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Alcohol Use Among Latino Adolescents: Neurocognitive and Contextual Explanations of the Immigrant Paradox

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Alcohol Use Among Latino Adolescents:

Neurocognitive and Contextual Explanations of the Immigrant Paradox

A dissertation submitted in partial satisfaction of the

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by

Guadalupe Alvarado Bacio

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ABSTRACT OF THE DISSERTATION

Alcohol Use Among Latino Adolescents:

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by

Guadalupe Alvarado Bacio

Doctor of Philosophy in Psychology

University of California, Los Angeles, 2014

Professor Lara A. Ray, Chair

The purpose of the dissertation was to examine the immigrant paradox in relation to alcohol use patterns among Latino youth and test potential neurocognitive and contextual explanations. Specifically, the dissertation analyzed the differences in drinking initiation and alcohol use patterns between non-U.S.-born Latino adolescents and their U.S.-born Latino counterparts. The neurocognitive factors tested included dimensions of impulsivity (i.e. risky decision-making, response inhibition, and delayed discounting) and alcohol use outcome expectancies. The contextual factors examined were association with substance using peers, perceptions of peer norms, different aspects of parental monitoring, and dimensions of *familismo*. To this end, a study was designed and implemented at a local Los Angeles Unified School District high school during the 2012-2013 academic year. A total of 130 female and male adolescents between ages 14 and 17 who self-identified as Latino participated in the study.

Participants completed a series of self-report measures and behavioral tasks that assessed sociodemographic characteristics, patterns of alcohol use, drinking outcome expectancies, risky decision making, response inhibition, delayed reward discounting, peer perceptions of use, association with substance-using peers, aspects of parental monitoring, and dimensions of *familismo.*

Consistent with hypotheses, non-U.S.-born teens were more likely to have started to drink in adolescence, started to drink at a younger age, and were more likely to drink more recently than their non-U.S.-born counterparts. No differences were found in frequency of drinking episodes or number of drinks per drinking occasion. Mediation analyses indicated that perception of peer norms and more favorable evaluations of negative alcohol expectancies helped explain these differences. That is, U.S.-born Latino youth were more likely to believe that a higher proportion of their friends used substances than their non-U.S.-born counterparts and, in turn, reported worse alcohol use outcomes. Similarly, U.S.-born Latino teens evaluated the negative effects of alcohol to be more favorable than non-U.S.-born youth and were as a result more likely to endorse worse alcohol use outcomes. The multi-mediation analyses that simultaneously tested these two potential mediators in one model determined that both peer perception of use by friends and evaluation of negative expectancies were strong explanations of the immigrant paradox in drinking initiation patterns.

Results identified that the immigrant paradox is prevalent in patterns of drinking initiation but not in severity of drinking once Latino teens begin using alcohol. Explanations for differences in drinking initiation suggested that both neurocognitive and contextual factors are relevant to understand the immigrant paradox. Both holding favorable valuations of negative alcohol use expectancy outcomes and perception of substance use by friends explained the

immigrant paradox in drinking initiation patterns found in this study. Whereas differences in dimensions of impulsivity, association with substance using peers, and family context factors did not help explain the identified differences in drinking, these factors may play a role in influencing or modulating the severity of alcohol use once Latino teens start drinking. Nevertheless, valuations of negative alcohol use expectancy outcomes and perception of substance use by friends are two tractable factors that present opportunities for intervention geared at this underserved group.

The dissertation of Guadalupe Alvarado Bacio is approved.

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2014

DEDICATION

Para mi madre:

por ser mi pilar de fuerza.

Para mi hermanita Giselle y mi hermanito Omar:

por mantener mis pies firmes sobre la tierra y mi imaginación entre las nubes.

Para Gaby:

eres, volver a los diecinueve,

vamos a darle la vuelta al mundo, al final de mil caminos…

"We cannot seek achievement for ourselves and forget about progress and prosperity for our community. Our ambitions must be broad enough to include the aspirations and needs of others, for their sakes and for our own"

-César E. Chávez

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Introduction

The Latino Population in the United States

According to the most recent population estimates of the United States Census, the Latino population is currently the largest ethnic minority group in the United States (U.S.), accounting for 16% of the total population (U.S. Census Bureau, 2011). By 2050, the Latino community is projected to reach 25% of the total population. In some cities, including Los Angeles, Latinos have already reached the majority (U.S. Census Bureau, 2010). In fact, as of 2009, the U.S. ranks as the country with the second largest population of Latino origin, following Mexico (U.S. Census Bureau, 2010). Approximately 47% of Latinos living in the U.S. are foreign born, with a mean age of 27.4 years (U.S. Census Bureau, 2010). Approximately 22% of youth younger than 18 in the U.S. are of Latino origin (U.S. Census Bureau, 2010). First and second immigrant generation youth are the fastest growing segment of this group (Pumariega, Rothe, & Pumariega, 2005). Studying the health and risk behaviors of this fast growing community is critical, not only for the well-being of the Latino population, but for the benefit of the country at large.

Epidemiological Findings: Alcohol Use Among Latino Teens in the National Context

Differences in alcohol use by racial/ethnic background. Alcohol continues to be the most abused substance among adolescents in the U.S. (Johnston, O'Malley, Bachman, & Schulenberg, 2010). Epidemiological surveys indicate that by 12th grade, 72% of adolescents report having drank alcohol, 55% report having been drunk, and 25% report binge drinking in the past two weeks (Johnston et al., 2010). Furthermore, young drinkers report a variety of alcohol related negative consequences including impaired school and work performance, physical and psychological impairment, risky sexual behaviors, interpersonal problems, and drunk driving (Brown et al., 2008; National Institute on Alcohol Abuse and Alcoholism, 2006;

Office of the Surgeon General, 2007; Windle & Windle, 2006). As a result, adolescent alcohol use remains a serious public health concern.

National epidemiological surveys, such as the National survey on Drug Use and Health, suggest that the overall rates of alcohol use of Latino adolescents are higher than those of African American and Asian American adolescents and slightly lower than non-Hispanic White teens (SAMHSA, 2010). These results are similar to those of school-based surveys, such as the Youth Risk and Behavior Surveillance System (YRBSS; Eaton et al., 2010) and Monitoring the Future (MFT; Johnston et al., 2011). These ethnic/racial differences, however, may vary with age. According to the most recent MFT estimates, which surveys adolescents in 8th, 10th, and 12th grades, alcohol use rates by race and ethnicity fluctuate across grade levels. By 8th grade, Latino teens report higher prevalence rates of binge drinking (10.8%) in the past two weeks than non-Hispanic White (7.1%) and African American (5.3%) adolescents. Similarly, Latino youth exhibit higher rates in getting drunk in the past month (18.1%) compared to non-Hispanic White (13.9%) and African American (11.8%) youth. However, by 12th grade, non-Hispanic White teens report the highest rates of binge drinking (27.6%) compared to Latino (22.1%) and African American (13.1%) adolescents. Likewise, non-Hispanic White (31.6%) youth exhibit higher rates of getting drunk than Latino (20.5%) and African American (14.7%) adolescents. These results are consistent with the YRBSS estimates of early initiation of alcohol use suggesting that the incidence of having been drunk before age 13 is higher for Latino (27.1%) and African American youth (24.9%) than their non-Hispanic White (18.1%) counterparts (Eaton et al., 2009).

This pattern of results suggest that alcohol use among Latino teens in the U.S. represents a major public health concern as it may affect the successful transition of Latino adolescents to

young adulthood and over time contributing to ethnic and racial health disparities observed in the population at large.

Alcohol use among Latino adolescents: The immigrant paradox. Adolescents of Latino origin living in the U.S. share important cultural similarities; however, Latino youth belong to a heterogeneous, pan-ethnic, cultural group. Latino adolescents vary by national origin, socioeconomic background, and place of birth, among other characteristics. These factors help define the context in which Latino youth grow up in the U.S., and in turn influence their alcohol use patterns.

The few available studies on alcohol use among nationally representative samples of Latinos stratified by national ancestry compare the largest populations of Latinos living in the U.S. who are of Cuban, Mexican, and Puerto Rican origin. As a result, less is known about Latinos of Central and South American ancestry. The existing studies of the relationship between country of ancestry and alcohol use among adolescents have produced mixed results. While some studies have found that youth of Cuban descent are less likely to drink heavily and use marijuana compared to their Mexican/Mexican-American and Puerto Rican counterparts (Delva et al., 2005; Guilamo-Ramos, Jaccard, Johansson, & Turrisi, 2004; Randolph, Stroup-Benham, Black, & Markides, 1998), others indicate that there are no significant differences in rates of substance use among these groups (Nielsen & Ford, 2001). Similarly, limited data are available on alcohol use rates in Latin America. A study comparing the national rates of alcohol use in Mexico to those of individuals of Mexican origin in the U.S. found that U.S. born individuals of Mexican descent were 1.82 times more likely to report lifetime alcohol use and 2.13 times more likely to meet criteria for alcohol abuse or dependence than their counterparts living in Mexico (Borges et al., 2011). Thus, whereas there may be important variability in alcohol use by national

origin in the U.S. and among Latin American countries, the limited available literature is inconclusive.

The association of socioeconomic status (SES) and alcohol use patterns in youth is unclear. Some studies have found a negative relationship between SES and adolescent drinking, such that lower SES is associated with greater alcohol use rates (e.g. Droomers, Schrijvers, Casswell, & Mackenbach, 2003) . Other results have indicated that higher SES is related to a greater frequency of drinking (e.g. Blum et al., 2000) . Yet other studies have found no relationship between SES and adolescent alcohol use (e.g. Hanson & Chen, 2007) . A study using Monitoring the Future data tested parental education as a marker of socioeconomic status and found that the association between parental education and substance use was stronger for non-Hispanic White youth than for Latino youth (Bachman, O'Malley, Johnston, Schulenberg, & Wallace, 2011). It is possible that the effects of socioeconomic status and alcohol use among Latino youth may not emerge until young adulthood, as youth are expected to decrease alcohol use as they assume other responsibilities that enable them to successfully transition to adulthood (e.g., begin full-time employment).

Place of birth, or nativity, has been related to the health status and health behaviors of the Latino population living in the United States (Alegria et al., 2008; Prado et al., 2009). Latino immigrants to the U.S. are more likely to experience stressors than their U.S.-born counterparts as immigrants are often exposed to trauma during migration, have to settle in more impoverished neighborhoods upon arrival, and are limited by language barriers. Despite these disadvantages, Latino immigrants exhibit better mental health outcomes, including lower alcohol use than their U.S.-born counterparts (Alegria, et al, 2008). This finding is known as the immigrant paradox (Vega & Sribney, 2011).

The immigrant paradox appears to be prevalent among Latino youth and to apply to alcohol use outcomes. Whether Latino adolescents were born in their country of ancestry or in the U.S. has been consistently associated with risky behaviors including a. U.S.-born Latino teens exhibit greater rates of drinking than their non-U.S.-born counterparts (Bacio, Mays, & Lau, in press; Prado et al., 2009; Vega, Chen, & Williams, 2007). Various hypotheses have been proposed to explain these differences, however, the underlying mechanisms of the immigrant paradox remain unknown.

Gender differences in alcohol use among Latino teens are similar to the gender differences observed among youth in the general population. Specifically, males and females report comparable drinking rates during early adolescence but males report drinking more often and in greater quantities compared to females as they transition to adulthood (SAMHSA, 2011; Windle, Mun, & Windle, 2005) .

In sum, these findings suggest that further research is warranted to clarify the epidemiology of alcohol use among Latino teens in the U.S. Whereas national surveys indicate that the alcohol use rates among Latino teens is lower than their non-Hispanic counterparts, these rates may be underestimates as these do not account for the high number of Latino youth who drop out of school. Despite the fact that the literature is mixed, drinking rates among this population vary by the demographic heterogeneity of this panethnic group. For example, whereas associations between alcohol, national origin, and SES are inconsistent, it is important to keep these factors into consideration as their salience may depend on the specific context in which Latino teens grow up in the United States. Nevertheless, one of the most robust predictors of alcohol use is nativity. Paradoxically, immigrant youth are at lower risk for drinking compared to their U.S.-born counterparts. Examining the underlying mechanisms of the immigrant paradox in

alcohol use among youth may offer important opportunities for intervention. In the long run, understanding these mechanisms may also help reduce the health disparities confronted by this fast growing and greatly underserved population.

Neurocognitive Factors of Adolescent Alcohol Use

Neurocognitive factors including dimensions of impulsivity and outcome expectancies have been posited as proximal risk factors for substance misuse among adolescents in the general population. Studies have used a variety of instruments including self-report measures and behavioral tasks to capture these constructs as they relate to the neurocognitive development of adolescents and observed risky behaviors in this developmental period.

Impulsivity and risky decision making. Adolescence is a developmental period characterized by an increase in impulsive and risky behaviors. Behaviors such as alcohol and drug use experimentation, unsafe sexual practices, and delinquency, are often observed during this developmental period (Brown et al., 2008; Spear, 2000). Whereas adolescents may encounter negative consequences as a result of engaging in risky and impulsive behaviors, impulsivity and risk-taking may help facilitate their transition to adulthood (Spear, 2000). That is, risky decision-making and novelty-seeking may serve an ontogenic purpose of helping adolescents master the skills that enable them to manage and adapt to new environments as they negotiate individuation from their families and seek independence. As illustrated by the high rates of teens reporting risky and impulsive behaviors (Johnston et al., 2010; Moffitt, 1993), engaging in such behaviors is normative. For example, a prospective study that examined the longitudinal development of a sample of preschoolers through age 18 found that those who experimented with some drugs during adolescence appeared to have better psychological health in adolescence compared to those who abstained from any drug use and those who used drugs

frequently (Shedler & Block, 1990). Thus, engaging in risky and impulsive behaviors is developmentally appropriate and somewhat expected during adolescence.

Risky decision-making, sensation-seeking, and response inhibition are often used to describe adolescents' propensity to respond impulsively and make more risky decisions compared to children and adults. However, these terms refer to distinct aspects of suboptimal decision-making (Courtney et al., 2012; Evenden, 1999) observed during adolescence that correspond to different trajectories of neurobiological development during this developmental period (Casey, Jones, & Somerville, 2011; Casey & Jones, 2010; Steinberg, 2008). Studies on the different aspects of impulsivity suggest that impulsivity decreases linearly with age (Casey, Jones, & Hare, 2008; Galvan, Hare, Voss, Glover, & Casey, 2007). That is, children are more impulsive than adolescents, and in turn, adolescents are more impulsive than adults. Behavioral and neuroimaging studies suggest that impulsivity result from poor "top-down" control (Casey & Jones, 2010; Steinberg, 2008). As these prefrontal "top-down" areas mature with age, so do individuals' cognitive and impulse control (Casey et al., 2011; Steinberg, 2008).

However, the linear neurobiological development of the prefrontal cortex does not solely explain the increase in suboptimal decision-making observed in adolescence. Recent imaging studies have indicated that risky decision-making in adolescents is the result of the protracted development of the prefrontal cortex and its connectivity with relatively more mature subcortical "bottom-up" areas (Casey et al., 2011; Galvan et al., 2006). These subcortical limbic areas, including the nucleus accumbens, striatum, and amygdala, are associated with sensitivity to rewards and risk-taking in the context of reward seeking (Galvan et al., 2007). Imaging studies that have examined the development of impulsivity and risk-taking across the life span suggest that adolescents are more likely to make risky decisions than children and adults when these

decisions are made in rewarding contexts (Casey et al., 2008; Galvan et al., 2007). Thus, according to this neurodevelopmental model, adolescents engage in risky decisions because their relatively immature prefrontal cortex does not allow them to control their responses when teens make decisions in environments that signal potential rewards.

Drinking alcohol is in itself biologically reinforcing as a function of alcohol's ability to activate the dopaminergic pathway in the brain's reward circuitry. In addition, experimentation with alcohol during adolescence is typically associated with social situations where teens are also reinforced by the responses of their peers. Consequently, adolescents' decision of drinking alcohol is reinforcing on multiple levels. Studies that have examined the neurological effects of alcohol use during adolescence suggest that teens are more sensitive to the positive effects of alcohol and less sensitive to the negative effects of alcohol (Brown et al., 2008; Casey & Jones, 2010; Spear, 2000; Spear & Varlinskaya, 2010). For example, findings from animal models indicate that teens are less sensitive to the sedative, withdrawal, and "hangover" effects of alcohol (Doremus, Brunell, Varlinskaya, & Spear, 2003; Spear & Varlinskaya, 2010). On the other hand, adolescents appear to be more sensitive to the positive effects of social facilitation than adults (Spear & Varlinskaya, 2010). This relative insensitivity to the negative effects of drinking and sensitivity to the positive effects of experimenting with alcohol place adolescents at a greater risk not only for alcohol use initiation, but also for heavy use, particularly in the form of binge drinking (Spear, 2000). In fact, some studies suggest that teens may transition from alcohol use to dependence more rapidly than adults (Clark, Kirisci, & Tarter, 1998).

Laboratory studies using behavioral tasks, as opposed to self-report measures, to examine impulsivity and risky decision-making in relation to substance use among adolescents have also identified that dimensions of impulsivity in adolescence are related to risky behaviors during this

developmental period, including alcohol use. There are several behavioral tasks used to assess different dimensions of impulsivity including the Balloon Analogue Risk Task (BART), the Delay Discounting Task (DDT), and the Stop Signal Task (SST).

The BART (Lejuez et al., 2002) is a computer-administered task where participants are presented with the picture of a balloon. Participants inflate the balloon by pressing a key on a computer keyboard. Each time they do so, the balloon is inflated by an unpredictable amount and a small sum of money ($0.003) is deposited into a bank. Participants decide the point at which they want to stop inflating the balloon and collect the amount earned on that trial. However, the balloon visibly pops on the screen if it is pumped past its explosion point, which results in the loss of the money accrued in the trial. Thus, each pump presents some risk. The literature on the BART (e.g. Lejuez et al., 2002) suggests that this task captures risky decision-making, a dimension of impulsivity. Studies have found that increased risky decision-making in this task is associated with alcohol and cigarette use in adolescence (Crowley, Raymond, Mikulich-Gilbertson, Thompson, & Lejuez, 2006; Lejuez, Aklin, Bornovalova, & Moolchan, 2005; Lejuez, Aklin, Zvolensky, & Pedulla, 2003). Furthermore, the increase in risky decision-making in this task across adolescence has also been associated with drinking outcomes. For example, MacPherson and colleagues (2010) conducted a longitudinal study using the BART to assess risky decision-making at 3 time points starting in early adolescence and found that higher risky decision-making at baseline was associated with probability of drinking across time points. In addition, the increase in risky decision-making on the BART across the three time points increased odds of drinking.

Delayed discounting can be assessed in several ways. A commonly used computer-based DDT presents participants with a series of hypothetical choices between immediate smaller

monetary rewards versus delayed higher monetary rewards. Participants indicate their preference by pressing one of two keys. Studies using DDT suggest that this task indexes impulsive decision-making. Performance on the DDT among adolescents is linked to substance use. For example, discounting of delayed rewards during adolescence has been found to predict smoking initiation (Audrain-McGovern, Rodriguez, & Kassel, 2009) and related to the use of cigarettes, alcohol, and marijuana at a younger age (Kollins, 2003). In addition, among drinkers, greater discounting of delayed rewards distinguishes heavy drinking adolescents from light drinkers (Field, Christiansen, Cole, & Goudie, 2007).

The SST is a computer-administered task where participants are presented with a series of Go and Stop trials. For the Go trials, participants match a right- or left- pointing arrow with the corresponding key on the keyboard. For the Stop trials, a tone appears with the arrow simultaneously to signal participants to inhibit their response. Stop trials are presented on approximately 35% of all trials. Consistent with previous studies in the Ray Lab (Courtney et al., 2012) the time interval between Go and Stop trials, or stop-signal delay (SSD), starts at 250 ms for ladder one and at 350 ms for ladder two. In addition, the SSD typically increases by 50 ms if participants succeed at inhibiting their response, and decrease by 50 ms if participants fail to inhibit their response. The literature indicates that the SST captures response inhibition (Courtney et al., 2012). For example, a study of adolescents found that being unable to inhibit a preponent response in the SST predicted binge drinking (Castellanos-Ryan, Rubia, & Conrod, 2011). Similarly, among drinkers, response inhibition has been associated with a greater number of drinks consumed among young adult social drinkers (Henges & Marczinski, 2012).

Together, these behavioral tasks (BART, DDT, and SST) afford unique opportunities to examine multiple dimensions of impulsivity in adolescents without relying solely on self-report

measures. Nevertheless there is a dearth of studies examining whether these findings on dimensions of impulsivity, including those from behavioral tasks, can be extended to Latino adolescents. Further, it is unknown whether impulsivity and risky decision-making may differ by nativity thereby partially explaining the immigrant paradox. Examining whether dimensions of impulsivity change by generation may help elucidate proximal risk mechanisms for substance misuse among Latino teens.

