Depressive Symptoms Over the Course of Adolescence among Latinx Youth from Small Towns in the United States: Comparing Children of Immigrants and Non-Immigrants

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Abstract

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Purpose: To compare depressive symptoms over the course of adolescence among Latinx Children of Immigrants (COI), Latinx Children of Non-Immigrants (CONI), and non-Latinx White CONI from small towns in the United States and to examine whether differences vary by developmental age and by sex.

Methods: We used 6 years of longitudinal data from 1,520 adolescents that were participating in the Community Youth Development Study (CYDS). Depressive symptoms were self-reported through the Communities That Care Brief Depression Scale (CTC-BDS) from grade 6 to 12. Our three study groups were defined by Latinx ethnicity, race, and immigrant generational status based on the child's and their parents' country of birth. We used a negative binomial count regression form of the generalized linear mixed model to evaluate differences in depressive

symptoms among the three ethnic/racial immigrant generation groups and also examine group-x-time interactions to assess whether differences varied across developmental age. Additional models were run stratified by sex.

Results: We did not find a statistically significant difference in depressive symptoms when comparing adolescent Latinx CONI and non-Latinx White CONI to Latinx COI. Comparisons between Latinx CONI and White CONI suggested Latinx CONI had a significantly higher depressive symptom score and a steeper decline in symptoms over the course of adolescence than White CONI. In sex stratified analyses, among males, Latinx CONI had a higher symptom score than Latinx COI and White CONI; however, there were no notable differences among groups in female youth.

Conclusion: Our study suggests depressive symptoms can vary by racial/ethnic immigrant generational status. Findings from this study provide some insight into the importance of considering immigrant generational status when assessing U.S. Latinx youth's mental health across adolescence, particularly Latinx CONI.

INTRODUCTION

The United States (U.S.) Latinx/Hispanic population reached 60.6 million in 2019, 18% of the total U.S. population, and accounted for 52% of the nation's growth from 2010 to 2019.[1] Projections suggest Latinx individuals will comprise 27% of the U.S. population by 2060.[2] This growth is especially rapid among youth.[3] Latinx populations in small town and rural communities across the U.S. have grown particularly rapidly over the last three decades. From 1990 to 2017, Latinx individuals accounted for over 60 percent of the overall nonmetropolitan population growth in the country.[4] With the lowest median age compared to White, Asian, and Black groups, Latinx persons are one of the youngest racial/ethnic groups in the U.S.[1] Understanding Latinx adolescent health and how to improve it can have significant impacts on a large portion of the U.S. population and future generations.

There is some evidence that mental health may be a particular concern in this population. For instance, a 2020 report found that Latinx adolescents reported feeling sad or hopeless at a higher proportion than White, Black, and Asian Pacific Islander students.[5] Brown and colleagues[6] found that Latinx adolescents report the highest levels of depressive symptoms among all racial/ethnic groups. Additionally, from 2016 to 2019 Latinx youth had a greater increasing prevalence of past-year major depressive episodes (12.7% to 17.3%) relative to African American (9.1% to 11.4%), American Indian/Alaska Native (11.5% to 12.2%), and Asian/Native Hawaiians and Other Pacific Islander (11.5% to 15.1%) youth.[7–10] Within the context of rural areas, Latinx youth may have a higher risk for poor mental health due to higher poverty rates, tight-knit communities that are difficult to integrate into, being a numerical minority and experiencing isolation, discrimination and marginalization, as well as a lack of infrastructure and resources to support non-English speaking new arrivals.[11–13] Moreover, existing research suggests that Latina adolescents experience more depressive symptoms than their male counterparts[14] and all White, Black, and Asian female adolescents.[6]

Immigrant Generational Status and Depression

It is important to understand whether certain groups within the Latinx youth population are at greater risk for depression in order to inform effective, equitable, and culturally applicable prevention strategies. One way to distinguish immigrants is by generational status. This categorization is regularly used in immigrant-focused research because generational status is a variable that can serve as a proxy for acculturation.[14,15] "First-generation immigrant" denotes foreign-born individuals with foreign-born parents. "Second-generation immigrant" designates U.S.-born individuals with at least one foreign-born parent. And "third-generation" or higher refer to U.S.-born adolescents with U.S.-born parents.[16] We refer to those who report at least 1 foreign-born parent as "children of immigrants" (COI), such that this term encompasses both first- and second-generation immigrants. Third and later generation immigrants are referred to as "children of non-immigrants" (CONI).

Available findings on mental health by immigrant generational status are inconclusive. Some research suggests that first-generation, or foreign-born, Latinx immigrants have lower levels of depressive symptoms and prevalence of depressive disorders than U.S.-born generations (second generation and later).[17,18] In another study, Peña et al.[14] found no significant association between depressive symptoms and generation status among Latinx youth, but they did observe a nonsignificant trend that suggested second-generation youth had higher levels of depressive symptoms than later generations. When grouping first- and second-generation youth as COI and comparing them to children of non-immigrant parents, Kim et al.[19] found that Latinx COI had significantly higher levels of depressive symptoms than those with non-immigrant parents. Thus, the role of generational status in depression among Latinx youth is not yet clearly understood.

