Review Article

Alcohol and Other Determinants of Non-Medical Use of Prescription Medications among Latinas: A Six Year Follow Up

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Abstract

Latinos are the fastest growing racial/ethnic minority population in the United States. This rate of growth exacerbates the increasing problem of substance abuse among Latina women, who experience disparate negative consequences from substance use disorders, including incarceration, homelessness, and medical ailments. This study examines risk factors associated with non-medical prescription sedative use (NPSU) among adult Latina mothers and daughters enrolled in a longitudinal study examining intergenerational transmission of drug use and sexual risky behaviors. Our study's theoretical model is multidimensional, and we examined the relationship between variables at each dimension of acculturation and NPSU. Results show that NPSU increased over a six year time period and that alcohol use and engaging in fewer wellness behaviors are associated with an increased risk of NPSU. NPSU increase was greater for mothers than for daughters. Among acculturation variables, Spanish proficiency is associated with decreased NPSU over time, whereas familiarity with Latino culture and feminism are associated with increased NPSU over time. Results from the current study can inform psychologists and social workers---and health practitioners in general---who work with adult Latina women. These results can inform future development of culturally-informed NPSU screenings and other NPSU prevention efforts, which could be included in health assessments for Latina women at risk of NPSU.

Keywords: Non-Medical Prescription Drug Use; Latinas; Alcohol; Mothers and Daughters; Sedatives

Non-medical use of prescription drugs is defined as the use of medication without a prescription, self-medicating beyond the medically-prescribed dosage, or use of medications for recreational purposes (Substance Abuse and Mental Health Services Administration [SAMHSA], [1]). According to a 2009 SAMHSA report, non-medical use of prescription pain medicine increased in 2008 among adults aged 26 and older (from 1.3% to 1.6%); prevalence rates of nonmedical prescription drug use have escalated especially among adults ages 18 to 25 [1]. In 2010, 2.6 million individuals initiated the use of psychotropic drugs---tranquilizers, sedatives, and stimulants---at ages averaging 25, 24, and 21 respectively [2]. Although in 2011, there was a decline in past initiation (for non-medical purposes) of those prescription drugs, 1.9 million individuals reported past year initiation and 11.1 million individuals reported past year use [3]. Using data from the 2002-2004 National Survey on Drug Use and Health, Becker, Fiellin, and Desai [4] reported that the prevalence of past-year non-medical use of prescription sedatives and tranquilizers is 2.3% among U.S. adults. They also reported use-prevalence rates of 1.5% among Hispanics and 2.8% among non-Hispanic Whites, both of which were significantly higher than the prevalence rate of 1% among non-Hispanic Blacks. Among Latinos, non-medical use of prescription sedatives, tranquilizers, and hypnotics is more common in adults who reported abuse of other drugs [4].

Non-medical use of prescription sedatives and tranquilizers is particularly concerning due to health consequences including significant sedation, psychomotor slowing, anterograde amnesia, and related motor vehicle accidents and falls [4]. The present study examines non-medical prescription sedative, tranquilizer, and hypnotic (e.g., Alprazolam, Temazepam, Diazepam, and other types of benzodiazepines) use---hereafter, NPSU---among a unique community-based sample of adult Latina mother-daughter dyads in South Florida.

Women and NPSU

Compared to men, women are more likely to seek out and use prescription drugs for non-medical purposes. Simoni-Wastila, Ritter, and Strickler [5] reported that women are significantly more likely than men to use any prescription drug and the difference is mainly driven by their non-medical use of narcotics, analgesics, and sedatives. Similarly, Cotto et al. [6] reported that women exceed men in their non-medical use of prescription pain relievers, tranquilizers, and sedatives. Research also suggests that women, particularly young women, have greater risk of developing dependence on prescription drugs than men [3].

Women who use prescription drugs for non-medical purposes risk adverse health outcomes. In Florida, prescription medications were present in 59 percent of heroin-related death cases in 2010 (U.S. Department of Health and Human Services [U.S. DHHS], [7]). In Miami-Dade County, Latina women comprised approximately 50% of the benzodiazepine related death cases reported in 2008; among all deaths in the same year, 84% involved a mix of different drugs, such as prescription medications (opioids and benzodiazepines), alcohol, and cocaine (U.S. DHHS, [7]). In an exploration of drug use and emergency care, Hurwitz [8] examined the number of instances that prescription pain relievers were involved in drug-abuse related emergency room visits between 1997 and 2002 and found a greater increase in NPSU compared to illicit drug use. Although marijuana use is still more common than NPSU among middle-aged adults, young adult females consume marijuana and prescription drugs for non-medical reasons at similar rates [1]. Additionally, although in the United States both sexes have similar access to prescription medications (doctor authorized and unauthorized), women may be more pharmacologically sensitive than men [9]. Along with the physiological differences that are found among women in pharmacokinetics and pharmacodynamics are variables such as body weight and less gastrointestinal mobility. The latter causes delayed gastric emptying, which affects people who must delay medicine intake in cases where medications must be taken when stomach is empty. Additionally, women may be more sensitive to prescription medications excreted at a lower glomerular rate, which would call for lower doses in women [10].

The greater prevalence of anxiety disorders among women may lead to more sedative use compared to men. Women are twice as likely as men to experience generalized anxiety disorder, panic disorder, and agoraphobia [11], all of which can trigger sedative use. Existing research [12] shows that Hispanic and non-Hispanic White prescription drug users in South Florida use more frequently than their African American counterparts and names anxiety and stress as reasons for prescription drug use. Additionally, studying a sample of 392 twin pairs, van den Bree et al. [13] reported that environmental factors have a greater influence on sedative use among women than among men. Thus, our study focuses on women and aims to expand understanding of some of the factors related to their NPSU.

