THE ASSOCIATION BETWEEN BEHAVIORAL AND ATTITUDINAL ACCULTURATION ON LATINX IMMIGRANTS AND U.S.-BORN LATINXS: A MULTIDIMENSIONAL ACCULTURATION MODEL

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Disparities in access and utilization of substance abuse treatment (SAT) among Latinxs, accentuated by this population's rapid growth, create a public health issue. Although substance abuse literature has given more consideration to environmental factors and social support concerning treatment outcomes, current substance abuse models fail to address important contextual and cultural aspects for Latinxs in recovery, including acculturation. The proposed study aims to test out a multidimensional acculturation model on a sample of 131 Latinxs (M_{age}= 36.3; SD±10.4, 117 males, 49% immigrants) who recently completed SAT. Specifically, the proposed study employed a conditional process model using the PROCESS Macro for SPSS to examine the association between behavioral acculturation and substance use behavior in the past six months on nativity status at different levels of attitudinal acculturation. Results yielded that, after controlling for age and substance use, higher endorsement of U.S. mainstream cultural practices was associated with a higher frequency of days using alcohol among Latinx immigrants, specifically those reporting high and very high affiliation to the U.S. mainstream culture. Also, a negative association between U.S. mainland-born Latinx and frequency of days using illicit drugs in the past six months was observed, but only among those who endorse very high affiliation of U.S. mainstream culture.

Keywords*: Substance abuse, multidimensional acculturation, Latinx immigrants, U.S. mainland born Latinx, communal recovery home.*

1. The association between behavioral and attitudinal acculturation on Latinx immigrants and U.S.-born Latinxs: A multidimensional acculturation model

The context - or conditions in the social, physical, and economic environment in which Latinxs live, work, and age in the U. S. - determines access to resources, which, in turn, leads to short-term and long-term impacts on health (DHHS, 2020). Latinxs are the largest, fastest-growing, and youngest ethnic minority in the United States, exceeding 60 million (U.S. Census Bureau, 2020a). U.S.-born Latinxs comprise 65.5%, whereas Latinx immigrants make up 34.5% of the Latinx population (U.S. Census Bureau, 2020b). Latinxs in the U.S. include native-born and immigrants from Latin America, the Caribbean, and Spain (U.S. Census Bureau, 2020b). Impacted by deep-rooted structural health inequities, pervasive discrimination, aggressive anti-immigration policies, and absolute restrictions to securing essential services and public benefits for undocumented

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immigrants (e.g., Public Charge), Latinxs face significant barriers to access to health care (Macias Gil et al., 2020; Otiniano et al., 2014), particularly substance abuse treatment (Ennis et al., 2011; Pinedo et al., 2018).

National data revealed that 9.6% of Latinxs met criteria for substance abuse and dependence in 2019 (NSDUH, 2020). Disparities in access utilization have been observed over the last decade, where Latinxs were less likely than Whites to receive substance abuse treatment (SAT) (1.1% vs. 1.6% respectively) (NSDUH, 2020). Among those in need of services, 83% reported not using any treatment. Only 5% reported perceiving a need for treatment in the past year (Pinedo, 2020). Only 58% completed treatment or were transferred to a controlled environment (NSDUH, 2018). Although aggregate rates of substance abuse among Latinxs are lower than the national average (SAMHSA, 2020), what is notable is the need for better integration of substance abuse treatment services to address the health needs of Latinxs (Pinedo, 2020).

With the passage of the Affordable Care Act (ACA), substance abuse treatment (SAT) services are more accessible for the Latinx population than ever, yet SAT utilization remains low (Creedon & Cook, 2016; Pinedo, 2018). This fact suggests that expanding health care coverage alone may not be enough to increase treatment utilization (Guerrero et al., 2013). Research on access and SAT utilization among Latinxs revealed mounting systemic barriers to access SAT (Arndt et al., 2013; Macias Gil et al., 2020; Schmidt et al., 2006), less informal treatment options available (Alegria et al., 2011), less satisfaction with treatment (Tonigan, 2003), and a lower percentage of SAT completion compared to other ethnic groups (Guerrero et al., 2013; Marsh et al., 2009; Vega et al., 2009). Of those who utilized and completed SAT, Latinxs reported their needs were not met in treatment (Mulvaney-Day et al., 2012). Taken together, traditional substance abuse models may fall short of addressing the complex needs of Latinxs, increasing the odds of relapsing (Alvarez et al., 2004).

2. Substance use and acculturation

Constant efforts to explore the substance abuse recovery process in Latinxs have led prevention researchers to introduce new theories or concepts to explain better unique factors impacting this population (Castro et al., 2006). Among these are the following: Social Ecology (Bronfenbrenner, 1979; Moos, 1973), orthogonal identification (Oetting & Beauvais, 1987), differential acculturation (Martinez, 2006; Szapocznik & Kurnines, 1980), ecodevelopmental (Szapocznik & Coatsworth, 1999), and segmented assimilation theories (Portes & Rumbaut, 2001).