Frameworks

Two frameworks may be informative in studying the mental health of children growing up in immigrant families: the "acculturative stress" framework and the Intergenerational Acculturation Conflict Model (IACM). In the "acculturative stress" framework, immigrant youth are believed to have a higher risk of mental health problems than non-immigrant peers[20] partially because of factors including economic disadvantage, discrimination, and disrupted social ties.[19] Furthermore, those who have lived in the U.S. for multiple generations are more likely to be acclimatized to U.S. cultural norms,[21] and a higher level of assimilation can result in lower levels of acculturative stress among U.S.-born third-generation youth compared to foreign-born youth.[22] The IACM suggests that when the gap in acculturation between a child and a parent is large, which may be the case for first- and second-generation youth, intergenerational conflict or problematic family dynamics can occur, resulting in distress among youth.[14] For instance, acculturation-related intergenerational and language conflicts have been identified as a primary stressor for children of immigrants and their parents.[22] The acculturative stress and acculturation-related intergenerational conflict models may suggest, then, that first- and second-generation youth may be at higher risk of poor mental health.

Current Study

Using longitudinal data collected on youth residing in rural and small towns over 6 years, this study examines depressive symptoms from Grade 6 (mean age: 12.1) to approximately age 18 among U.S. Latinx and non-Latinx White adolescents. The primary aim of this study was to examine whether there are differences in depressive symptoms over time among Latinx children of immigrants (COI), children of non-immigrants (CONI), and non-Latinx White CONI. The secondary aim was to explore whether differences in depressive symptoms vary by sex. For the first aim it was hypothesized that rural/small-town COI Latinx adolescents (first- and second-generation immigrant youth) would report more depressive symptoms and experience a greater

change in symptoms across adolescence than their CONI counterparts (third generation and higher) and non-Latinx White CONI. For the second aim the hypothesis was that the differences in depressive symptoms over time by immigrant generational status would be greater for females compared to male youth.

METHODS

Study Population and Procedures

Data come from the Community Youth Development Study (CYDS), a community-randomized controlled trial of the Communities that Care (CTC) prevention system that included 24 towns in seven states (Colorado, Illinois, Kansas, Maine, Oregon, Utah, and Washington). Within each state, communities were matched into pairs by total population, racial and ethnic composition, percentage of those living at or below the poverty threshold, and percentage of those unemployed. Within each community pair, one community was randomly assigned to the CTC system or the control condition of usual prevention services. This study used data from the 12 control communities to avoid potential differences in depressive symptomology due to youth in the experimental communities being exposed to the CTC intervention. Study procedures of the parent study (CYDS) were reviewed and approved by the University of Washington's Institutional Review Board.

Of 2,611 youth initially eligible to participate in the control communities, 76.6% (N=2,002) were enrolled. Of those, 26.6% (n=532) were Latinx and 57.4% (n=1,150) were non-Latinx White. Although children of other racial and ethnic groups participated in this study, their numbers were small. Thus, only those that self-identified with Latinx ethnicity (of any race) or as non-Latinx White were included in this study. Of the Latinx youth, 59.6% had immigrant parents (18.4% [n=98] were first-generation immigrants, 41.2% [n=219] were second-generation immigrants) and 31.2% (n=166) were children of non-immigrants. Participants missing immigrant generational status were excluded (9.2%, n=49). Among the non-Latinx White

participants, less than 1% identified as first-generation and 2.6% as second-generation immigrants. These participants (n=31) were excluded due to the small sample size and considerable variability in their country of birth. Non-Latinx White participants missing immigrant generational status were also excluded (n=72). All Latinx children of immigrants and non-immigrants, as well as third-plus generation non-Latinx White youth that were not missing immigrant generational status or Latinx ethnicity were included as part of the analytic sample, for a total of 1,530 participants.

Primary data for this study were gathered in nine waves between 2005 and 2016, with participants surveyed annually or biennially from grade 6 (mean age = 12.1, standard deviation [SD] = 0.4, range: 11-14) to approximately age 23. Although this study was originally a test of a community prevention system, the study continued to follow participants even if they left school before graduating or moved away from their original study community. Participants in this study completed a modified version of the Communities That Care Youth Survey.[23] During middle and high school study waves, most youth completed the surveys during a class period during the school year. If participants were absent, had moved, or were inaccessible in a school setting, alternative options were provided (make-ups, questionnaires sent to new schools, and in-person or telephone administration outside of school). Additionally, the survey was made available via the web during the 12th-grade wave for participants that had moved or left school before graduating. The study was able to achieve survey response rates between 90% and 96% through the 12th grade.