Acculturation and NPSU

Studies using nativity and length of residence in the United States to indicate acculturation have consistently reported that higher acculturation level is associated with greater risk of alcohol and illicit drug use [14]. This finding has been replicated in both nationally representative studies and regional studies. For example, several studies [14,15] used data from the National Latino and Asian American Study and reported that U.S.-born Latinos are at greater risk of substance use disorder than immigrant Latinos. Several studies based in the State of Florida also reported similar findings [16,17]. Moreover, these studies also reported that the length of residence in the United States is associated with increased risk of substance use disorder [16,17]. There are other negative health outcomes such as mental health associated with country of origin and length of residence in the United States, this phenomenon is known as the immigrant paradox [18]. The negative effect of country of origin on substance use is greater among women than men; foreign born Latinas' substance abuse increases with each year they live in the USA [17,19]. According to the National Institute of Alcohol Abuse and Alcoholism (NIAAA), as women acculturate, they may experience more socio-cultural stress than their male counterparts [20]. However, acculturation is more complex than nativity and length of residence in the United States is insufficient to measure it [21]. Others researchers have proposed theories supporting the multidimensionality of acculturation. Berry [22] identified two dimensions of acculturation including receiving-culture acquisition and heritage-culture retention. Instead of opposing ends on a single continuum, Berry indicated that the two dimensions intersect with each other. According to Berry, individuals who rate high in both receiving-culture acquisition and heritage-culture retention are considered bicultural. More recently, cultural psychologists [23] advanced Berry's bi-dimensional model and developed a multidimensional model by specifying the components in culture. Schwartz et al. [23] identified six components of acculturation-including the practices, values, and identifications of the heritage culture and those of the receiving culture, respec-

tively. According to Schwartz et al. [24,25], cultural practices refer to language use, media preference, social affiliations, and cultural customs and traditions. Cultural values refer to belief systems associated with a specific context or group, such as collective versus individual values. Cultural identifications refer to attachment to cultural groups, and the positive esteem drawn from these attachments.

Our study uses the multidimensional model to examine the effects of acculturation on non-medical use of prescription sedatives. We hypothesized that participants' cultural practices, values, and identifications are associated with NPSU. This is one of the first studies to examine the relationship between acculturation and NPSU among Latino women; because the previous literature mostly focuses on the relationship between acculturation and alcohol and illicit drug use, we could not develop hypotheses based on the directly related findings from previous studies. Instead, our hypotheses were based on our notions regarding the relationships between the specific acculturation indicator and NPSU.

First, regarding the effects of cultural practices, we hypothesized that, English proficiency, Spanish proficiency, Spanish preference, and Latino affiliation are associated with NPSU. More explicitly, we hypothesized that English proficiency is associated with decreased risk of NPSU. Previous literature reported that English proficiency is related to increased access to health care [24,26] and adherence to the prescribed medication [27,28]. Given that access to health care and adherence to prescribed medication reduces the risk of NPSU, we hypothesized that English proficiency is associated with decreased risk of NPSU. In addition, we hypothesized that Spanish proficiency is also associated with decreased risk of NPSU. This hypothesis is based on previous literature that Spanish proficiency is associated with better self-reported health and mental health [29], which is likely to reduce the risk of NPSU. Frequent Spanish use was found to be a protective factor against general substance use [15]. Researchers have suggested that frequent Spanish use may indicate that individuals are retaining a Latino-dominated social network—a community with norms that discourage illicit drug use [14]. Our study uses Spanish preference as the proximate indicator of frequent Spanish use. However, we hypothesized that Spanish preference, along with Latino affiliation, is associated with higher risk of NPSU. This hypothesis is based on the social norms among Latino dominated social networks, which are more permissive of self-medication [30-33] and prefer using medications from their country of origin [34,35]. Latino immigrants often use medications without prescriptions because it is customary in their country of origin to buy medications directly from pharmacies without first consulting a doctor [12,30,31]. Moreover, many Latino immigrants believe medications from their country of origin are stronger and more effective than medications obtained from physician-ordered prescriptions filled by U.S.

pharmacies; hence they obtain medications from their country of origins via their friends or family members or during their own travels [30,31,36,37]. Latina women often turn to their families and friends for prescription drugs and remedies for perceived health problems before consulting health care providers [36]. This may be especially true among Latinas living in areas such as South Florida with a large Latino enclave where they can buy medications without prescriptions from untrained "pharmacists" or pharmacy clerks [36,37]. Because Latinas obtain medications mostly from their friend and families in their countries of origin, they are obtaining those medications from pharmacies that are not monitored or required to hire trained individuals to dispense medications. In some Latin American countries, no special credentials are needed to own and operate a pharmacy, and trained pharmacists are not required to be at the pharmacy beyond a few hours per week and anyone can own a pharmacy [38]. Many pharmacies were ran by attendants or pharmacy clerks who did not receive professional training.

Second, regarding the effects of cultural values, we hypothesized that adoption of Latino cultural values is associated with increased risk of NPSU. To test this, we explicitly examine the effects of two elements in Latino culture: respeto and traditional gender roles. Respeto refers to the adherence to the hierarchical family structure, which treats older generations as authorities because of their knowledge and experience [39]. We hypothesized that individuals with strong respeto attitudes are more likely to adopt the older generation's tradition of medical care, which is more tolerant about self-medication. Latino culture emphasizes traditional gender roles: machismo men are expected to be strong and provide for the family, whereas marianismo women are expected to be nurturing, sacrificing for family, and submissive to men [39]. Given that all individuals in our sample are women, we hypothesized that individuals with strong beliefs in traditional gender roles are less likely to seek professional medical care for themselves, and therefore increase NPSU.

Third, regarding the effects of cultural identification, we hypothesized that culturally identifying as Latino is associated with increased risk of NPSU, whereas culturally identifying as American is associated with decreased risk of NPSU. We used the definition of cultural identification developed by Phinney [40], who defines cultural identification as the psychological trait that reflects how close one feels to their culture. This definition captures a broad view of cultural identification beyond simply defining cultural identification by one's ethnicity. In our study, cultural identification indicators include individual familiarity with Latino fine art and artists, history and politics, cultural legends and symbols, and popular entertainers. We hypothesized that stronger identification with Latino culture is associated with higher risk of NPSU. This hypothesis is also motivated by social norms among Latino-dominated social

networks, which are more likely to be tolerant of self-medication [29-32] and to have a preference for medications from the country of origin [33,34]. In contrast, we hypothesized that stronger identification with American culture is associated with a decreased risk of NPSU.