Acculturation is defined as a continuous adaptation process in which individuals from one culture are in contact with a host culture (Salabarria-Pena et al., 2001), whether they migrated from overseas or as a result of growing up in an immigrant-headed household (Sam & Berry, 2010). The study of acculturation concerning substance abuse behavior is complex given the heterogeneity of the Latinx population (Szapocznik et al., 2007; Wallace et al., 2010). The etiology of substance use among Latinxs has been widely explored on adolescents (Johnson, 2007; Kulis et al., 2005; Marsiglia et al., 2016; Pokhrel et al., 2013; Szapocznik et al., 2007; Vega & Gil, 1998) and, to a lesser extent, on Latinx adults (Alegria et al., 2017; Alvarez et al. 2007; Black & Amaro, 2019; Fish et al., 2015; Miller, 2011; Torres et al., 2020; Vega et al., 2009). Among the factors implicated in substance abuse, acculturation has been associated with substance misuse on Latinx immigrants (Alegria et al., 2017; Bacio, Mays, & Lau, 2013; Ojeda, Patterson, & Strarthdee, 2008) and U. S. born Latinxs (See Alvarez et al., 2007; Canino et al., 2008; Vega et al., 1998; Schwartz et al., 2014).

Acculturation models (i.e., unidimensional, bidimensional) used in past studies have been criticized for assessing aspects of acculturation (i.e., language, cultural practices) while failing to examine other dimensions of acculturation (Chirkov, 2009). Acculturation theorists have called for the use of a broader conceptualization of acculturation to account for changes occurring across dimensions (Lopez-Class et al., 2011). Changes in acculturation dimensions are influenced by perceptions about the community individuals live, social interactions with peers, and resources facilitating the adaptation process (Alegria, 2009). Moreover, the acquisition of behaviors, attitudes, and values endorsed within the U.S. mainstream culture is shaped by political, economic, and social contexts to which they have been exposed (Castro et al., 2010) influences how they would adapt to a new environment (Cabassa, 2003). For Latinx immigrants and their U.S.-born children, living and growing in low-resource communities can influence the acculturation process in adopting selective U.S. cultural practices while retaining native cultural values and practices (Alegria, 2009; Lopez-Class et al., 2011). The cultural clash signified by the differences in values and social norms that prevent them from adapting successfully to the host culture within a cultural environment may lead to the acquisition of health risk behaviors, including substance use (Lopez-Class et al., 2011; Salas-Wright et al., 2014).

Schwartz and colleagues (2010) proposed a multidimensional approach reconceptualizing the acculturation construct by including immigrants and their immediate descendants (e.g., second-generation). Thus, acculturation is defined as "the confluence among heritage-cultural and receiving-cultural practices, values, and identities" (Schwartz et al., 2010, p. 237), where acculturation processes may fluctuate in function of the interaction individual-environment (Schwartz et al., 2010). The multidimensional approach proposes an examination of cultural heritage and receiving cultural practices (dimensions) that operate within the domains of social norms, values (attitudes), and identifications (see Figure 2).

Some of the advantages of the multidimensional approach are the following: a) it acknowledges that associations between acculturation indicators and behavioral outcomes (i.e., substance abuse) may vary based on attitudes toward Latinx culture or U.S. mainstream culture; b) the examination of multiple dimensions (i.e., attitudes, behaviors) shed light on the aspects that are associated with nativity (i.e., immigrants vs. U. S. mainland-born); and c) this approach has the potential to render more explanatory power than the simplistic unidimensional acculturation models (Chirkov, 2009).

Given that acculturation is an evolving phenomenon, an integrative approach is needed to understand the variations in cultural practices and attitudinal acculturation concerning substance abuse. Studies that test theories of acculturation using a critical lens are needed to expand current notions of acculturation and how these theories can be applied to multiple populations and settings (Chirkov, 2009). Research on multiple acculturation dimensions should provide policymakers with a better understanding of the mechanisms, interpersonal dynamics, and community-level conditions that impact Latinx immigrants and U.S. mainland-born Latinxs' recovery process from substance abuse.

3. The Oxford House Model

The need for sober and inviting environments where individuals continue their recovery has led to the creation of community-based recovery homes. The Oxford House, Inc. is a network of self-run democratic recovery homes (Jason & Ferrari, 2010). The Oxford House (OH) model was founded in 1975 on the premise that a sober, stable environment is needed for long-term recovery. Therefore, residents are allowed to stay as long as they need (Jason et al., 2008). With more than

3,200 houses and more than 46,000 individuals in recovery living in any OH during the year, OH is the most extensive self-support recovery program in the United States (Oxford House, 2021). The OH model enforces three ground rules among its residents: pay rent and collaborate with the maintenance of the house, no disruptive behavior, and refrain from using alcohol and other drugs (Oxford House Manual, 2021). OHs are located in communities with easy access to public transportation, social services, and employment opportunities (Ferrari et al., 2009). Unlike halfway houses, the OH model employs a system with standards of governance and member practices (e.g., protocol to accept new residents, assign roles in the house, elections, etc.) within a democratic framework that promotes equal participation in house matters and home activities (Jason et al., 2008).

The OH model has been extensively studied concerning a variety of behavioral (i.e., abstinence, sense of community, reduced criminal activity) and economic outcomes (i.e., employment, involvement in the criminal justice system) (Jason et al., 2010). Of note, the majority of the sample was composed of European American (58.4%) and African American (34%) OH residents, while only 4% were of Latinx background (Jason et al., 2010). These findings indicate that Latinxs are underrepresented in OHs, even in states with a higher Latinx population (Alvarez et al., 2009; Jason et al., 2010).

4. The present study

Despite mounting research on acculturation relative to substance use, little is known about the role of acculturation dimensions in the recovery process of Latinxs from substance use disorders (SUDs). Most acculturation literature focuses on behavioral aspects (i.e., language, cultural practices), creating a rather simplistic view of such complex sociocultural construct (Portes & Rumbaut, 2001; Schwartz et al., 2007). Furthermore, the dearth of research testing acculturation models on clinical samples of individuals with SUDs limits our understanding of the mechanisms that facilitate abstinence in recovery settings (Lopez-Tamayo et al., 2016a; Ojeda et al., 2008). However, little is known about the role of acculturation dimensions in the recovery process of Latinxs from SUDs.

