25, 4.17) ^a	0.20 (-0.16, 0.55)
Later-gen vs. 2nd gen	1.25 (0.59, 2.64)	1.47 (1.03, 2.10) ^a	1.53 (1.10, 2.11) ^a	1.23 (0.79, 1.91)	-0.49 (-0.92, -0.05)
Age	1.01 (0.87, 1.16)	1.27 (1.17, 1.38) ^a	1.27 (1.16, 1.38) ^a	1.14 (1.05, 1.24) ^a	0.14 (0.05, 0.22) ^a
Male	0.25 (0.13, 0.47) ^a	0.97 (0.74, 1.28)	1.39 (1.09, 1.77) ^a	1.21 (0.82, 1.78)	-0.90 (-1.23, -0.57) ^a
Bi-ethnic Latino	1.78 (0.28, 11.47)	0.81 (0.21, 3.10)	0.87 (0.42, 1.82)	1.12 (0.37, 3.35)	0.28 (-1.01, 1.57)
Puerto Rican	0.76 (0.40, 1.43)	0.53 (0.33, 0.88) ^a	0.87 (0.54, 1.40)	0.45 (0.20, 1.01)	0.38 (-0.03, 0.78)
Cuban-American	1.31 (0.36, 4.69)	0.77 (0.44, 1.38)	0.72 (0.49, 1.05)	0.80 (0.40, 1.58)	-0.47 (-1.29, 0.36)
Other Hispanic	1.09 (0.48, 2.50)	0.82 (0.53, 1.28)	0.67 (0.46, 0.98) ^a	0.65 (0.41, 1.03)	-0.19 (-0.53, 0.15)
Parents HS education	0.88 (0.47, 1.67)	1.20 (0.82, 1.77)	1.62 (1.16, 2.26) ^a	1.74 (1.14, 2.66) ^a	-0.29 (-0.55, -0.03) ^a
Urban residency	1.01 (0.56, 1.83)	0.91 (0.60, 1.37)	0.85 (0.59, 1.23)	0.82 (0.53, 1.28)	0.03 (-0.41, 0.47)
Residential poverty	1.49 (0.23, 9.58)	0.64 (0.20, 2.08)	0.66 (0.20, 2.14)	0.18 (0.04, 0.90) ^a	0.61 (-0.59, 1.81)
Welfare	0.98 (0.52, 1.84)	1.15 (0.84, 1.58)	0.97 (0.65, 1.45)	1.15 (0.78, 1.68)	0.18 (-0.21, 0.56)
Reside w/ two bio parent	0.34 (0.18, 0.64) ^a	0.77 (0.54, 1.10)	0.43 (0.29, 0.64) ^a	0.57 (0.38, 0.86) ^a	-0.59 (-0.85, -0.33) ^a

Reference group for familial country of origin is Mexican-American. Comparison between generations was conducted using two different regressions with the same covariates but a different generation group as the reference

^a Significant after Holm Adjustment

variable, the dependent variable is expected to increase by x standard deviation, holding all other variables constant (Long 1997). However, we also have included the results of the unstandardized regression coefficients in Fig. 1. The interpretation of unstandardized regression coefficients depends on the outcome. Regression coefficients for categorical outcomes (e.g., suicide attempt and substance use variables) are equivalent to results of probit models, whereas those for continuous outcomes (e.g., depressive symptoms) are equivalent to linear regression. Results depicted in Fig. 1 illustrate three overall sets of findings.

First, compared with first-generation youth, second- and later-generation youth remained at increase risk for problematic alcohol use [0.20 ($p < 0.001$) and 0.30 ($p < 0.001$)], repeated marijuana use [0.22 ($p < 0.001$) and 0.33 ($p < 0.001$)], and repeated other drug use [0.17 ($p < 0.01$) and 0.22 ($p < 0.001$)]. These results remained robust even after adjusting for all covariates and taking into account the association between substance use variables and depressive symptoms.

Second, only repeated other drug use and depressive symptoms remained significant predictors of suicide attempts for Latino youth in our model depicted in Fig. 1 [0.49 ($p < 0.001$) and 0.27 ($p < 0.001$)], respectively. Although there was a bivariate relation between suicide attempt and the substance use variables of problematic alcohol use and repeated marijuana [0.28 ($p < 0.001$) and 0.36 ($p < 0.001$)] (not depicted in figure), this relation was largely accounted for by strong associations with repeated other drug use [0.52 ($p < 0.001$) and 0.71 ($p < 0.001$)] and depressive symptoms [0.32 ($p < 0.001$) and 0.28 ($p < 0.001$)].