Other correlates of NPSU

Alcohol and illicit drug use are associated with increased risk of NPSU. In adults, abuse of prescription medications has been related to other drug-particularly alcohol-abuse and dependence [4,41]. The National Institute on Drug Abuse (NIDA) also reports that multidrug abuse is reported among those who abuse sedatives [42]. In a large longitudinal study, heavy drinking (i.e. according to NIAAA, having more than 3 drinks on any day or 7 drinks per week for a woman and for men, having more than 4 drinks on any day or 14 per week) was associated with non-medical use of prescription drugs among all participants [43]. NPSU is common among adults who report abuse of other drugs because they are accustomed to self-medicate for anxiety, sleep problems, and pain relief [4,44]. Furthermore, the consumer culture in the USA, may contribute to the increase use of NPSU as women may want to act proactively by taking a pill for their substance abuse problems. However, we have not identified any studies that investigated NPSU alone or in combination with alcohol and/or illicit drug use among adult Latino mother and daughter dyads. Hence, the current study explores these associations.

Economic factors also contribute to NPSU. In a national study that included a representative sample of Latinas, women who reported using prescription medications given to them by friends and family members (63.1%) also reported that, despite having a legitimate physician-ordered prescription, they "borrowed" medications primarily—instead of purchasing them from a pharmacy—because they could not afford the medicine [45]. Latino immigrants may use medications without physician ordered prescriptions because they cannot afford professional medical care [35,46]. Furthermore, language barriers, suboptimal health insurance, no health insurance, and lack of confidence in the U.S. health care system deter Latinos from professional medical care [29,35].

The findings on education effects are mixed. Some studies reported that low education attainment is associated with higher levels of NPSU among adult Latinos [5,29]. However, in a prior analysis of baseline data from the current study, high educational attainment and having a college degree was associated with increased (estimate = .33, p < .01) non-medical use of prescription medications [47].

The Present Study

This longitudinal study, this longitudinal study investigates the

extent to which acculturation (English language proficiency, Language preference, and Latino culture affiliation) and other social determinants (health insurance status, perceived health status, wellness behaviors) account for changes in NPSU among a sample of adult Latina mother daughter dyads. Salient socio-demographic factors influencing Latina NPSU such as age, income, and education levels are taken into account as covariates.

our analysis was guided by the cultural transmission theory, which posits that human behaviors are learned at an early age and are maintained long after people immigrate to another country [48]. Furthermore, the theory posits that parents will pass their beliefs and preferred cultural traits to their offspring. Our sample of adult Latina mother-daughter dyads allows us to capture variance of intergenerational acculturation levels. However, because younger Latinas may be more exposed to the receiving culture, the younger generation is likely to show greater acculturation level than the older one.

Method

Data for the present analyses were obtained from an ongoing longitudinal study of intergenerational drug use and related health behavior problems among Latina mother-daughter dyads residing in Miami-Dade County, Florida. The study was approved by, and conducted in compliance with, the institutional review board at a large southeastern university.

Procedures

At baseline (Wave1), a community-based convenience sample (N=316) of substance using and non-using participants was recruited via the snowball sampling (chain referral) method [49]. Participants were enrolled in a longitudinal study in which there were similar numbers of drug using and non-using mothers and daughters. To yield a heterogeneous sample of substance users, participants were recruited using announcements at various local venues: community health fairs, health clinics, drug court programs, Alcoholics Anonymous (AA) and Narcotics Anonymous (NA) meeting sites, Spanish radio stations and television channels, and a local newspaper. Different approaches were used to maximize the likelihood that we would be able to recruit both drug using and non-using participants. Individuals were approached at all venues and asked to participate or refer people that might be eligible. Participants were screened for eligibility and current drug use was assessed using a screening instrument that discretely asked questions regarding the frequency and quantity of legal and illegal drug use in the past twelve months. All consenting study participants completed a face-to face interview guided by a structured questionnaire, which included questions on acculturation, wellness behaviors, substance abuse including alcohol, and demographics. Inclusion criteria were: (a) con-

senting to be interviewed for at least 2-3 hours; (b) being 18 years of age or older; (c) self-identifying as Latina; (c) living in Miami-Dade County, Florida; and (d) willingness to provide two telephone numbers (her own, a friend's or family member's) to researchers for correspondence during participation in study.

Five years after baseline (Wave 1), the first follow-up (Wave 2) was conducted; the second follow-up (Wave 3) was conducted one year after Wave 2. For the follow-ups, women who had participated at baseline were located using word of mouth, community outreach, telephone calls, postal mail, and fliers posted in the community based organizations. A community outreach coordinator placed telephone calls to baseline participants and performed home visits. We provided a twenty dollar ($20.00) incentive for referrals. Interview protocols at follow-up were the same as those at baseline; the assessment took 1-2 hours to complete and participants received a $50.00 incentive for each assessment at Waves 2 and 3 and a $40.00 incentive at Wave 1. We conducted the interviews at locations that were convenient to participants. The majority of interviews were completed in participants' homes (65%) or in public places (35%). Participants chose to be interviewed in either Spanish or English. The eight bilingual trained and supervised female interviewers were mostly master's-level graduate students; three interviewers were bachelor's-level students. Interviewer training included more than four hours of didactic instruction using a manual that detailed each of the measures used in the study. Interviewers received intensive supervision from the study director to ensure data quality. Interviews were audio-recorded when participant consented and reviewed by the study director to determine the completeness and accuracy of data collection. Interviewers also participated in debriefing sections to monitor the fidelity of how the interviews were being conducted. This study used three waves of data, including baseline, and first and second follow-ups. Among the 316 baseline participants, 282 (92%) were interviewed for the Wave 2 follow-up, and 266 (84%) were interviewed for the Wave 3 follow-up. Our study used the sample of 261 participants who participated in all three waves.