Alcohol outcome expectancies. Alcohol outcome expectancies are cognitions related to the anticipated effects of drinking alcohol (Christiansen, Smith, Roehling, & Goldman, 1989). Alcohol expectancies are acquired directly and indirectly across development through several pathways including parental modeling, peers, media, and direct alcohol exposure (Brown, Tate, Vik, Haas, & Aarons, 1999; Christiansen, Goldman, & Inn, 1982; Cranford, Zucker, Jester, Puttler, & Fitzgerald, 2010; Dunn & Goldman, 1996; Dunn & Goldman, 1998). Alcohol expectancies are stored in memory networks that are activated by alcohol-related stimuli (Rather, Goldman, Roehrich, & Brannick, 1992). These alcohol expectancy memory networks interact with emotion regulation and impulse control mechanisms to guide individuals' decision to drink or not to drink (Dunn & Goldman, 1996; Rather et al., 1992).

Studies indicate that alcohol expectancies can be identified early in childhood, long before drinking occurs (Christiansen et al., 1982; Christiansen et al., 1989; Dunn & Goldman, 1996; Dunn & Goldman, 1998). The literature suggests that the alcohol expectancy memory networks of younger children are more likely to activate along a negative dimension, and that by 5th grade, memory networks activate along a positive and arousing dimension (Dunn & Goldman, 1996; Dunn & Goldman, 1998), likely signaling the period in which children are likely to have their first experiences with alcohol (e.g., sipping).

Alcohol expectancies have been associated with earlier initiation of alcohol use, higher frequency of drinking occasions, and greater quantities of drinks consumed (Windle et al., 2008). Among non-users, positive alcohol expectancies are associated with intentions to drink in adulthood (Zamboanga, Ham, Van Tyne, & Pole, 2011). In addition, among 7th and 8th graders, alcohol expectancies have been related to drinking behavior one year later (Christiansen et al., 1989). Higher scores on subscales assessing anticipatory expectancies that alcohol can enhance or impede social behavior, alcohol improves cognitive/motor functioning, alcohol enhances sexuality, alcohol leads to deteriorated cognitive/behavioral functioning, and alcohol increases arousal, were associated with the transition from abstinence to initiation and non-problem drinking to problem drinking. Among adolescents, positive alcohol expectancies, compared to negative, are more relevant in predicting alcohol use (Cranford et al., 2010; Leigh & Stacy, 2004; Urban, Kokonyei, & Demetrovics, 2008). For example, alcohol-related stimuli activate positive and arousing dimensions of alcohol expectancy memory networks held by higher drinking teens between 6th and 9th grade compared to their lower drinking counterparts (Dunn & Goldman, 1998). Similarly, positive alcohol expectancies are associated with frequency of getting drunk (Cranford et al., 2010) as well as the number of drinks consumed per drinking episode (Leigh & Stacy, 2004).

Different dimensions of impulsivity may influence the development of or interact with alcohol expectancies. Studies examining impulsivity or sensation seeking in adolescence have posited that higher impulsivity or sensation seeking is associated with more positive alcohol expectancies as these adolescents are more likely to overestimate the positive effects of risky behaviors (McCarthy, Miller, Smith, & Smith, 2001; Urban et al., 2008). According to the Acquired Preparedness Model (Smith & Anderson, 2001), individuals with higher impulsivity

may encode positive alcohol expectancies more easily than negative ones when exposed to direct or indirect alcohol experiences. Thus, impulsive individuals are hypothesized to be more likely to hold positive alcohol expectancies and, in turn, exhibit higher levels of drinking. Empirical findings lend support to this hypothesis such that positive alcohol expectancies mediates, in part, the relationship between sensation seeking and alcohol use among adolescents and college students (McCarthy et al., 2001; Urban et al., 2008). Similarly, studies testing the relationship between alcohol use and aggressive behaviors, a marker of impulsivity, have also identified positive alcohol expectancies as a mediator between drinking and aggressive behaviors in adolescence (Barnow et al., 2004; Meier, Slutske, Arndt, & Cadoret, 2007).

Whereas alcohol outcome expectancies and drinking behaviors have been widely studied among adults and adolescents, these findings have yet to be extended to ethnic minority adolescents in general, and Latino teens in particular. There is some initial evidence that the association between alcohol outcome expectancies and drinking behaviors may be relevant across cultures. For example, a study found that positive alcohol expectancies mediate the relationship between delinquency and alcohol use across non-Hispanic White, African American, Native American, Asian, and Latino adolescents (Meier et al., 2007). In addition, a study that examined the associations between alcohol use and peer alcohol use in a sample of Latino teens found that positive alcohol expectancies mediated this relationship (Segura, Page, Neighbors, Nichols-Anderson, & Gillaspy, 2003). However, it remains unknown if alcohol outcome expectancies among Latino teens differ by nativity and whether these may help explain the immigrant paradox.

In sum, dimensions of impulsivity and outcome expectancies represent proximal neurocognitive determinants of alcohol use in adolescence. However, less is known about

whether these findings can be extended to Latino adolescents. Further, it is unknown if differences in key neurocognitive factors, such as dimensions of impulsivity and alcohol outcome expectancies, may help explain the immigrant paradox in Latino youth drinking. Examining whether dimensions of impulsivity and outcome expectancies may help explain the immigrant paradox may offer novel ways to consider how the socio-cultural environments that Latino youth encounter in the U.S. help shape their neurocognitive risk profiles for alcohol use.

Contextual Factors in Alcohol Use Among Latino Teens

The context in which Latino teens grow up in the U.S. helps determine their risk for alcohol use. Peer and family factors are important components of this developmental context and influence their risk for drinking alcohol during adolescence. As such, changes in peer and family factors have been identified as potential explanations of the immigrant paradox.

The peer context. Peers and peer networks become more salient in adolescence (Brown & Larson, 2009) and are fundamental to adolescent development as teens seek individuation from their families (Brown et al., 2008; Spear, 2000). Consequently, peers and peer networks serve a developmental function and influence the risky behaviors observed in youth. Peers and peer networks exert influence through various mechanisms including group norms, modeling of and exposure to behaviors, and social reinforcement (Allen, Porter, & McFarland, 2006; Brown et al., 2008; Cohen & Prinstein, 2006; Deater-Deckard, 2001).

Affiliation with deviant or substance using peers has consistently been associated with an increased risk for alcohol use among adolescents (Brown et al., 2008; Spear, 2000; Wang, Simons-Morton, Farhat, & Luk, 2009; Wood, Read, Mitchell, & Brand, 2004). The relationship between alcohol use and association with deviant or substance using peers has also been identified among Latino teens (Bacio et al., in press; German, Gonzales, & Dumka, 2009; Lopez

et al., 2009; Prado et al., 2009). The influence of peer alcohol use on adolescents' drinking is thought to be exerted through several pathways including perceived peer group use norms, modeling and exposure to alcohol use, social reinforcement of impulsive behaviors, and maintenance of positive alcohol expectancies, among others (Martino, Collins, Ellickson, Schell, & McCaffrey, 2006; Prado et al., 2009; Schulenberg & Maggs, 2002).

Adolescents oftentimes overestimate the rates of alcohol use of their peers (Prinstein & Wang, 2005; Schulenberg & Maggs, 2002). In turn, adolescents' perceptions of peer drinking, even if these are erroneous overestimations, are a risk factor for alcohol use (Prinstein & Wang, 2005; Schulenberg & Maggs, 2002). These relationships appear to be similar among Latino adolescents. For example, a study of predominantly Latino inner city youth found that perceived drinking norms was associated with perceived benefits of drinking which in turn predicted adolescents' drinking (Epstein, Griffin, & Botvin, 2008). Similarly, a study of alcohol use among Latino adolescents found that perception of drinking norms had a direct and positive effect on adolescents' drinking (Yan, Beck, Howard, Shattuck, & Kerr, 2008).

Association with peers who use alcohol and drugs, is one of the most robust predictors of teen's own use. The literature indicates that this relationship is also prevalent among Latino adolescents of different national origins (German et al., 2009; Lopez et al., 2009; Prado et al., 2009). Association with deviant peers has been posited as one explanation of the observed increase in drinking among U.S.-born Latino adolescents compared to their non-U.S. born, first generation immigrant counterparts (German et al., 2009; Lopez et al., 2009; Prado et al., 2009). These studies suggest that U.S.-born Latino teens are more likely to associate with substance-using peers and, in turn, are more likely to drink earlier in adolescence and at a higher frequency than first generation teens (German et al., 2009; Lopez et al., 2009).

Peers may also influence adolescent alcohol use through the direct reinforcement of impulsive and risk taking behaviors. Drinking during adolescence commonly occurs in peer groups and adolescents report positive social effects of alcohol use (Brown et al., 2008; Spear, 2000). In fact, adolescents who have some experience with substance use are perceived as more competent than those who abstain or become frequent users (Shedler & Block, 1990). Similarly, the presence of peers increases the risky decision-making of adolescents. For example, Gardner and Steinberg (2005) conducted a laboratory study using an experimental paradigm where adolescents were instructed to stop a moving car somewhere between the signaling of a yellow light and the appearance of a red light, at which point a wall would appear and the car would crash. The goal was to accumulate points by stopping the car the closest to the wall without crashing. The study found that conductors made double the amount of risky decisions and focused on the positives of these decisions when accompanied by peers than when alone. A laboratory study with older adolescents, between 18 and 20 years old, used the DDT to examine whether the presence of peers increases the salience of immediate rewards (O'Brien, Albert, Chein, & Steinberg, 2011). Findings suggested that those who completed the task in the presence of peers were more likely to make riskier decisions and prefer lower immediate rewards than higher distal rewards. Thus, one pathway through which peers influence risky decision-making is by directly amplifying impulsivity. It remains unknown, however, whether these relationships can be extended to Latino teens.

Another way in which peers may also impact alcohol use behaviors is through outcome expectancies. The literature suggests that exposure to substance using peers is associated with positive alcohol expectancies among drinkers and non-drinkers (Martino et al., 2006). In turn, positive alcohol expectancies predict subsequent use (Leigh & Stacy, 2004). Although less is

known about alcohol expectancies among Latino teens, a study by Segura and colleagues (2003) found that association with drinking peers was related to more positive social enhancement expectancies and, in turn, positive expectancies were related to higher levels of alcohol use.

In sum, association with deviant peers and perceived peer use are closely associated with adolescent alcohol use. This relationship can be explained through different pathways including a promotion in risky decision-making and outcome expectancies. These peer context factors are relevant to drinking among Latino adolescents and have been posited as partial explanations of the immigrant paradox. Thus, it is necessary to account for these contextual factors when studying alcohol use among Latino teens.

The family context. Despite the fact that teens display a preference for peers during adolescence, the family context remains important throughout this developmental period. The relationships that adolescents have with their families influence the types of behaviors in which they engage. For example, a decrease in parental monitoring during adolescence has been associated with increased risk for alcohol use (Barnes, Reifman, Farrell, & Dintcheff, 2000). On the other hand, parental involvement has been found to attenuate the relationship between peer use and adolescent alcohol use (Wood et al., 2004).

The family context is particularly salient for Latino adolescents. For Latino families, parenting practices and relationships tend to be organized around the centrality of family integrity. *Familismo* is a dynamic construct defined as a normative set of values espoused by Latinos in the U.S. (Sabogal, Marín, Otero-Sabogal, Marín, & Perez-Stable, 1987). *Familismo* encompasses several facets including a sense of obligation to provide instrumental support to the family, an edict that family expectations should guide behavior, and an implicit sense that emotional support must be cultivated within the family (German et al., 2009; Sabogal et al.,

1987). Endorsement of family values appears to be protective against drinking during adolescence (Castro, Stein, & Bentler, 2009; Gil, Wagner, & Vega, 2000). In turn, the erosion of these family oriented values across generations is thought to increase the risk for alcohol use and partially explain the immigrant paradox (Barrera, Gonzales, Lopez, & Fernandez, 2004; Mogro-Wilson, 2008).

In spite of the fact that association with substance using peers is one of the most robust predictors of Latino adolescent substance use, different facets of *familismo* and family closeness appear to buffer against exposure to deviant peers (Frauenglass, Routh, Pantin, & Mason, 1997; German et al., 2009). Similarly, a decrease in parental monitoring associated with increased levels of acculturation appears to be related to increased rates of alcohol use among Latino youth (Mogro-Wilson, 2008). In addition, for Latino teens who report having substance-using friends, parental monitoring has a protective effect against substance use initiation (e.g. Lopez et al., 2009).

Little is known about the associations of orientation to family values and parenting practices with dimensions of impulsivity among Latino teens. Given the importance of the family context to the development of Latino teens, research examining how orientation to family values and parenting practices impact the development of different dimensions of impulsivity among Latino teens is warranted.

The context in which Latino adolescents develop is critical to understanding their relative risk for drinking alcohol in this developmental period. Differences in peer and family context are partial explanations for the immigrant paradox in alcohol use among Latino teens. Specifically, association with deviant peers is an important risk factor whereas orientation to family values and parental monitoring represent protective factors. Consequently, these contextual aspects need

to be taken into consideration when examining the immigrant paradox in alcohol use among this population. Further, while there is initial evidence that association with deviant peers, perception of peer norms, and some family factors may be related to neurocognitive development, more research is necessary to understand these relationships.

Previous Study by the Candidate

A previous study was conducted by the candidate as her 251 project to examine different mechanisms that may help explain the immigrant paradox in drinking initiation and problematic alcohol use among Latino youth in the U.S. (Bacio et al., in press). The study used a nationally representative sample of Latino teens of three immigrant generations obtained from the National Longitudinal Study of Adolescent Health. The mechanisms examined included erosion of family closeness, decreased parental monitoring, and increased association with substance-using peers. Results supported the immigrant paradox in drinking initiation and problematic alcohol use among Latino teens. Multimediation analyses indicated that decreased family closeness and increased association with substance-using peers across generations simultaneously and partially mediated the relationship between generation and alcohol use patterns. Findings highlighted that these contextual factors work in tandem with other risk factors to explain the immigrant paradox in drinking patterns among Latino teens.

While this study had strengths in that it tested multiple potential explanations of the immigrant paradox in drinking patterns using a fairly large nationally representative sample of Latino teens, it also had several limitations. The project was a secondary data analysis of an epidemiological study of adolescent health in the general U.S. population. As such, the study analyses were limited by the available data. For example, the existing data on alcohol use was not collected using standardized instruments to measure different aspects of adolescent drinking.

Similarly, the assessment of culturally relevant practices such as *familismo* had to be approximated by the existing subscale of family closeness. Furthermore, the examined mechanisms of the immigrant paradox only focused on two, albeit important, contextual factors. In view of these limitations, the proposed dissertation will address several of these concerns by designing and implementing a study that will allow for first-hand data collection. Moreover, the proposed dissertation will use a standardized battery of state-of-the-art instruments that will broaden the scope of the explanatory hypotheses for the immigrant paradox by including neurocognitive factors, namely impulsivity and outcome expectancies.

The Dissertation

Latino adolescents are a fast-growing group in the United States that is greatly underserved and understudied. Alcohol use among Latino teens represents a major health concern as it is related to a host of negative risks that may affect their successful transition to adulthood and contribute to the racial/ethnic health disparities observed confronted by the Latino community at large. Further, the immigrant paradox in adolescent drinking suggests that U.S.-born Latino teens are at greater risk for using alcohol and engaging in other risk behaviors that may place them at a disadvantage compared to their first generation immigrant counterparts. Different theories have been tested to attempt to explain the immigrant paradox but its underlying mechanisms are not yet understood.

The purpose of this dissertation project was to extend the previous study by the candidate and examine whether proximal neurocognitive risk factors for alcohol use in the general adolescent population are relevant to Latino adolescents and may help explain the immigrant paradox, while considering key contextual factors known to partially explain the immigrant paradox in drinking among Latino teens. Neurocognitive factors included dimensions of

impulsivity and outcome expectancies. Contextual factors included the peer and family environments. This study used standardized, self-report instruments, interviews, and behavioral tasks to assess dimensions of impulsivity (i.e. risky decision-making, response inhibition, and delay reward discounting).

Specific Aims and Hypotheses

Aim 1: Examine the immigrant paradox in alcohol use initiation and drinking patterns between non-U.S. born and U.S. born Latino teens.

Hypothesis 1: U.S.-born teens will be more likely to report drinking initiation compared to their non-U.S.-born counterparts. Youth born in the U.S.-born will report higher drinking frequency and severity than their non-U.S.-born counterparts.

Aim 2: Examine neurocognitive explanations of the immigrant paradox in alcohol use among Latino youth.

Aim 2A: Test dimensions of impulsivity as neurocognitive explanations of the immigrant paradox. Specifically, this study tested whether risky decision-making, response inhibition, and delayed reward discounting helped explain the relationship between nativity and drinking initiation and alcohol use patterns among Latino youth.

Hypothesis 2A: Drinking initiation and higher drinking intensity reported by U.S.-born teens compared to their non-U.S.-born counterparts will be partially explained by dimensions of impulsivity.

Aim 2B: Test alcohol expectancies as explanations of the immigrant paradox. In specific, this project tested whether alcohol outcome expectancies helped explain the relationship between nativity and drinking initiation and alcohol use patterns among Latino youth.

Hypothesis 2B: Drinking initiation and higher drinking intensity reported by U.S.-born teens compared to their non-U.S.-born counterparts will be partially explained by alcohol outcome expectancies.

Aim 3: Examine contextual explanations of the immigrant paradox in alcohol use among Latino teens.

Aim 3A: Test contextual peer factors as mediators of the immigrant paradox. This project tested if perceived peer alcohol norms and perceived peer alcohol use behaviors helped explain the relationship between nativity and drinking initiation and alcohol use patterns among Latino youth.

Hypothesis 3A: Drinking initiation and higher drinking intensity reported by U.S.-born teens compared to their non-U.S.-born counterparts will be partially explained by higher indices of perceived peer alcohol use and association with substance using peers.

Aim 3B: Test family context factors as potential explanations of the immigrant paradox. Dimensions of *familismo* and parental monitoring were examined as potential explanations for the relationship between nativity and drinking initiation and alcohol use patterns among Latino youth.

Hypothesis 3B: Drinking initiation and higher drinking intensity reported by U.S.-born teens compared to their non-U.S.-born counterparts will be partially explained by decreased indices of parental monitoring, and dimensions of familismo.

Exploratory Aim: Test whether the significant mediators identified in Aims 2 and 3 (above) simultaneously explain the relationship between nativity and drinking initiation and alcohol use patterns among Latino youth.

Methods

Participants

Participants were recruited from University High School (UHS), a local public school within the Los Angeles School District. UHS serves a diverse student body, with an approximate total of 2,233 students in the 2012-2013 academic year. According to public records, approximately 60% of the student body in the 2012-2013 was of Latino origin and 14% of the total student population were English learners. Although its catchment area corresponds to the area of West Los Angeles, a significant percentage of students reside in the greater metropolitan Los Angeles county and commute to the UHS daily.

Tables 1 and 2 illustrate the sociodemographic characteristics of all participants by place of birth. A total of 130 self-identified Latino adolescents participated in the study. Consistent with the distribution of the school's Latino student body, 28% of participants were born outside the United States. Approximately 40% of participants identified as male. There were no differences in gender (χ^2 = .03, p > .05) between non-U.S.-Born and U.S.-born youth. Participants were in 9th, 10th, and 11th grade. There were differences in grade (χ^2 = 7.14, p < .05) by place of birth; the majority of U.S.-born participants were in 10th grade (49%), whereas the majority of non-U.S.-born teens were in 9th grade (47%). However, there were no differences in age by nativity (t (128) = -1.80, p >.05). The average age of the sample was 15.4 years of old and ranged between 14 and 17. The majority of participants were of Mexican origin (71%), followed by Central American origin (20%). There were no differences in national origin by nativity (b = -.39, p >.05).

Non-U.S.-born participants migrated to the U.S. when they were approximately 6.7 years old, and have been residing in the U.S. for an average of 8.7 years. Among non-U.S.-born teens,

83% reported Spanish as their first language compared to 67% of U.S-born participants. However this difference was not statistically significant ($\chi^2 = 3.4$, $p > .05$). In fact, 95% of all participants chose to complete the study in English.

Two measures were used as proxies for socioeconomic status: assistance in school lunch and education of parents. The vast majority of participants received free lunch at school (89%) with no differences by place of birth. Similarly, participants reported that the majority of their fathers (71%) and mothers (67%) did not graduate high school across both U.S- and non-U.S.-born participants ($b = -.89$, $p > .05$).

Procedures

All procedures and materials were approved by the UCLA IRB, the Los Angeles School District, and University High School. In addition, a Certificate of Confidentiality (CoC) was obtained from the National Institute on Alcohol Abuse and Alcoholism (NIAAA) as an additional legal protection of participants confidentiality. The CoC protects researchers from having to provide information regarding the identity or data of all participants even under legal subpoena.