Third, repeated other drug use mediates the relation between immigrant generation status and suicide behavior in our model. Repeated other drug use is related to both suicide attempt and generation status in our model. Furthermore, the indirect effects of suicide attempt on second- and later-generations through repeated other drug use were estimated to be significant [0.08 ($p < 0.05$) and 0.11 ($p < 0.01$)] (not depicted in Fig. 1). Additionally, the direct effects of suicide attempt on second- and later-generations became nonsignificant (0.11 and 0.15) in our model with the inclusion of the substance use variables. Different sets of indirect paths also were tested by including different combinations of intermediate variables. When depressive symptoms remained in our model and the substance use outcomes were excluded, the direct effects of second- and later-generations became significant [0.19 ($p < 0.05$) and 0.27 ($p < 0.01$)]. Additionally, when both substance use outcomes and depressive symptoms were excluded from our model, the results also remained significant [0.21 ($p < 0.05$) and 0.25 ($p < 0.05$)].

Discussion

We found a relation between suicide attempts and immigrant generation status among Latino adolescents. First-generation youth were less likely to attempt suicide compared with second-generation and later-generations of youth. This central finding is congruent with the lower suicide rates found for first-generation Latinos across multiple national and regional cohorts of Latinos (Singh and Hiatt 2006; Sorenson and Shen 1996, 1999), lower rates of suicide ideation and attempt among first-generation Mexican adults in a community sample (Sorenson and Golding 1988), and lower suicide attempt rates among first-generation Hispanic female adolescents in a national sample (SAMHSA 2003). Our findings also support those of Vega et al. (1993), who found a relation between acculturation and suicide attempts among a sample of early adolescent Latino boys.

Consistent with prior studies, our analysis also found a marked linear relation between higher immigrant generation status and illicit drug use and problematic alcohol use (Cervantes et al. 1990; Gilbert 1987; Gilbert and Alcocer 1988; Gilbert and Cervantes 1986a,b; Grant et al. 2004; Harris 1999; Vega et al. 2004). Our study extends these earlier findings by using a nationally representative sample of Latino adolescents and by taking into account immigrant generation status beyond a simple dichotomy of foreign-born and US-born status. Results also confirmed that family structure and age are important determinants of mental health and substance use outcomes in Latino youth.

Unlike studies showing an association between depression and generation status for Latino adults (Grant et al. 2004; Vega et al. 2004), there were no significant relations found with depressive symptoms and generation status among youth in this study. However, there was a nonsignificant trend that suggested that second-generation youth had higher levels of depressive symptoms than later-generations after controlling for other contextual factors. Further research exploring this potential relation is warranted, particularly because higher depressive symptoms among second-generation adolescents would be consistent with the Intergenerational Conflict Model.

With regard to the potential role of substance use and depressive symptoms as intermediate risk factors between generation status and suicide attempts, we found that only repeated other drug use mediated the effect of generation status on the propensity to attempt suicide. Repeated other drug use had a significant indirect effect that was independent of its relation with problematic alcohol use, repeated marijuana use, or depressive symptoms. Additionally, when substance use variables were excluded from the model, the direct relation between immigrant generation status and suicide attempt became significant.

Clinical and Research Implications

Although this study was not designed to test the Preventive Culture Model, the Intergenerational Conflict Model, or the Resilient Immigrant Model, it does offer potential explanations for why suicide attempts or substance use may be related to immigrant generation status. As one example, substance use increases across all three generations for problematic alcohol use, repeated marijuana use, and repeated other drug use. This pattern is consistent with the Culture Protective Model and suggests elements of Latino culture exist that, when diminished or transformed across several generations, increase risk for substance use among youth. The lack of similar findings for depressive symptoms also suggests that these mechanisms may be related to social control factors (e.g., high parental monitoring, cultural taboos) that limit substance use among youth but fail to have a similar effect on depressive symptoms. Although nonsignificant, the trend associated with increased depressive symptoms among second-generation youth compared with later-generations is consistent with the Intergenerational Conflict Model. Specifically, the higher level of depressive symptoms for US-born youth with immigrant parents (second-generation) compared with those with US-born parents (later-generations) may be explained by problematic family dynamics resulting from the acculturation gap between adolescent and parent.