Participants

Sixty-nine percent of the sample was born outside of the United States. Overall, 33.5% of the participants were from Cuba, 17% from Colombia, 8.5% from Peru, 6% from Nicaragua, 7% from Dominican Republic, 6% from Honduras, 5.5% from Puerto Rico, 4% and 4.5% from Mexico and Venezuela respectively, 3.0% from Argentina or Bolivia, 3% were born in Chile, Brazil, Guatemala, or Panama, and only 2.0% from Ecuador. Forty-six percent of daughters (n= 72) were U.S. born. On average, at baseline assessment, the foreign born had spent 56.08% of their lifetime in the United States (64.87% of lifetime for mothers, and 47.29% for daughters). Approximately half of the participants reported personal incomes of less than

$10,000 per year at baseline and similar percentages were reported at Waves 2 and 3. Table 1 shows that 28.35% of participants reported illicit drug use, 77.39% had good health or above, 55.94% had health insurance, 26.82% had less than high school education, 21.46% had high school or equivalent education, 32.57% had post-high school training, 16.48% had bachelor's degrees, and 2.68% had graduate degrees. Regarding NPSU, 3.83% reported NPSU at Wave 1, 9.2% at Wave 2, and 11.2% at Wave 3, which suggests that NPSU increased over the six-year window. The average age at baseline interview was 39.88 years old (SD=15.49). In Table 1, we also presented characteristics of the mother subsample and daughter subsample separately.

Measures

Demographics: Participants reported age, education level, personal income, and time in the United States. Several other variables were also collected from participants using a demographics form at each of the 2 assessment time points (see Table 1).

Acculturation: At baseline, participants completed the Multidimensional Measure of Cultural Identity Scales for Latinos (MMCISL) [50]. There are ten subscales in MMCISL, including Spanish preference, Spanish proficiency, English proficiency, and familiarity with Latino culture, familiarity with U.S. culture, feminism, respeto, perceived discrimination, preferred Latino affiliation, and Latino Activism. Examining the same sample used in our present study, Dillon et al. [51] analyzed the psychometric properties of MMCISL for Latinas. Nine of the ten subscales showed satisfactory internal consistency. That is, the values of Cronbach's α are greater than 0.60 for the entire sample, the mother subsample, and the daughter subsample, respectively. Only Latino Activism showed internal consistency below 0.60. Therefore, we did not include the Latino Activism subscale in our study. We also did not include the discrimination subscale, which does not meet any of the dimensions in the theoretical model used in our study [23]. We used the total score on each subscale in our analysis.

Health Insurance Status: We asked participants a single binary question to determine if they had health insurance during the 12 months prior to assessment (1= yes or 0= no).

Alcohol Use Frequency: The Health and Daily Living Form [52] was used to assess participant alcohol use frequency during the 12 months prior to assessment. The form includes separate questions for each of three types of alcohol: beer, liquor, and/or wine. For example, for beer, the question is "How often did you drink beer during the last 12 months?" The answer is the 8-point Likert scale ranging from 1 (never uses) to 8(uses every day). The variable alcohol use frequency was calculated by averaging participants' responses across three types of alcohol.

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Variables	Total (N=261)		Mother (N=130)		Daughter (N=131)	
	Mean	SD	Mean	SD	Mean	SD
Age	39.88	15.49	52.27	9.74	27.59	8.93
Alcohol use	2.28	1.12	2.08	1.21	2.47	0.99
Wellness	26.95	6.17	27.38	6.41	26.52	5.92
Time at US (in months)	248.58	168.27	283.81	192.92	213.62	131.25
Spanish proficiency	9.70	2.23	10.02	2.13	9.39	2.29
English proficiency	8.25	3.26	6.94	3.16	9.56	2.81
Spanish preference	18.34	5.91	20.48	5.29	16.22	5.75
Latino culture	10.67	3.24	11.28	3.26	10.07	3.13
American culture	11.17	2.94	10.64	2.98	11.70	2.82
Latino affiliation	29.77	5.15	31.59	4.86	27.95	4.79
Respect	8.51	2.67	8.42	2.81	8.61	2.53
Feminism	13.03	2.05	13.08	2.06	12.98	2.04
	N	%	N	%	N	%
Education						
Less than high school	70	26.82	38	29.23	32	24.43
High school diploma or equivalent	56	21.46	29	22.31	27	20.61
Post high school training	85	32.57	36	27.69	49	37.4
Bachelor's degree	43	16.48	23	17.69	20	15.27
Graduate Degree	7	2.68	4	3.08	3	2.29
Illicit drug use	74	28.35	18	13.85	56	42.75
Health status (Good or above)	202	77.39	89	68.46	113	86.26
Health insurance	146	55.94	73	56.15	73	55.73
NPSU at Wave 1	10	3.83	5	3.85	5	3.82
NPSU at Wave 2	24	9.2	17	13.08	7	5.34
NPSU at Wave 3	29	11.2	21	16.28	8	6.15

Note: NPSU = Non-medical prescription sedative use.

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Table 1. Descriptive Analysis of the whole sample and mother and daughter subsamples.

to 8(uses every day). The variable alcohol use frequency was calculated by averaging participants' responses across three types of alcohol.

llicit Drug Use Frequency: We used the Drug Use Frequency measure [53] to assess the frequency of illicit drug use and non-medical use of prescription drugs during the 12 months prior to the assessment at each of the two time points. The DUF measure assesses frequency of use for each separate illicit and prescription drug (sedatives, hypnotics or tranquilizers, cannabis, stimulants, heroin, opioids, cocaine, PCP, hallucinogens, inhalants) using an 8-point Likert scale ranging from 1 (never uses) to 8 (uses every day). Items included questions such as, Answers range from 1 (1-2, 12 oz. bottles or cans) to 5 (3 six-packs or more). For hard liquor (vodka or whiskey), the answers ranged from 1 (1-2 drinks) to 8 (12 drinks or more).

Participants were also asked how many ounces of hard liquor in each drink, the answers ranged from 1 (1oz.) to 5 (4 oz. or more). Similarly for wine, participants were asked what was the usual amount of wine they consumed when they drank? The answers ranged from 1 (1-3 glasses) to 5 (about 3 bottles or more).

How often did you use sedatives (e.g., Valium, Xanax, and Lorazepan) during the past 12 months? If participant reported use of sedatives at least once, they were asked if the sedative was medically prescribed (yes/no) and if it was taken in greater amounts than prescribed (yes/no) or for longer a period of time (yes/no). Use of prescription medication without medical prescription was defined using the following criteria: If participant reported using them without prescription, using larger amounts of sedatives than prescribed or for longer periods than prescribed, in the 12 months prior to assessment [54]. Past research indicates that DUF scores correlate closely with collateral reports of drug use frequency and with self-reports of other drug and alcohol use measures, indicating evidence of convergent validity [53]. Participant responses were coded as 0= no prior NPSU, or 1= prior NPSU, for our analysis.