Based on the multidimensional acculturation model (Schwartz et al., 2010), the proposed study aims to examine the mediation effect of cultural practices (i.e., endorsement of Latinx-oriented vs. U.S. Mainstream-oriented) on the association between nativity (i.e., Latinx immigrants vs. U.S. mainland-born Latinx) and substance use in the past six months, and attitudinal acculturation (i.e., identify more with Latinx culture vs U.S. mainstream culture) moderating frequency of substance use. The use of a theory-driven acculturation model may further our understanding of the role of multiple acculturation dimensions implicated in recovery and inform and develop sustainable and effective substance abuse aftercare for Latinxs (Alvarez et al., 2004; Jason et al., 2013; Lopez-Tamayo et al., 2016b).

4.1. Methods

4.1.1. Participants

Participants for this study were part of a larger NIH-funded study that examined community-based recovery homes for Latinxs in recovery from substance abuse (see Jason et al., 2013). A total of 135 Latinxs were recruited from multiple community-based organizations (CBOs) and

health facilities from a large metropolitan area in the Midwest. The inclusion criteria for this study were (1) identified as Latinx, (2) had successfully participated in a substance abuse treatment program, and (3) had remained abstinent from alcohol and illicit substances. Of the 135 participants who completed the baseline assessment, four were excluded for not having completed SAT. Data from 131 Latinx participants (M_{age} = 36.3; $SD\pm10.5$), 113 males (86.3%), and 18 females (13.7%) were employed to test the proposed hypothesis. Nearly half of the participants immigrated from Puerto Rico, Mexico, Cuba, Guatemala, and El Salvador (49%), with a mean length of stay of 19.2 years ($SD\pm13.71$) in the United States. The majority of the participants had previously had alcohol and substance abuse treatment (n = 124), while for seven participants, it was their first time completing SAT. All participants were included in the study despite previous involvement in the criminal justice system or legal status.

Recruitment of participants took place from fall 2009 to spring 2012. A bilingual/ bicultural research team was formed to facilitate outreach, recruitment, and assessment of Latinx participants. Research assistants contacted substance treatment programs, hospitals, community-based agencies, and churches servicing Latinxs via phone and email to introduce the OH project. A team of OH alumni, two of them of Latinx background, established ties with staff and potential participants at various treatment centers. Recruiters provided via phone and email information on community-based recovery home options, described the nature of the study to potential participants, and facilitated the interview process. Potential participants were informed about the possibility to be assigned either to a traditional OH or a culturally modified OH – where most or all residents were of Latinx background. Near substance abuse treatment completion, individuals interested in continuing their recovery in an OH were encouraged to contact the project director or the recruiter. Those interested in the study received information about the nature, purpose, goals of the study and were interviewed in their language of preference (i.e., English or Spanish) either by OH alumni or a bicultural/bilingual research assistant. Interviews took place at treatment facilities, a private location within an OH, or at the DePaul Center for Community Research. Participants received $30 as compensation for their time after completing the baseline interview and the 6-month follow-up interview, respectively.

4.1.2. Measures

Demographics. A 24-item demographic questionnaire was used to collect participants' age, gender, country of origin, length of time living in the United States, and treatment setting.

Substance use. The Form-90 (Miller, 1996) was utilized to reconstruct daily alcohol and substance use consumption within six months. The three primary outcome measures of the Form-90 that we will use are the number of drinks per day, percentage of days abstinent, and the total number of days of illicit drug use. The days in which participants reported using alcohol or illicit drugs in the last 90 days were coded with a *1*, and days on which participants did not use alcohol or illicit substances were coded with a *0*. The Form-90 was translated into Spanish using translation and back-translation procedures by a team that included a professional translator, a psychologist, and a psychology graduate student. The Form-90 had been used in several studies with Latinx samples to produce valid data (Arroyo et al., 2003; Arroyo et al., 1998). A count index of alcohol and illicit substance use was computed for the proposed study, with higher scores indicating more alcohol and drug use in the past six months.

Generational Status. An item from the demographic questionnaire collected data on participants' country of origin. Participants were asked to report their place of birth and were assigned either to the *Immigrant* or *U.S. mainland-born* groups. Puerto Ricans who were born on the island were placed in the immigrant group. We acknowledge that Puerto Ricans are U.S. citizens by birth. However, Puerto Ricans endorse traditional cultural norms and practices similar to those of other Latin American countries, so we determined to group Puerto Ricans born on the island with other Latinx immigrants.

Behavioral Acculturation. The Bidimensional Acculturation Scale for Hispanics (BAS; Marin & Gamba, 1996) is a 24-item, 4-point Likert-type (1=*low* or *not well* to 4=*high* or *very well*) self-report behavioral measure of social practices conducted either in English and Spanish. Three subscales measure language use, linguistic proficiency, and use of electronic media subscales in both Spanish and English. An item sample of the language subscale includes "how often do you speak English?" The Hispanic and Non-Hispanic domain scores are derived from the total scale, where scores higher than 2.5 suggest biculturalism. Good to high internal consistency (α = .81 - .97) and high correlation with other behavioral measures of acculturation, such as generation in the U.S. and proportion of life spent in the U.S., are reported (Marin & Gamba, 1996).

