

Spanish Language Use Across Generations and Depressive Symptoms Among US Latinos

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Abstract

Acculturation markers, such as language use, have been associated with Latino depression. Language use may change between generations; however, few studies have collected intergenerational data to assess how language differences between generations impact depression. Using the Niños Lifestyle and Diabetes Study (2013–2014), we assessed how changes in Spanish language use across two generations of Mexican-origin participants in Sacramento, California, influenced offspring depressive symptoms (N = 603). High depressive symptoms were defined as CESD-10 scores ≥ 10 . We used log-binomial and linear-binomial models to calculate prevalence ratios and differences, respectively, for depressive symptoms by language use, adjusting for identified confounders and within-family clustering. Decreased Spanish use and stable-equal English/Spanish use across generations protected against depressive symptoms, compared to stable-high Spanish use. Stable-low Spanish use was not associated with fewer depressive symptoms compared to stable-high Spanish use. Exposure to multiple languages cross-generationally may improve resource access and social networks that protect against depression.

Keywords Mexican Americans · Depressive symptoms · Acculturation · Family · Language

Abbreviations

CESD-10	Center for Epidemiological Studies Depression Scale-10
CI	Confidence interval
MDD	Major depressive disorder
NLDS	Niños Lifestyle & Diabetes Study
PD	Prevalence difference
PR	Prevalence ratio
SALSA	Sacramento Area Latino Study on Aging

SD	Standard deviation
US	Unites States

Introduction

In the United States (US), the Latino community suffers a disproportionate burden of depression compared to non-Latino Whites [1, 2]. Cultural behaviors and ethnic identity are particularly salient for Latino depression [3, 4]. Acculturation refers to the process by which attitudes and behaviors of individuals from one culture are altered or retained

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upon contact with a different culture [5, 6]. US immigrants may experience culture shock and isolation upon encountering the new environment, which may lead to feelings of displacement, stress, and anxiety [7]. This chronic acculturative stress may greatly influence depression among Latino immigrants and their offspring.

Several studies have examined the impact of cultural orientation on depression. Some studies indicate that acculturation to the dominant culture is associated with increased depression [8, 9], while others suggest that this positive association exists in girls but not boys [10]. Other studies have shown that in terms of acculturation styles, integration rather than segregation is associated with lower depression prevalence, and difficulty integrating into mainstream “Anglo” culture and a lower degree of acculturation predict higher depression prevalence [3, 4, 6]. The literature also suggests that cultural factors may play a role in suicidal ideation, which is closely tied to depression. One study among a nationally representative population of US Hispanics demonstrated that more time spent in the US, a higher degree of English-language orientation, lower Hispanic composition of social networks, and lower Hispanic racial/ethnic identification were associated with increased risk of lifetime suicidal ideation [11]. Similarly, acculturative stress has been found to increase vulnerability to depression and suicidal ideation, especially among those with low levels of ethnic identity [12].

These seemingly inconsistent results may have several explanations. First, acculturation is inherently relational, meaning that it depends on interactions and relations between multiple individuals from varying contexts [5, 6]. Consequently, the effects of an individual’s acculturation level should be examined in concert with the cultural orientation of that individual’s family members. Indeed, theories regarding the acculturative process suggest that acculturation conflict between individuals within families and changing degrees of acculturation over time actually drive the association between cultural orientation and depression [13, 14].

A growing body of literature examining intergenerational data has indicated the importance of familial relations for Latino depression. Several studies have found that familial conflict and changing structure of Latino families across generations are associated with emotional distress and other health risk behaviors [15–17]. The presence of intra-familial warmth has been shown to protect against mental illness relapse in Latino families [18]. Further, relational factors between Latina mothers and daughters has been associated with suicide attempts of adolescent daughters [19].

The ways in which Latino families relate to each other in terms of their cultural heritage also has the potential to influence depressive symptoms. Studies among Latino adolescents and their parents have suggested that parent-adolescent conflict is a risk factor for internalizing symptoms

and lowered self-esteem and that familism, biculturalism, and high culture-of-origin involvement are cultural assets associated with fewer internalizing symptoms and higher self-esteem, optimism, and prosocial behavior [20, 21]. Additionally, a qualitative study interviewing elderly Latinos indicated that conflicting values between parents and children are perceived to be life stressors that may contribute to depression [22]. Further research in this area is needed to continue to shed light on the influence of cultural changes across generations on offspring depression.