Recruitment. Active parental consent was required to participate in the study. Packets that included a letter explaining the study along with consent forms were sent through several avenues to parents of potentially eligible Latino students as identified by UHS administrators. All documents were in both English and Spanish. Parents who were willing to allow their teens to participate in the study were asked to sign one consent form and return it to study staff by (a) giving it to their eligible teen to submit at the time of participation, (b) dropping it into one of two clearly marked confidential boxes placed in the school cafeteria and a designated staff

office, (c) faxing it to the UCLA Addictions Lab, or (d) emailing it to the study PI (the candidate) using contact information on the consent form.

Several strategies were employed to invite potentially eligible students to participate in the study: targeted announcements to specific groups, mailing of packets directly to parents, presentations at parent nights, tabling at parent open house event, presentations to classes that served English learners, participant referrals of friends through raffles, and general handing out of flyers and advertising posters.

The high school's administrative staff generated a list of potentially eligible participants who endorsed their ethnicity as "Latino" and were currently in grades 9, 10, or 11. This list was used by school staff to identify students for targeted announcements throughout the academic year. During these announcements, the candidate along with several school staff would explain the rationale for the study, participant eligibility requirements, parental consent and adolescent assent procedures, participation incentives, and also answer any questions. Students left with a parental consent packet, flyers, and a date to present to and participate in the study. The announcements varied in frequency and number of students per group depending on participation response. Eleventh grade students were prioritized in the school's Fall semester to increase the probability that a representative number of students in this grade would participate, given the high drop-out rates that likely occur as the academic year progresses. The first announcement for the study grouped half of the 11th grade Latino population of students on one morning during "Home" period. Given the complications of maneuvering a high number of students, the number of students was decreased to 50 in the subsequent 3 announcements in November and December, 2012, and was then decreased to 20 in January, 2013 and thereafter. Recruitment of eleventh grade students was followed by 10th grade students in February, 2013, and 9th grade students in

March, 2013. Although different grades were targeted at different points of the academic year, all eligible students were allowed to participate at any point in recruitment.

To boost participant recruitment, a parent consent packet was mailed to all parents of potentially eligible students in March 2013. Parents were incentivized to return the consent form using any of the methods described above to be entered into a raffle for two $50 giftcards. In addition, the candidate and study team attended events where a sizable proportion of Latino parents were expected to attend. These events included a parent open house night and an organized meeting by the school's counselors with parents of English learners who were struggling to meet the requirements to graduate high school. During these events, parents were approached to explain the rationale for the study, procedures, incentives, and to invite them to provide parental consent at that time. Despite expecting a high percentage of Latino parents to attend these events, there was low overall participation of parents at these school sponsored activities. For example, approximately 40-50 parents had indicated that they would attend the meeting organized by school counselors on graduation requirements and less than 10 parents presented to the event.

To recruit a higher number of participants who were non-U.S.-born, several presentations were tailored to English-learners. UHS administrative staff identified the classrooms that served this specific population in the school. The candidate made several announcements in Spanish and English to these classes to explain the study that were later followed by visits to collect parental consent forms and encourage students to reserve a spot to participate in the study within the next several days.

Study. The study was conducted by a team comprised of the candidate, four undergraduate students, and one staff member of the UCLA Addictions lab. The study team

members were not affiliated with UHS to protect participants' confidentiality and create an environment where participants felt comfortable sharing information. No sensitive information that may have required reporting was collected. The study was conducted on site, after school hours in the private staff cafeteria adjacent to but secluded from other after school activities. The only people with access to this space were the study team and the participants who were escorted by the study team. The study was offered on Mondays, Wednesdays, Thursdays, and Fridays between 3:00 pm to 5:00 pm. Eligible participants completed a battery of behavioral tasks and self-report measures that took approximately 1 to 1.5 hours in total. Participants were provided light refreshments.

Prior to participation, all interested participants were screened to ensure that they had parental consent and that they fulfilled eligibility criteria. To be eligible, participants must have self-identified as Latino/Latina/Hispanic and attend grades 9th or 11th grade. Participants also indicated their place of birth to inform study recruitment progress. Eligible students stated their language preference as well as fluency in English and Spanish to determine the language of the materials for the assent procedures and the study process and materials. Once eligibility was determined, participants were explained the study rules and procedures in writing and orally in the language of their choice, were given the opportunity to ask any questions, provided written assent by signing a form, and were given an assent form for their personal records. All study materials were de-identified to protect the confidentiality of the students. Upon establishing eligibility and providing consent, students were given an index card with an assigned participant number with a checklist that included each part of the study they were expected to complete in order to receive the incentive.

Participation incentives. Upon completion of the study, participants were provided: monetary compensation, earnings from the Behavioral Analogue Risk Task (BART), and tokens to take public transportation if needed. The monetary compensation changed in April, 2013 to increase study participation. The initial monetary compensation was a $15 giftcard to an establishment of their choice (e.g. Jamba Juice) and was changed to $30 in cash. The majority (84%) of participants completed the study once the monetary compensation was increased to $30. Earnings from the BART ranged from $1 to $4. Participants were provided with 3 tickets for an additional opportunity to win a $25 giftcard if they referred eligible participants.

Measures

Instruments only available in English were translated by the study team following a translation and back-translation method. One undergraduate who was a native Spanish speaker working toward a Bachelor of Arts (B.A.) in Spanish Literature and was also fluent in English translated the measures from English to Spanish. A second undergraduate whose first language was Spanish and was also fluent in English translated the measures back from Spanish to English while remaining blind to the measures available in English. The candidate, whose first language is also Spanish and holds a B.A. in Spanish Literature, made corrections to the Spanish translations based on the back translation to ensure that the instruments were consistent with the original measures available in English.

Sociodemographics.

Gender. Participants reported whether they identified as male or female.

Grade and age. Participants endorsed if they were in 9th, 10th, or 11th grade. They also indicated their age within the range of 14 and 17.

Ethnicity. Participants indicated their ethnicity by first choosing all categories with which they identified from the following: American Indian/Alaskan Native, Black/African American, Asian/Asian American/ Pacific Islander, White/Caucasian, or Latino/Hispanic. Participants were then asked the group with which they identified most closely.

National ancestry. Those who identified as Hispanic/Latino were asked to report their national ancestry by choosing if they or their parents were from Mexico, Guatemala, El Salvador, another country in Central America, Puerto Rico, Cuba, another country in the Caribbean, or South America.

Place of birth. Participants indicated if they had been born in the United States or in a Latin American country.

Characteristics of non-U.S.-born participants. Those who were non-U.S.-born, identified their country of birth, the age at which they immigrated to the U.S., and the number of years they have resided in the United States.

Language use. Participants indicated whether English or Spanish was their first language. They also reported whether they currently preferred to speak English or Spanish.

Socioeconomic status. Participants indicated the level of education of their mother and father respectively by choosing whether they: never went to school, completed elementary school, completed middle school, attended some high school, graduated high school or equivalent, completed some college, or graduated from college or beyond. These variables were re-coded into 3 categories: did not finish high school, completed high school or equivalent, completed some college or beyond.

Participants also endorsed if they received financial assistance for their school lunch by choosing from "none, "reduced lunch," and "free lunch." Given the distribution of this variable,

the last two groups were combined into one such that participants were categorized as either receiving no financial assistance or receiving financial assistance for school lunch.

Alcohol use.

Adolescent Alcohol Involvement Scale (AAIS). The AAIS (Mayer & Filstead, 1979) is a 14-item measure reliably identifies problematic drinking among adolescents and shows good psychometric properties (Martin & Winters, 1998; Mayer & Filstead, 1979). The AAIS has not been used with a sample of primarily Latino teens. The measure was translated to Spanish by the study team as described above. Five alcohol use indicators were derived from this measure:

1. Lifetime alcohol use. Age of initiation was used to determine whether participants had started to drink in their lifetime. Those who endorsed "Never" where categorized as non-drinkers whereas participants who endorsed starting to drink at any age were categorized as drinkers.

2. Age of drinking initiation. Participants reported how old they were when they first had a drink of alcohol by choosing: "never," "after age 15," "at ages 14 and 15," "between ages 10-13," and "before age 10." The last two categories were collapsed into one group to capture participants who started drinking at age 13 or younger.

3. Recency of last drinking episode. Participants reported when they had their last drink by choosing: "never," "not for over a year," "between 6 months and 1 year ago," "several weeks ago," "last week," "yesterday," and "today." Given the low endorsement of the last three categories, these were combined into one group that captured if participants within the last week including today.

4. Frequency of drinking episodes. Participants reported how often they drank by choosing one of the following: "never," "once or twice a year," "once or twice a month," "every weekend," "several times a week," "every day." Given the low distribution of the last four

categories, these were combined to capture whether participants drank once or more times per month.

5. Number of drinks per drinking episode. Participants reported how many drinks they had when they drink by endorsing: "one drink," "two drinks," "three to six drinks," or "six or more drinks."

Rutgers Alcohol Problem Index (RAPI). The RAPI (White & Labouvie, 1989) was used to assess alcohol related problems. The RAPI is a 23-item measure that asked adolescents to report the number of times they have experienced the specified problems as a result of alcohol in the past year on a four point scale ranging from "Never" to "More than 10 times". Domains assessed included: family, academic, occupational, social, and interpersonal. The RAPI has been used with adolescent populations and has excellent psychometric properties (Miller et al., 2002). This instrument has been translated to Spanish and has been used among a bilingual sample of Latino college students (Orona, Blume, Morera, & Perez, 2007). The RAPI showed excellent internal consistency (α = .90).

Behavioral and self-report measures of impulsivity.

Balloon Analogue Risk Task (BART). The BART (Lejuez et al., 2002) is a computer-administered task where participants are presented with a picture of a balloon that is inflated by pumping a predetermined amount by pressing a key on a keyboard. A small amount of money ($0.003) is deposited into a bank with each pump. Participants decide the point at which they want to stop inflating a balloon and collect the amount earned on that trial. However, a balloon visibly pops on the screen if it is pumped past its explosion point, which results in the loss of the money accrued in the trial. Thus, each pump presents some risk. A total of 72 trials will be presented with a risk of explosion normally distributed with mean of 32 and a standard deviation

of 20 (Courtney et al., 2012). Participants were paid the amount of money they earned which range between $1 and $4. Two indicators were obtained from the BART: the adjusted mean pumps (AMP) and the post failure mean pumps (PFMP). The AMP is a general measure of propensity for risky decision-making (Courtney et al., 2012). The AMP adjusts for the number of pumps that resulted in the explosion of balloons to avoid biasing the mean negatively. The PFMP is the mean number of pumps that follow a failed trial given the importance of response to punishment for externalizing disorders (Courtney et al., 2012). The BART has been used with adolescent samples and shows appropriate psychometric properties (Lejuez et al., 2002; 2005). The task has been used with a sample of ethnic minority youth (Lejuez et al., 2005), however it has not been implemented with a sample of primarily Latino teens. Task instructions were translated to Spanish as described above.

Stop Signal Task (SST). The SST is a computer- administered task where participants are presented with a series of Go and Stop trials. For the Go trials, participants were asked to match a right- or left- pointing arrow with the corresponding key on the keyboard. For the Stop trials, a tone signaled participants to inhibit their response. A total of 128 trials were presented, with 35% of Stop trials. Consistent with previous studies in the Ray Lab (Courtney et al., 2012) the time interval between Go and Stop trials, or stop-signal delay (SSD), started at 250 ms for ladder one and at 350 ms for ladder two. In addition, the SSD increased by 50 ms if participants succeed at inhibiting their response, and decreased by 50 ms if participants failed to inhibit their response. Two indicators were calculated for the SST: mean go reaction time (MGRT50) and stop signal reaction time (SSRT50). The MGRT50 was an estimate of the time to respond in Go trials assuming 50% of probability to inhibit. The SSRT50 was estimated by subtracting the average SSD from the MGRT50 to represent the time required for participants to succeed in inhibiting a

response in 50% of the Stop trials. Different iterations of the SST have been used with samples of adolescent populations (e.g. Castellanos-Ryan, Rubia, & Concord, 2011); however, studies on Latino adolescents are lacking. Task instructions were translated to Spanish as described above.

Delay Discounting. The Monetary Choice Questionnaire (MCQ; Kirby, Petry & Bickel, 1999) was used to assess delayed discounting. Participants were presented with a series of hypothetical choices between small monetary rewards and larger monetary rewards. Participants circled one of two options to indicate their preferred choice. A total of 27 hypothetical choices were presented. A hyperbolic discounting function was derived from the equation $V = A/(1+kD)$, where V is the value of the delayed reward A at delay D, and k determines the discount rate. As k increases, a delayed reward is discounted more steeply and as such is considered an impulsiveness parameter (Herrnstein, 1981). High k values index higher levels of impulsive decision-making. That is, k scores represent preference for smaller immediate rewards compared to larger delayed rewards. Consistent with prior studies in the Ray Lab (Courtney et al., 2012), three k variables corresponding to different reward magnitudes were extracted: for small, medium, and large rewards. These k values were derived with an automated program in Stata (Wileyto, Audrain-McGovern, Epstein, & Lerman, 2004). The MCQ has been used with adolescent populations (Stanger, Budney, & Bickel, 2013), however it has not been implemented with a sample of primarily Latino teens. The MCQ was translated to Spanish as described above.

Alcohol outcome expectancies.

Brief Comprehensive Effects of Alcohol (BCEOA). The BCEOA (Ham, 2005) is a comprehensive self-report questionnaire assessed participants' expectancies and valuations of the effects of drinking alcohol. This instrument is a brief version of the Comprehensive Effects of Alcohol (Fromme, 1993) questionnaire and it contains only 15-items. The BCEOA was scored

following the factor structure generated from an alcohol use study of a sample of ethnic minority students by Ham et al., 2012. This approach yields a score on positive expectancies, negative expectancies, valuation of positive expectancies, and valuation of negative expectancies. Participants were presented with 15 statements on the anticipated positive or negative effects of alcohol. They endorsed whether they agreed or disagreed with each statement on a 4-point scale ranging from "Disagree" to "Agree." An example of a positive expectancy was: "If I were under the influence of alcohol, I would be brave and daring." A sample item of a negative expectancy was: "If I were under the influence of alcohol, I would feel clumsy." Following each statement, participants evaluated each expectancy on a 5-point scale from "Bad" to "Good." The BCEOA has shown good psychometric properties (Ham, Stewart, Norton, & Hope, 2005) and has been used with ethnic minority populations (Ham, Wang, Kim, & Zamboanga, 2013). However the instrument has not been used primarily with Latino adolescents. The BCEOA was translated to Spanish as described above. The internal consistency of the valuation of positive expectancies (α = .61) was questionable. The internal consistency of the subscales assessing positive expectancies (α = .74), negative expectancies (α = .85), and valuation of negative expectancies (α = .83) was in the acceptable range.

Peer context.

Perceived peer alcohol use norms. Perceived peer norms were assessed with modified items from the Monitoring the Future Survey (Johnston et al., 2010). Participants were asked the proportion of their peers they think use alcohol, cigarettes, marijuana, and other drugs among their ethnic group, school, grade, age, and group of friends. Participants endorsed one of the following categories: "None," "Some," "Most," and "All." A mean score was obtained by averaging responses across substances by peer group. The internal consistency across peer

perception of norms by ethnic group (α = .77), school (α = .78), grade (α = .74), age (α = .76), and group of friends (α =.66) was acceptable.

Association with substance using peers. Association with peers who use alcohol or drugs was assessed with items from the Monitoring the Future Survey (Johnston et al., 2010). They were asked to report how many of their three closest friends (1) drink alcohol, (2) smoke, (3) use marijuana, and (4) use any other illicit drug. A sum score was obtained by adding the number of friends across substances (α = .83).

Family context.

The Mexican American Cultural Values Scale (MACVS). The MACVS (Knight et al., 2010) was used to assess orientation toward traditional family values. The questionnaire yields three *familismo* subscales: family support, family obligation, and family as a referent. Participants were asked if they agree or disagree with each item presented on a 5-point scale ranging from "Strongly Disagree" to "Strongly Agree". Validity for the MACVS has been established (Knight et al., 2010). The internal consistency of the family support (α = .79) and the family as a referent (α = .82) subscales was acceptable. However the internal consistence of the family obligation subscale (α = .37) was poor.

Parental Monitoring. Parental monitoring was assessed with a multidimensional parental monitoring scale (Kerr & Stattin, 2000) that evaluates four aspects of parental monitoring: parental knowledge of teen's activities (9 items), parental control of teen's activities (5 items), parental solicitation of information regarding teen's activities (5 items), and adolescent voluntary disclosure of activities to parents (5 items). Adolescents indicated the frequency of each item on a five-point scale ranging from "No/Almost Never" to "Very Often". Average scores were calculated for each subscale. This instrument has been used with adolescent populations and has

good psychometric properties (Kerr & Stattin, 2000). This measure was translated to Spanish using the method described above. The internal consistency of the subscales measuring parental knowledge of teen's activities (α = .62), parental control of teen's activities (α = .85), parental solicitation of information regarding teen's activities (5 items; α = .67), and adolescent voluntary disclosure of activities to parents (5 items; α = .70) was acceptable.

Power Analysis

A power analysis was conducted using G*power (Faul, Erdfelder, Buchner, & Lang, 2009) to determine the sample size required to detect the effects of generation, neurocognitive factors, and contextual factors on alcohol use outcomes using a multiple regression model. The effect sizes used in the power analysis were taken from analyses conducted in the previous study by the candidate discussed above (Bacio, Mays & Lau, 2013). The analyses used for these calculations examined whether family closeness, parental monitoring, and association with substance-using peers simultaneously mediated the relationship between generation and problematic alcohol use. This previous study revealed that the effect size of family closeness was small (f^2=.12) and the effect size of association with substance-using peers was large (f^2=.9). Cohen's conventions for F tests are small for f^2= .02, medium for f^2 =.15, and large for f^2=.35 (Cohen, 1988). Taking a more conservative approach, the power analysis for a regression model using an effect size of .12 and 6 predictors, indicated that the required sample size of 120 participants would afford > 80% power to detect a significant effect at alpha = .05.

Data Analytic Plan

Statistical analyses were conducted in Stata IC 13 (StataCorp, 2013) and SPSS 22 (IBM Corp, 2010). The relationships among all the variables were tested using univariate regression analyses in Stata IC 13. Specifically, the associations between background variables (i.e. gender,

age, grade, nationality, and socioeconomic status) and outcome variables was explored using regression models to determine if these should be entered as covariates in the models testing each aim. Regression models were also used to test each aim. The distribution of each outcome was examined to determine the appropriate regression model (e.g. ordinary least squares, logistic, negative binomial, etc.). Mediation models were conducted following the Baron and Kenny (1986) approach as illustrated in Figures 1A and 1B. Full mediation is established when (a path) the predictor is significantly related to the mediator, (b path) the mediator significantly predicts the outcome, and (c' path) the effect of the predictor on the outcome is reduced no longer significant when the mediator is included in the model. Multimediation models were conducted as illustrated in Figure 1C and as specified below to control for effects of significant mediators in the model and decrease parameter bias (Preacher & Hayes, 2008).

Significance of mediation or indirect effects was tested using PROCESS (Hayes, 2013), a macro for SPSS that uses bootstrapping to estimate indirect effects, standard errors, and confidence intervals. PROCESS allows for testing of indirect effects of continuous, categorical, and dichotomous variables for both mediation and multimediation models. Bootstrapping is a method that uses resampling with replacement; for these analyses it was set to 5000 times. A sampling distribution is generated empirically through this non-parametric method which allows for estimation of indirect effects and confidence intervals. If the confidence interval does not include zero, then the indirect effect is considered to be statistically significant, $p < .05$ (Hayes, 2013; Preacher & Hayes, 2008).

Analysis of specific aims and hypotheses.

Aim 1. To examine the immigrant paradox in alcohol use initiation and drinking patterns between U.S. born and non-U.S. born Latino youth.

Hypothesis 1. Odds of starting to drink in adolescence were expected to be greater for those who were U.S. born compared to their non-U.S. born counterparts. Being U.S.-born was predicted to be associated with younger age of initiation, greater frequency of alcohol use episodes, and higher number of drinks per drinking episode.

Separate models were used to test each outcome of interest. The nature and distribution of the outcome determined the type of regression model utilized (e.g. logistic regression vs. negative binomial)

Aim 2. To examine dimensions of impulsivity (risky decision-making, response inhibition, and delayed reward discounting) and alcohol outcome expectancies as neurocognitive explanations of the immigrant paradox in alcohol use among Latino youth.

Hypothesis 2A. The association of nativity and each drinking outcome (increased odds of starting to drink, younger age of drinking initiation, higher drinking frequency, and higher number of drinks per drinking episode) will be partially mediated by indices of risky decision-making, response inhibition, and delayed reward discounting.

Separate models were used to examine risky decision-making, response inhibition, and delayed reward discounting, followed by a multimediation model including all significant differences in dimensions of impulsivity. Mediation analyses were performed as discussed above.