Attitudinal Acculturation. The Psychological Acculturation Scale (PAS*;* Tropp et al., 1999) is a 10-item, 9-point Likert-type scale (1=*only with Latinxs* to 9=*only with Anglos*) self-report measure that assesses sense of attachment to and belonging within the U.S. and Hispanic/Latinx cultures. An item sample includes "with what group of people do you feel you share most of our beliefs and values?" A mean total score is derived from the scale, where a score of 5 indicates bicultural orientation. Both the English and Spanish versions of the PAS have good internal consistency (α=.90 and .83) and correlate with language and cultural preferences, along with the percentage of life spent in the U.S. and measures of cultural values (Ghorpade et al., 2004). The PAS has been used with a sample of Mexican Americans, Central Americans, and South Americans and found to be correlated with both the proportion of life spent in the U.S. and measures of cultural values (Ghorpade et al., 2004).

5. Analysis plan

A conditional process analysis using the PROCESS Macro (Hayes, 2017) was conducted to analyze the proposed hypothesis, which proposed that high endorsement of Latinx cultural practices mediate the association between nativity (Immigrants vs. U.S. mainland-born) and days using substances (alcohol/illicit drug use) in the past six months, and the frequency of substance consumption is moderated by attitudinal acculturation (i.e., identify more with the U.S. mainstream culture). Age and other illicit drug use were entered in the model as covariates. All continuous values were standardized before running the analysis. The PROCESS model 8 allows testing moderated mediation using a type of moderation called first stage and direct effect moderation (Preacher et al., 2007). This approach examines the direct and indirect effect of an independent variable (X) on a dependent variable (Y) through one or more mediators (M) that vary at different values or a moderator (W). The main characteristic of the first stage moderation is that it moderates the a-path (indirect effect), and it is labeled as the a3-path. Similarly, moderation of the direct effect path (c-path) in a mediation model is labeled as significant c'3-path.

The use of a dummy coded independent variable allows one to compare orthogonal combinations and provides greater statistical power (Cohen et al., 2003). The interpretation of a conditional process model is recommended to focus on the moderation of the indirect and direct effect of X by W (Hayes & Preacher, 2013). Thus, it is called a conditional process in that the effect of X on Y through M is a function of W (see Figure 1). In other words, the indirect effect of nativity (X) on substance use in the past six months (Y) through behavioral acculturation (M1-U.S. mainstream cultural practices, M2 – Latinx cultural practices) is a function of participants' attitudes toward both Latinx and U.S. mainstream culture (W). Therefore, it is conditional $(a1+a3W)$ $b1$ (See Figure 2).
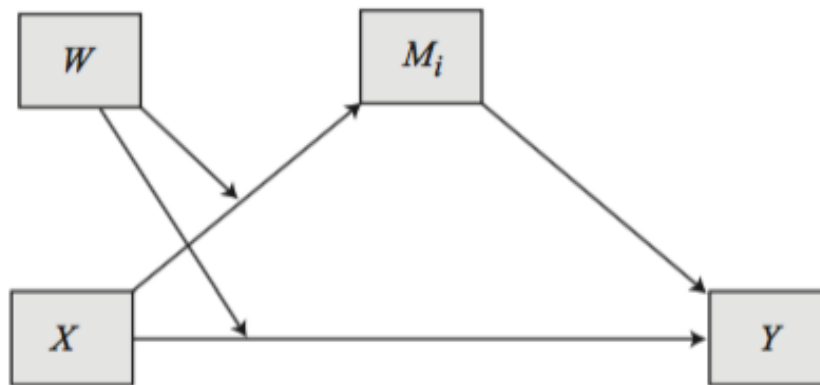

Figure 1. Conceptual model (PROCESS macro, model 8) for the proposed Hypotheses.

6. Results

Preliminary analyses using pairwise deletion were conducted to determine descriptive statistics. The final sample used for the model analysis was 131 participants (n = 63 immigrant, n = 68 U.S.-born), with a mean age of 36.15 years ($SD\pm10.5$). Most participants were males (n = 113; 86.3%). Nearly half of the participants immigrated from Mexico, Puerto Rico, and other Central American countries (48.1%), with a mean length of stay of 19.2 years ($SD\pm13.71$) in the U.S. The majority of the participants had previously had alcohol and substance abuse treatment (n = 124), while for seven participants, it was their first time in treatment. The majority of participants in the present study were recruited from an inpatient treatment center for substance abuse (n = 98; 72.6%). Of these, 58 (43%) came from a 28-day residential treatment program administered in Spanish. Means and standard deviations for sociodemographic characteristics can be found in Table 1.