Furthermore, prior studies of cultural orientation and depression have not measured acculturation consistently, often using proxy acculturation measures, including birth country, generational status, immigration history, time in the US, or acculturation scales that combine multiple measures of acculturation into a single index [23]. The use of acculturation scales in particular in public health research has been the subject of recent scrutiny [24]. In health research, the measurement technique of combining diverse aspects of acculturation into a single score raises a question of consistency of exposure. Consistency requires that if exposure can vary within a given exposure level, that these variations in exposure are irrelevant [25, 26]. For example, with regard to acculturation scales, an individual who speaks little Spanish but still spends much time with other Latinos may have the same acculturation score as an individual who is proficient in Spanish but mostly associates with non-Latino Whites. The consistency assumption requires that a single acculturation score have the same effect on health regardless of how that acculturation score was achieved. Such an assumption may not be plausible for acculturation. Thus, while a single overall construct of acculturation may exist, measuring it in the form of a composite scale score may not provide a clear understanding into disease etiology. Anthropologists have also begun to question the validity of many acculturation measures given that they assume the existence of two distinct cultures, one of which is an “invented majority” to which the ethnic groups adapt [24]. These critics argue that these acculturation measures lack a clear definition and have come to function as an ideologically convenient black box [24]. Critics of acculturation scales further contend that specific cultural factors, such as language use, that may facilitate access to structural health benefits and positive health outcomes have not been adequately explored in a public health context [24]. Thus, while previous studies utilizing acculturation scales help to establish an understanding of the association between acculturation and depression, the literature could benefit from studies attempting to tease apart the aspects of acculturation that most influence depression.

Significant interdisciplinary support exists for the role of language use in depression [27–29]. For example, numerous studies have demonstrated the social-emotional and socio-cognitive advantages afforded bilingual individuals

compared to monolingual English-speakers [30, 31]. Additionally, qualitative studies interviewing Latinos residing in the US have indicated that language differences are viewed as a life stressor; multiple participants emphasized the trauma, loneliness, and isolation associated with their language preference: “The language difference is traumatizing; it is more difficult when you are old,” and “I felt lonely. I couldn’t talk to anyone [22].” Language use is intricately linked to depression through its influence on acquisition of resources, creation of social ties, formation of relationships of trust, maintenance of familial shared values, and a sense of belonging or isolation from one’s community [27, 29]. Cultural beliefs and values are embedded in language, connecting the speakers to their cultural past through the oral traditions, lexical variation, literary forms, music, history, and customs conveyed in this language [32]. Additionally, studies demonstrate that language use accounts for the majority of the variability in acculturation scales [33].

There has been a call for further research into the mental health effects of these varying language use preferences [34]. Given the demonstrated importance of both familial relations and the language aspect of acculturation for depression, further investigation into the role of intergenerational language use in Latino depression is needed and may help disentangle the mechanisms by which cultural factors promote or reduce depressive symptoms [34].

To build upon findings and address limitations of existing literature, this study utilized data from multiple generations of Latinos participating in the Niños Lifestyle & Diabetes Study (NLDS) and the Sacramento Area Latino Study on Aging. These combined studies include 638 parent-offspring pairs, allowing us to examine the influence of changes in Spanish language use across two generations of Latinos on offspring depressive symptoms.

Methods

Study Population

Offspring in this analysis were members of the NLDS. NLDS comprises biological offspring, grandchildren, and other referred relatives of participants in the Sacramento Area Latino Study on Aging (SALSA), which took place from 1998 to 2008 [3]. Any living English- or Spanish-speaking biological relatives of the original 1789 SALSA participants aged 18+ years at baseline were eligible to participate in the NLDS. For the purposes of this study, we utilized participants from the NLDS who could be linked to a biological parent in either SALSA or NLDS.