To test these models in future research, several methodological considerations are needed. First, to examine the Preventive Culture Model, protective factors associated with Latino culture must be tested as mediators or moderators of risk factors related to substance use, especially those related to social control such as parental monitoring, religiosity, and cultural norms regarding drug use. Second, to examine the Intergenerational Conflict Model, more precise measures of acculturation and biculturalism are needed for both the adolescents and their parents. Without these measures, accurately capturing any acculturation gaps that exist between adolescents and their parents may not be possible. Additionally, future research must measure family factors, such as parent-child conflict or role reversal, so that these factors can be tested as potential mediators between parent-adolescent acculturation differences and mental health outcomes (e.g., depressive symptoms or emotional distress). Third, to examine the Resilient Immigrant Model, comparison data are needed from the Latin American countries where the families of these youth originally resided. Factors related to culture versus immigration selection can begin to be disentangled by making comparisons between Latinos in the USA across different generations or acculturation levels with youth from Latin American countries. Lastly, there is a paucity of longitudinal and multigenerational research on accultura-

tion and suicidal behavior, mental health, or substance use outcomes. These types of studies allow the modeling of developmental or familial trajectories associated with different explanatory models such as the Preventive Culture Model (e.g., do changes in cultural norms across time or generations in the USA lead to greater substance use?) or the Intergenerational Conflict Model (e.g., does family conflict or role reversal correspond to changes of acculturation gaps between parent and child across time?).

Besides improving methodology to test the models described above, national surveillance systems for youth suicide and related behaviors also could be strengthened by inclusion of information on generation status. The current major national surveillance system for high school suicide attempts youth risk behavior surveillance system (YRBSS) does not inquire about generation status. By including a few additional questions regarding the youths' and parents' birthplaces and the age of arrival to the USA (e.g., In what country were you born? What year did you arrive in the United States?), future surveillance can provide valuable data that can have an important impact on millions of Americans.

Findings of this study suggest that prevention or treatment of substance use problems and depression are likely to be an effective means to reduce suicidal behavior among Latino youth. The results highlight differences in the salience of mental health programming needs for Latino youths of different generational status. Results indicate that later-generations of Latino youth would benefit from interventions that treat or prevent substance use. By age 15 years, more than 20% of youth from later-generations were engaged in problematic alcohol use, almost one third had repeatedly used marijuana, and approximately 13% had repeatedly used other drugs. In contrast, the need to identify and treat depressive symptoms are similar for first-, second-, and later-generations of Latino youth.

Limitations

Results from this study may not generalize to youth who do not attend school or to future birth cohorts. As in all cross-sectional data, this study could not ascertain the temporal order of factors such as substance use, depressive symptoms, and suicide attempts. However, modeling substance use and depressive symptoms as risk factors for suicidal behavior is supported by previous literature. Variability is limited because of the use of dichotomized substance use variables. However, the use of these categorical outcomes for problematic alcohol use, repeated marijuana use, and repeated other drug use allows the use of ORs and age-adjusted rates that practitioners and researchers can easily interpret and understand. Additionally, by using thresholds such as recurrent impairment (problematic alcohol use) and repeated use (marijuana and other drug use), these variables

also provide results for youth who are more likely to have problems that merit concern rather than those who may simply have experimented with a drug once. The combination of multiple illicit drugs into a single variable also ignores potential differences between illicit drugs (e.g., heroin, cocaine) and their relation with suicidal behavior. However, we were able to make a distinction between marijuana use, which is by far the most commonly used illicit substance, and other drug use. The more parsimonious approach of combining all other drug use together was warranted in this study to avoid the methodological problems that may potentially arise by examining multiple illicit drugs that are not commonly used (e.g., small cell sizes, especially for first-generation youth). The use of immigrant generation status as an acculturation-related variable is another limitation given that factors other than acculturation may potentially account for differences across generations. However, many contextual and demographic factors were controlled for in the models, including parental education, welfare status, residential poverty, urban residency, familial country of origin, age, and residing with two biological parents.

Conclusion

Our study makes important contributions to the literature. First, using a nationally representative sample of Latino adolescents, this study provides evidence that rates of suicide attempt among Latino youths are lower for first-generation Latino youth than for second- and later-generation youth. Second, results show that problematic alcohol use and repeated illicit drug use increases across first-, second-, and later-generations. Third, this study provides evidence that repeated other drug use among adolescents with longer familial history in the USA may indirectly contribute to their higher rates of suicide attempts. To improve suicide and substance use prevention efforts for Latino youth, immigrant generation status and acculturation must be taken into account as important factors and studied in greater depth.

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