Bivariate correlations were conducted in the variables of interest. Results indicated that being an immigrant was positively correlated with Latinx cultural practices and negatively correlated with affiliation to the U. S. mainstream culture. Immigrants also were more likely to be male and older than their U. S. born counterparts. Regarding acculturation measures, attitudinal acculturation was positively correlated with U.S. mainstream cultural practices and negatively correlated with Latinx cultural practices. Alcohol use in the past six months was positively correlated with Latinx cultural practices and negatively correlated with U.S. mainstream cultural practices.
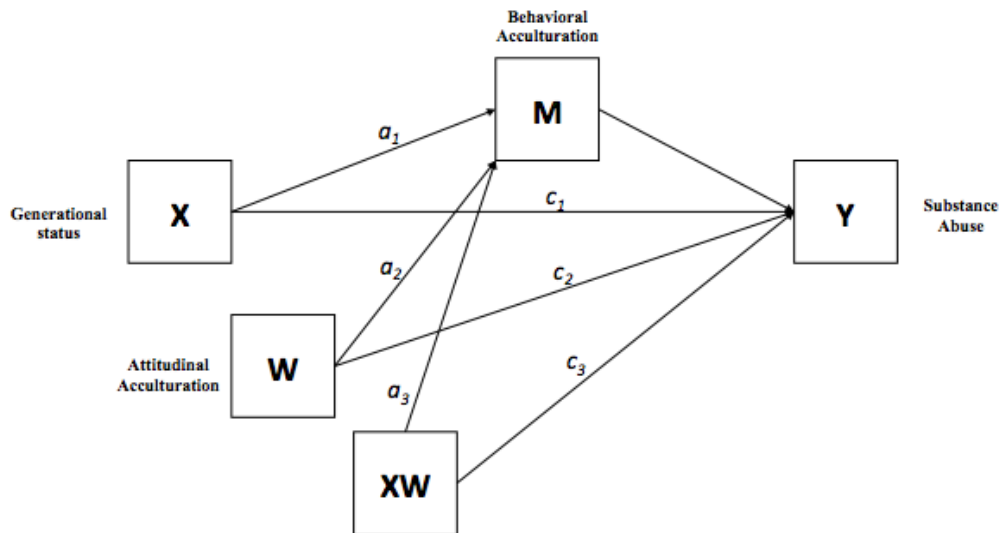
Figure 2. Statistical diagram of the conditional process model for both alcohol and illicit drug use.

Independent-samples t-tests were conducted to compare the impact of the study variables on immigrant and U.S. mainland-born Latinxs. Results from the t-tests revealed that there was a significant difference in age between the immigrant ($M = 39.14$, $SD = 10.90$) and U.S. mainland-born Latinxs ($M = 33.66$, $SD = 9.39$) groups, $t(129)= 3.09$, $p < .01$. Conversely, there was no significant difference between the immigrant and U.S. mainland-born groups regarding alcohol or drug use in the past six months.

6.1. Testing the model of cultural practices as moderator of the association between nativity and alcohol use

First, a conditional process model using the PROCESS Macro (Hayes, 2017; model 8) was conducted to examine the mediational effect of cultural practices on the association between nativity and days using alcohol, with attitudinal acculturation moderating the frequency of alcohol use in the past six months. Age and days using illicit drugs were entered in the model as covariates. All continuous values were standardized before running the analysis. Bootstrap was set to 5,000 to calculate indirect effects and create 95% confidence intervals (Hayes, 2017). Evidence of moderation of the indirect effect was found in a statistically significant interaction between Latinx immigrants and attitudinal acculturation through U.S. mainstream cultural practices, ($b = .30$, $SE = .14$, $p = <.03$), $\Delta R^2 = .59$, $F(5, 118) = 33.32$, $p = <.0001$. Thus, the more Latinx immigrants endorsed higher affiliation to the U.S. mainstream culture, the more days they spent using alcohol in the past six months than their U.S. mainland-born counterparts. Conversely, moderation of the indirect effect by Latinx cultural practices was not statistically significant.

It is worthwhile to note that extant methodological research indicates that evidence of an association between independent and dependent variables is not required as a precondition for testing indirect effects (Hayes, 2013). Recent recommendations by Hayes and Preacher (2013) base inference about the indirect effect not on the significance of direct paths but on quantifying the indirect effect itself and asymmetrical bootstrap confidence intervals. Given that the "first

stage" of the mediation model (X M) is moderated, that suggests that the indirect effect is also moderated.

Table 1. Sociodemographic Characteristics of Latinx Immigrants and U. S. Mainland-Born Latinx

	Latinx Immigrants (n = 63) M(SD)	U. S. Mainland-Born Latinx (n = 68) M(SD)
Age	39.1(10.9)	33.7(9.4)
Education	10.4(2.9)	11.8(1.8)
	%(n)	%(n)
Sex		
Male	96.8(61)	76.5(52)
Female	3.2(2)	23.5(16)
Marital Status		
Married	6.3(4)	3.0(2)
Separated	22.2(14)	13.4(9)
Divorced	22.2(14)	19.4(13)
Never married	49.2(31)	64.2(43)
Country of Origin		
U. S. born (mainland)		100(67)
Puerto Rico[1]	47.6(30)	
Mexico	41.3(26)	
Cuba	4.8(3)	
El Salvador	3.2(2)	
Guatemala	3.2(2)	
Employment Pattern[2]		
Full-time	49.2(30)	36.9(24)
Part-time	31.1(19)	32.3(21)
Unemployment	19.7(12)	30.8(20)
Substance of Major Problem		
Alcohol	23.8(15)	16.4(11)
Heroin/Opiates/Analgesics	15.9(10)	26.9(18)
Cocaine	12.7(8)	9.0(6)
Cannabis/Amphetamines	7.9(5)	11.9(8)
Alcohol & one or more drugs	31.7(20)	31.3(21)
More than one, not alcohol	7.9(5)	3.0(2)
Prior Substance Abuse Treatment		
No	6.3(4)	4.5(3)
Yes	93.7(59)	95.5(64)
History of Incarceration		
No	25.4(16)	19.4(13)
Yes	74.6(47)	80.6(54)
Legal Status (on Parole/Probation)		
No	77.8(49)	58.2(39)
Yes	22.2(14)	41.8(28)