This analysis utilized data collected by trained interviewers from the baseline NLDS phone interview (March–November 2013) and linked participants’ data with

baseline cultural and sociodemographic data from their parents. Interviewers for both the SALSA and NLDS studies were trained in methods of survey administration in order to maximize inter-rater reliability. Of the 670 NLDS participants contributing baseline phone interviews, 638 were linked to a SALSA or NLDS parent with acculturation data. Participants not reporting language use, education, age, sex, or nativity were excluded, leaving a total sample of 603 offspring-parent pairs. Informed consent was obtained from all individual participants included in the study, and study procedures were approved by institutional review boards at participating institutions. Further, the studies were performed in accordance with the ethical standards as laid down in the 1964 Declaration of Helsinki and its later amendments.

Measures

Assessment of High Depressive Symptoms

The outcome of interest was Center for Epidemiological Studies Depression Scale-10 (CESD-10) scores among offspring. The CESD-10 is a 4-point Likert-type scale assessing the extent to which individuals experienced depressive symptoms during the prior week. The CESD-10 was derived from the 20-item CES-D, a widely-used self-report survey that measures depressive symptomology in the general population [35]. The 10-item scale was developed to alleviate participant burden in older adults [36]. The CESD-10 corresponds closely to the full-length version, has high internal consistency and test–retest reliability, and has been validated in Spanish-speaking populations [37–39]. As suggested by validation studies, participants scoring ≥ 10 were considered to have high depressive symptoms [37].

Intergenerational Acculturation Categories

We constructed intergenerational Spanish language use categories utilizing two NLDS survey questions: (1) “When you were growing up, how often did your parents speak to you in Spanish?”, and (2) “In your current adult life, how often do you speak Spanish?” With these questions, we created three individual Spanish language use categories for each parent and each offspring of: (1) high Spanish use, (2) equal English/Spanish use, and (3) low Spanish use. Utilizing these parental and offspring categories, we created five mutually exclusive cross-generational language categories: (1) stable-high Spanish use, (2) stable-low Spanish use, (3) stable-equal English/Spanish, (4) increased Spanish use, and (5) decreased Spanish use. We recognize that the terms “stable-high,” “stable-low,” “increased,” and “decreased” suggest the ability to assess change over time, even though our particular study is cross-sectional in nature. Nevertheless, we chose to employ these terms because the questions

asked of the NLDS participants were meant to allow for a conceptualization of offspring and parent language use over time.

Other Covariates

Nativity was based on self-report of birth country (US-born vs. foreign-born). Education level was dichotomized into ≤ 12 years and > 12 years as done in similar populations and prior NLDS publications [40, 41]. Other covariates included age and sex of the offspring.

Statistical Analysis

To assess the association between intergenerational language use and depressive symptoms, we estimated prevalence ratios of depressive symptoms using log-binomial models and prevalence differences of depressive symptoms using linear-binomial models [42]. To create the adjustment set for the models, we examined directed acyclic graphs. This allowed us to identify potential confounders, and we adjusted final models for age, sex, offspring education, and offspring nativity. Stable-high Spanish use was the referent category. Additionally, given that one parent could be linked to multiple offspring, we employed general estimating equations to account for within-family clustering [43].

Finally, because cultural orientation is closely linked with socioeconomic factors, the impact of cross-generational language use on Latino depression may vary by educational level [24]. Consequently, we assessed potential modification of the intergenerational language use–depressive symptom association by offspring education. We examined effect estimates stratified by offspring education and the Wald test for a language use–education interaction term. Analyses were conducted in SAS 9.4 (SAS Institute, Inc., Cary, NC).

Results

Table 1 displays selected offspring and parent characteristics, overall and stratified by education level. NLDS participants had an average age of 53.0 ± 11.8 years; 38.2% were male. Additionally, 75.6% of NLDS participants were US-born compared to 52.2% of parents. Similarly, 81.6% of offspring completed their entire education in the US compared to 58.6% of parents. Foreign-born participants were predominantly Mexican-origin (~88%). NLDS participants were more highly educated than parents; 13.3% of participants completed < 12 years of education compared to 62.9% of parents. NLDS participants with a CESD-10 score ≥ 10 comprised 28.3% of the sample.