Perceived Health Status: A single likert scale question from the Addiction Severity Index (McLellan et al., 1992; How would you rate your health status? 5= Excellent, 4= Very Good, 3= Good, 2= Fair, 1= Poor) was used to assess perceived health status at the time of each assessment. We recoded this variable to be a dichotomous variable: 0= Poor or Fair, 1= Good or Beyond.

Wellness Behaviors: The Wellness scale [55] consists of seven item scale measuring behaviors a participant engages in to maintain her wellbeing. Items were summed to create a total wellness scale score for each participant. The seven items ask respondents to rate the frequency in which they engage in each behavior on a five-point Likert scale (1= never, 2= rarely

[1 to 12 times/year], 3= occasionally [2 to 4 times/month], 4= frequently [2 to 4 times/week], 5= Yes, always). High scores indicate more engagement in wellness behaviors. Sample items include: Do you take the time to let your hair down and relax, or make time for enjoyable activities? and I read the labels of the foods I buy. Cronbach's alpha reliability estimates were 0.71 for mothers and 0.67 for daughters at Wave 1; while 0.78 for mothers and 0.75 for daughters at Wave 3.

Data analytic plan

Descriptive statistics were used to describe the characteristics of the sample. Bivariate statistics were used to explore the relationships between participants' demographics, acculturation, and NPSU at each wave. We used chi-square test, Fisher exact test, and t-test to examine the statistical significance of the relationships. Individual growth curve modeling was used to examine the effect of baseline acculturation on NPSU over time, adjusted by baseline demographic variables. Individual growth curve modeling has the advantage of accounting for varying spacing of waves [56]. In our data collection, the time between Waves 1 and 2 was five years, and the time between Waves 2 and 3 was one year. We used PROC GLIMMIX in SAS 9.3 software [57] to model the binary dependent variable, NPSU, and ran three growth curve models. First, we fit the random intercept model without any covariates. Second, we added the covariates to the model, including generation (i.e., mother or daughter), age, education, alcohol use, illicit drug use, perceived health status, health insurance status, wellness, and time in the United States in months, and acculturation. Third, we added the interactions between time and all the covariates except age and time in the United States because these two covariates already relate to time. Fourth, we removed the non-significant interactions one by one based on p-value. We used model fit statistics for model comparison, including -2 L [likelihood] and Akaike and Bayesian information criteria (AIC and BIC, respectively). Lower values of -2 Ln [likelihood], AIC, and BIC indicate better model fitting. To detect multicollinearity, we used tolerance. A tolerance value less than 0.1 is regarded as severe multicollinearity [58]. Tolerances for all our covariates are greater than 0.18; we computed the tolerances in PROC GLM in SAS 9.3 [57]. Therefore, there is no severe multicollinearity between the covariates. We also ran the growth curve modeling for mother and daughter samples separately to investigate the effects of acculturation consistent across generations. Given the low number of daughter participants reporting NPSU at each wave [five at Wave 1, seven at Wave 2, and eight at Wave 3 (Table 1)], the growth curve modeling did not converge for daughter participants. Therefore, the results for daughter participants are not reported.

Results
The results of bivariate analyses are shown in Table 2. We examined the relationship between demographics, acculturation,

Variables	NPSU at Wave 1		NPSU at Wave 2			NPSU at Wave 3		
	Yes Mean (SD)	No Mean (SD)	Yes Mean (SD)	No Mean (SD)	p	Yes Mean (SD)	No Mean (SD)	p
Age	35.10 (15.81)	40.07 (15.47)	42.50 (11.03)	39.62 (15.86)	0.25	43.59 (13.16)	39.28 (15.71)	0.16
Alcohol use	2.53 (0.57)	2.27 (1.14)	2.93 (1.38)	2.21 (1.07)	<0.001	2.67 (1.38)	2.23 (1.08)	<0.05
Wellness	26.60 (4.72)	26.96 (6.23)	21.71 (4.73)	27.48 (6.06)	<0.001	23.55 (5.90)	27.36 (6.04)	<0.001
Time at US (in months)	237.60 (160.78)	249.02 (168.86)	256.29 (169.25)	247.80 (168.51)	0.81	280.10 (185.03)	241.76 (163.81)	0.24
Spanish proficiency	10.50 (2.22)	9.67 (2.23)	9.46 (2.02)	9.73 (2.25)	0.58	9.21 (2.41)	9.77 (2.20)	0.20
English proficiency	9.40 (3.17)	8.21 (3.26)	7.83 (3.36)	8.30 (3.25)	0.51	8.28 (3.39)	8.23 (3.25)	0.95
Spanish preference	17.70 (6.15)	18.37 (5.91)	19.54 (5.11)	18.22 (5.98)	0.30	18.79 (5.70)	18.30 (5.95)	0.67
Latino culture	10.20 (3.33)	10.69 (3.25)	11.08 (2.95)	10.63 (3.28)	0.51	10.79 (3.14)	10.67 (3.26)	0.85
American culture	10.90 (3.38)	11.18 (2.93)	10.71 (2.77)	11.22 (2.96)	0.42	11.52 (2.52)	11.13 (2.98)	0.51
Latino affiliation	30.70 (5.21)	29.73 (5.16)	31.33 (4.12)	29.61 (5.23)	0.12	30.52 (4.72)	29.68 (5.20)	0.41
Respect	7.90 (3.14)	8.54 (2.66)	8.96 (2.97)	8.47 (2.64)	0.39	8.45 (2.84)	8.54 (2.65)	0.86
Feminism	12.10 (2.64)	13.07 (2.02)	13.21 (2.00)	13.01 (2.05)	0.66	13.17 (1.97)	13.00 (2.06)	0.68
	N (%)	N (%)	N (%)	N (%)		N (%)	N (%)	
Education					0.32			0.58
Less than high school	0 (0)	70 (100)	4 (6)	66 (94)		5 (7)	65 (93)	
High school diploma or equivalent	3 (5)	53 (95)	3 (5)	53 (95)		5 (9)	51 (91)	
Post high school training	4 (5)	81 (95)	12 (14)	73 (86)		13 (15)	72 (85)	
Bachelor's degree	3 (7)	40 (93)	4 (9)	39 (91)		5 (12)	38 (88)	
Graduate Degree	0 (0)	7 (100)	1 (14)	6 (86)		1 (14)	6 (86)	
Illicit drug use					<0.05			0.42
Yes	5 (7)	69 (93)	11 (15)	63 (85)		10 (14)	63 (86)	
No	5 (3)	182 (97)	13 (7)	174 (93)		19 (10)	167 (90)	
Health status					0.07			0.10
Good or above	8 (4)	194 (96)	15 (7)	187 (93)		19 (9)	182 (91)	
Fair or below	2 (3)	57 (97)	9 (15)	50 (85)		10 (17)	48 (83)	
Health insurance					<0.05			0.27
Yes	6 (4)	140 (96)	18 (12)	128 (88)		19 (13)	126 (87)	
No	4 (3)	111 (97)	6 (5)	109 (95)		10 (9)	104 (91)	