Table 2. Correlations for the Variables of Interest

Measure	1	2	3	4	5	6	7	8
1. Non-Latinx Cultural practices[1]	--							
2. Latinx Cultural practices[1]	-.68**	--						
3. Attitudinal Acculturation[2] (PAS)	.48**	-.52**	--					
4. Country of Origin	-.61**	.55**	-.26**	--				
5. Drug Use[3]	-.04	.03	-.08	.04	--			
6. Alcohol Use[3]	-.19*	.26**	-.12	.13	.01	--		
7. Age	-.29**	.29**	-.15	.24**	-.25**	.21*	--	
8. Gender	-.31**	.40**	-.16	.29**	-.08	.16	.24**	-

Note. [1]The Latinx and Non-Latinx cultural practices are subscales from the Bidimensional Acculturation Scale (BAS). Attitudinal acculturation was measured using a 1 to 9 Likert scale, where lower values indicate a preference for Latinx culture and higher values suggest a preference for the U.S. mainstream culture. Values close to the mean ($M = 5$) indicate that participants successfully navigate between both cultures.[3] Days when alcohol and drugs were consumed within the past six months. ** $p<.01$, * $p<05$.

To probe for moderation of an indirect effect, the PROCESS macro generates the conditional indirect effect of generational status on days using alcohol in the past six months at values of the moderator attitudinal acculturation. Thus, the conditional indirect effect of the Latinx immigrant group on alcohol use in the past six months through endorsement of U.S. mainstream cultural values was significant at the 75th percentile (effect = .142, 95% CI = .011, .263) and 90th percentile (effect = .19, 95% CI = .019, .449) of the moderator attitudinal acculturation. A 95% bootstrap confidence interval for the conditional indirect effect is above zero across the different values of attitudinal acculturation.

Thus, U.S. mainstream cultural practices mediated the effect of Latinx immigrants on days using alcohol in the past six months only for those who report high and very high endorsement of attitudinal acculturation. The PROCESS macro produces an index of moderated mediation. Results indicate that the indirect effect is significant (effect = .08, 95% bootstrap CI, .001, .184). These findings illustrate that the indirect effect of the Latinx immigrant group on alcohol use in the past six months through the endorsement of U.S. mainstream cultural practices is a function of the beliefs or attitudes toward the U.S. mainstream culture.

6.2. *Testing the model of cultural practices as moderator of the association between nativity and illicit drug use*

Next, a conditional process model using the PROCESS Macro (Model 8; Hayes, 2017) employing days of illicit drug use as the dependent variable was tested following the procedures outlined in the previous model. Age and days participants used alcohol in the past six months were entered in the model as covariates. Evidence of moderation of the indirect effect was found in a statistically significant negative interaction between U.S. mainland-born Latinxs and attitudinal acculturation in relation to drug use in the past six months, ($b = -.425$, $SE = .204$, $p = <.03$), $\Delta R^2 = .14$, $F(5, 118) = 3.14$, $p = .006$. Results from the conditional indirect effect indicate that moderation of the indirect effect was not significant as the 95% bootstrap confidence intervals contained zero. The PROCESS macro generates the conditional direct effects of the U.S. mainland-born Latinx group on drug use in the past six months. Results indicated that it was significant only for those in the 90th percentile, endorsing a very high attitude towards the U.S. mainstream culture (effect = -

.657, 95% bootstrap CI, -1.294, -.019). Thus, a reduction in the days participants used drugs in the past six months was observed only among U.S. mainland-born Latinxs who endorsed very high affiliation with U.S. mainstream culture.

Table 3. Correlations for the Latinx Immigrant and U. S. mainstream-born Latinx groups.

Measure	1	2	3	4	5	6	7
1. U.S. Mainstream Cultural practices[1]	--	-.50**	.05	.12	-.23	-.39**	-.20
2. Latinx Cultural practices[1]	-.59**	--	-.41**	.03	.28*	.32**	.26*
3. Attitudinal Acculturation (PAS)	.63**	-.56**	--	-.22	-.07	-.11	-.06
4. Drug Use[2]	.01	-.02	.07	--	.08	-.21	-.07
5. Alcohol Use[2]	-.14	.17	-.12	-.07	--	.24*	.19
6. Age	-.14	.05	-.09	-.33**	.14	--	.23
7. Gender	-.25*	.49**	-.20	-.17	.03	.15	--

Note. Correlations for the Immigrant group (*n* = 62) are above the diagonal; correlations for the U.S. mainland-born group (*n* = 68) are below the diagonal. [1]The Latinx and U.S. mainstream cultural practices are subscales from the Bidimensional Acculturation Scale (BAS). [2]Days when alcohol and drug were consumed within the past six months.
** *p*<.01, * *p*<05.

7. Discussion

This study aimed to test a multidimensional acculturation model (Schwartz et al., 2010) that examined behavioral acculturation (Latinx cultural practices and U.S. mainstream cultural practices) in relation to substance abuse behavior (i.e., days using alcohol and illicit drugs). Also, it was expected that attitudinal acculturation (affiliation to Latinx culture vs. affiliation to U.S. mainstream culture) would moderate the association between behavioral acculturation and substance use behavior on Latinxs who completed substance abuse treatment. Findings from the study support the hypothesized model.

Results from the conditional process model indicated that, after controlling for age and substance use, higher endorsement of U.S. mainstream cultural practices was associated with a higher frequency of alcohol use among Latinx immigrants, specifically among those reporting high and very high affiliation to the U.S. mainstream culture (i.e., attitudinal acculturation). Also, a negative association between U.S. mainland-born Latinx and frequency of illicit drug use in the past six months was observed, but only among U.S. mainland-born Latinxs who endorsed very high affiliation of U.S. mainstream culture.