Regarding language use, 52.4% of offspring reported using Spanish language at least half the time in their current

adult life; 66.1% reported that their parents spoke to them in Spanish at least half the time during childhood. Regarding cross-generational Spanish language use changes, 30.4% of offspring classified as having stable-low Spanish use across generations, 25.4% had stable-high Spanish use, 4.8% had increased Spanish use, 35.5% had decreased Spanish use, and 4.0% had stable-equal English/Spanish use.

Compared to those with > 12 years of education, participants with ≤ 12 years were slightly older and were more likely to be female, foreign-born, and foreign-educated; speak Spanish at least half the time; and have stable-high cross-generational Spanish use and CESD-10 scores ≥ 10 .

Table 2 shows PRs and PDs for high depressive symptoms by intergenerational language use changes among NLDS participants. In the fully adjusted model, compared to participants with stable-high Spanish use, those with decreased Spanish use had 0.60 (95% CI 0.42, 0.85) times the prevalence of high depressive symptoms. Notably, stable-low Spanish use did not confer a clear depressive symptom benefit compared to stable-high Spanish use (PR: 0.87; 95% CI 0.60, 1.27). Additionally, stable-equal English/Spanish use appeared to protect against high depressive symptoms (PR: 0.60; 95% CI 0.27, 1.36). However, this estimate lacked precision due to small sample size ($n=25$, confidence limit ratio: 5.04). Prevalence difference estimates showed a similar pattern.

Stratification of the association by offspring educational attainment, indicated that the association did not differ across education levels, and Wald tests on both the multiplicative and additive scales produced non-significant results for an interaction between education and the acculturation variables (see Supplemental File).

Discussion

This study assessed the impact of cross-generational Spanish language use on depressive symptoms among a sample of Latinos, predominantly of Mexican origin. Depressive symptoms were highly prevalent among participants, with 28.3% of offspring having CESD-10 scores ≥ 10 . This is comparable to larger, representative samples of US Latinos, where high depressive symptom prevalence has been shown to be 27% [44]. Our study supports an association between intergenerational language use and depressive symptoms among Mexican-origin individuals, whereby exposure to multiple languages across generations appeared to be associated with lower prevalence of high depressive symptoms and cross-generational monolingualism in either Spanish or English was equally depressive symptom promoting.

Exposure to both English and Spanish across generations, through stable-equal English/Spanish use or decreased Spanish use, appeared to protect against depression; although the

Table 1 Descriptive characteristics of the NLDS population, overall and stratified by education level, Sacramento, California, 2013–2014