Hypothesis 2B. The association of nativity and each drinking outcome (increased odds of starting to drink, younger age of drinking initiation, higher drinking frequency, and higher number of drinks per drinking episode) will be partially mediated by alcohol outcome expectancies and evaluations of outcome expectancies.

Mediation analyses were conducted as specified above.

Aim 3. To examine indices of peer and family factors as contextual explanations of the immigrant paradox in alcohol use among Latino teens.

Hypothesis 3A. The association of nativity and each drinking outcome (increased odds of starting to drink, younger age of drinking initiation, higher drinking frequency, and higher number of drinks per drinking episode) will be partially mediated by higher indices of perceived peer alcohol use and association with substance using peers.

Separate models were tested for perception of peer use and association with substance using peers followed by a multimediation model including significant indicators. Mediation analyses were conducted as specified above.

Hypothesis 3B. The association of nativity and each drinking outcome (increased odds of starting to drink, younger age of drinking initiation, higher drinking frequency, and higher number of drinks per drinking episode) will be partially mediated by decreased indices of parental monitoring and dimensions of familismo.

Separate models were tested for parental monitoring and dimensions of *familismo* followed by a multimediation model including all variables related to family context that differed by place of birth. Mediation analyses were conducted as specified above.

Exploratory Aim. To test whether the significant mediators identified in Aims 2 and 3 (above) simultaneously explain the relationship between nativity and drinking initiation and alcohol use patterns among Latino youth.

The significant neurocognitive and contextual mediators identified in aims 2-3 were tested in a multiple mediator model as outlined by Preacher and Hayes (2008). The multiple mediation model examined whether the previously identified mediators help to simultaneously explain the increased odds of starting to drink, younger age of initiation, recency of drinking

episode, higher drinking frequency, and higher number of drinks per drinking episode reported by U.S.-born compared to their non-U.S.-born counterparts.

Results

Aim 1. Alcohol Use Initiation and Drinking Patterns

Hypothesis 1. Odds of starting to drink were predicted to be greater for those who are U.S. born compared to their non-U.S. born counterparts. Being U.S.-born is expected to be associated with greater frequency of alcohol use episodes and higher number of drinks per drinking episode.

Table 3 shows the alcohol use patterns reported by non-U.S.-born and U.S.-born Latino youth. Table 5 illustrates the correlations between alcohol use patterns and other constructs of interest.

Initiation of drinking. Initiation of drinking in adolescence was measured by a dichotomous indicator of whether or not participants reported that they had started to drink alcohol. Accordingly, a series of logistic regression models were used to test the relationship between place of birth and initiation of drinking. Approximately 51% of U.S.-born participants reported having started to drink compared to 31% of their non-U.S.-born counterparts. Place of birth predicted drinking initiation ($Wald\ \chi^2 = 4.3$, $p < .05$) in the expected direction such that U.S.-born youth were 2.3 times more likely to start drinking in adolescence than non-U.S.-born teens ($b = .84$, $z = 2.02$, $p < .05$). Point estimates from this model were used to test mediation and estimate indirect effects.

Separate logistic regression models were used to test whether sociodemographic characteristics were associated with drinking initiation and needed to be accounted for in the main models. Results from these models indicated that gender ($b = -.25$, $z = -.7$, $p > .05$), age ($b =$

.12, z = 57, p >.05), grade (*Wald* χ^2 = 2.14, p > .05), preferred language (b = -.25, z = -.64, p >.05), financial assistance with lunch (b = -.22, z = -.33, p >.05), mother education (*Wald* χ^2 = 4.3, p > .05), and father education (*Wald* χ^2 = 2.18, p > .05), were not associated with drinking initiation. As a result, these sociodemographic characteristics were not included in subsequent models to maintain parsimony.

Age of initiation. Ordinal logistic regression models were used to test differences in age of drinking initiation. Participants indicated the age at which they started to drink by endorsing never, after age 15, between 14 and 15, or before age 13. The model did not violate the proportional odds assumption (χ^2 = .15, p >.05). Place of birth was associated with age of initiation (b = .86, z = 2.13, p <.05) in the expected direction. That is, U.S-Born-teens in contrast with non-US.-born teens were more 2.37 times more likely to have started to drink at 13 compared to 14-15, after 15, or never. Point estimates from this model were used to test mediation and estimate indirect effects.

Separate ordinal logistic regression models were used to test whether sociodemographic characteristics were associated with age of drinking initiation and needed to be accounted for in subsequent models. Results from these models indicated that gender (b = -.28, z = -.8, p >.05), age (b = -.12, z = .57, p >.05), grade (χ^2 = .43, p > .05), preferred language (b = -.15, z = -.41, p >.05), financial assistance with lunch (b = -.22, z = -.36, p >.05), mother education (χ^2 = .94, p > .05), and father education (χ^2 = 1.19, p > .05), were not associated with age of drinking initiation. As a result, these indicators were not included in subsequent models to maintain parsimony.

Recency of drinking. Ordinal logistic regression models were used to test how recent participants reported drinking by endorsing never, not for over a year, between 6 months and one year, several weeks ago, or last week or after. The model did not violate the proportional odds

assumption (χ^2 = 5.5, p >.05). Participants who were U.S.-born were more likely to have had a drink more recently (b = .85, z = 2.11, p <.05). U.S.-born teens in contrast to their non-U.S.-born counterparts were 2.34 times more likely to have drank in the last week or more recent compared to several weeks ago, between 6 months and one year, not for over a year, and never. Point estimates from this model were used to test mediation and estimate indirect effects.

Separate ordinal logistic regression models were used to test whether sociodemographic characteristics were associated with recency of drinking episode and needed to be accounted for in the main models. Results from these models indicated that gender (b = -.11, z = .34, p >.05), age (b = .08, z = .43, p >.05), grade (χ^2 = .38, p > .05), preferred language (b = -.46, z = 1.19, p >.05), financial assistance with lunch (b = -.04, z = -.07, p >.05), mother education (χ^2 = 2.36, p > .05), and father education (χ^2 = 2.77, p > .05), were not associated with recency of drinking episode. As a result, these indicators were not included in subsequent models to maintain parsimony.

Frequency of drinking episodes. Ordinal logistic regression models were used to analyze the frequency of drinking episodes between U.S.- and non-U.S.-born teens who endorsed whether they had used alcohol: never, once or twice a year, or at least once or twice a month. Place of birth was not related to the frequency with which participants reported drinking episodes (b = 54, z = 1.28, p >.05). Results from these models indicated that gender (b = -.31, z = -.83, p >.05), age (b = .14, z = .71, p >.05), grade (χ^2 = .56, p > .05), preferred language (b = -.17, z = -.43, p >.05), financial assistance with lunch (b = -.41, z = -.66, p >.05), mother education (χ^2 = 1.98, p > .05), and father education (χ^2 = 2.84, p > .05), did not predict number of drinks per drinking episode. There were no differences in frequency of drinking episodes by place of birth

or any sociodemographic characteristic. As a result, mediation analyses were not conducted for frequency of drinking episodes.

Number of drinks per drinking episode. Ordinal logistic regression models were used to analyze the number of drinks participants had every time they had alcohol by endorsing whether they: never drank, 1 drink, 2 drinks, 3-6, or 6 or more. Place of birth was not related to average number of drinks per drinking episode (b = .78, z = 1.86, p > .05). Results from these models indicated that gender (b = -.24, z = -.69, p >.05), age (b = .11, z = .55, p >.05), grade (χ^2 = 2.46, p > .05), preferred language (b = -.39, z = -1.01, p >.05), financial assistance with lunch (b = -.13, z = -.22, p >.05), mother education (χ^2 = 3.16, p > .05), and father education (χ^2 = 2.45, p > .05), were not associated with number of drinks per drinking episode. No differences were identified in the number of drinks per drinking occasion reported by participants regardless of place of birth and any other sociodemographic characteristic. Consequently, mediation analyses were not conducted for number of drinks per drinking episode.

Alcohol related problems. Negative binomial regression models were used to test the differences by nativity in the number of alcohol related problems to account for the over-dispersed variance of this count variable. There were no differences in the number of alcohol related problems by place of birth (b = .51, z = .93, p > .05). Results from these models indicated that gender (b = -.64, z = -1.27, p >.05), age (b = -.41, z = -1.4, p >.05), grade (χ^2 = 1.82, p > .05), preferred language (b = -.34, z = -.63, p >.05), financial assistance with lunch (b = 1.1, z = 1.11, p >.05), mother education (χ^2 = 1.82, p > .05), and father education (χ^2 = 1.77, p > .05), did not predict the number of alcohol related problems reported by participants. There were no differences in the number of alcohol related problems reported by participants by place of birth

or by any other sociodemographic characteristic. Analyses of mediation were not conducted for number of alcohol related problems.

Aim 2. Neurocognitive Explanations: Dimensions of Impulsivity and Alcohol Outcome Expectancies

Hypothesis 2A. The association of nativity and drinking patterns is expected to be partially mediated by indices of risky decision-making, response inhibition, and delayed reward discounting.

Table 4 shows the means and standard deviations of all neurocognitive mediators examined by non-U.S.-born and U.S.-born Latino youth. Table 5 illustrates the correlations among constructs of interest. Tables 6, 9, and 12 illustrate the results of each step in mediation analyses that examined whether risky decision making, response inhibition, and delayed reward discounting explain the immigrant paradox in drinking initiation, age of drinking initiation, and recency of drinking episode in this sample. Figures 1A and 1B illustrate the paths tested (i.e. a, b, c') in the following mediation analyses.

Risky decision-making.

a Path. A series of OLS regressions were used to test the relationship between nativity and indicators of risky decision-making: adjusted mean pumps (AMP) and post failure mean pumps (PFMP). There were no differences in AMP scores (F (1, 127) = .83, p >.05) by nativity. Place of birth was not associated with PFMP scores (F (1, 127) = 2.97, p = .08), though it was close to statistical significance. There were no differences in AMP and PFMP by place of birth. Consequently, differences in risky decision-making were not mediators of the relationship between nativity and drinking outcomes.

Response inhibition.

a Path. A series of OLS regressions were used to test the relationship between nativity and two indicators of response inhibition: mean go reaction time (MGRT50) and stop signal reaction time (SSRT50). Nativity was not related to MGRT50 (b =-1.04, t = .07, p >.05). Place of birth was associated with SSRT50 (b =--26.64, t = -2.08, p <.05) and was further tested as a potential mediator.

b Path. Separate logistic and ordinal logistic regression models were used to test the relationship between SSRT50 and drinking outcomes (Tables 4, 7, 10). SSRT50 was not associated with initiation of drinking (b =-.0003, z = -.02, p >.05), age of initiation (b =-.0004, z = .15, p >.05), or recency of drinking (b =-.0007, z = -.27, p >.05). Consequently, SSRT50 was not found to be a mediator of the association between place of birth and drinking outcomes.

Differences in response inhibition were not a mediator of the relationship between nativity and drinking outcomes.

Delayed reward discounting.

a Path. A series of OLS regressions were used to test the relationship between nativity and indicators of delayed reward discounting (Table 4): discount rate total (k-total), discount rate for small rewards (k-small), discount rate for medium rewards (k-medium), and discount rate for large rewards (k-large). Nativity was not related to k total (F(1, 119) = .45, p >.05), k-large (F(1, 119) = .28, p >.05), k-medium (F(1, 119) = .77, p >.05), or k-small (F(1, 119) = .23, p >.05).

There were no differences identified in indicators of delayed reward discounting by place of birth, consequently, these indicators were not mediators of the relationship nativity and drinking outcomes.

Hypothesis 2B. The association of nativity and drinking patterns was predicted to be partially mediated by alcohol outcome expectancies.

Table 4 shows the means and standard deviations of all neurocognitive mediators examined by non-U.S.-born and U.S.-born Latino youth. Table 5 illustrates the correlations among constructs of interest. Tables 6, 9, and 12 illustrate the results of each step in mediation analyses that tested whether alcohol outcome expectancies explain the immigrant paradox in drinking initiation, age of drinking initiation, and recency of drinking episode in this sample.

a Path. A series of OLS regressions were used to test the relationship between nativity and each aspect of expectancies of alcohol use. Nativity was not related to positive expectancies (F (1, 126) = 1.93, p >.05), negative expectancies (F (1, 127) = 2.28, p >.05), or evaluation of positive expectancies (F (1, 123) = 0.64, p >.05). Place of birth was related to evaluation of negative alcohol expectancies (F (1, 126) = 4.16, p <.05) such that, U.S.-born teens evaluated the negative effects of alcohol to be more beneficial compared to their non-U.S.-born counterparts. Expectancies of the negative evaluations of alcohol were tested as a potential mediator of the association between nativity and drinking outcomes.

b Path. Separate logistic and ordinal logistic regression models were used to test the relationship between negative evaluations of alcohol use expectancies and drinking outcomes. Negative evaluations of drinking expectancies was associated with initiation of drinking (Table 4; b = 1.08, z = 4.07, p <.001), age of drinking initiation (Table 7; b =.70, z = 3.63, p <.001), and recency of drinking (Table 10; b =.82, z = 4.09, p <.001). These point estimates were used to estimate and test indirect effects.

c' Path. Place of birth and positive evaluations of drinking were entered simultaneously in separate logistic and ordinal logistic regression models according to each drinking outcome (Tables 4, 7 and 10). After accounting for evaluation of negative alcohol expectancies (b =1.03, z = 3.88, p < .001), nativity did not significantly predict drinking initiation (Table 4; b =.51, z =

1.12, p >.05). After introducing evaluations of negative expectancies to the model (b =.67, z = 3.45, p <.001), place of birth was no longer associated with age of drinking initiation (Table 7; b =.65, z = 1.56, p >.05). Similarly, nativity did not predict recency of drinking (b =.66, z = 1.57, p >.01) after introducing evaluations of negative drinking expectancies (Table 10; b =.79, z = 3.95, p <.01) in the same model.

Indirect effect. Significance of the indirect effect of place of birth on each drinking outcome was tested using bootstrapping as described above. The indirect effect of place of birth on drinking initiation through evaluation of negative expectancies was .36, 95% CI [.04, .79] and was statistically significant. The indirect effect of place of birth on age of initiation through evaluation of negative expectancies was .15, 95% CI [.02, .32] and was statistically significant. Similarly, the indirect effect of place of birth on recency of drinking by way of evaluation of negative expectancies was .17, 95% CI [.01, .37] and was also statistical significant. Consistent with the hypothesis, endorsing more beneficial evaluations of the negative expectancies of drinking alcohol fully mediated the associations between place of birth and drinking initiation, age of initiation, and recency of drinking respectively.

Aim 3. Contextual Explanations: Peer and Family Factors

Hypothesis 3A. The association of nativity and drinking patterns was expected to be partially mediated by higher indices of perceived peer substance use and association with substance using peers.

Table 4 shows the means and standard deviations of all contextual mediators examined by non-U.S.-born and U.S.-born Latino youth. Table 5 illustrates the correlations among constructs of interest. Tables 7, 10, and 13 show the estimates of mediation analyses testing whether perceived peer use and association with substance using peers explain the immigrant

paradox in drinking initiation, age of drinking initiation, and recency of drinking in this sample. Figures 1A and 1B illustrate the paths tested (i.e. a, b, c') in the following mediation analyses.

Association with substance using peers.

a Path. A series of negative binomial logistic regressions were used to test the relationship between nativity and association with substance-using peers to account for the over-dispersed variance of this count variable. Place of birth was not significantly related to the number of friends participants reported used alcohol, cigarettes, marihuana, or drugs ($\chi^2(1) = 1.02$, $p > .05$). Consequently, association with substance using peers was not a mediator of the relationship between nativity and drinking outcomes.

Perception of peer use.

a Path. A series of OLS regressions were used to test the association between place of birth and participants' perception of use among peers who are friends, in the same grade, of the same age, in the school overall, and of Latino ethnicity. Nativity was related to the number of friends who participants perceived used alcohol, cigarettes, marihuana, or drugs ($F(1, 127) = 6.07$, $p < .05$). Nativity was not related to perception of use among peers in the same grade ($F(1, 127) = 1.88$, $p > .05$), of the same age ($F(1, 124) = 1.06$, $p > .05$), in the school overall ($F(1, 126) = .14$, $p > .05$), or of Latino ethnicity ($F(1, 126) = .51$, $p > .05$). The average number of friends that participants perceived to use alcohol, cigarettes, marihuana, or drugs will be tested as a potential mediator of the relationship between nativity and the identified alcohol use outcomes (Tables 5, 8, 11).

b Path. Separate logistic and ordinal logistic regression models tested the relationship between perception of use among peers who are friends and drinking outcomes. Perception of use among peers who are friends was associated with initiation of drinking (Table 5; $b = 1.14$, z

= 3.46, p <.01), age of drinking initiation (Table 8; b =.84, z = 3.23, p <.01), and recency of drinking (Table 11; b = I1.14, z = 4.2, p <.01). These point estimates will be used to test mediation effects.

c' Path. Place of birth and perception of peer use by friends were entered simultaneously in separate logistic and ordinal logistic regression models according to each drinking outcome (Tables 5, 8, 11). After accounting for peer perception of use by friends (b =1.1, z = 3.20, p <.01), nativity did not significantly predict drinking initiation (b =.62, z = 1.39, p >.05). After introducing peer perception of use by friends to the model (b =.77, z = 2.92, p <.01), place of birth was no longer associated with age of drinking initiation (b =.68, z = 1.64, p >.05). Similarly, nativity did not predict recency of drinking (b =.55,z = 1.34, p >.01) after introducing peer perception of use by friends (b =1.08, z = 3.80, p < .01) in the same model.

Indirect effect. Significance of the indirect effect of place of birth on each drinking outcome was tested using bootstrapping as described above. The indirect effect of place of birth on drinking initiation through peer perception of use by friends was .34, 95% CI [.08, .78] and was statistically significant. The indirect effect of place of birth on age of initiation through peer perception of use by friends was .15, 95% CI [.04, .32] and was statistically significant. The indirect effect of place of birth on recency of drinking was .19, 95% CI [.07, .38] and was also statistically significant. As predicted, perception of peer use who are friends fully mediated the relationships between place of birth and drinking initiation, age of initiation, and recency of drinking, respectively.

Hypothesis 3B. The association of nativity and drinking patterns will be partially mediated by decreased indices of parental monitoring and dimensions of familismo between non-U.S.-born and U.S. born teens.

Table 4 shows the means and standard deviations of all contextual mediators examined by non-U.S.-born and U.S.-born Latino youth. Table 5 illustrates the correlations among constructs of interest. Tables 7, 10, and 13 illustrate the model estimates at each step of mediation analyses that examined whether parental monitoring and familismo explained the immigrant paradox in drinking initiation, age of drinking initiation, and recency of drinking episode among this sample.

Parental Monitoring. Parental control dimensions included parental control, parental monitoring, parental active solicitation of information, and adolescent voluntary disclosure of information.

a Path. A series of OLS regressions were used to test the relationship between place of birth and each dimension of parental monitoring (Tables 5, 8, 11). There were no differences in parental control (b = .11, t = .69, p >.05), parental monitoring (b = -.08, t = -.48, p >.05), and adolescent voluntary disclosure (b = - .001, t = 0, p >.05) between non-U.S.-born teens and their U.S. born counterparts. Place of birth was associated with active parental solicitation of information (b = .46, t = 2.17, p < .05). Consequently solicitation of information will be tested as a potential mediator.

b Path. Separate logistic and ordinal logistic regression models were used to test the relationship between solicitation of information and drinking outcomes. Solicitation of information was not related to initiation of drinking (Table 5; b = 0.11, z = .65, p >.05), age of drinking initiation (Table 8; b = .03, z = .21, p >.05), or to recency of drinking (Table 11; b = .11, z = .69, p > .05). Consequently, solicitation of information was not a mediator of the relationship between nativity and drinking outcomes.

Dimensions of familismo. Dimensions of *familismo* included providing family support, sense of obligation to the family, and sense of family as a referent (Tables 5, 8, and 11).

a Path. Separate OLS models were used to test the association between place of birth and each dimension of *familismo*. Nativity was not related to providing family support (b = -.13, t = -1.06, p >.05), family obligation (b = -.01, t = -.08, p >.05), and sense of family as a referent (b = -.23, t = -1.67, p >.05). Dimensions of *familismo* were not mediators of the association between place of birth and drinking outcomes.

Exploratory Aim. Multimediational Model: Neurocognitive and Contextual Explanations

Evaluation of negative expectancies of alcohol use and perception of peer use who are friends were included in one model to test whether each mediator helped explain the relationship between nativity and drinking outcomes over and above the one other.