Several unique contributions emerged from the present study. First, it is the first time a multidimensional acculturation model has been employed to examine the association between behavioral acculturation and substance use in the past six months through attitudinal acculturation in Latinxs who completed substance abuse treatment. Second, these findings illustrate the mechanisms through which higher-order values (i.e., attitudes) shaped cultural practices and their association to frequency (e.g., days) of alcohol and illicit drug use in the past six months (measured at the end of substance abuse treatment). Third, results of the analysis support the growing body of research on multidimensional acculturation frameworks (Abraido-Lanza et al., 2006; Eitle et al., 2009; Castro et al., 2010; Schwartz et al., 2014) in that it allowed for a more accurate depiction

of substance abuse behavior through the endorsement of cultural practices contingent on affiliation to the U.S. mainstream culture. The use of distinct sub-groups (i.e., Latinx immigrants vs. U.S. mainland-born Latinx adults in recovery from SUDs) allowed better detection of where the associations were most salient (Updegraff & Umana-Taylor, 2010). Based on the present findings, the study of several aspects of acculturation by disaggregating substance use data by nativity and frequency of alcohol and illicit drug use is instrumental in explaining differences in substance use behavior among Latinx immigrants and U.S. mainland-born Latinxs who completed substance abuse treatment.

7.1. Results from the model testing cultural practices as mediator of the association between nativity and alcohol use at different levels of attitudinal acculturation

Findings from the model examining the association between nativity and alcohol use via endorsement of cultural practices at different levels of attitudinal acculturation shed light on studies that show higher rates of alcohol use among second and later generations compared to Latinx immigrants (Alegria et al., 2017; Borges et al., 2007). Studies suggest the acculturation process may result in different ways of cultural adaptation, where some acculturation dimensions develop more than others (Eitle et al., 2009). Attitudes, a higher-order construct often overlook in acculturation research, represent a cognitive dimension of acculturation that influences individuals' cultural practices and identification with a cultural group (Portes & Rumbaut, 2001). As noted in the literature, high rates of alcohol use among Latinx immigrants (Alegria et al., 2017; Vaughan et al., 2014; Vega et al., 2009) may be a result of adopting U.S. social norms toward drinking (Zemore et al., 2009). Given that alcohol use is deemed as culturally accepted among Latinx cultures, it is plausible that Latinx immigrants' drinking behavior increased as an attempt to "fit in" the U.S. mainstream culture (Schulenberg & Maggs, 2002).

It is also plausible that alcohol use is used to cope with the stressors of being part of a minority group navigating between two cultures, particularly among those facing more dissonance – immigrants who reported higher affiliation to the U.S. mainstream culture (Des Rosiers et al., 2012). Although it is beyond the scope of the study, it is plausible that other distal and proximal factors, including early immigration to the U.S., family conflict, trauma exposure, poor ethnic identity development, experiences of social support and social exclusion, language, and a hostile context of reception led a number of Latinx immigrants to minimally endorse their home cultural practices (Alegria et al., 2017; Castro et al., 2010; Portes & Rumbaut, 2001).

These results also shed light on the immigrant paradox in substance abuse by offering a more nuanced picture of the protective effects of endorsing Latinx cultural practices and high affiliation to Latinx culture among Latinx immigrants in addiction recovery. Mounting research on immigration and mental health establishes that the longer Latinx immigrants live in the U.S. and become more acculturated into U.S. social and cultural norms, the more they resemble their U.S.-born counterparts regarding substance use behavior (See Alarcon et al., 2016; Alegria et al., 2017; Maldonado-Molina et al., 2011; Farley et al., 2005; Pena et al., 2008; Prado et al., 2008). However, differences in substance use observed among Latinx immigrants may be interpreted in light of the cultural armamentarium explanation (Vaughn et al., 2014), which suggests that immigrants preserve cultural norms and practices that may reduce their involvement in substance use behaviors compared to their U.S.-born counterparts (Charles, 2006; Coll et al., 2012; Salas-Wright et al., 2014; Schwartz et al., 2010). Overall, the literature on the immigrant paradox in substance use presents the ongoing dilemma– is the acculturation process beneficial as it promotes the integration

of immigrants to the U.S. mainstream society (Portes & Zhou, 1995), or is detrimental to the mental health and behavior of immigrants (Castro et al., 2010). The finding from the present study supports the use of more nuanced approaches that identify the extent to which acculturation dimensions lead to substance use behavior among Latinx immigrants.

Table 4. Model coefficients for the conditional process model for alcohol use.

M (Behavioral Acculturation)					Y (Alcohol use in the past six months)			
		Coeff	SE.	P		Coeff	SE.	P
X (Country of Origin)	$a1$	.318	.159	.04	c'	-.052	.242	.831
M1 (U.S. mainstream cultural practices)		--	--	--	b	.256	.137	.060
M2 (Latinx cultural practices)		--	--	--	c'_2	.036	.157	.817
W (Attitudinal acculturation)	$a2$	-.267	.069	<.001	c'_3	.009	.110	.937
XW	$a3$	.298	.138	.033		-.037	.211	.862
Constant	i_1	-.304	.226	.181	I_2	-.4571	.341	.182

7.2. *Results from the model testing cultural practices as mediator of the association between nativity and illicit drug use at different levels of attitudinal acculturation*

Results from the model examining the association between nativity and illicit drug via use as the dependent are partially consistent with the ecodevelopmental model of acculturation (Castro et al., 2010; Portes et al., 2005). Mounting research shows that U.S.-born Latinxs are impacted by racism and perceived discrimination (Alarcon et al., 2008), structural and social barriers to services and community resources (Zambrana & Carter-Pokras, 2010; Zemore et al., 2018), neighborhood disadvantage, and fewer occupational and educational opportunities that lead to maladaptive coping strategies including drug use (Alegria et al., 2017). Additionally, U.S. mainland-born Latinxs who live in disadvantaged neighborhoods may be exposed to deviant peers and adhere to unconventional norms, which may increase the likelihood of using drugs as a coping mechanism (Gallardo & Curry, 2009; Karriker-Jaffe, 2011).