Measures

Racial/ethnic Immigrant Generation Groups – Latinx ethnicity was assessed through self-report by asking youth "Are you Spanish/Hispanic/Latino?" at grades 6, 7, and 8. To assign Latinx ethnicity, we first used the 8th grade responses because youth were believed to be more informed about their ethnic identity and more willing to share their ethnic background. If this item

was missing in 8th grade, then we used the next earlier available wave to assign Latinx ethnicity. Similarly, race was measured during the first three study waves, but was assigned based on the grade 8 report, and, if missing, defined by 7th or 6th grade responses. Participants were asked “What is your race?” and allowed to select one or more of these options: 1) White or Caucasian, 2) Black or African American, 3) Asian, 4) American Indian or Alaska Native, 5) Native Hawaiian or Other Pacific Islander, 6) Other - Please Specify. Final categories included those listed, plus “Multiracial”. During the 2014 (~ age 21) and 2016 (~age 23) CYDS study waves, participants were asked the following three questions: “In what country were you born?” “In what country was your mother[/father] born?”. Each of these questions were presented with the answer options of: 1) In the United States, 2) In a US territory (American Samoa, Guam, Puerto Rico, U.S. Virgin Islands or other U.S. Territory: (please specify), 3) In another country: (please specify). If a participant indicated they were born outside the U.S. and had at least one foreign-born parent, then they were classified as first-generation immigrant. If they reported that they were U.S.-born and had at least one foreign-born parent, they were categorized as second-generation immigrants. Individuals were characterized as third-plus generation immigrants if they indicated that both they and their parents were U.S.-born.

Latinx ethnicity and immigrant generational status were used to then define our three primary groups used for analyses. If participants self-identified as Latinx and met criteria to be categorized as first- or second-generation immigrant, then they were assigned to the Latinx COI group. If they self-identified as Latinx and as a third-generation immigrant or higher, then they were assigned as Latinx CONI. If a participant self-identified as White or Caucasian, did not identify as Latinx and met criteria for a third-plus generation immigrant, then they were assigned as non-Latinx White CONI. For both Latinx COI and CONI groups, youth of any race category were included, even if missing. But, for the non-Latinx White CONI group, if race was missing then they were excluded.

Depressive symptoms – The outcome of interest was self-reported depressive symptomatology. To assess depressive symptoms, the Communities That Care Brief Depression Scale (CTC-BDS; referred to as the BDS from this point forth) was administered during the 6th to 12th grade waves. It consists of the following four items: "Sometimes I think that life is not worth it"; "At times I think I am no good at all"; "All in all, I am inclined to think that I am a failure"; "In the past year (12 months), have you felt depressed or sad MOST days, even if you felt OK sometimes?". Participants were asked to rate the strength of their agreement to each of the statements using the following 4-point Likert scale: "NO!"=1; "no"=2; "yes"=3; "YES!"=4. Item scores were summed to yield a total symptom score, which could range from 4 to 16. The BDS has been found to have strong construct and criterion validity.[24,25] The BDS demonstrated high internal consistency in this study sample with a Cronbach's alpha greater than 0.8 across middle and high school grades. Further, preliminary confirmatory factor analysis suggests that the scale shows measurement equivalence (e.g., similar item factor loadings) across the three racial/ethnic immigrant generation groups of interest. The total BDS score of individuals missing only one or two of the four scale items (n = 98, 1.1%) was calculated as the mean of their existing item scores multiplied by 4, then rounded to the nearest integer. All BDS scores were rescaled by subtracting 4 such that the minimum total score was 0 and maximum total score was 12.

Additional Covariates – Potential confounders were selected *a priori* based on an initial literature review. The following were included as covariates in the final adjusted models: study wave as an indicator for developmental age, age at baseline, sex, and parents' highest education. Study wave was coded as a numerical value from 0 to 5, with wave 0 denoting the baseline at grade 6, wave 1 for grade 7, wave 2 for grade 8, wave 3 for grade 9, wave 4 for grade 10, and wave 5 for grade 12. Age at baseline was measured as a continuous variable in years and transformed such that the minimum age in the sample was set as 0. Sex was self-reported by answering the

question “Are you?” and selecting male or female. Like with the race and ethnicity questions, sex was assessed at the first 3 study waves and primarily based grade 8 responses. If missing, sex was determined according to available responses at the two prior grades. Participants were asked about the highest level of education completed for the father and mother, separately, and the highest of the two was used in analyses. For analyses, this highest level of parental education final variable was categorized into four levels (0: less than high school, 1: completed high school, 2: some college, 3:completed college, graduate or professional degree). This parental education variable was used as a proxy for socioeconomic status (SES). Individuals missing any of these model covariates were excluded from analyses.

Analytic Plan

For our primary analytic approach, we used generalized linear mixed models (GLMMs; also referred to as multilevel models) with a random intercept that accounted for potential correlation of responses within an individual over time. A strength of the GLMM is that it can provide unbiased estimates even if there is incomplete data over time on participants, assuming data are missing at random (MAR) or missing completely at random (MCAR).[26] The BDS score, a non-negative integer, showed a strong positive skew at all waves that followed a count distribution. To account for this, we used a negative binomial count regression form of the GLMM. The negative binomial model, an extension of the Poisson, yields less biased standard errors and parameter estimates in the presence of over-dispersion, where the variance exceeds the mean.[26,27] In the negative binomial model, the covariate is connected to the outcome via a natural log link function, so the coefficients are on the log scale. As is common with count regression, we exponentiated coefficients to yield Count Ratios (also referred to as Rate Ratios) that describe the proportional change in the count associated with a 1-unit increase in the covariate.[27]