Drinking initiation. Table 8 illustrate the results of the models used to test the multimediation of drinking initiation and place of birth by perception of use by friends and evaluations of negative drinking. Figures 1A and 1C illustrate the paths tested (i.e. a, b, c') in the following multi-mediation analyses. expectancies.

b Path. A logistic regression model was used to test the relationship between both mediators and drinking initiation. Perception of use among peers who are friends was associated with initiation of drinking (b = 1.01, z = 3.06, p <.01) over and above positive evaluation of negative drinking expectancies. Evaluation of negative drinking expectancies was also related to initiation of drinking (b = 1.01, z = 3.73, p < .001) over and above perception of peer use by friends.

c' Path. Place of birth, perception of peer use by friends, and evaluation of negative drinking expectancies were entered simultaneously in a logistic regression model. After

accounting for both mediators, nativity did not significantly predict drinking initiation (*b*= .29, *z* = .61, *p* >.05). Peer perception of use by friends (*b* = .99, *z* = 2.93, *p* <.01) was significantly related to lifetime drinking over and above evaluations of negative expectancies. Similarly, evaluation of negative drinking expectancies (*b* = .99, *z* = 3.62, *p* <.001) predicted initiation of drinking over and above perception of use by friends. Figure 2 illustrates the multimediation results from these models.

Indirect effect. Significance of the indirect effect of place of birth on drinking initiation through peer perception of use by friends and evaluation of negative alcohol outcome expectancies was tested using bootstrapping as described above. The indirect effect of place of birth on drinking initiation through peer perception of use by friends over and above evaluation of negative expectancies was .31, 95% CI [.07, .77] and was statistically significant. Similarly, the indirect effect of place of birth on drinking initiation through evaluation of negative expectancies accounting for peer perceptions of use by friends was.35, 95% CI [.04, .82]) and was statistically significant. Peer perception of use by friends and evaluation of negative alcohol expectancies were significant mediators of the relationship between nativity and drinking initiation.

Age of drinking initiation. Table 11 shows model estimates used to test the multimediation of age of drinking initiation and place of birth by perception of use by friends and evaluations of negative drinking expectancies. Figures 1A and 1C illustrate the paths tested (i.e. a, b, c') in the following multi-mediation analyses.

b Path. An ordered regression model was used to test the relationship between both mediators and age of drinking initiation. Perception of use among peers who are friends was associated with age of initiation (*b* = .78, *z* = 2.96, *p* <.01) over and above evaluation of negative

drinking expectancies. Evaluation of negative drinking expectancies was related age of initiation (b = .33, z = 13.37, p <.001) over and above perception of peer use.

c' Path. Place of birth, perception of peer use by friends, and evaluation of negative drinking expectancies were entered simultaneously in one ordinal logistic regression model to predict age of drinking initiation. After accounting for both mediators, nativity did not significantly predict drinking initiation (b = .47, z = 1.01, p >.05). Peer perception of use by friends (b = .73, z = 2.74, p <.001) remained significantly related to age of drinking initiation over and above evaluation of negative expectancies. Similarly, evaluation of negative drinking expectancies was related to age of drinking initiation (b = .64, z = 3.24, p <.05) after accounting for peer perception of use by friends. Figure 3 illustrates the multimediation results from this models.

Indirect effect. Significance of the indirect effect of place of birth on age of drinking initiation through peer perception of use by friends and evaluations of negative alcohol outcome expectancies was tested using bootstrapping as described above. The indirect effect of place of birth on drinking initiation through peer perception of use by friends over and above evaluation of negative expectancies was .13, 95% [CI .03, .29] and was statistically significant. The indirect effect of place of birth on drinking initiation through evaluation of negative expectancies over and above peer perceptions of use by friends was also statistically significant (Indirect effect = .13, 95% CI [02, .29]). Both, peer perception of use by friends and evaluation of negative alcohol use expectancies were significant mediators of the relationship between nativity and age drinking initiation.

Recency of drinking. Table 14 shows model estimates used to test the multimediation of recency of drinking episode and place of birth by perception of use by friends and evaluations of

negative drinking expectancies. Figures 1A and 1C illustrate the paths tested (i.e. a, b, c') in the following multi-mediation analyses.

b Path. An ordered regression models was used to test the relationship between both mediators and recency of drinking. Perception of use among peers who are friends was associated with recency of drinking (b = 1.07, z = 3.85, p <.001) over and above evaluation of negative drinking expectancies. Evaluation of negative drinking expectancies was related to initiation of drinking (b = .77, z = 3.75, p < .001) over and above perception of peer use.

c' Path. Place of birth, perception of peer use by friends, and evaluation of negative alcohol expectancies were entered simultaneously in one ordinal logistic regression model. After accounting for both mediators, nativity did not significantly predict drinking initiation (b = .34, z = .78, p >.05). Peer perception of use by friends (b = 1.03, z = 3.60, p <.01) remained significantly related to recency of drinking over and above evaluation of negative expectancies. Negative evaluation of drinking expectancies (b = .76, z = 3.67, p < .001) was related to recency of drinking over and above peer perception of use by friends. Figure 4 illustrates the multimediation results from these models.

Indirect effect. Significance of the indirect effect of place of birth on recency of drinking episode through peer perception of use by friends and evaluations of positive alcohol outcome expectancies was tested using bootstrapping as described above. The indirect effect of place of birth on recency of drinking through peer perception of use by friends over and above evaluation of negative expectancies was .17, 95% CI [.05, .36] and was statistically significant. Similarly, the indirect effect of place of birth on recency of drinking through evaluation of negative expectancies over and above peer perceptions of use by friends was statistically significant (Indirect effect = .15, 95% CI [.02, .35]. Peer perception of use by friends and evaluation of

negative alcohol use expectancies were significant mediators of the association between nativity and recency of drinking.

Discussion

The purpose of the dissertation was to examine the immigrant paradox in alcohol use patterns among Latino youth and test potential neurocognitive and contextual explanations. Specifically, the dissertation analyzed the differences in drinking initiation and alcohol use patterns between non-U.S.-born Latino adolescents and their U.S.-born counterparts and tested whether neurocognitive factors, such as dimensions of impulsivity and alcohol use expectations, and contextual factors, including peer and family factors, helped explain these differences. For this purpose, a study was designed and implemented at a local Los Angeles Unified School District high school during the 2012-2013 academic year. A total of 130 female and male adolescents between ages 14 and 17 who self-identified as Latino completed the study. Participants completed a series of self-report measures and behavioral tasks that assessed sociodemographic characteristics, patterns of alcohol use, alcohol outcome expectancies, risky decision making, response inhibition, delayed reward discounting, peer perceptions of use, association with substance-using peers, aspects of parental monitoring, and dimensions of *familismo*.

The first aim of the dissertation was to examine whether the immigrant paradox was prevalent in drinking initiation and patterns of alcohol use between U.S.-born and non-U.S.-born Latino adolescents. The hypotheses posited that U.S.-born teens would be more likely to have started to drink in adolescence and would drink with more frequency and consume a greater number of drinks than their non-U.S. born counterparts.

Consistent with these hypotheses, Latino youth who were born in the U.S. were twice as likely to have started to drink in adolescence compared to those who were born in Latin America. Similarly, U.S.-born youth were more likely to have started to drink at an earlier age than those who were non-U.S.-born. Thus, the immigrant paradox was observed in patterns of initiation of drinking among Latino teens by place of birth. These findings are consistent with the literature (Alegria, Sribney, Woo, Torres, & Guarnaccia, 2007; Lopez et al., 2009; Prado et al., 2009), including the prior study conducted by the candidate. The study conducted by the candidate, which was a secondary data analysis of a nationally representative sample of Latino teens (Bacio, Mays, & Lau, 2013), showed that U.S.-born-Latino youth are more likely to start drinking in adolescence compared to non-U.S.-born teens regardless of whether those who were U.S.-born were of second (born to immigrant parents) or third (born to U.S.-born parents) generation. This pattern previously identified in large epidemiological studies also emerged in this smaller sample. Therefore, results from the dissertation further support this finding in that place of birth seems to be a strong correlate of initiation of drinking in adolescence for Latino youth. Namely, U.S.-born Latino youth are at higher risk for onset of drinking in this developmental period than non-U.S.-born teens.

Research to date examining alcohol use among Latino youth has not determined whether the age at which Latino teens start to drink differs specifically by place of birth. However, studies conducted with adolescent samples at different ages show that U.S.-born youth are consistently more likely to drink than their non-U.S.-born counterparts regardless of the age at which they are being compared (Kopak, 2013; Prado et al., 2009). Findings from the dissertation extend the literature by suggesting that U.S.-born Latino youth are more likely to start drinking at an earlier age than non-U.S.-born adolescents. In turn, these results highlight that U.S.-born

Latino youth may be at higher risk overall for encountering problematic drinking or dependence later in development given the strong association between the two key variables. That is, initiation of drinking in adolescence and age of onset before age 15 is associated with alcohol use problems, risk for dependence, and risk for multiple episodes of dependence later in life (Grant & Dawson, 1998; Hingson, Heeren, & Winter, 2006; Windle et al., 2008). Therefore, these findings suggest that U.S.-born Latino, compared to their non-US born peers, youth may be at greater risk for alcohol problems in their lifetime as a function of earlier age of initiation.

Contrary to the second hypothesis of the first aim, the present study did not find differences in severity of drinking patterns between U.S.-born and non-U.S.-born Latino youth. The only significant difference identified in patterns of use was that U.S.-born teens were more likely to report drinking alcohol more recently compared to non-U.S.-born youth. Unfortunately, the existing studies on adolescent drinking among Latino youth tend to examine general drinking patterns (e.g. lifetime alcohol use) or focus on one or two key variables (e.g. binge drinking, alcohol use in the past 12 months) but do not examine patterns of use at this level of analysis that can help contextualize this finding. It is possible that the difference in recency of drinking may be an indicator that is more consistent with characteristics of drinking initiation rather than a marker of the severity of drinking reported among Latino youth. That is, this difference may signal that U.S.-born teens are more likely to use alcohol in adolescence than non-U.S.-born youth overall rather than indicating that U.S.-born teens use alcohol more heavily or at a more severe level than non-U.S.-born teens. In fact, results indicated that participants did not differ in markers of severity of alcohol use (frequency of drinking episodes, drinks per drinking episode, alcohol related problems) by place of birth.

Specific to severity of drinking, study findings suggested that contrary to expectations, there were no differences in the frequency of drinking episodes, drinks per drinking episode, and alcohol-related problems between U.S.-born and non-U.S.-born participants. Although it is possible that the lack of differences in drinking patterns by nativity may be influenced by the sociodemographic homogeneity between the groups, these similarities in drinking patterns are not inconsistent with the literature. The secondary study conducted by the candidate found that, once first generation Latino teens started to drink, their drinking behaviors did not differ from second generation teens (Bacio et al., 2013). Similarly, other studies have found that place of birth/generation does not seem to have a strong effect on markers of severity of alcohol use in adolescence among Latino youth such as binge drinking, frequency of drinks in the past 30 days, or drinking episodes (Almeida, Johnson, Matsumoto, & Godette, 2012; Guilamo-Ramos et al., 2004; Kopak, 2013).

In sum, as predicted, the immigrant paradox was found in drinking initiation and age of drinking initiation between U.S.-born and non-U.S.-born Latino teens. Specifically, U.S.-born Latino youth were more likely to report starting to drink in adolescence and at a younger age than their non-U.S.-born counterparts. On the other hand, the immigrant paradox was not observed with regard to the drinking patterns between these groups. These findings indicate that although non-U.S.-born teens may be at lower risk for negative alcohol use outcomes in adolescence than their U.S.-born counterparts because they are less likely to start drinking during this developmental period, non-U.S.-born youth lose this advantage and purport the same risk as U.S.-born teens once they start to drink.

Based on these results, the examination of neurocognitive and contextual explanations of the immigrant paradox focused on the three identified significant differences by nativity: drinking initiation, age of drinking, and recency of drinking.

The second aim of the dissertation was to test whether neurocognitive factors such as dimensions of impulsivity and alcohol outcome expectancies helped explain the immigrant paradox in drinking outcomes between U.S.-born and non-U.S.-born Latino youth.

Dimensions of impulsivity (i.e. risky decision-making, response inhibition, delayed reward discounting) and alcohol outcome expectancies have been identified to be proximal contributing factors for alcohol use and other risky behaviors in adolescence (Brown et al., 2008; Spear, 2000). Specific to drinking, tendencies to make risky decisions, lower abilities to inhibit a response, favoring immediate smaller rewards over delayed bigger rewards, and holding favorable alcohol outcome expectancies are related to patterns of alcohol use in adolescence and beyond (Castellanos-Ryan et al., 2011; Kollins, 2003; Lejuez et al., 2003; MacPherson et al., 2010). Though the applicability of these constructs and their assessment using behavioral measures has not been studied extensively among ethnic minority teens, it is highly plausible that the relationships among these risk factors and adolescent drinking also apply to ethnic minority youth. Dimensions of impulsivity across species are thought to serve an ontogenic function to help teens gain the necessary skills to transition to independent living (Brown et al., 2008; Spear, 2000). In fact, these behaviors are a normative part of this period of development as demonstrated by the high rates of teens who engage in risky/novelty seeking/impulsive behaviors (Johnston, 2011; Moffitt, 1993) irrespective of ethnicity. The dissertation aimed to assess different dimensions of impulsivity and expectancies of alcohol use and test whether these

factors may help explain the higher rates of alcohol use between U.S.-born compared to non-U.S.-born Latino youth.

The construct of impulsivity is often used interchangeably with risky decision-making and inhibition. However, these factors seem to describe different aspects of sub-optimal decision-making (Courtney et al., 2012; Evenden, 1999; Jentsch et al., 2014). These dimensions of impulsivity have been studied through self-report and behavioral measures in mostly Caucasian samples. The present study used behavioral tasks to assess dimensions of impulsivity to decrease the potential bias of self-report measures. To this end, participants completed the Balloon Analogue Risk Task (BART; Lejuez et al., 2012) to estimate risky decision-making and the Stop Signal Task (SST) to assess response inhibition. Participants also completed a self-report measure of the Delayed Discounting Task (DDT) using the Monetary Choice Questionnaire (Kirby et al., 1999) to approximate delayed reward discounting. This was one of the first studies to measure these constructs utilizing these instruments within a sample of Latino youth.

Study results found similar patterns in outcomes across dimensions of impulsivity between U.S.-born and non-U.S.-born Latino youth. To test whether estimates of risky decision-making could be a potential mediator of the relationship between place of birth and alcohol use patterns among Latino youth, two indices of the BART were used: the adjusted mean pumps (AMP) and the post-failure mean pumps (PFMP). The AMP was used as a general measure of risky decision-making and the PFMP was posited to be an index of response to punishment. Results indicated that there were no differences in propensity for risky decision-making and response to punishment between U.S.-born and non-U.S.-born Latino youth. As a result, indices of risky decision-making were not an explanation of the increased patterns of alcohol use among

U.S.-born compared to their non-U.S.-born counterparts. To analyze whether response inhibition may help explain the immigrant paradox in drinking among Latino teens, two measures of the SST were tested: mean reaction time for participants to respond in Go trials assuming 50% of probability to inhibit (MGRT50) and reaction time required for participants to succeed in inhibiting a response 50% of the Stop trials (SSRT50). No differences in mean go reaction time were found by nativity. However, there were differences in the stop signal reaction time by nativity such that U.S.-born youth had, on average, a lower stop signal reaction time than their non-U.S.-born counterparts. That is, U.S.-born teens were faster to inhibit a prepotent response than their non-U.S.-born counterparts. However, SSRT50 was not related to initiation of drinking, age of initiation, or recency of drinking. Three rates of delayed discounting corresponding to different reward magnitudes were calculated and tested as potential mediators of the immigrant paradox in drinking patterns among Latino youth: for small, medium, and large rewards. Results found no differences in discounting rates between non-U.S.-born and U.S.-born Latino teens for all reward magnitudes. Consequently, performance on the BART, SST, and DDT did not help explain the immigrant paradox with regard to the identified differences in drinking by place of birth.

This set of results indicated that participants performed similarly in measures of risky decision-making, response inhibition, and delayed discounting regardless of whether or not they were born in the United States. The only difference was that non-U.S.-born teens exhibited a longer reaction time to inhibit a prepotent response compared to their U.S.-born counterparts. Nevertheless, mediation analyses indicated that this difference did not help explain why U.S.-born Latino teens were more likely to start drinking during adolescence, at an earlier age, and more recently, than their non-U.S.-born counterparts. Thus, performance on these indicators of

impulsivity were not found to be explanations of the immigrant paradox observed in drinking behaviors in this sample of Latino youth. Rather, these findings suggest that the neurocognitive development of Latino youth, regardless of nativity, seems to be at the same pace with respect to dimensions of impulsivity.

These similarities in performance across dimensions of impulsivity by place of birth may be due to different factors. It is possible that these constructs as assessed with these instruments are more relevant in predicting drinking behaviors and less sensitive in predicting initiation of drinking. That is, the existing literature among adolescents using this methodology has tested the relationship between these dimensions of impulsivity and several indicators of risky behaviors but not drinking initiation specifically. For example, studies have shown that the risky decision-making predicts an overall sum of a number of risk taking behaviors which included alcohol use (Lejuez et al., 2003), or have examined this construct among adolescents that have already been diagnosed with a substance use disorder (Crowley et al., 2006). Similarly, response inhibition has been found to predict binge drinking (Castellanos-Ryan et al., 2011) and number of drinks per episode (Henges & Marczinski, 2012). Likewise, delayed discounting has been shown to distinguish light from heavy drinking adolescents (Field et al., 2007). Therefore, it is possible that performance on these instruments and differences in dimensions of impulsivity are more pertinent to discerning characteristics among adolescents who have already started to drink and are less sensitive in predicting initiation of drinking. Of note, analyses that examined the associations between these markers across the three dimensions of impulsivity with drinking outcomes collapsing by place of birth indicated that none of these markers were correlated with any of the drinking outcomes. Perhaps these results may mean that the effect size is small and could not be detected in this sample or that these instruments may not be valid for examining

dimensions of impulsivity and drinking outcomes among Latino youth. Thus, these findings suggest that further analyses between these impulsivity dimensions and other risky behaviors (i.e. use of other drugs, skipping class, delinquency) and with other samples are necessary to assess their validity with Latino youth. In addition, the similarities in performance among all participants across nativity may be due to the fact that this study did not find differences in patterns of drinking (i.e. number of drinks per episode, frequency of drinking, and alcohol related problems) which suggests that study participants exhibited similar levels of impulsivity and are not yet performing in a way that allows these tasks to identify differences. Nevertheless, these similarities underline that other factors may be more relevant in explaining why U.S.-born teens are at higher risk for drinking initiation than their non-U.S.-born counterparts.

Expectancies of the anticipated effects of drinking alcohol and valuations of these anticipated effects are related to alcohol use behaviors among adolescents in general (Brown et al., 1999; Fromme & D'Amico, 2000; Windle et al., 2008). These cognitions are gained directly and indirectly throughout development and can be identified as early as childhood (Christiansen et al., 1982; Dunn & Goldman, 1998). Alcohol expectancies refer specifically to beliefs held with regards to the effects of alcohol in hypothetical scenarios. These cognitions are present in different positive (sociability, tension reduction, liquid courage, sexuality) and negative (cognitive and behavioral impairment, risk and aggression, self-perception) domains. In addition to expectancies, individuals also hold subjective valuations of these expectancies. That is, an alcohol outcome expectancy, whether positive or negative, is evaluated as having a "good" or "bad" effect. For example, individuals can anticipate that alcohol makes them more sociable and evaluate this to be a positive or detrimental effect. Both alcohol outcome expectancies and expectancy valuations are important in predicting alcohol use (Fromme & D'Amico, 2000; Ham

et al., 2013) given that both a belief regarding an outcome and its desirability may impact behavior. To assess these domains of alcohol expectancies, participants completed the Brief Comprehensive Effects of Alcohol questionnaire (Ham et al., 2005; Ham et al., 2013). Though expectancies of alcohol use and their valuations have not been used extensively with Latino populations, there is some initial evidence that holding more positive alcohol expectancies are related to higher patterns of alcohol use across ethnic minority groups (Ham et al., 2013). Among non-ethnically diverse samples, holding more favorable valuations of negative expectancies have also been found to predict drinking behaviors (Fromme & D'Amico, 2000; Zamboanga et al., 2012). Consequently, it was hypothesized that endorsing higher scores on positive alcohol expectancies and more beneficial valuations of negative alcohol expectancies would help explain the relationship between nativity and alcohol use patterns among Latino adolescents.