Table 5. Model coefficients for the conditional process model for illicit drug use.

M (Behavioral Acculturation)					Y (Drug use in the past six months)			
		Coeff	SE.	P		Coeff	SE.	P
X (Country of Origin)	$a1$	.722	.125	<.001	c'	-.079	.234	.206
M1 (U.S. mainstream cultural practices)		--	--	--	b	.001	.133	.994
M2 (Latinx cultural practices)		--	--	--	c'_2	-.196	.152	.206
W (Attitudinal acculturation)	$a2$	.176	.062	.005	c'_3	-.036	.106	.738
XW	$a3$	-.658	.108	<.001		-.425	.204	.039
Constant	i_1	.272	.074	.173	I_2	1.231	.330	<.001

7.3. Limitations

There were significant limitations in the present study. Results from the study should be interpreted in light of the following limitations. First, the cross-sectional nature of the analysis precludes us from establishing causal effects. Second, the lack of data on participants' socioeconomic status may mask the influence of socioeconomic factors in both immigrant and U.S. mainland-born participants. Missing socioeconomic data is a significant limitation given that socioeconomic status influences context of reception and the acculturation process for Latinx immigrants through access to resources and social capital (Abraido-Lanza et al., 2006). Third, the use of retrospective recall to identify days using alcohol and drug use in the past six months might be a limitation for two reasons: a) recall is subject to memory distortion, and b) participants may underreport substance use due to social desirability. Also, alcohol and drug use in the past six months shed light on the frequency, but not on the severity of SUDs reported by participants. Fourth, the limited number of women participating in the study ($n = 18$) did not allow for examining gender differences concerning the outcomes of interest. Given the small representation of Latinx women in substance use research, future studies should employ other approaches (e.g., mixed methods or qualitative) to examine the intersection between various acculturation dimensions and substance use in clinical samples.

7.4. Implications

The current study has important implications for research on culturally grounded substance abuse prevention and treatment. First, there is a growing body of literature supporting the development and testing of culturally appropriate models that examine the effects of acculturation on substance abuse (Castro & Alarcon, 2002). Moreover, results from the present study disaggregating acculturation domains and components related to substance abuse support the need for complex models (e.g., Latent Class and Latent Profile Analysis). These study designs can provide valuable information regarding cultural practices and perceptions relative to substance abuse behavior among Latinxs in recovery. Second, acculturation research is called to provide a more nuanced examination of the mechanisms, dynamics, and treatment conditions that either support or hinder the acculturation process of Latinxs concerning substance use behavior. By examining how acculturation occurs within and between the treatment settings, researchers may identify interactions among individuals' cultural practices, house processes, and social networks.

Acculturation research calls for research on changes in cultural values, perceptions, and social practices relative to substance abuse behavior (Abraido-Lanza et al., 2006; Lopez-Class et al., 2011). The acculturation process is similar to the natural process of behavioral adaptation to fit in a recovery home. This process implies that acculturation is driven by general laws that operate independently of contextual and individual factors (Chirkov, 2009). Further research on the intersection of socioecological factors and cultural values is critical to changing the current paradigm from linear models to multidimensional models (Abraido-Lanza et al., 2006; Schwartz et al., 2010). Overall, research employing multidimensional models of acculturation may inform the development of prevention and substance abuse treatment for Latinxs in recovery.

As Latinxs in recovery from substance use disorders may endorse different acculturation levels, prevention interventions in the community should capitalize on the collectivistic nature of the Latinx culture by promoting community involvement where participants develop self-confidence and self-efficacy (Bandura, 1986). The confidence that an individual has about their abilities to

remain sober (specific self-efficacy) can be generalized to other settings, increasing self-agency through community participation. Emphasis should be placed on prevention programs building social and human capital (e.g., learning social conventions, strengthening social networks, building community support systems) that facilitate the process of acculturation, promoting healthy behaviors, and reducing substance use behaviors. Recovery homes may be a viable option for Latinxs in recovery in that they foster abstinence, social support, accountability, increased self-esteem, and a sense of purpose (Alvarez et al., 2009).

Findings from the present study suggest several clinical implications for practitioners to consider. First, assessment of cultural orientation and practices in Latinxs who are enrolled in substance abuse treatment (SAT) may assist practitioners in assigning individuals to SAT or recovery homes that share similar cultural perspectives (Burrow-Sanchez et al., 2015). By matching participants to treatment based on the degree of cultural relevance would maximize cultural fit and treatment outcomes. Secondly, measuring the individual's acculturation level and substance use behavior pre and post-treatment and at multiple points over time would facilitate the evaluation of existing SAT programs. Data from multiple data points may inform culturally appropriate SAT programs for this population (Castro et al., 2010).

In sum, the present study illustrates the impact of acculturation dimensions and attitudes relative to substance use behavior (Castro et al., 2010). With a growing population of Latinxs that become the largest ethnic minority in 2042 (U. S. Census Bureau, 2021), there is an urgent need for culturally inclusive prevention-intervention programs for Latinx adults in recovery from substance use disorders.

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