Racial/ethnic immigrant generational status was included as an indicator variable in the model with Latinx COI as the reference group in primary models allowing for comparisons of Latinx CONI with Latinx COI and non-Latinx White CONI with Latinx COI, consistent with hypotheses. In additional models, we also compared Latinx CONI and non-Latinx White CONI by switching the reference group to Latinx CONI. All models were adjusted for study wave, age at baseline, sex, and parents' highest education. In sensitivity analysis we explored including community at enrollment as indicator variables, but results remained similar to models without their inclusion. Thus, for simplicity, we only present results from models without the community fixed effects. Next, we examined differences over time by groups by looking at a $COIstatus * time$ interaction, where time is the survey wave. We explored including time (study wave) as an additional random effect that allowed the effect of time to vary by participant. However, this did not result in significantly improved model fit and we only present results from models with the random intercept only.

To evaluate if sex modified the differences in depression symptoms among these three immigrant generational status groups, our secondary aim, the fully adjusted GLMMs were run separately by sex.

RESULTS

Sample Characteristics

We included 1,520 individuals in our final sample after 10 participants were excluded for missing sex, baseline age, or parents' highest education. The final sample was comprised of 313 Latinx COI, 166 Latinx CONI, and 1,041 non-Latinx White CONI. Participant characteristics are shown in **Table 1**. All groups had a similar mean baseline age of approximately 12 years. Overall, there was a similar proportion of males and females across the groups. While approximately two-thirds of the full sample had a parent with at least some college education, the distribution of parents' highest education differed within each study group. Among the Latinx

COI group, about 36% had parents with less than a high school education and only 15% had a parent that completed a college degree. Approximately 18% of the Latinx CONI group's parents had less than a high school education, but a little more than a third of them had a college graduate parent. The White CONI group had the smallest proportion (4%) of parents with less than a high school education and the largest proportion (50%) of parents with a college-level education.

Depressive Symptoms

BDS averages and standard deviations for each racial/ethnic immigrant generation group at each grade are shown in **Table 2**. Generally, depressive symptom scores were the highest at baseline (grade 6) and gradually declined over time. In the full sample, mean scores ranged between 3.1 (grade 12) and 4.1 (grade 6 and 8). The non-Latinx White CONI group consistently had the lowest depressive symptom score across study waves compared to both Latinx groups, except for the final wave when Latinx CONI and White CONI groups were similar. From grade 6 through grade 8, the first three study waves, Latinx CONI had the highest BDS mean score. From grade 9 through grade 12, however, the Latinx COI showed similar or higher BDS scores compared to Latinx CONI and non-Latinx White CONI.

Depressive Symptom Differences Between Racial/Ethnic Immigrant Generation Groups

Results for the primary adjusted negative binomial GLMM are shown in **Table 3**. Compared to Latinx COI, Latinx CONI and White CONI were not significantly different in depressive symptom count across study waves. However, when we compared White CONI to Latinx CONI (data not shown in table), White CONI had a statistically significant 13% lower symptom score than Latinx CONI (CR = 0.87; 95%CI: 0.76, 0.99). Consistent with descriptive results, adolescents showed a 5% decrease in depressive symptoms per one study wave (CR = 0.95, 95%CI: 0.92, 0.96).

Changes in Depressive Symptoms Over Time

We next examined whether the change in depressive symptoms over time differed by immigrant generational status. Results of the fully adjusted negative binomial GLMM are shown in **Table 4**. We did not find a statistically significant interaction between racial/ethnic immigrant generational status and study wave when comparing the Latinx CONI or White CONI youth to Latinx COI youth. Thus, the change over time in depressive symptoms did not appear to differ significantly in the Latinx CONI and White CONI compared to the Latinx COI. However, when comparing Latinx CONI and White CONI, we observed a statistically significant interaction between White CONI status and time (CR = 1.04; 95%CI: 1.00, 1.07). As an illustration of this interaction, **Figure 1** shows that Latinx CONI (green line) showed higher initial BDS scores than White CONI (blue line) and then decreased at a greater rate from grade 6 to 12 such that the difference between them became attenuated over time.

Adjusted Model Stratified by Sex

The results of the adjusted negative binomial GLMMs comparing overall levels of depressive symptoms across racial/ethnic immigrant generation groups stratified by sex are shown in **Table 5**. Among female youth, we did not find a statistically significant differences in depressive symptoms when comparing Latinx CONI and White CONI to Latinx COI. Nor did we find a statistically significant difference when comparing female White CONI to female Latinx CONI (CR = 0.94; 95%CI: 0.79, 1.12). When examining males, similarly, there was no significant difference between male White CONI and male Latinx COI. However, there was a significant difference in depressive symptoms between Latinx CONI and Latinx COI with male Latinx CONI showing a 33% higher symptom score than Latinx COI across study waves (CR = 1.33; 95%CI: 1.04, 1.70). There was also a statistically significant difference when comparing male White CONI to male Latinx CONI, where White CONI had a 21% lower symptom score (CR = 0.79; 95%CI: 0.64, 0.97).