Dissertation findings suggested that participants held comparable negative expectancies, positive expectancies, and valuations of positive expectancies across place of birth. That is, non-U.S.-born and U.S.-born participants reported similar beliefs of the anticipated positive and negative effects of alcohol. This was contrary to the study hypothesis as it was expected that U.S.-born Latino youth would endorse more positive outcome expectancies than their non-U.S.-born counterparts. On the other hand, the study identified differences in the valuations of the negative anticipated effects of alcohol by place of birth in the anticipated direction. Namely, U.S.-born Latino teens evaluated the negative anticipated effects of alcohol to be more beneficial than their non-U.S.-born counterparts. However, both groups evaluated the positive effects of alcohol to be equally harmful. These results are consistent with the literature that suggests that children and adolescents acquire beliefs or cognitions of the anticipated effects of alcohol throughout development (Dunn & Goldman, 1998; Leigh & Stacy, 2004; Zamboanga et al.,

2011). In this case however, U.S.-born and non-U.S.-born teens held similar positive and negative expectancies of alcohol use. These similarities may be explained by the fact that the sociodemographic characteristics of the sample suggest that the developmental environments of participants are comparable across place of birth. Nevertheless, participants differed in evaluations of negative alcohol expectancies but not of positive alcohol expectancies. This finding is consistent with existing studies on non-ethnically diverse samples (Fromme & D'Amico, 2000; Zamboanga et al., 2012). It remains unclear as to why favorable evaluations of negative expectancies are more closely linked to drinking behaviors than evaluations of positive expectancies, however, it is posited that for adolescents with limited drinking experience, subjective evaluations of expectancies may be more important in predicting later drinking behavior (Zamboanga et al., 2012; Zamboanga, Schwartz, Ham, Jarvis, & Olthuis, 2009).

Mediation analyses demonstrated that more favorable valuations of negative expectancies was a mediator of the immigrant paradox in the three identified differences in drinking outcomes of this study. Specifically, U.S.-born teens were more likely to hold more favorable valuations of negative alcohol outcome expectancies. In turn, holding more beneficial valuations of negative alcohol expectancies was related to higher odds of starting to drink in adolescence, beginning to drink at an earlier age, and reporting a more recent drinking episode. These findings highlight the fact that Latino youth are exposed to similar messages regarding the effects of alcohol throughout their development and that both groups believe that the positive effects of alcohol are equally favorable. However, despite that U.S.-born and non-U.S.-born Latino youth seem to hold similar cognitions about the anticipated effects of alcohol, the former group may develop the belief that the negative effects of drinking are more favorable.

Notably, when collapsing across place of birth, the indices of negative expectancies, valuations of positive expectancies, and valuations of negative expectancies were related to drinking initiation, age of initiation, recency of drinking episode, frequency of drinking episodes and number of drinks per episode. However, positive expectancies were not related to any of the drinking outcomes. These results provide some initial evidence that the constructs of alcohol outcome expectancies and valuations assessed with the BCEOA are valid for Latino youth. Nevertheless, further research with other samples is necessary to make this assertion.

In sum, several dimensions of impulsivity and alcohol expectancies were assessed and tested as possible explanations of the immigrant paradox in drinking outcomes among this sample of Latino teens. A combination of behavioral tasks and self-report measures were utilized to assess these constructs. Though the majority of these constructs using these measures have not been formally tested with Latino participants, there is initial evidence that these are applicable to Latino youth. Study results identified that holding more favorable valuations of negative alcohol expectancy outcomes was a mediator of the relationship between nativity and the identified differences in alcohol use patterns between U.S.-born and non-U.S.-born Latino youth in this sample.

These findings on the one hand may suggest that the neurocognitive development of Latino youth is similar regardless of their place of birth and that the key differences may rather emerge as a function of their contextual environment. However, the fact that differences in valuations of negative alcohol expectancies emerged as a mediator of differences in drinking initiation may indicate that neurocognitive indicators play an important role in explaining the immigrant paradox in drinking among Latino youth in a specific pattern. That is, it is possible that valuations of negative outcome expectancies may be more relevant to explaining the

likelihood of starting to drink in adolescence but perhaps other aspects of alcohol outcome expectancies and dimensions of impulsivity may be more relevant in explaining severity of drinking for those who become regular drinkers. The sample of this study precludes from testing this hypothesis, however, it can be tested in future studies by oversampling for drinkers and including third generation teens (U.S.-born youth of U.S.-born parents). Nevertheless, findings provide initial support that the constructs of dimensions of impulsivity and alcohol outcome expectancies may be applicable to Latino youth and offer opportunities for further testing of the immigrant paradox in drinking outcomes among Latino adolescents living in the United States.

The third aim of the dissertation was to test whether contextual factors such as peer and family factors helped explain the immigrant paradox in drinking outcomes between U.S.-born and non-U.S.-born Latino youth. The context in which Latino youth develop helps determine their risk for alcohol use in adolescence. The peer and family contexts are two strong forces that affect the development and alcohol use patterns and outcomes of Latino adolescents. As a result, peer and family influences have been posited as explanatory factors of the immigrant paradox.

Peers in particular, become increasingly important in adolescence as teens begin to individuate from their families. As a result, the peer context exerts a great influence on teens' beliefs and behaviors, including adolescent drinking attitudes and behaviors (Brown & Larson, 2009; Spear, 2000). The present study assessed two indices of the peer context: peer perceptions of drinking norms among various peer groups and association with peers who use substances. The hypotheses posited that association with peers who engage in substance use and peer perceptions of use would help explain the higher patterns of alcohol use reported by U.S.-born Latino youth compared to their non-U.S.-born counterparts.

Association with peers who use substances refers to teens' report of whether their close friends use alcohol, cigarettes, marihuana, or drugs. This aspect of the peer context assesses if teens are exposed to the use of substances (alcohol, cigarettes, marijuana, illicit drugs) through the behaviors of their closest peer group (Bacio et al., 2013; German et al., 2009; Prado et al., 2009). The dissertation hypothesis predicted that U.S.-born teens would report that a higher number of their friends use substances compared to their non-U.S.-born counterparts. Contrary to what was expected, both non-U.S.-born and U.S.-born Latino youth reported a similar number of friends who engaged in substance use. As a result, this indicator of the peer context was not found to help explain the greater patterns of use by nativity. Nevertheless, associating with deviant peers was related to all the drinking outcomes tested when collapsing by place of birth.

Perceptions of use estimate teens' beliefs of the prevalence of use among their peers. Often times, adolescents overestimate the rates of substance use among their peers which influences their drinking behaviors (Epstein et al., 2008; Prinstein & Wang, 2005). These perceptions may be acquired through many pathways, these may be based on direct observations, established word-of-mouth, portrayal of use in the media, stereotypes, etc. (Epstein et al., 2008; Schulenberg & Maggs, 2002). Consequently, teens may have different beliefs regarding the normality of use of different peer groups to which they belong. Generally, the peer group is usually left to the interpretation of each teen. That is, adolescents are asked about rates of use among their peers but rarely is the specific peer group identified for them. On the one hand, adolescents are left to refer to whomever they identify as their peer group, on the other, this leaves unknown whether teens' perceptions of prevalence would differ if they were to be queued to a specific peer group to which they belong (e.g. the school level vs. the grade level vs. friends). To address this point, the dissertation assessed perceptions of the prevalence of use of

alcohol, cigarettes, marijuana, or drugs among a series of peer groups: friends, those of the same age, those of the same grade, in the school overall, and those of Latino ethnicity. Findings suggested that, when collapsing by place of birth, perceptions of use by peers who are friends, of the same age, and in the same grade were correlated with all the drinking outcomes assessed in the study. On the other hand, perception of use at the school level was only associated with initiation of drinking, whereas perception of use by peers who are of Latino descent was not correlated with any of the drinking outcomes. Results indicated that, of these groups, Latino youth only differed by nativity in their perception of use by peers they consider friends in the predicted direction. Namely, U.S.-born teens believed that use of alcohol, cigarettes, marihuana, and drugs was more prevalent among their friends than their non-U.S.-born counterparts. However, non-U.S.-born and U.S.-born teens perceived that the prevalence of use was similar in their peer groups of the same age, grade, school, and Latino ethnicity. Consequently, perception of use by friends was further tested as a mediator of the immigrant paradox.

Consistent with the hypotheses, peer perception of use by friends was related to patterns of drinking in the expected direction. Specifically, believing that a higher number of friends were using substances was associated with a higher likelihood of starting to drink during adolescence, a younger age of initiation, and recency of the last drinking episode. Mediation analyses showed that peer perception of use by friends helped explain the higher likelihood of starting to drink in adolescence, younger age of initiation, and recency of drinking of those who are U.S.-born compared to their non-U.S.-born Latino counterparts.

The finding that perceptions of peer use explained the immigrant paradox in the differences in drinking patterns is consistent with and extends the existing literature (Epstein et al., 2008; Yan et al., 2008). This provides further evidence that peers play an integral role in

drinking behaviors among Latino youth in general and increases the risk of U.S.-born for drinking compared to non-U.S.-born teens. Results also suggest that, although teens belong to multiple peer groups and may hold beliefs about each group, their beliefs regarding their more proximal peer group seem to exert the greatest influence on their drinking behaviors. In this case, the most relevant peer group was "friends," whereas the other peer groups encompass larger groups of peers (i.e. same age, same grade, same ethnicity, school level). In contrast, there were no differences by nativity in association with substance-using peers and consequently, this aspect of the peer context was not found to be an explanation of the immigrant paradox. This was an unexpected finding, given the strong support of this explanatory factor in studies of differences in substance use by place of birth among Latino youth (Bacio et al., 2013; German et al., 2009; Prado et al., 2009). Further, results demonstrated that perceptions or beliefs of use by friends were more relevant in explaining the immigrant paradox related to drinking initiation patterns than being friends with a larger number of friends who use. It is possible that association with substance using peers may be more relevant in predicting differences in characteristics of severity of alcohol use such as frequency or drinks per drinking episode. That is, perhaps associating with substance using peers has a stronger impact in determining how often Latino teens drink or how much they drink when they do, whereas beliefs about whether their friends use is more pertinent to predicting whether or not Latino teens start drinking and at what age.

In sum, as expected, perceptions of peer use by friends helped explain the immigrant paradox in drinking patterns among Latino youth. Specifically, U.S.-born Latino teens, compared to non-U.S.-born adolescents, believed that a larger number of their "friend" peer group used substances and, in turn, higher perceptions of peer use was related to higher likelihood of starting to drink in adolescence, younger age of initiation, and recency of drinking. Contrary to

predictions, however, association with substance-using peers did not help explain the immigrant paradox in drinking among this sample.

Although peers gain increasing importance in adolescence, parents and the family continue to play a key role in adolescent development in general, and drinking behaviors in specific (Barnes et al., 2000; German et al., 2009; Lopez et al., 2009). Among Latino adolescents, parental monitoring and endorsement of family-oriented values present protective factors against risk behaviors (Lopez et al., 2009; Mogro-Wilson, 2008). Conversely, the erosion of family oriented values, or *familismo* across generations living in the U.S. has been found to be a risk factor for negative outcomes (Frauenglass et al., 1997; German et al., 2009). The hypotheses of the dissertation predicted that the decrease in parental monitoring and *familismo* between non-U.S.-born Latino teens and U.S.-born Latino youth would help explain the greater patterns of alcohol use found in the former group compared to the latter.

The dissertation assessed four dimensions of parental monitoring (Kerr & Stattin, 2000): parental knowledge of teen's activities, parental control of teen's activities, active solicitation of information regarding teen's activities, and adolescent voluntary disclosure of information. Analyses identified differences in parental solicitation of information by nativity such that U.S.-born teens reported that their parents asked them more information about their activities more often than non-U.S.-born adolescents. Contrary to predictions, however, no differences were found by place of birth in parental knowledge, parental control, and adolescent voluntary disclosure. Results of the mediation analyses indicated that solicitation of information was not significantly related to any of the drinking outcomes and therefore, the increase in soliciting information in U.S.-born teens compared to non-U.S.-born teens did not explain drinking behaviors by nativity. It is possible that the higher rates in solicitation of information by parents

in U.S.-born youth compared to non-U.S.-born teens may not just represent increased parental monitoring derived from a cultural parenting value per se. Rather this difference may potentially indicate that parents may be more concerned about the whereabouts and behaviors of U.S.-born teens than their non-U.S.-born youth due to a number of reasons. These motives could include possible differences in language between immigrant parents and U.S.-born teens or concern over U.S.-born teens already engaging in other risky behaviors compared to non-U.S.-born adolescents. Consequently, active solicitation of information may not necessarily act as a protective factor against drinking but rather an indication of increased parental concern over U.S.-born teens compared to their non-U.S.-born counterparts.

Study results, while contrary to the original hypotheses, are not entirely inconsistent with the existing literature. Some studies have not found parental monitoring to be an explanation of the immigrant paradox between first and second generation Latino youth with respect to drinking initiation (Bacio et al., 2013). This may be due to the fact that first and second generation teens are raised by non-U.S.-born parents and thus their cultural parenting values are likely to remain unchanged regardless of where their teens were born. Of note, in this sample, only parental monitoring was significantly related to age of drinking initiation, alcohol-related problems, and recency of drinking episode and marginally correlated with frequency of use and number of drinks per episode when collapsing by place of birth. On the other hand, parental control, solicitation of information, and voluntary disclosure were not related to any of the outcomes. This may suggest that parental monitoring may not be as relevant to explain the higher likelihood of starting to drink among U.S.-born-teens compared to their non-U.S.-born counterparts but may play a bigger role in helping determine the frequency of drinking or average number of drinks per drinking episode among drinkers or in later generations.

A comprehensive measure of *familismo* (Knight et al., 2010) assessed three dimensions as potential explanations of the immigrant paradox: a sense of obligation to the family, providing family support, and a sense of family as a referent. Contrary to the hypotheses, results indicated that there were no differences by nativity in any of these constructs and, therefore, *familismo* did not explain the drinking initiation patterns identified among U.S.-born compared to non-U.S.-born Latino teens. These findings may also be a result of the fact that both groups are born to immigrant parents and that these results were driven by this similarity in their family context. Nevertheless, it would be expected that Latino teens who are also immigrants would endorse a greater sense of *familismo* because they may have more common values and traditions with their parents than their U.S.-born counterparts. It is possible that the relatively young average age of immigration reported by non-U.S.-born teens in this sample may signal that this group may not share as much in common with their immigrant parents and, in fact, feel more similar to their U.S.-born counterparts. Perhaps the differences in *familismo* would be more pronounced if non-U.S.-born teens had spent more time in development in their country of origin. Further, when collapsing by place of birth, neither of these dimensions were correlated with the drinking outcomes. This may also suggest that these dimensions of *familismo* may be more protective against other externalizing or risky behaviors than just drinking in adolescence.

In sum, several dimensions of the peer and family context were assessed using established measures to test whether these constructs helped explain the higher likelihood of starting to drink in adolescence, younger age in drinking initiation, and recency of last drinking episode between U.S.-born compared to their non-U.S.-born counterparts. Findings indicated that, in this sample, perceptions of peer use by friends was the most salient factor in explaining the immigrant paradox in the identified differences in drinking outcomes by nativity. The

similarities between groups across nativity in association with substance using peers, dimensions of parental monitoring, and dimensions of *familismo* indicate that these aspects of the developmental context of these two groups are very comparable. That is, they associate with a similar number of friends who engage in substance use, report that their parents monitor them to the same degree, and endorse an equal sense of *familismo*. Given this homogeneity, the fact that perception of use by friends is an explanation of the higher patterns of drinking initiation in U.S.-born compared to non-U.S.-born Latino teens highlights peer perception of use as a robust, key difference between the two groups. This finding presents an opportunity for intervention as this indicator is a modifiable factor that can be addressed to help non-U.S.-born teens maintain a lower level of risk for negative alcohol use outcomes.

The exploratory aim of the dissertation was to test the identified neurocognitive and contextual explanations of the immigrant paradox in drinking behaviors among Latino teens in one multi-mediation model. The purpose of these analyses were to help determine whether each mediator contributed to the explanation of drinking patterns over and above the others. Thus, valuations of negative alcohol expectancies and perceptions of peer use by friends were tested in one multimediation model.

Results suggested that, when tested simultaneously, peer perception remained a significant mediator of the relationship between nativity and drinking initiation, age of drinking initiation, and recency of the last drinking episode, over and above valuations of negative expectancies. Similarly, evaluating the negative effects of alcohol as more favorable also helped explain the relationship between place of birth and the identified differences in drinking behaviors once peer perceptions of use by friends was accounted in the models.

These findings indicate that, both neurocognitive and contextual factors are salient in explaining the higher likelihood of starting to drink in adolescence, earlier age of initiation, and recency of last drinking episode reported by U.S.-born-Latino teens compared to non-U.S.-born youth. Specifically, both valuations of negative alcohol expectancies and perceptions of peer use by friends uniquely contribute to explaining these differences in alcohol use by place of birth.

Findings from the dissertation should be interpreted within the limitations of the study. As a cross-sectional study, findings only capture the relationships among these constructs at one point in time; it is possible that these associations change across development. The sample recruited for study participation reflects the cultural context of the Latino community in Los Angeles and may not represent the overall Latino culture of other places in the United States. That is, the sample is mostly of Mexican origin with a smaller but significant proportion of participants of Guatemalan and Salvadorian ancestry. In addition, the socioeconomic background of participants was similar across nativity in that the majority of participants' parents had completed high school or less and reported receiving financial assistance for school lunch. Furthermore, participants were recruited from a specific high school that, even though is part of the Los Angeles Unified School District, its location in West Los Angeles serves a wider range of students. This high school serves both the Latino community within their catchment area as well as youth who commute from greater Los Angeles and petition to be allowed to receive their education from this institution. As a result, the students who attend this school and who comprised the recruiting population may be more motivated to attend school and may engage in less risky behaviors than Latino youth in the greater Los Angeles metropolitan area. Similarly, even though every effort was made to facilitate study participation, the fact that the study was conducted after school may have posed a barrier for those who had jobs, had a long commute

back to their homes on public transportation, or had to be picked up by their parents by a specific time to embark upon that commute.

Study findings identified that the differences in drinking behaviors focused on indices of initiation rather than frequency of use or severity of use. It is possible that participants who self-selected into the study did not capture those who drink more heavily. In addition, participants may have been more likely to downplay the frequency with which they drank and the number of drinks they had. Perhaps recruiting a larger sample, or oversampling for regular drinkers may have yielded different results. Similarly, results suggested that there were no differences in dimensions of impulsivity assessed through self-report (DDT) or behavioral tasks of (BART and SST). This is the first study to use these measures to assess these constructs in this population, and it is plausible that these instruments are not as sensitive among this population. On the other hand, it may suggest that the development of impulsivity in Latino youth is similar regardless of their place of birth and that the immigrant paradox may be a result of other neurocognitive or contextual factors.

In addition, in spite of evidence from other studies, the dissertation did not find parental monitoring or *familismo* indicators to be explanations of the immigrant paradox. However, these findings do not necessarily indicate that these family factors are not important in explaining drinking patterns among generations of Latino youth but instead may be a result of the similarities in family context between these two groups in this sample regardless of their place of birth. This is unsurprising when considering that both non-U.S.-born (first generation) and U.S.-born teens whose parents are not-U.S.-born (second generation) are raised by immigrant parents and thus share similar family characteristics.

Further, the sample of non-U.S.-born youth in the study ranged in having lived in the U.S. between a few months to most of their lives. In fact, the majority of this group reported living in the U.S. for an average of 9 years. Thus, it is possible that some of these participants who arrived to the U.S. earlier in their lives exhibit behaviors closer to those who are born in the U.S. and may reflect the 1.5 generation rather than the first generation. Additionally, it is possible that differences are more pronounced when comparing first and second generation teens to third generation youth (U.S.-born teens whose parents are also U.S.-born). This highlights the importance of not categorizing Latino youth only as U.S.-born or non-U.S.-born but also taking into consideration immigrant generation as well as age of immigration for first generation youth. The vast majority of participants in this sample were of second generation (U.S.-born to immigrant parents) and consequently do not generalize to third generation or beyond. This also underlines the lack of understanding in the field regarding the health and behaviors of third and later generation Latino youth as it is often unknown whether they get collapsed with those who are second generation youth or are not just included in research samples.

Summary and Conclusions

The purpose of the dissertation was to (1) examine the immigrant paradox in drinking initiation and patterns of alcohol use among Latino youth and (2) to test whether neurocognitive (dimensions of impulsivity, alcohol outcome expectancies) and contextual (peer context, family context) factors help explain these differences in drinking outcomes by place of birth. Consistent with the dissertation hypotheses, non-U.S.-born teens were more likely to have started to drink in adolescence, started to drink at a younger age, and were more likely to drink more recently than their non-U.S.-born counterparts. Mediation analyses indicated that perception of peer norms and more favorable evaluations of negative alcohol expectancies helped explain these differences.

That is, U.S.-born Latino youth were more likely to believe that a higher proportion of their friends use substances than their non-U.S.-born counterparts and, in turn, reported worse alcohol use outcomes. Similarly, U.S.-born Latino teens evaluated the negative effects of alcohol to be more favorable than non-U.S.-born youth and were as a result more likely to endorse worse alcohol use outcomes. The multi-mediation analyses that tested these two potential mediators in one model determined that both peer perception of use by friends and evaluation of negative expectancies are robust explanations of the immigrant paradox in drinking initiation patterns.