Offspring variables	Overall (n = 638)	Education level	
		≤ 12 years (n = 226)	> 12 years (n = 393)
Covariates			
Age, mean (SD)	53.0 (11.8)	54.3 (12.3)	51.9 (11.4)
Male, n (%)	244 (38.2)	78 (34.5)	159 (40.5)
Offspring birth country, n (%)			
United States	482 (75.6)	148 (65.5)	327 (83.2)
Mexico	137 (21.5)	71 (31.4)	54 (13.7)
Other	19 (3.0)	7 (3.1)	12 (3.1)
Offspring location of education, n (%)			
United States	504 (81.6)	154 (70.3)	343 (87.5)
Mexico	56 (9.1)	47 (21.5)	9 (2.3)
Both/uncertain	58 (9.4)	18 (8.2)	40 (10.2)
Offspring education (years), n (%)			
< 12	82 (13.3)		
12	144 (23.3)		
13–16	316 (51.1)		
> 16	77 (12.4)		
Acculturation			
Spanish use, n (%)			
More than half the time	178 (27.9)	91 (40.3)	75 (19.1)
Half the time	156 (24.5)	46 (20.4)	108 (27.5)
Less than half the time	304 (47.7)	89 (39.4)	210 (53.4)
Parent Spanish use, n (%)			
More than half the time	338 (53.6)	134 (59.6)	191 (48.9)
Half the time	79 (12.5)	26 (11.6)	52 (13.3)
Less than half the time	214 (33.9)	65 (28.9)	148 (37.9)
Intergenerational language use, n (%) ^a			
Stable-high Spanish	160 (25.4)	85 (37.8)	64 (16.4)
Decreased Spanish	224 (35.5)	63 (28.0)	158 (40.4)
Stable-low Spanish	192 (30.4)	58 (25.8)	133 (34.0)
Increased Spanish	30 (4.8)	10 (4.4)	20 (5.1)
Stable-equal English/Spanish	25 (4.0)	9 (4.0)	16 (4.1)
Depression			
≥ 10 CESD-10 score, n (%)	178 (28.3)	81 (36.7)	90 (23.0)
Parent variables			
	Overall (n = 415)	Education level	
		< 12 years (n = 259)	≥ 12 years (n = 153)
Covariates			
Age, mean (SD)	69.2 ± 8.1	66.3 ± 8.3	70.9 ± 7.5
Parent birth country, n (%)			
United States	216 (52.2)	96 (37.1)	120 (78.4)
Mexico	177 (42.8)	153 (59.1)	22 (14.4)
Other	21 (5.1)	10 (3.4)	11 (7.2)
Parent location of education, n (%)			
United States	232 (58.6)	109 (44.3)	123 (82.0)
Mexico	155 (39.1)	136 (55.3)	19 (12.7)
Both/uncertain	9 (2.3)	1 (0.4)	8 (5.3)
Parent education (years), n (%)			
< 12	259 (62.9)		
12	60 (14.6)		
13–16	74 (18.0)		
> 16	19 (4.6)		

Table 1 (continued)

SD standard deviation, *US* United States, *CESD-10* Center for Epidemiological Studies Depression Scale-10

^aMobility from Gen1 parents to Gen2 offspring or from Gen2 parents to Gen3 offspring

Table 2 Prevalence ratios and differences for high depressive symptoms by Spanish language use category among participants in the NLDS, Sacramento, California, 2013–2014

Spanish language use category ^a	Prevalence ratio (95% CI)			Prevalence difference (95% CI)		
	Crude ^b	Model 1 ^c	Model 2 ^d	Crude	Model 1	Model 2
Stable-high Spanish	1	1	1	0	0	0
Decreased Spanish	0.52 (0.38, 0.72)	0.53 (0.39, 0.72)	0.60 (0.42, 0.85)	-0.19 (-0.28, -0.10)	-0.19 (-0.28, -0.10)	-0.15 (-0.25, -0.05)
Stable-low Spanish	0.72 (0.54, 0.97)	0.73 (0.54, 0.99)	0.87 (0.60, 1.27)	-0.11 (-0.21, -0.01)	-0.11 (-0.21, -0.01)	-0.06 (-0.18, 0.05)
Increased Spanish	0.84 (0.49, 1.45)	0.84 (0.47, 1.49)	1.01 (0.56, 1.81)	-0.06 (-0.25, 0.12)	-0.06 (-0.25, 0.14)	-0.02 (-0.22, -0.17)
Stable-equal English/Spanish	0.50 (0.23, 1.13)	0.52 (0.24, 1.13)	0.60 (0.27, 1.36)	-0.20 (-0.37, -0.02)	-0.20 (-0.35, -0.04)	-0.15 (-0.32, 0.02)

CI confidence interval, *PR* prevalence ratio, *PD* prevalence difference

^aStable-high Spanish (n=160), decreased Spanish (n=224), stable-low Spanish (n=192), increased Spanish (n=30), stable-equal English/Spanish (n=25)

^bOverall PR *P* value=0.002, overall PD *P* value=0.002

^cAdjusted for age, sex, and clustering at family level (overall PR *P* value=0.003, overall PD *P* value=0.002)

^dAdjusted for age, sex, nativity, education, and clustering at family level (overall PR *P* value=0.03, overall PD *P* value=0.03)

confidence interval for stable-equal English/Spanish use included the null. In our population, decreased Spanish use across generations was characterized by high Spanish language exposure in childhood and increased English use in adulthood. Therefore, both the stable-equal English/Spanish and decreased Spanish use categories comprised individuals who experienced exposure to both languages across generations. Indeed, bilingual offspring comprised both the stable-equal English/Spanish and decreased Spanish use categories. Of the 224 participants classified as having decreased Spanish use, 117 reported speaking Spanish half the time and their parents speaking Spanish all/most of the time. Thus, while these individuals had decreased Spanish use across generations, they would likely consider themselves bilingual. Our findings are therefore consistent with studies showing socio-cognitive and socio-emotional benefits of multiple language exposure throughout life; however, these previous studies lacked an intergenerational component [30, 31].