Changes in Depressive Symptoms Over Time Stratified by Sex

Results for the adjusted GLMM stratified by sex that examined differences over time by groups are shown in **Table 6**. In our sample there was no statistically significant interaction between immigrant generational status and study wave in either male or female subgroups when comparing the Latinx CONI or White CONI to Latinx COI. Likewise, we did not observe a significant interaction when comparing White CONI to Latinx CONI in either male (CR = 1.05; 95%CI: 1.00, 1.11) or female youth (CR = 1.02; 95%CI: 0.98, 1.07). Thus, when stratified by sex, the change over time in depressive symptoms did not appear to differ significantly in the Latinx CONI and White CONI compared to the Latinx COI or in the White CONI compared to the Latinx CONI.

DISCUSSION

This longitudinal study of youth growing up in small towns compared overall level and changes in depressive symptoms over time during adolescence among Latinx children of immigrants (COI), Latinx children of non-immigrants (CONI), and non-Latinx White CONI. Our study did not find a statistically significant difference in depressive symptom count when comparing adolescent Latinx CONI and non-Latinx White CONI to Latinx COI. Thus, we did not find evidence to support our primary study hypothesis that adolescent Latinx COI would report more depressive symptoms. However, when compared to Latinx CONI we observed a significantly lower depressive symptom score among White CONI. Further, there was no strong evidence that Latinx COI experience a greater change in symptoms across adolescence than their CONI counterparts or non-Latinx White CONI. However, when comparing Latinx CONI and non-Latinx White CONI, we found that although Latinx CONI showed initially higher levels in depressive symptoms, they showed a significantly steeper decrease over the study period. We observed some differences in associations when stratifying results by sex. Among males, Latinx CONI had a higher symptom count than Latinx COI and White CONI. However, among female

youth we did not find a notable difference in BDS scores in any of the group comparisons (Latinx CONI vs. Latinx COI, White CONI vs. Latinx COI, White CONI vs. Latinx CONI). This was opposite to what was hypothesized.

Our finding of non-Latinx White adolescents reporting fewer depressive symptoms than Latinx CONI might be expected for U.S. youth. Overall, ethnically and racially minoritized youth residing in the U.S. appear to show higher prevalence of depression than White youth.[28] Across three data collections waves in a nationally representative longitudinal sample, another study found that White adolescents showed the lowest levels of depressive symptoms at each wave relative to Hispanic, Black, and Asian adolescents.[6]

Contrary to expectations, however, we did not find evidence for elevated depressive symptoms over time among Latinx COI compared to Latinx CONI in the full sample. If anything, findings tended to suggest that depressive symptoms were somewhat higher among the Latinx CONI, although these results were not statistically significant. Another framework, the “immigrant health paradox,” may be relevant in light of our findings. This model posits that those individuals who leave their country of birth and immigrate to a new country have better health outcomes compared to native-born individuals in the receiving country, even though they face poorer socioeconomic conditions, have less social and material resources, and experience stress related to migration and acculturation.[16,19,29] Explanations for this health advantage include that those who emigrate tend to be a self-selected healthier group to begin with, that foreign-born immigrants may practice healthier behaviors than their U.S.-born counterparts, that foreign-born immigrant children have lower levels of acculturation and a stronger ethnic identity, and that children of immigrants live within a protective environment of two-parent families, multigenerational households, strong social support, familism and other cultural values and traditions.[16,30–35] This health advantage, though, is thought to dissipate over time and generations.[16,36] More research is needed to explore whether the immigrant health paradox holds for mental health outcomes as the majority of studies that support the immigrant paradox

focus on physical health outcomes, externalizing psychological outcomes, risk behaviors, and academic outcomes.[37] Additionally, most studies on Latinx immigrants that support the immigrant health paradox with respect to depression have been conducted in adults.[14] Further, researchers have cautioned against generalizing the immigrant paradox to all Latinx subgroups because the protective effect may vary by subethnicity, country of origin, and type of psychiatric disorder.[38]

Another perhaps relevant model, the Protective Culture Model, proposes that elements of the Latinx culture reduce risk for poor health outcomes and may confer protection against deleterious effects of racism.[14] Some of the cultural elements that are thought to provide Latinx immigrants with a health advantage include maintaining strong ties to their cultural community via traditions, spirituality, and language.[21,39] Like the immigrant health paradox, this model implies that the protective effects of cultural characteristics wane with time spent in the U.S., which would suggest better mental health outcomes among earlier generation Latinx youth versus later generations. This aligns with findings from Perez & Padilla's[40] study of cultural orientation across three generations of Hispanic adolescents where Hispanic cultural orientation decreased in a linear manner from first-generation to third-generation while American cultural orientation increased in a similar pattern.

We hypothesized that the impact of racial/ethnic immigrant generational status on depressive symptoms would be stronger among Latina youth, particularly those in the COI category. Most of our sex stratified analyses yielded non-significant results, except for two comparisons of note: 1) male Latinx CONI had a higher symptom score than male White CONI, and 2) male Latinx CONI had a higher symptom count than male Latinx COI. The first finding of Latinx male CONI showing higher depressive symptoms than non-Latinx White male CONI is consistent with Brown et al.'s[6] finding that White males had the lowest depressive symptom levels in their nationally representative 3-wave longitudinal sample of White, Black, Hispanic and Asian adolescents.