This set of findings provide support that the immigrant paradox may only be partially prevalent in drinking outcomes among Latino youth when comparing teens on one key variable, namely place of birth. That is, these results suggest that non-U.S.-born Latino teens may be at lower risk for negative outcomes related to alcohol use than their U.S.-born counterparts because the former are less likely to start drinking in adolescence than the latter. However, once non-U.S.-born adolescents start drinking, they drink with the same frequency and at the same rates as U.S.-born teens. Consequently, their risk for negative outcomes related to alcohol use does not differ by place of birth once non-U.S.-born Latino adolescents begin using alcohol. This implies that, perhaps the most effective intervention for Latino youth, particularly for those who are not U.S.-born, is to prevent or delay the initiation of drinking in adolescence.

At the neurocognitive level, results provided evidence that more beneficial evaluations of the negative anticipated effects of alcohol (e.g. alcohol makes people more clumsy) may explain differences in drinking initiation patterns between non-U.S.-born and U.S.-born teens. Notably, no support was found for differences in expectancies of positive or negative effects of alcohol or the benefits of positive effects of alcohol. That is, Latino youth in this sample held similar beliefs about what would happen if they drank alcohol regardless of nativity but U.S.-born teens

perceived the negative effects of alcohol to be more beneficial than their non-U.S.-born counterparts. This difference in expectancy valuations offers an important avenue for prevention. Specifically, addressing not only the beliefs of what happens when people drink but helping teens think through whether these alcohol effects are as beneficial as they think they are may reduce the risk for initiation of drinking, particularly for non-U.S.-born Latino youth.

At the contextual level, findings identified that perception of peer use among friends is a strong predictor of alcohol use in adolescence and a robust mediator of the immigrant paradox in patterns of drinking initiation. The similarities across the other peer and family contextual factors regardless of place of birth in this sample highlights perception of peer use as a key difference between U.S.-born and non-U.S.-born teens. It is important to note that teens differed by nativity in their thoughts of how many of their peers who are friends engaged in substance use and not in the actual number of friends each group reported to use substances. This also offers a unique opportunity for intervention to prevent drinking initiation among Latino youth. Specifically, addressing inflated perceptions of peer use by providing corrective feedback has a great potential to reduce likelihood of starting to drink particularly among non-U.S.-born teens regardless of whether or not their close friends actually engage in substance use. In this case, changes in contextual perceptions may yield a positive outcome without directly changing the context.

In sum, results from the dissertation identified that the immigrant paradox is prevalent in patterns of drinking initiation but not in severity of drinking once Latino teens begin using alcohol. Explanations for differences in drinking initiation suggested that both neurocognitive and contextual factors are relevant to understand the immigrant paradox. As highlighted by the single and multi-mediation analysis, both holding favorable valuations of negative alcohol use expectancy outcomes and perception of substance use by friends explained the immigrant

paradox in drinking initiation patterns found in this study. Whereas differences in dimensions of impulsivity, association with substance using peers, and family context did not help explain the identified differences in drinking, these factors may play a role in influencing or modulating the severity of alcohol use once Latino teens start drinking. Nevertheless, valuations of negative alcohol use expectancy outcomes and perception of substance use by friends are two tractable factors that present openings for intervention.

Implications for Intervention

Addressing valuations of negative alcohol use expectancy outcomes and perception of substance use by friends represent opportunities for interventions delaying initiation of alcohol use among a traditionally underserved population. Providing corrective feedback of peer use and discussing valuations of alcohol expectancies may not be considered novel ideas, however, study findings offer initial evidence that these interventions may have an impact on drinking outcomes using strategies that do not require a lot of preparation or rigorous cultural tailoring. In fact, these skills are used in preventions and interventions with general adolescent and college populations (Schulte, Monreal, Kia-Keating, & Brown, 2010; Wagner, Brown, Monti, Myers, & Waldron, 1999) in diverse settings. Further, providing normative feedback has been identified as a key mechanism for change in brief, alcohol use interventions (e.g. Carey, Henson, Carey, & Maisto, 2010) . Thus, providers who interface with Latino youth can access information that is already available on these two indicators to inform their approach. For example, the National Institute on Alcohol Abuse and Alcoholism (NIAAA) has prepared guidelines for screening and brief interventions for youth that outline specific recommendations (National Institute on Alcohol Abuse and Alcoholism, 2011) that can be used by any provider in any setting interfacing with adolescents. For screening, NIAAA recommends that providers assess risk for alcohol use

among teenagers regardless of the youth's reported personal use by using indicators of whether the youth's friends drink and, if so, how many drinks they have when they do. Providers screen for risk based on youth's alcohol use as well as the number of peer drinkers and the drinks the teen reports his/her peers have per drinking episode; the greater the number of drinking friends and/or the higher number of drinks, the higher the youth's individual risk for use. Findings from the dissertation would suggest that, when working with Latino youth, providers' approach may be bolstered by asking not only about actual drinking behaviors by peers but also about youth's perception of peer use, particularly with those who are non-U.S.-born. Similarly, these recommendations advise that, when youth denies any personal alcohol use or use by friends, providers praise their choice, elicit and affirm reasons to stay alcohol free, and educate about the risks to brain development and dependence if the teen is open. These recommendations for non drinkers who are at low risk may be strengthened by briefly eliciting and discussing youth's expectancies about the effects of alcohol and the teen's valuations of these effects. Dissertation results suggest that targeting favorable evaluations of negative effects of alcohol in this context with Latino youth, especially if they are not U.S.-born, may maximize this brief intervention.

In sum, results from this dissertation provide recommendations for how to use existing interventions to address the needs of Latino youth, a highly underserved group. Further, addressing these two tractable factors, perception of peer use and valuations of negative expectancies, to delay initiation of drinking among immigrant youth may help them maintain a low risk for negative alcohol use outcomes compared to their non-U.S.-born counterparts.

Future Directions

Findings from the dissertation indicated that the immigrant paradox is prevalent in drinking initiation when comparing U.S.-born and non-U.S.-born Latino youth. However,

expanding the sample to include first, second, and third generation Latino adolescents may provide unique opportunities to test whether patterns of alcohol use among drinkers differ by immigrant generation. Similarly, exploring whether age of immigration for first generation Latino youth impacts risk for adolescent drinking may clarify study findings. In addition, a longitudinal study that addresses the associations among these constructs would allow for the examination of these relationships across development.

Although no differences were identified in dimensions of impulsivity, testing these constructs using behavioral tasks with another sample may provide further evidence of the relevance of this construct in the neurocognitive development of Latino youth. Further, implementing these instruments with a sample that includes more regular drinkers may elucidate whether impulsivity accounts for generational differences in drinking patterns for drinkers.

The use of validated instruments used with adolescent populations and measures that assess cultural values appropriately represents a strength in this study. However, adding a brief interview that allows for examination of qualitative data in a mixed methods approach may offer further insight into the alcohol use patterns, peer context, and family context of Latino youth. Further, accounting for parenting and developmental information obtained from the parent may strengthen the approach and findings from future studies.

Lastly, every effort was made to balance participants' access to the study by conducting it on school grounds and at the same time make them feel that their individual information was not going to be disclosed to school administration, however, it is possible that participants were not as forthcoming due to the setting and time constraints. Perhaps conducting the study in a separate setting that is completely removed from the school may address this issue and maximize participants' disclosure of sensitive information.

Taken together, findings from this dissertation identified that the immigrant paradox was observed in indices of initiation of drinking but not in patterns of alcohol use between non-U.S.-born and U.S.-born Latino youth. These differences were explained by a combination of neurocognitive and contextual factors, namely valuations of negative alcohol outcome expectancies and perceptions of peer use by friends. These findings offer an initial evaluation of tractable mechanisms underlying the immigrant paradox, which in turn may help refine and personalize prevention and intervention efforts for Latino youth.

Table 1

Sociodemographic Characteristics by Place of Birth

	Overall	Non U.S.-Born	U.S. Born
Total	*N*= 130	28%	72%
Gender			
Female	60%	61%	50%
Male	40%	39%	40%
Age	*M*=15.4, *SD*=.9	*M*=15.2, *SD*=.9	*M*=15.5, *SD*=.9
Minimum	14	14	14
Maximum	17	17	14
Grade			
9th Grade	30%	47%	23%
10th Grade	45%	36%	49%
11th Grade	25%	17%	28%
First Language			
English	29%	16%	33%
Spanish	71%	84%	67%
National Origin			
Mexican	71%	64%	74%
Central American	20%	28%	17%
South American	2%	5%	1%
Caribbean	2%	3%	1%
Mixed	6%	--	7%
Country of Birth			
United States	72%	--	100%
Mexico	18%	64%	--
Central America	8%	28%	--
South America	1%	5%	--
Caribbean	1%	3%	--
Age of Immigration	--	*M*=6.7, *SD*=4.7	---
Years in the U.S.	--	*M*=8.7, *SD*=4.6	---

Table 2

Socioeconomic Background Characteristics by Place of Birth

	Overall	Non U.S.-Born	U.S. Born
Assistance for School Lunch			
Free lunch	86%	89%	85%
Reduced lunch	6%	3%	7.5%
No aid for lunch	8%	8%	7.5%
Mother Education			
Never went to school	8%	6%	10%
Did not graduate high school	63%	66%	62%
High school or equivalent	14%	17%	13%
Some college	3%	3%	3%
College degree and beyond	11%	8%	12%
Not known	1%	0%	1%
Father Education			
Never went to school	6%	14%	3%
Did not graduate high school	61%	57%	62%
High school or equivalent	16%	17%	16%
Some college	2%	0%	3%
College degree and beyond	7%	6%	7%
Not known	8%	6%	9%

Table 3

Alcohol Use Patterns by Place of Birth

	Overall	**Non U.S.-Born**	**U.S. Born**
Lifetime alcohol use	45%	31%	51%
Age of first drink among drinkers			
After age 15	22%	27%	21%
Ages 14-15	40%	46%	38%
Ages 10-13	38%	27%	41%
Frequency of drinking episodes among drinkers			
Once or twice per year	68%	60%	71%
Once or twice per month	28%	40%	24%
Every weekend	2%	0%	2.5%
Several times per week	2%	0%	2.5%
Average of number drinks per drinking episode among drinkers			
One drink	44%	50%	42%
Two drinks	30%	0%	33%
Three to Six Drinks	16%	20%	16%
Six or more	13%	30%	9%
Most recent drinking episode among drinkers			
Not for over a year	28%	45%	23%
Six months to 1 year ago	40%	18%	45%
Several weeks ago	24%	37%	21%
Last week	8%	0%	11%
Rutgers Alcohol Problem Index Total among drinkers	*M*=5, *SD*=7.3	*M*=5.45, *SD*=6	*M*=4.8, *SD*=7.6

Table 4

Means and Standard Deviations of Tested Mediators by Place of Birth

	Overall	Non-U.S.-Born	U.S.-Born
Balloon Analogue Risk Task			
Adjusted Mean Pumps	10.94 (4.57)	10.36 (4.21)	11.17 (4.70)
Post Failure Mean Pumps	8.31 (3.54)	7.46 (2.89)	8.65 (3.72)
Stop Signal Task			
Mean Go Reaction Time	472.50 (73.72)	471.76 (77.02)	472 (81.19)
Stop Signal Reaction Time	230.35 (65.85)	249.45(74.80)	222.80 (60.75)
Delayed Reward Discounting			
k- Small Rewards	.09 (.21)	.11 (.20)	.09 (.21)
k- Medium Rewards	.07 (.16)	.05 (.05)	.08 (.19)
k- Large Rewards	.05 (.14)	.07 (.18)	.04 (.12)
Alcohol Outcome Expectancies			
Positive Outcome Expectancies	2.35 (.68)	2.22 (.67)	2.40 (.68)
Negative Outcome Expectancies	2.66 (.87)	2.85 (.90)	2.59 (.85)
Evaluation of Positive Expectancies	2.75 (1.21)	2.61 (1.12)	2.80 (1.24)
Evaluation of Negative Expectancies	2.02 (.86)	1.77 (.82)	2.11 (.85)
Perception of Use by Peer group			
Friends	.92 (.66)	.69 (.59)	1.00 (.67)
Same Age	1.25 (.59)	1.16 (.61)	1.29 (.59)
Same Grade	1.21 (.58)	1.10 (.61)	1.25 (.57)
School Overall	1.39 (.59)	1.35 (.64)	1.40 (.57)
Latino Youth	1.25 (.57)	1.19 (.65)	1.27 (.54)
Association with Substance-Using Peers	2.69 (2.74)	2.25 (2.37)	2.87 (2.86)
Dimensions of *Familismo*			
Family Support	4.24 (.61)	4.34 (.48)	4.21 (.66)
Obligation to Family	4.05 (.80)	4.06 (.57)	4.05 (.87)
Family as a Referent	3.94 (.72)	4.11 (.58)	3.88 (.76)
Parental Monitoring			
Parental Control	4.24 (.83)	4.16 (.84)	4.28 (.83)
Parental Monitoring	3.54 (.82)	3.59 (.61)	3.52 (.90)
Parental Solicitation of Information	2.89 (1.1)	2.56 (.98)	3.02 (1.12)
Voluntary disclosure by adolescent	2.84 (.71)	2.84 (.63)	2.84 (.74)

Table 5

Correlations Among All Variables

Variable	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Alcohol use patterns															
1. Lifetime alcohol use	--														
2. Age of first drink	.90*	--													
3. Frequency of drinking episodes	.78*	.76*	--												
4. Average number of drinks per episode	.77*	.73*	.81*	--											
5. Most recent drinking episode	.84*	.83*	.89*	.83*	--										
6. Rutgers Alcohol Problem Index	.40*	.42*	.46*	.50*	.41*	--									
Balloon Analogue Risk Task															
7. Adjusted Mean Pumps	.05	-.04	.01	.06	-.00	.01	--								
8. Post Failure Mean Pumps	.13	.02	.06	.09	.06	.03	.91*	--							
Stop Signal Task															
9. Mean Go Reaction Time	-.04	-.02	.04	-.03	-.02	-.03	-.08	-.05	--						
10. Stop Signal Reaction Time	-.00	.02	-.04	-.09	-.04	.02	.00	-.04	.001	--					
Delayed Reward Discounting															
11. *k*- Small Rewards	-.07	-.06	-.15	.01	-.12	.01	-.04	-.10	-.15	.12	--				
12. *k*- Medium Rewards	-.08	-.07	-.02	.06	-.05	-.03	-.12	-.02	-.02	-.07	.21*	--			
13. *k*- Large Rewards	-.15	-.16	-.14	-.08	-15	-.03	-.21*	-.25*	.04	.02	.20*	.46*	--		
Alcohol Outcome Expectancies															
14. Positive Outcome Expectancies	.05	.05	.02	.07	.09	.10	.05	.05	.12	.20*	-.01	-.02	-.08	--	
15. Negative Outcome Expectancies	-.38*	-.32*	-.39*	-.31*	-.33*	-.10	-.02	-.07	.12	.11	.06	.07	-.03	.32*	--

* $p < .05$

Table 5

Correlations Among All Variables (Continued)

Variable	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
16. Evaluation of Positive Expectancies	.37*	.29*	.21*	.23*	.32*	.13	.07	.12	-.10	.01	-.07	-.00	-.11	.24*	-.13
17. Evaluation of Negative Expectancies	.40*	.33*	.32*	.37*	.36*	.17	.12	.14	-.07	-.10	.00	.07	-.09	.13	-.38*
Perception of Use by Peer group															
18. Friends	.34*	.30*	.35*	.37*	.36*	23*	.07	.11	.06	.00	-.06	-.09	-.14	.15	-.14
19. Same Age	.25*	.17	.17	.21*	.19*	.12	.10	.06	.07	.07	-.09	-.11	-.21	.09	-.03
20.Same Grade	.27*	.19*	.23*	.26*	.23*	.19*	.10	.09	.05	.06	-.10	-.15	-.21	.02	-.11
21.School Overall	.19*	.14	.17	.21*	.16	.17	.08	.00	-.02	-.04	-.04	-.12	-.16	.11	-.02
22. Latino Youth	.10	.07	.09	.16	.12	.11	.04	-.03	.05	.02	-.05	-.08	-.17	.16	.08
23.Association with Substance-Using Peers	.41*	.43*	.44*	.43*	.43*	.29*	-.07	-.04	.02	.05	.00	-.01	-.09	.03	-.24*
Dimensions of *Familismo*															
24.Family Support	-.03	-.11	.00	.01	-.05	.00	.00	.02	-.05	.08	.13	.00	.03	.02	.09
25.Obligation to Family	.05	-.03	.07	.06	-.02	.04	.07	.10	-.09	-.01	.01	.06	.04	-.15	-.10
26.Family as a Referent	-.16	-.20	-.05	-.06	-.14	-.01	-.18*	-.16	-.07	.07	.20*	.06	.12	-.07	.10
Parental Monitoring															
27.Parental Control	.03	-.00	-.02	-.06	-.05	-.01	-.08	-.06	.13	.10	.09	.03	-.02	-.10	.08
28.Parental Monitoring	.13	-.18*	-.16	-.17	-.18*	-.31*	-.03	.00	-.18	.02	.05	.10	.09	.00	.05
29.Parental Solicitation of Information	.06	.00	-.02	.07	.06	-.06	.02	.08	-.18	.01	.02	.18	.06	-.04	.04
30.Voluntary disclosure by adolescent	-.00	.03	-.01	.03	-.02	.03	-.09	-.05	-.11	-.00	.08	.07	.04	.02	.08

* $p < .05$

Table 5

Correlations Among All Variables (Continued)

Variable	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
16. Evaluation of Positive Expectancies	--														
17. Evaluation of Negative Expectancies	.50*	--													
Perception of Use by Peer group															
18. Friends	.15	.14	--												
19. Same Age	.11	.04	.64*	--											
20.Same Grade	.13	.08	.70*	.90*	--										
21.School Overall	.07	.07	.54*	.83*	.78*	--									
22. Latino Youth	.05	.05	.57*	.86*	.75*	.86*	--								
23.Association with Substance-Using Peers	.16	.12	.64*	.46*	.53*	40*	.40*	--							
Dimensions of *Familismo*															
24.Family Support	-.09	.17	-.16	.00	-.00	.01	-.01	-.02	--						
25.Obligation to Family	-.05	.06	-.00	-.10	.03	.07	.03	.01	.60*	--					
26.Family as a Referent	-.07	-.11	-.06	-.07	-.05	-.01	-.02	-.03	.70*	.61*	--				
Parental Monitoring												--			
27.Parental Control	.02	-.07	-.21*	-11	-.14	-.04	-.11	-.02	.16	.13	.16				
28.Parental Monitoring	.05	-.09	-.19*	-.23*	-.16	-.12	-.20*	-.26*	.31*	.22*	.33*	.25*	--		
29.Parental Solicitation of Information	.14	-.05	-.08	-.11	-.11	-.06	-.11	-.19*	.39*	.28*	.08	.24*	.53*	--	
30.Voluntary disclosure by adolescent	.07	-.09	-.24*	-19*	-.24*	-.13	-.12	-.10	.20*	.14	.23*	.26*	.42*	.39*	--

* $p < .05$

Table 6

Model Estimates for Mediation Analyses that Examine whether Neurocognitive Factors Help Explain the Differences in Drinking Initiation between Non-U.S.-Born and U.S.-Born Latino Youth

Path	Variable	Beta	SE
c Path: Direct Effect			
Outcome	Drinking Initiation		
Predictor	Place of Birth (U.S.-Born vs. Non-U.S.-Born)	0.84*	0.42
a Path: Relationship between place of birth and each mediator tested in separate models			
Predictor	Place of Birth (U.S.-Born vs. Non-U.S.-Born)		
Mediator	Risky Decision Making (BART)		
	Adjusted Mean Pumps	0.82	.89
	Post Failure Mean Pumps	1.18	.68
	Response Inhibition (SST)		
	Mean Go Reaction Time	1.04	15.8
	Stop Signal Reaction Time	-26.64*	12.7
	Delayed Reward Discounting		
	k- Small Rewards	-0.02	0.04
	k- Medium Rewards	0.03	0.03
	k- Large Rewards	-0.03	0.03
	Alcohol Outcome Expectancies		
	Positive Outcome Expectancies	0.19	0.13
	Negative Outcome Expectancies	-0.26	0.17
	Evaluation of Positive Expectancies	0.20	0.25
	Evaluation of Negative Expectancies	0.34*	0.17
b Path: Relationship between each mediator and outcome tested in separate models			
Outcome	Drinking Initiation		
Predictor	Evaluation of Negative Expectancies	1.08***	0.27
Predictor	Stop Signal Reaction Time	-0.0001	.003
c' Path: Indirect effect			
Outcome	Drinking Initiation		
Predictor	Place of Birth	0.52	0.46
Mediator	Evaluation of Negative Expectancies	1.03***	0.27