Our analysis was not able to explicitly investigate the mechanisms behind why certain cross-generational language use categories were associated with lower prevalence of high depressive symptoms while others were not; however, a number of studies in the fields of linguistics, anthropology, and sociology may shed some light on potential mechanisms. Decreased Spanish usage across generations may capture upward social mobility and increased access health-promoting resources. While we did control for education

level, this variable may not fully capture the socioeconomic benefit of English proficiency. Improved resource access due to increased English use may result in a sense of self-efficacy and less psychological distress [3]. English proficiency may provide educational and employment opportunities, allowing for upward socioeconomic mobility or improved access to social and medical resources [3]. Further, participants with decreased Spanish language use had to report higher exposure to parental Spanish language use in childhood. Early-life exposure to one's cultural heritage may foster maintenance of cultural and familial ties that help prevent depressive symptoms despite increased English use throughout life. Early-life exposure to parental Spanish use may therefore prevent cutting ties with heritage-cultural support networks and consequently prevent a sense of displacement or isolation during adulthood [9].

In our study, cross-generational monolingualism in English or Spanish appeared to equally promote depression. Spanish monolingualism may adversely influence depression because English-language proficiency has been shown to increase access to mental health services [45]. Additionally, English-language barriers could promote social isolation from an inability to interact directly with mainstream English-speaking US culture [46]. Those without English proficiency also may lack social resources allowing them to navigate the US educational system and job market, resulting in exclusion from advancement opportunities,

socioeconomic hardship, and thereby increased susceptibility to depression [3].

At the same time, English monolingualism could promote Latino depressive symptoms because maintaining Spanish language proficiency throughout the acculturation process may foster intergenerational familial connectedness and promote other social and cultural connections [34]. Maintaining one's primary language is connected with cultural identity, self-concept, and social-emotional development [31]. Consequently, preservation of one's primary language in addition to developing a second language supports the maintenance of cultural and familial ties while also enabling improved resource access.

Bilingualism has been shown in numerous studies to have beneficial effects. Among second generation immigrants in the US, fluent bilingualism has been shown to be beneficial for family relationships and psychosocial adjustment when compared to both monolingualism and limited bilingualism [47]. Proficiency in both English and Spanish has also been shown to foster social connections in the school setting and to assist in acquiring the institutional support necessary for academic success and social mobility [48]. An additional study found that levels of familism, a measure of connectedness to one's family, were highest among children who preferred to use both English and Spanish rather than either English or Spanish alone [49]. This association between language use and familism is important because low levels of familism have been associated with depression [50]. A study of a Mexican-origin population demonstrated that US-born youths reported more stress from needing improved Spanish fluency to better connect with their families while foreign-born youths reported more stress from needing better English fluency in order to succeed academically [51].

Our study advances single-generation studies of language use and contributes to the growing body of intergenerational research by examining how cultural factors collected directly from multiple generations of Latinos interact to impact depressive symptoms in subsequent generations. Our finding that decreased Spanish use was more protective against depressive symptoms than stable-low Spanish use indicates that the depressive symptom impact of offspring language use depends upon parental language use. Additionally, our finding of lower prevalence of high depressive symptoms among those with decreased Spanish use compared to stable-high Spanish use suggests that the depressive symptom impact of parental language use also depends on offspring language use. Thus, our overall findings demonstrate for the first time that the joint effects of language use across multiple generations, rather than the independent effects of a single generation's language use, may play a key role in Latino depression. An intergenerational perspective is especially important when examining the depressive symptom impacts of cultural factors. Individual language use and acculturation

level depend upon contact and interactions between multiple individuals from varying contexts [5, 6]. Given this relational nature, individual language preference and acculturation level need to be examined concurrently with the cultural orientation of that individual's family.