For the second finding, it is possible that the biased or gendered rules and expectations for children that have been observed in Latinx families may play a role. For instance, due to the gender role ideologies of machismo and marianismo, immigrant Latinx parents may expect daughters to be controlled, modest, reserved and nurturing and expect sons to be more confident, independent, and assertive.[41,42] Conflicting views between Latinx generations (i.e., children and parents) about gender roles may lead to family conflict, resulting in more distress, particularly among Latina youth.[43] Latinx families may require daughters to help around the home, supervise them more closely, and limit their out-of-home activities. On the other hand, boys may have fewer home responsibilities and may be given more freedom to explore and engage in activities outside of their home.[44] The independence that boys are given may result in them spending more time away from their protective Latinx cultural elements and more time assimilating in the American "mainstream culture," which can lead to more experiences of discrimination and more depressive symptoms.[44] Future studies with larger sample sizes will be important to better understand potential differences across the groups and by sex and their underlying mechanisms.

It was notable in our study that that depressive symptom scores tended to decline across all groups during the course of adolescence. This was not consistent with prior studies that suggest that prevalence of depressive disorders and levels of symptoms tend to increase over the course of adolescence.[45–48] The reason for this in our study sample is not clear. One possibility is that the decline is an artifact related to measurement reactivity due to repeated measurement over time. Another possibility could be related to period effects. A period effect is a variation over a time period (i.e., calendar time) that affects all age groups at the same time, such as environmental or historical factors.[49] Examples of period effects include economic changes, pandemics, world wars, technological advancements, and cultural or social shifts.[49] This could mean that in general the period from 2005-2011, when the data collection for this study occurred, there was a decline in depressive symptoms among all youth. One study of

national trends of depressive symptoms from 1991 to 2018 among school attending U.S. adolescents (13-18 years) found evidence of a period effect where girls' symptoms declined from 1991 to 2012 and boys' symptoms, similarly, decreased between the mid-1990s and mid-2000s. Around 2012, depressive symptoms began to increase for both girls and boys. Moreover, this period effect was also observed in White, Black, and Hispanic adolescents.[47]

Our project adds to the body of research focused on immigrant generational status and adolescent depression in important ways. First, most research on depression and other internalizing problems among immigrant youth has focused on early adolescence and has used cross-sectional data.[37] The longitudinal data allowed us to investigate differences in depressive symptoms across six study waves. We were able to model the change of depression from early to late adolescence. Second, this diverse sample allowed us to compare levels of depressive symptoms between Latinx COI and CONI. Third, the small-town context of our project contributes evidence toward the knowledge gap of depression among Latinx youth in rural areas of the United States. Rural populations tend to be marginalized, understudied, and underserved. Accordingly, there is a paucity of research on rural Latinx youth's mental health.[50] One study of Mexican-Americans found that immigrants were more likely to live in a rural area than U.S.-born individuals (27% vs. 19%).[18] Further, during the time frame that this study occurred, the Latinx populations doubled in rural and small-towns of the U.S.[51] Fourth, by examining the role of sex on depressive symptoms we consider the intersectionality of sex, ethnicity, and immigrant generational status, which is important to understand if and why the impact of generational status may be more prominent among Latina youth.

There are also important limitations of this study to consider. Data collection took place in a public-school setting in rural communities within seven states. Thus, results may not apply to U.S. Latinx youth growing up in a different context, such as an urban setting in other states. Since the majority of the Latinx study participants were of Mexican origin (80%), our results may not be generalizable to U.S. Latinx groups originating from other Latin American countries.

Additionally, we were unable to look at differences by country of origin, which may have masked significant sub-group differences. This hindered us from assessing heterogeneity within the Latinx population, which tends to be viewed as monolithic.[52,53] This is especially important since recent immigration trends indicate that from 2010 to 2018, individuals originating from Venezuela, the Dominican Republic, Guatemala, and Honduras saw the fastest population growth at 106%, 37%, 37%, and 34%, respectively.[54] In comparison, the number of people of Mexican origin only increased by 12% in that same time.[54] Further, prior studies have suggested that while Mexican Americans may experience some protection against psychiatric morbidity relative to White individuals, mental health advantages consistent with the immigrant health paradox do not extend to Puerto Ricans and Cuban Americans.[55] Also, Afro-Latinx individuals have higher rates of depression compared to other racial/ethnic groups.[56]

We were unable to assess underlying mechanisms through which immigrant generational status may influence depressive symptoms including factors relevant to immigrant health such as acculturation, biculturalism, ethnic identity development, or acculturative stress. There is also the potential for unmeasured confounding. For example, we lacked robust measures of SES. We were able to use parents' highest level of education as a proxy; however, there may be additional confounding due to SES factors such as annual household income.

Due to the small sample size (n=98) of the first-generation immigrant group, we combined first- and second-generation Latinx immigrant youth into the COI classification. This precluded us from understanding variability between the first- and second-generation groups and from comparing across the three different immigrant generational groups. Each of these groups have diverse and dissimilar migration and acculturation experiences that may differentially impact mental health. Also, the distribution of Latinx participants across the twelve participating communities was uneven. This prevented us from fully examining the role of the community context, which may be particularly salient here because the uneven distribution is related to the proportion of the population in the communities that identify as Latinx. Lastly, we may not have

been able to detect statistically significant changes over time and differences in sex stratified analyses due to limited statistical power.