Note: NPSU= Non-medical prescription sedative use

Table 2. Binary analyses on the relationship between covariates and NPSU over time.

and NPSU at each wave. The results showed that at Waves 2 and 3, alcohol use is positively, while wellness behavior is negatively associated with NPSU. At Wave 2, illicit drug users and having health insurance are positively associated with NPSU.

Table 3 shows the results from growth curve modeling for the binary dependent variable, NPSU, with 261 participants. We report results for three models: the random intercept model (Model 1), the model including all covariates (Model 2), and the model including all covariates and significant time interactions (Model 3). Model 3 showed the best model fit, with lowest -2 Ln [likelihood] and AIC among the three models, and lower BIC than Model 2. Note that Model 3 showed higher BIC than Model 1, which is not surprising given that BIC is adjusted by number of covariates, and we included many more covariates in Model 3. The covariance test showed a chi-square statistic of 28.19 (p < .0001), which indicates that the model with random intercept fits the data significantly better than the model without random intercept.

alcohol use at baseline is associated with higher odds of NPSU (OR = 1.62, p = 0.04); more wellness behaviors at baseline is associated with lower odds of NPSU (OR = 0.85, p = < 0.01). Adjusted by the significant time interactions in Model 3, mothers is still associated with higher odds of NPSU as compared to Before introducing the significant time interactions (Model 2), the model showed that mothers is associated with higher odds of NPSU as compared to daughters (OR = 9.52, p = 0.02); the odds of NPSU increases over time (OR = 1.36, p < 0.01); more

daughters (OR = 9.56, p = 0.03); time is no longer significant any more (OR = 1.46, p = 0.60); more alcohol use at baseline is still associated with higher odds of NPSU (OR = 1.73, p = 0.03); wellness behavior at baseline is not significant (OR = 1.02, p = 0.85), but has a significant interaction with time (OR = 0.96, p = 0.01), which indicates that the effect of baseline wellness behavior on decreasing NPSU becomes stronger over time; similarly,

Effect	Model 1 β	SE	P	OR	Model 2 β	SE	P	OR	Model 3 β	SE	P	OR
Intercept	-4.27	0.54	<0.001	0.01	0.40	4.74	0.93	1.48	-1.80	5.81	0.76	0.17
Mother					**2.25**	**0.97**	**0.02**	**9.52**	**2.26**	**1.03**	**0.03**	**9.56**
Time					**0.31**	**0.08**	**<0.001**	**1.36**	0.38	0.72	0.60	1.46
Age					-0.03	0.03	0.37	0.97	-0.03	0.04	0.48	0.97
Education												
Less than high school					-2.77	1.70	0.10	0.06	-3.00	1.83	0.10	0.05
High school diploma or equivalent					-1.33	1.58	0.40	0.26	-1.53	1.72	0.38	0.22
Post high school training					-0.30	1.51	0.84	0.74	-0.36	1.64	0.83	0.70
Bachelor's degree					0.08	1.56	0.96	1.09	-0.17	1.70	0.92	0.84
Alcohol use					**0.48**	**0.23**	**0.04**	**1.62**	**0.55**	**0.25**	**0.03**	**1.73**
Illicit drug use					1.23	0.64	0.06	3.40	1.25	0.69	0.07	3.50
Health status (Good or above)					-0.57	0.64	0.38	1.77	-0.71	0.70	0.31	2.03
Heath insurance					0.71	0.56	0.21	2.03	0.62	0.60	0.30	1.85
Wellness					**-0.17**	**0.05**	**< 0.01**	**0.85**	0.02	0.09	0.85	1.02
Time at US (months)					<0.001	0.00	0.65	1.00	<0.001	0.00	0.72	1.00
Spanish proficiency					-0.27	0.16	0.09	0.76	0.49	0.30	0.10	1.64
English proficiency					0.04	0.16	0.78	1.04	0.09	0.17	0.61	1.09
Spanish preference					0.09	0.10	0.36	1.10	0.13	0.11	0.25	1.13
Latino culture					0.10	0.13	0.44	1.11	**-0.50**	**0.22**	**0.02**	**0.60**
American culture					0.03	0.13	0.83	1.03	0.05	0.14	0.72	1.05
Latino affiliation					0.07	0.07	0.32	1.08	0.08	0.08	0.32	1.08
Respect					<0.001	0.10	1.00	1.00	0.004	0.11	0.97	1.00
Feminism					-0.12	0.14	0.36	0.88	**-0.56**	**0.23**	**0.01**	**0.57**
Time*Wellness									**-0.04**	**0.02**	**0.01**	**0.96**
Time*Spanish proficiency									**-0.18**	**0.06**	**< 0.01**	**0.84**
Time*Latino Culture									**0.13**	**0.04**	**0.001**	**1.14**
Time*Feminism									**0.11**	**0.04**	**0.01**	**1.12**
Covariance												
Level 2	6.11	2.19			4.02	1.79			4.94	2.05		
Model Fit												
-2 ln (Likelihood)	392.46				322.31				296.70			
AIC	396.46				368.31				350.70			
BIC	403.59				450.30				446.95			
Covariance Test	Chi Square	DF	P-Value		Chi Square	DF	P-Value		Chi Square	DF	P-Value	
	45.51	1	<.0001		20.57	1	<.0001		28.19	1	<.0001	

Note: The odds ratio (OR) = exp(β).