Our study had several strengths including data collected directly from multiple generations of a representative sample of Latino families living in California's Sacramento Valley and use of trained bilingual interviewers and validated surveys to collect depressive symptoms. Additionally, our study was unique in its ability to examine Spanish language use across generations in relation to depressive symptoms in Mexican-origin individuals. Further, while most previous studies report odds ratios of acculturative effects, our study estimated prevalence ratios and differences. Given the high prevalence of depressive symptoms in our population, odds ratios greatly overstated the effect. Prevalence ratios and differences allow for a more interpretable estimation of relative and absolute between-population differences and of public health burden [52].

Our study also had limitations. The cross-sectional data prevented determination of the temporal direction of the intergenerational language-depressive symptom association. Reverse causality may have influenced our results; depressed individuals may struggle integrating into a new cultural environment and maintaining fluency in multiple languages as a result of their mental status while non-depressed individuals may be more capable of such cultural adaptation. The cross-sectional design also precluded examination of causal interrelations between education and language use, variables that are undeniably linked. Additionally, our analysis utilized self-reported measures, which may be subject to recall bias and social-desirability bias. Further, we lacked the power due to small sample size to detect a significant association among stable-equal English/Spanish individuals despite our results suggesting a protective effect. Given the overlap of bilingual individuals in both the stable-equal English/Spanish and decreased Spanish use categories, we conducted two sensitivity analyses: (1) separating into their own category the 117 individuals who reported speaking Spanish half the time with parents speaking Spanish all/most of the time, and (2) combining these individuals with the stable-equal English/Spanish participants. Both analyses produced results nearly identical to those with the original categorizations in terms of direction and magnitude of effects; although in the latter analysis, the stable-equal English/Spanish category became more significant due to its increased sample size (P value = 0.08).

Further, we recognize that language use, preference, and proficiency, especially as they occur over several generations, are complex social and cognitive processes and experiences. Unfortunately, the categories created for our intergenerational language use variable are simplistic in nature and

cannot fully capture the complexity of this process. Many, and possibly even most, of the NLDS participants may in reality be bilingual, given that they are living and in most cases working in the US and likely using both English and Spanish in their daily lives. Categorizing these individuals as having “decreased Spanish use,” for example, is not meant to suggest that the offspring do not speak Spanish at all or that the parent and offspring are not both entirely bilingual. It is only meant to indicate that the offspring reported that they currently speak less Spanish in their adult lives than their parents spoke. Therefore, the amount of Spanish spoken by the parent-offspring pair “decreased” across the two generations. Despite the simplistic nature of these categorizations, we ultimately decided to employ this five-category language use variable because we believed it would not be as overly stratified as an interaction term between offspring and parent language use while still allowing for more nuance than an overly simplified dichotomous variable assessing whether or not the parent and offspring matched in terms of language preference.

Additionally, study participants were predominantly Mexican-origin individuals living in California’s Sacramento Valley. Consequently, we cannot draw conclusions among all US Latinos given that our findings may not apply to other Latino subpopulations. However, Mexican Americans are the largest and fastest growing Latino subgroup in the US [53]; therefore, examining factors associated with depression in this group holds particular importance. In addition, our study population was largely comprised of foreign-born offspring and parents, and acculturation measures are often considered to be more valid among foreign-born individuals. However, a sensitivity analysis including an interaction term between nativity and the intergenerational language variable indicated that the association of interest did not vary by nativity status among our population.

Furthermore, while the CESD-10 is a commonly used measure, it is limited in that it only measures depressive symptoms in the past week. Depressive symptoms experienced in the prior week may be situational and unstable and should not be used as a measure of lifetime major depressive disorder (MDD). Thus, caution should be exercised when drawing conclusions with this short-term measure. The CESD-10 is also limited in its ability to accurately detect depression. As a measure of MDD, the measure demonstrates high sensitivity, yet it suffers from low specificity and low positive predictive value [54]. Nevertheless, it is important to keep in mind that the CESD-10 was designed to be used in epidemiologic research studies as an indicator of depressive symptomology in the general population [35]; it was not designed to make clinical diagnoses of depression. When used as a measure of distress and a screening tool for depressive symptomology, as was intended, the CESD-10 performs quite well [55]. Thus, for the purposes of this

study, we utilized the CESD-10 as an indicator of depressive symptoms and interpreted our findings as such.