Conclusions

Results from this 6-year longitudinal study of small-town U.S. Latinx children of immigrants (COI), Latinx children of non-immigrants (CONI), and non-Latinx White CONI suggest that Latinx CONI have a significantly higher depressive symptom score and a steeper decline in symptoms over adolescence than White CONI. In sex stratified comparisons, male Latinx CONI had higher symptom scores than Latinx COI and White CONI, but no notable differences were found among female youth. Findings from this study provide some insight into U.S. Latinx youth's mental health across adolescence. Further understanding of immigrant generational status and its relationship to depression can inform prevention and treatment strategies. Informing culturally suitable screening, prevention, and treatment strategies aimed to address stressors that are specific to Latinx youth could help improve their mental health and well-being.

TABLES & FIGURES:

Table 1: Distribution of Participant Characteristics by Racial/Ethnic Immigrant Generation Group and Full Sample

Characteristic	**Latinx Children of Immigrants** n = 313	**Latinx Children of Non-Immigrants** n = 166	**White Children of Non-Immigrants** n = 1,041	**Full Sample** N = 1,520
Baseline Age in years, mean (SD[a])	12.1 (0.4)	12.1 (0.4)	12.1 (0.4)	12.1 (0.4)
Female Sex, n (%)	164 (52.4%)	85 (51.2%)	517 (49.4%)	766 (50.4%)
Parents' highest education, n (%)				
Less than High School	113 (36.1%)	29 (17.5%)	46 (4.4%)	188 (12.4%)
High School	96 (30.7%)	36 (21.7%)	200 (19.2%)	332 (21.89%)
Some college	56 (17.9%)	46 (27.7%)	266 (25.6%)	368 (24.2%)
≥ College graduate	48 (15.3%)	55 (33.1%)	529 (50.8%)	632 (41.6%)

[a] Standard deviation

Table 2: Mean and Standard Deviation of Brief Depression Scale (BDS) Score at Each Wave by Racial/Ethnic Immigrant Generation Group and Full Sample

	mean (SD[a])			
	Latinx Children of Immigrants	**Latinx Children of Non-Immigrants**	**White Children of Non-Immigrants**	**Full Sample**
Grade 6	4.5 (3.2)	4.6 (3.2)	3.9 (3.3)	4.1 (3.3)
Grade 7	3.9 (3.3)	4.6 (3.8)	3.6 (3.3)	3.8 (3.3)
Grade 8	4.5 (3.5)	4.9 (3.6)	3.8 (3.5)	4.1 (3.5)
Grade 9	4.2 (3.6)	4.1 (3.6)	3.6 (3.3)	3.8 (3.4)
Grade 10	3.6 (3.4)	3.5 (3.3)	3.4 (3.3)	3.5 (3.3)
Grade 12	3.5 (3.3)	3.0 (2.9)	3.1 (3.1)	3.1 (3.1)

[a] Standard deviation

Table 3: Negative Binomial Generalized Linear Mixed Model Results for Association of Racial/Ethnic Immigrant Generation Group with Depressive Symptoms, Adjusted for Covariates

	Count Ratio (95% CI[a])
Intercept	3.17 (2.73, 3.69)
COI status	
Latinx COI (ref.)	--
Latinx CONI	1.11 (0.95, 1.30)
White CONI	0.96 (0.86, 1.08)
Study wave	0.95 (0.94, 0.96)
Sex - *Female*	1.31 (1.21, 1.43)
Age at baseline (years)	1.14 (1.02, 1.27)
Parents' highest education	0.91 (0.87, 0.95)

[a] Confidence Interval

Table 4: Adjusted[a] Negative Binomial Generalized Linear Mixed Model Results for Interactions of Racial/Ethnic Generation Group by Study Wave

	Count Ratio (95% CI[b])
Intercept	3.21 (2.74, 3.76)
COI status	
Latinx COI (ref.)	--
Latinx CONI	1.17 (0.98, 1.40)
White CONI	0.94 (0.83, 1.06)
Latinx CONI*study wave	0.98 (0.94, 1.01)
White CONI*study wave	1.01 (0.99, 1.04)

[a] Model adjusted by study wave, sex, age at baseline and parents' highest education
[b] Confidence Interval

Figure 1: Model-Predicted Depressive Symptom Score Over Time by Racial/Ethnic Immigrant Generation Group