Table 3. Growth curve modeling on non-medical prescription sedative use over time.

Spanish proficiency at baseline is not significant (OR =1.64, p = 0.10), but over time, is associated with significantly lower NPSU (OR = 0.84, p = < 0.01); moreover, higher level of Latino culture (OR = 0.60, p = 0.02) and feminism (OR = 0.57, p = 0.01) at baseline are associated with lower odds of NPSU. However, their impacts decreases over time, based on the significant interactions with time (OR for time*Latino culture = 1.14, p = 0.001, and OR for time*feminism = 1.12, p = 0.01).

Table 4 shows the results from growth curve modeling for NPSU among mothers. Model 3 is the best model among the three, with lowest -2 Ln [likelihood] and AIC among the three models, and lower BIC than Model 2. The covariance test showed that the model with random intercept fits the data significantly better than the model without random intercept (p = < 0.001). Model 2 showed that the odds of NPSU increases over time (OR = 1.51, p < 0.01), and that more wellness behaviors at baseline is associated with lower odds of NPSU (OR = 0.82, p = 0.01).

Adjusted by the significant time interactions in Model 3, time (OR = 12.66, p = 0.01) and wellness behaviors (OR = 0.80, p = 0.01) still show significant association with the odds of NPSU; moreover, higher level of Spanish proficiency at baseline is associated with higher odds of NPSU (OR = 3.13, p = 0.03), although this positive effect decreases over time (OR = 0.72, p = 0.001). The significant interaction between time and Latino culture (OR = 1.12, p = 0.01) indicates that over time, higher levels of Latino culture increases the odds of NPSU.

Discussion

Over a 6 year time period, NPSU increased for participants in this study, particularly for mothers. Higher alcohol use frequency is associated with an increased risk of NPSU, and women's wellness behaviors are protective against NPSU.

Effect	Model 1				Model 2				Model 3			
	β	SE	P	OR	β	SE	P	OR	β	SE	P	OR
Intercept	-3.27	0.50	<0.001	0.04	-0.56	6.09	0.93	0.57	-11.52	8.40	0.17	0.00
time					**0.41**	**0.12**	**<0.001**	**1.51**	**2.54**	**0.96**	**0.01**	**12.66**
Age					-0.04	0.05	0.39	0.96	-0.04	0.05	0.40	0.96
Education												
Less than high school					-3.01	1.89	0.11	0.05	-3.44	2.03	0.09	0.03
High school diploma or equivalent					-2.00	1.74	0.25	0.14	-2.33	1.88	0.22	0.10
Post high school training					-0.97	1.63	0.55	0.38	-0.96	1.73	0.58	0.38
Bachelor's degree					-0.51	1.75	0.77	0.60	-0.64	1.88	0.73	0.53
Alcohol					0.24	0.27	0.38	1.27	0.31	0.30	0.30	1.36
Illicit drug use					0.70	0.92	0.45	2.02	0.57	1.01	0.57	1.77
Health status (Good or above)					-0.38	0.77	0.63	0.69	-0.52	0.85	0.54	0.60
Heath insurance					0.28	0.68	0.68	1.32	0.35	0.74	0.63	1.42
Wellness					**-0.20**	**0.08**	**0.01**	**0.82**	**-0.23**	**0.09**	**0.01**	**0.80**
Time at US (months)					0.00	0.00	0.77	1.00	0.00	0.00	0.90	1.00
Spanish proficiency					-0.40	0.21	0.06	0.67	**1.14**	**0.52**	**0.03**	**3.13**
English proficiency					-0.03	0.20	0.90	0.97	-0.03	0.22	0.88	0.97
Spanish preference					0.12	0.15	0.41	1.13	0.11	0.16	0.47	1.12
Latino culture					0.11	0.18	0.53	1.12	-0.42	0.29	0.15	0.66
American culture					0.04	0.17	0.80	1.04	0.08	0.19	0.66	1.09
Latino affiliation					0.07	0.10	0.49	1.07	0.10	0.11	0.36	1.10
Respect					0.02	0.12	0.89	1.02	0.02	0.14	0.88	1.02
Feminism					0.12	0.19	0.52	1.13	0.13	0.21	0.54	1.14
Time*Spanish proficiency									**-0.33**	**0.10**	**0.001**	**0.72**
Time*Latino culture									**0.12**	**0.05**	**0.01**	**1.12**
Covariance												
Level 2	4.04	1.89			3.42	2.11			4.02	2.35		
					Model Fit							
-2 ln (Likelihood)	251.16				198.19				177.41			
AIC	255.16				242.19				225.41			
BIC	260.90				305.28				294.23			
Covariance Test	Chi Square	DF	P-Value		Chi Square	DF	P-Value		Chi Square	DF	P-Value	
	19.3	1	<.0001		9.2	1	0.001		11.73	1	< 0.001	

Note: The odds ratio (OR) = exp(β).

Table 4. Growth curve modeling on NPSU over time for Latino mothers.

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Among acculturation variables, Spanish proficiency is associated with decreased NPSU over time, while familiarity with Latino culture and feminism are associated with increased NPSU over time. Mothers' higher odds of reporting NPSU may be explained by their physical health. Compared with daughters, mothers may experience more chronic illness and be more likely to be prescribed sedatives. Hence, they are more likely to use prescription drugs longer or in larger amounts than prescribed. A previous study of a South Florida prescription drug abuser sample [12] reported that older participants were more likely than younger ones to report pain relief as a motivation for abusing prescription drugs.

Our finding that higher alcohol use frequency is associated with an increased risk of NPSU is consistent with the findings from previous studies [46,59]. However, unlike previous studies, we did not find that illicit drug use is associated with NPSU, which may be related to the interaction between generation status and illicit drug use. In our sample, illicit drug use is less prevalent among mothers. Nearly 14% of mothers and 43% of daughters are illicit drug users. Given that being a mother is negatively associated with illicit drug use, the effect of illicit drug use on increasing NPSU may not emerge because we controlled for this generational status.