Additionally, we chose to dichotomize the CESD-10 measure, losing the gradation of the continuous measure. However, a dichotomized CESD-10 score allows for more straightforward interpretation of findings. A model utilizing the continuous score provides the absolute difference in CESD-10 score between groups. At the population level, an average absolute CESD-10 score may not be as meaningful as the proportion of the population that has been identified as having high depressive symptoms as defined by validation studies. Further, we conducted sensitivity analyses utilizing continuous CESD-10 scores, which resulted in findings similar to those found with the dichotomized score in terms of direction and magnitude.

Finally, our modification analysis utilized education as a proxy for socioeconomic position. The NLDS did collect data on participant income; however, income and education were highly correlated in our dataset, and inclusion of both in a model would have caused issues with collinearity. Education is often the preferred measure since it predicts future occupation and wages and is less influenced by age-related changes in these characteristics [56, 57]. In our population income is a less valid measure because the younger NLDS participants may not have yet reached their full income potential, and the elderly participants may be retired and therefore not have incomes representative of their earlier occupations. Furthermore, use of educational attainment is consistent with other studies examining socioeconomic effects among Latino populations [40, 44].

Our findings support an association between cross-generational language changes and depressive symptoms among Mexican-origin individuals. Given the cross-sectional and observational nature of our study, our findings are suggestive only. Nevertheless, even though definitive causal conclusions cannot be drawn from our analyses, these results do provide valuable information regarding which populations may be carrying a disproportionate burden of depressive symptoms and where screening and treatment efforts could most effectively be targeted. Our study suggests that exposure to multiple languages across generations may protect against depression. These findings highlight the potential health importance of resource access through successful interactions with US culture in addition to maintaining ties to one’s culture of origin. If the observed associations are causal, encouraging bilingualism and exposure to multiple languages in school and home settings may help to prevent Latino depression. Over the last two decades, several states have instituted English-only instruction policies in public schools, such as Massachusetts’s Question 2 in 2002, Arizona’s Proposition 203 in 2000, and California’s Proposition 227 in 1998, requiring English immersion and prohibiting bilingual

instruction. Our findings indicate that such policies may have adverse consequences for affected students. Further, given the high depression prevalence among monolingual individuals across generations, improving access to mental health services in linguistically and culturally isolated communities may improve depression identification and ultimately lead to increased treatment among underdiagnosed Latino populations.

Summary

Acculturation markers, such as language use, have been associated with Latino depression. Language use is not a static process but changes from generation to generation. This study examined the impact of changes in language use across generations on depression of subsequent generations among US Latinos. Using the Niños Lifestyle and Diabetes Study (2013–2014), we assessed the influence of changes in Spanish language use across two generations of Mexican-origin individuals living in Sacramento, California, on offspring depressive symptoms ($N = 603$; mean age = 53.0 years). High depressive symptoms were defined as CESD-10 scores ≥ 10 . We used log-binomial and linear-binomial models to calculate prevalence ratios and differences, respectively, for depressive symptoms by language use categories, adjusting for identified confounders and within-family clustering. Decreased Spanish use and stable-equal English/Spanish use across generations were associated with fewer depressive symptoms, compared to stable-high Spanish use. Notably, stable-low Spanish use did not confer a depressive symptom benefit compared to stable-high Spanish use. Exposure to multiple languages across generations may help reduce depressive symptoms among US Latino populations, possibly by improving access to resources and social networks.

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Compliance with Ethical Standards

Conflict of interest The authors declare that they have no conflict of interest.

Ethical Approval All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

Informed Consent Informed consent was obtained from all individual participants included in the study, and study procedures were approved by institutional review boards at participating institutions.

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