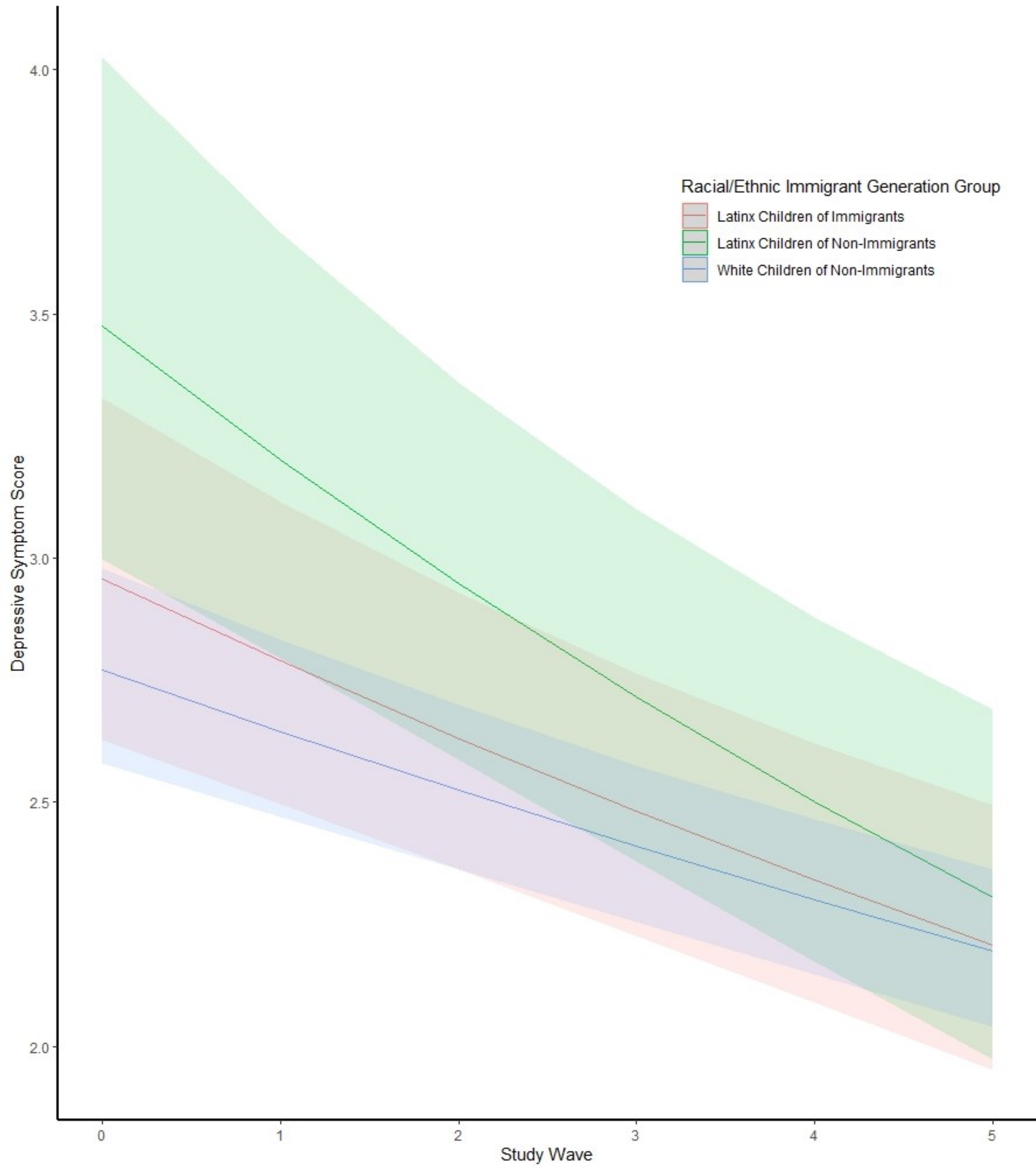

Table 5: Sex-Stratified Adjusted Negative Binomial Generalized Linear Mixed Model Results

	Male	*Female*
	Count Ratio (95% CI[a])	**Count Ratio (95% CI[a])**
Intercept	3.01 (2.42, 3.74)	4.37 (3.63, 5.26)
COI status		
Latinx COI (ref.)	--	--
Latinx CONI	1.33 (1.04, 1.70)	0.96 (0.79, 1.17)
White CONI	1.05 (0.88, 1.25)	0.90 (0.78, 1.04)
Study wave	0.93 (0.91, 0.94)	0.96 (0.95, 0.98)
Age at baseline	1.14 (0.97, 1.34)	1.13 (0.98, 1.31)
Parents' highest education	0.91 (0.85, 0.97)	0.90 (0.85, 0.95)

[a] Confidence Interval

Table 6: Sex-stratified Adjusted[a] Negative Binomial Generalized Linear Mixed Model Results for Interactions of Racial/Ethnic Generation Group by Study Wave

	Male	*Female*
	Count Ratio (95% CI[b])	**Count Ratio (95% CI[b])**
Intercept	2.99 (2.38, 3.77)	4.51 (3.71, 5.47)
COI status		
Latinx COI (ref.)	--	--
Latinx CONI	1.47 (1.12, 1.95)	0.96 (0.77, 1.21)
White CONI	1.04 (0.85, 1.27)	0.86 (0.73, 1.01)
Latinx CONI*study wave	0.95 (0.90, 1.01)	1.00 (0.95, 1.04)
White CONI*study wave	1.00 (0.96, 1.05)	1.02 (0.99, 1.05)

[a] Model adjusted by study wave, sex, age at baseline and parents' highest education
[b] Confidence Interval

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