Our finding that wellness behaviors are protective against NPSU over time is consistent with previous cross-sectional analysis we performed on this sample [47]. Our Wellness Scale measures individuals' engagement in a variety of wellness behaviors, including various exercises, relaxation, and health-conscious food purchases. Latino women who frequently practice wellness behaviors may be more likely to choose wellness behaviors over NPSU to cope with their health concerns. Therefore, wellness behaviors are negatively associated with NPSU.

Our finding that neither self-reported health status nor health insurance coverage is associated with NPSU is consistent with some of the previous literature. Ford and Rivera [46] reported that neither self-reported health status nor health insurance coverage is significantly associated with NPSU among their overall sample of multiple racial groups. In their analysis of the Hispanic subsample, they also reported that neither self-reported health status nor health insurance coverage is significantly associated with non-medical prescription drug use in general. However, other studies [4,60] reported that poor health is associated with an increased risk of non-medical prescription drug use. Future research should include larger samples to explore this relationship further.

Among the eight acculturation variables, only three are significantly associated with NPSU. Their relationships with NPSU are all as hypothesized. First, Spanish proficiency is associated with a decreased risk of NPSU. This finding can be explained by previous literature that Spanish proficiency is associated with better health and mental health [28], which is likely to be related to a decreased need for prescription sedatives. However, we did not find that Spanish preference is associated with NPSU, which is inconsistent with previous studies [46]. The dissimilar findings may be related to the different measure of Spanish preference. Ford and Rivera [46] used respondents' choice of Spanish to complete survey as the indicator of Spanish preference, whereas our measure of Spanish preference is the respondents' self-reported preference of using Spanish in reading, speaking, and thinking. We also did not find that Latino affiliation is associated with NPSU. Conforming to traditional gender role is associated with an increased risk of NPSU. In Latino culture, traditional expectation of women is to be nurturing, sacrificing for family, and submissive to men [39]. The traditional gender role variable in our study covered questions on both the submissive position of wife compared to husband and the housework responsibilities of daughters compared to sons. Therefore, individuals with strong beliefs in traditional gender roles are more likely to focus on maintaining the household in accordance with the preference of males in their household, less likely to seek professional medical care for themselves, and therefore more likely to report NPSU. However, we did not find that the culture variable respeto is associated with NPSU. Third, familiarity with Latino culture is associated with an increased risk of NPSU. This finding can be explained by Latino cultural norms, which may be more lenient toward self-medication [29-32] and establish a preference for use of medications from one's country of origin [12,34]. However, we did not find that familiarity with American culture is associated with NPSU. This finding could be explained by the American cultural value of seeking prescription medications authorized by conventional doctors.

Findings concerning links between social and cultural correlates of increases in NPSU have important implications for health professionals, as well as for researchers, interested in addressing NPSU among Latina women. As the Latino population in the United States ages, the need to help Latina women in the United States make healthy choices becomes increasingly imperative, particularly those who engage in frequent heavy alcohol and/or illicit drug use. Health professionals should monitor and discuss NPSU among adult and older Latina women, especially when screening women who are at risk of being heavy alcohol users who may not be routinely screened for other drug use, particularly NPSU. In addition to adequate biomarkers such as urine and blood tests to evaluate possible drugs interactions among at risk women who consent to be tested, our findings also provide psychologists, social workers, and public health practitioners with sociocultural markers (e.g., generation, Spanish language proficiency) that are associated with NPSU among adult Latina women. Health professionals will need to more routinely make appropriate referrals when heavy alcohol use behaviors surface during interactions

with clients.

Mental health workers such as psychologists and social workers also should consider assessing and addressing potential determinants of sedative misuse among their clients. To buffer against NPSU, community-based interventions should be considered to promote healthy practices and to stress that women should not share prescription drugs and should not ingest medications without medical authorization. Such interventions should be culturally tailored (e.g., delivered in partnership with Latino community-based agencies) to exert a preventive influence [61,62]. For instance, to promote awareness of the dangers of NPSU, health care providers can serve in a training or consultant role to provide technical assistance to local organizations and agencies (e.g., community health centers, state and county departments of health). These efforts may include collaborating on outreach events, conducting topical workshops, giving talks about research that have application at the community level, and conducting literature reviews to communicate the importance of avoiding NPSU [61]. Finally, our results have policy implications for the pharmaceutical companies who supply discount pharmacies that may sell medications without prescriptions in South Florida. The women in our study are like the majority of non-medical users of prescription drugs who typically obtain drugs from a family member, friend, or neighbor [63]. Hence, culturally-tailored community education programs targeting proper management and disposal of prescription sedatives may be needed in Latino communities with high rates of NPSU or in areas with a large amount of prescription drug diversion, such as South Florida.

Limitations

Several limitations are noteworthy. Although efforts were undertaken to include participants from major Latino subgroups in the United States, some groups (e.g., Latinas of Mexican and Puerto Rican origin) were not well represented due to their underrepresentation in the Miami-Dade County area. Thus, the current sample was representative of Latinas living in Miami-Dade County but not the United States. Future longitudinal studies are needed with nationally representative samples to ensure generalizability of the results. Also, substance use behaviors are stigmatized among Latinas, which often inhibits discussion and disclosure of such personal information with others including family [64]. Measuring health status with a single question is limiting; however, single question measures for general self-rating of health status has been correlated with many objective measures such as hypertension and diabetes [65]. Although interviewers were trained to detect inconsistencies in participants' responses and to address such inconsistencies during the interview in a clinically and culturally sensitive manner, socially desirable responding may have occurred. Finally, this is a three time point study of a convenient

non-clinical sample that only illuminates a potential association and correlative likelihood among the respective covariates. Notwithstanding the limitations of the current study, the findings provide critical information about possible influences on NPSU in this non-clinical sample of Latina mother-daughter dyads, which will be further explored in our next follow-up with this sample.

Overall, our study contributes to the limited knowledge on changes in sociocultural determinants of NPSU among Latina adult women. Future clinical research concerning additional social and cultural determinants of NPSU and its prevention may provide valuable information to social work and health care professionals concerning competent care of Latina women. Such research is of critical importance as it will inform efforts to address NPSU and related negative health outcomes among the largest and fastest growing racial/ethnic minority group in the United States.

Acknowledgements

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