*$p < .05$; ** $p < .01$; *** $p < .001$

Table 7

Model Estimates for Mediation Analyses that Examine whether Contextual Factors Help Explain the Differences in Drinking Initiation between Non-U.S.-Born And U.S.-Born Latino Youth

Path	Variable	Unstandardized Beta	SE
c Path: Direct Effect			
Outcome	Drinking Initiation		
Predictor	Place of Birth (U.S.-Born vs. Non-U.S.-Born)	0.84*	0.42
a Path: Relationship between place of birth and each mediator tested in separate models			
Predictor	Place of Birth (U.S.-Born vs. Non-U.S.-		
Mediator	Association with Substance-Using Friends	0.24	0.23
	Perception of Use by Peer Group		
	Friends	0.31*	0.13
	Same Age	0.12	0.12
	Same Grade	0.15	0.11
	School Overall	0.04	0.12
	Latino Youth	0.08	0.11
	Parental Monitoring		
	Parental Control	0.11	0.16
	Parental Monitoring	-0.08	0.16
	Parental Solicitation of Information	0.46*	0.21
	Voluntary disclosure by adolescent	-.001	0.14
	Dimensions of *Familismo*		
	Family Support	-0.13	0.12
	Obligation to Family	0.02	0.16
	Family as a Referent	-0.23	0.14
b Path: Relationship between each mediator and outcome tested in separate models			
Outcome	Drinking Initiation		
Predictor	Peer Perception of Use by Friends	1.14**	0.33
Predictor	Parental Solicitation of Information	0.11	0.16
c' Path: Indirect Effect			
Outcome	Drinking Initiation		
Predictor	Place of Birth (U.S.-Born vs. Non-U.S.-	0.62	0.44
Mediator	Peer Perception of Use by Friends	1.07***	0.33

*$p < .05$; ** $p < .01$; *** $p < .001$

Table 8

Estimates for Multimediation Analyses Testing Neurocognitive and Contextual Explanations of the Differences in Drinking Initiation between Non-U.S.-Born and U.S.-Born Latino Adolescents

Path	Variable	Unstandardized Beta	SE
c Path: Direct Effect			
Outcome	Drinking Initiation		
Predictor	Place of Birth (U.S.-Born vs. Non-U.S.-	0.84*	0.42
a Path: Relationship between place of birth and each mediator tested in separate models			
Predictor	Place of Birth (U.S.-Born vs. Non-U.S.-		
Mediator	Evaluation of Negative Expectancies	0.34*	0.17
	Peer Perception of Use by Friends	0.31*	0.13
b Path: Relationship between both mediators and outcome tested in one model			
Outcome	Drinking Initiation		
Predictor	Evaluation of Negative Expectancies	1.01	0.27***
Predictor	Peer Perception of Use by Friends	1.02	0.34**
c' Path: Indirect Effect			
Outcome	Drinking Initiation		
Predictor	Place of Birth	0.45	0.71
Mediator	Evaluation of Negative Expectancies	0.99	0.34***
Mediator	Peer Perception of Use by Friends	0.99	0.27**

*$p < .05$; ** $p < .01$; *** $p < .001$

Table 9

Model Estimates for Mediation Analyses that Examine if Neurocognitive Factors Help Explain the Differences in Age of Drinking Initiation between Non-U.S.-Born and U.S.-Born Latino Youth

Path	Variable	OR	SE
c Path: Direct Effect			
Outcome	Age of drinking Initiation		
Predictor	Place of Birth (U.S.-Born vs. Non-U.S.-Born)	0.86*	0.41
a Path: Relationship between place of birth and each mediator tested in separate models			
Predictor	Place of Birth (U.S.-Born vs. Non-U.S.-Born)		
Mediator	Risky Decision Making (BART)		
	Adjusted Mean Pumps	0.82	0.89
	Post Failure Mean Pumps	1.18	0.68
	Response Inhibition (SST)		
	Mean Go Reaction Time	1.04	15.8
	Stop Signal Reaction Time	-26.64*	12.7
	Delayed Reward Discounting		
	k- Small Rewards	-0.02	0.04
	k- Medium Rewards	0.03	0.03
	k- Large Rewards	-0.03	0.03
	Alcohol Outcome Expectancies		
	Positive Outcome Expectancies	0.19	0.13
	Negative Outcome Expectancies	-0.26	0.17
	Evaluation of Positive Expectancies	0.20	0.25
	Evaluation of Negative Expectancies	0.34*	0.17
b Path: Relationship between each mediator and outcome tested in separate models			
Outcome	Age of drinking Initiation		
Predictor	Evaluation of Negative Expectancies	0.71***	0.19
Predictor	Stop Signal Reaction Time	.0004	.003
c' Path: Indirect Effect			
Outcome	Age of drinking Initiation		
Predictor	Place of Birth	0.65	.42
Mediator	Evaluation of Negative Expectancies	0.68***	.30

*$p < .05$; ** $p < .01$; *** $p < .001$

Table 10

Model Estimates for Mediation Analyses that Examine if Contextual Factors Help Explain the Differences in Age of Drinking Initiation between Non-U.S.-Born and U.S.-Born Latino Youth

Path	Variable	Unstandardized Beta	SE
c Path: Direct Effect			
Outcome	Age of drinking Initiation		
Predictor	Place of Birth (U.S.-Born vs. Non-U.S.-Born)	0.86*	0.41
a Path: Relationship between place of birth and each mediator tested in separate models			
Predictor	Place of Birth (U.S.-Born vs. Non-U.S.-		
Mediator	Association with Substance-Using Friends	0.24	0.23
	Perception of Use by Peer Group		
	Friends	0.31*	0.13
	Same Age	0.12	0.12
	Same Grade	0.15	0.11
	School Overall	0.04	0.12
	Latino Youth	0.08	0.11
	Parental Monitoring		
	Parental Control	0.11	0.16
	Parental Monitoring	-0.08	0.16
	Parental Solicitation of Information	0.46*	0.21
	Voluntary disclosure by adolescent	-0.001	0.14
	Dimensions of *Familismo*		
	Family Support	-0.13	0.12
	Obligation to Family	0.02	0.16
	Family as a Referent	-0.23	0.14
b Path: Relationship between each mediator and outcome tested in separate models			
Outcome	Age of drinking Initiation		
Predictor	Peer Perception of Use by Friends	1.15***	0.33
Predictor	Parental Solicitation of Information	0.03	0.15
c' Path: Indirect Effect			
Outcome	Age of drinking Initiation		
Predictor	Place of Birth (U.S.-Born vs. Non-U.S.-	0.77**	0.26
Mediator	Peer Perception of Use by Friends	0.68	0.42

*$p < .05$; ** $p < .01$; *** $p < .001$

Table 11

Estimates for Multimediation Analyses Testing Neurocognitive and Contextual Explanations of the Differences in Age of Drinking Initiation between Non-U.S.-Born and U.S.-Born Latino Adolescents

Path	Variable	Unstandardized Beta	SE
c Path: Direct Effect			
Outcome	Age of Drinking Initiation		
Predictor	Place of Birth (U.S.-Born vs. Non-U.S.-Born)	0.86*	0.41
a Path: Relationship between place of birth and each mediator tested in separate models			
Predictor	Place of Birth (U.S.-Born vs. Non-U.S.-		
Mediator	Evaluation of Negative Expectancies	0.26*	0.12
	Peer Perception of Use by Friends	0.31*	0.13
b Path: Relationship between both mediators and outcome tested in one model			
Outcome	Drinking Initiation		
Predictor	Evaluation of Negative Expectancies	0.66***	0.19
Predictor	Peer Perception of Use by Friends	0.78**	0.27
c' Path: Indirect Effect			
Outcome	Drinking Initiation		
Predictor	Place of Birth	0.47	0.43
Mediator	Evaluation of Negative Expectancies	0.65***	0.20
Mediator	Peer Perception of Use by Friends	0.73**	0.27

*$p < .05$; ** $p < .01$; *** $p < .001$

Table 12

Model Estimates for Mediation Analyses that Examine if Neurocognitive Factors Help Explain the Differences in Recency of Drinking Episode between Non-U.S.-Born and U.S.-Born Latino Youth

Path	Variable	Unstandardized Beta	SE
c Path: Direct Effect			
Outcome	Recency of drinking episode		
Predictor	Place of Birth (U.S.-Born vs. Non-U.S.-Born)	0.85*	0.41
a Path: Relationship between place of birth and each mediator tested in separate models			
Predictor	Place of Birth (U.S.-Born vs. Non-U.S.-		
Mediator	Risky Decision Making (BART)		
	Adjusted Mean Pumps	0.82	0.89
	Post Failure Mean Pumps	1.18	0.68
	Response Inhibition (SST)		
	Mean Go Reaction Time	1.04	15.8
	Stop Signal Reaction Time	-26.64*	12.7
	Delayed Reward Discounting		
	k- Small Rewards	-0.02	0.04
	k- Medium Rewards	0.03	0.03
	k- Large Rewards	-0.03	0.03
	Alcohol Outcome Expectancies		
	Positive Outcome Expectancies	0.19	0.13
	Negative Outcome Expectancies	-0.26	0.17
	Evaluation of Positive Expectancies	0.20	0.25
	Evaluation of Negative Expectancies	0.34*	0.17
b Path: Relationship between each mediator and outcome tested in separate models			
Outcome	Recency of drinking episode		
Predictor	Evaluation of Positive Expectancies	0.82***	0.20
Predictor	Stop Signal Reaction Time	-0.001	.003
c' Path: Indirect Effect			
Outcome	Recency of drinking episode		
Predictor	Place of Birth	0.66	0.42
Mediator	Evaluation of Positive Expectancies	0.79***	0.20

*$p < .05$; ** $p < .01$; *** $p < .001$

Table 13

Model Estimates for Mediation Analyses that Examine if Contextual Factors Help Explain the Differences in Recency of Drinking Episode between Non-U.S.-Born and U.S.-Born Latino Youth

Path	Variable	Beta	SE
c Path: Direct Effect			
Outcome	Recency of drinking episode		
Predictor	Place of Birth (U.S.-Born vs. Non-U.S.-Born)	0.85*	.41
a Path: Relationship between place of birth and each mediator tested in separate models			
Predictor	Place of Birth (U.S.-Born vs. Non-U.S.-Born)		
Mediator	Association with Substance-Using Friends	0.24	0.23
	Perception of Use by Peer Group		
	Friends	0.31*	0.13
	Same Age	0.12	0.12
	Same Grade	0.15	0.11
	School Overall	0.04	0.12
	Latino Youth	0.08	0.11
	Parental Monitoring		
	Parental Control	0.11	0.16
	Parental Monitoring	-0.08	0.16
	Parental Solicitation of Information	0.46*	0.21
	Voluntary disclosure by adolescent	-.001	0.14
	Dimensions of *Familismo*		
	Family Support	-0.13	0.12
	Obligation to Family	0.02	0.16
	Family as a Referent	-0.23	0.14
b Path: Relationship between each mediator and outcome tested in separate models			
Outcome	Recency of drinking episode		
Predictor	Peer Perception of Use by Friends	1.14***	0.28
Predictor	Parental Solicitation of Information	0.11	0.15
c' Path: Indirect Effect			
Outcome	Recency of drinking episode		
Predictor	Place of Birth (U.S.-Born vs. Non-U.S.-Born)	0.56	0.42
Mediator	Peer Perception of Use by Friends	1.08***	0.28

*$p < .05$; ** $p < .01$; *** $p < .001$

Table 14

Estimates for Multimediation Analyses Testing Neurocognitive and Contextual Explanations of the Differences in Recency of Drinking Episode between Non-U.S.-Born and U.S.-Born Latino Youth

Path	Variable	Unstandardized Beta	SE
c Path: Direct Effect			
Outcome	Recency of Drinking Episode		
Predictor	Place of Birth (U.S.-Born vs. Non-U.S.-Born)	0.85*	0.41
a Path: Relationship between place of birth and each mediator tested in separate models			
Predictor	Place of Birth (U.S.-Born vs. Non-U.S.-		
Mediator	Evaluation of Negative Expectancies	0.34*	0.17
	Peer Perception of Use by Friends	0.31*	0.13
b Path: Relationship between both mediators and outcome tested in one model			
Outcome	Drinking Initiation		
Predictor	Evaluation of Negative Expectancies	0.78***	0.21
Predictor	Peer Perception of Use by Friends	1.07***	0.28
c' Path: Indirect Effect			
Outcome	Drinking Initiation		
Predictor	Place of Birth	0.38	0.43
Mediator	Evaluation of Negative Expectancies	0.76***	0.31
Mediator	Peer Perception of Use by Friends	1.03***	0.29

*$p < .05$; ** $p < .01$; *** $p < .001$

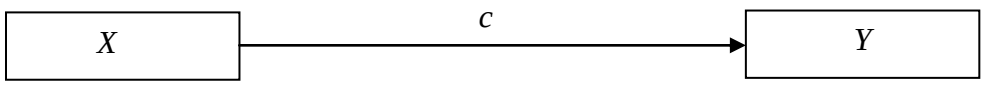


Figure 1A. Direct effect of predictor X on outcome Y.

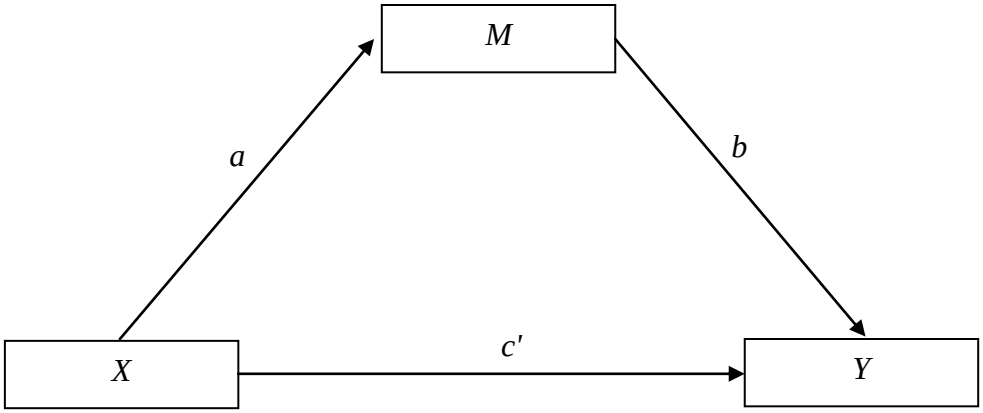


Figure 1B. Indirect effect of predictor X on outcome Y through mediator M.

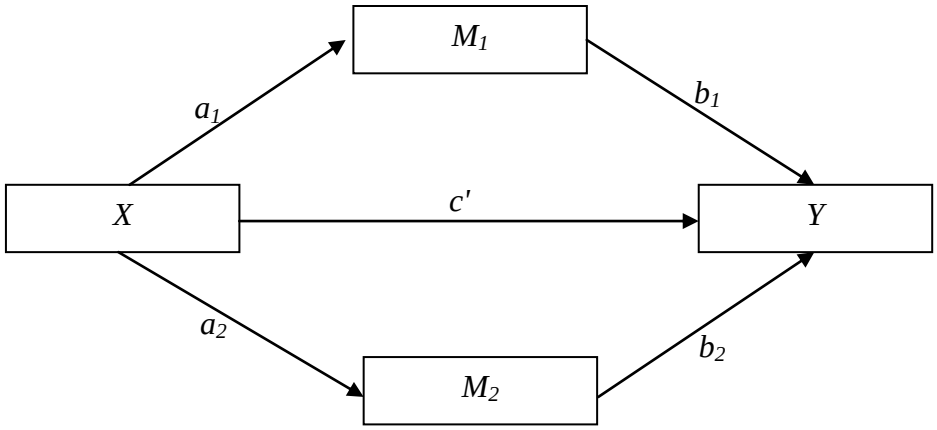
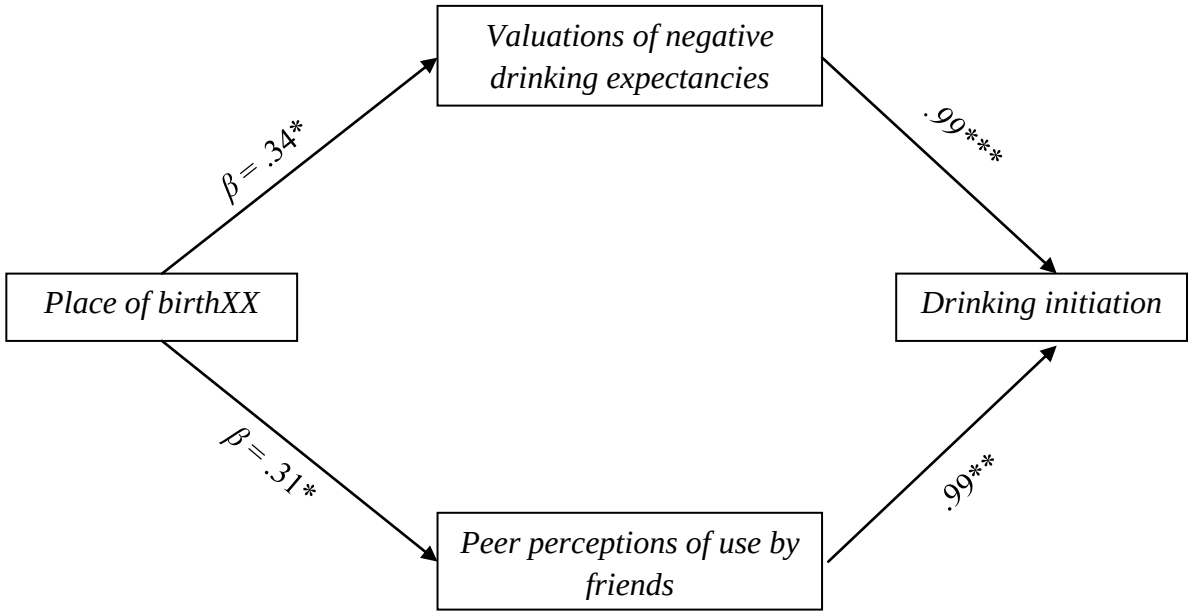
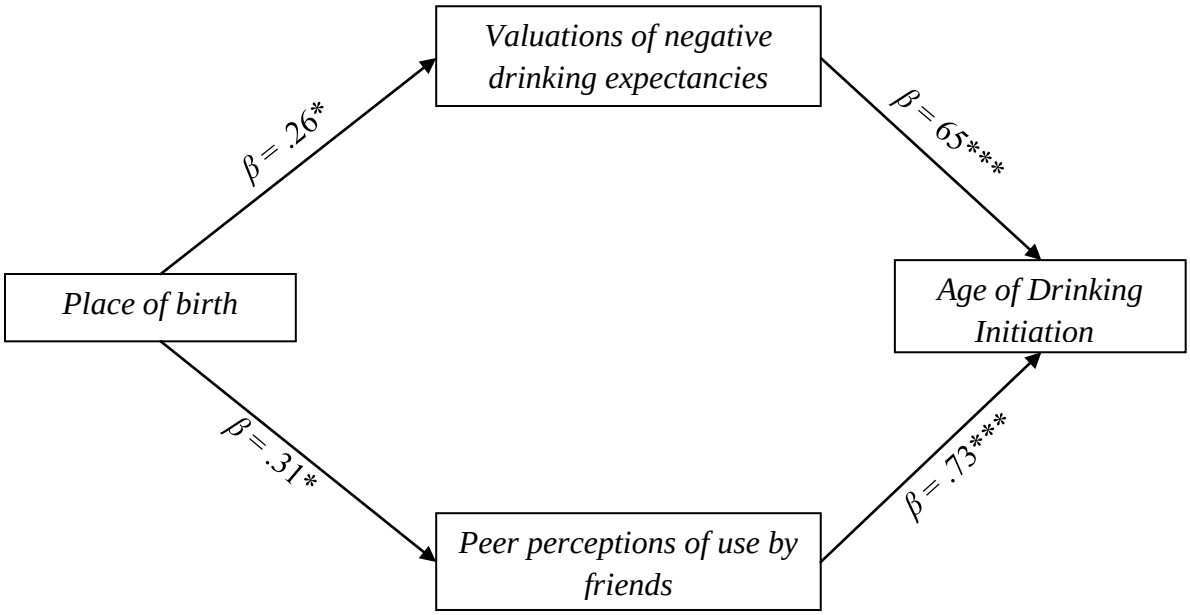


Figure 1C. Indirect effect of predictor X on outcome Y through mediators M_1 and M_2.



*$p < .05$; ** $p < .01$; *** $p < .001$

Figure 2. Multimediation model: Indirect effects of place of birth on drinking initiation through valuations of negative alcohol outcome expectancies and peer perceptions of substance use by friends.



*$p < .05$; ** $p < .01$; *** $p < .001$

Figure 3. Multimediation model: Indirect effects of place of birth on age of drinking initiation through valuations of negative alcohol outcome expectancies and peer perceptions of substance use by friends.

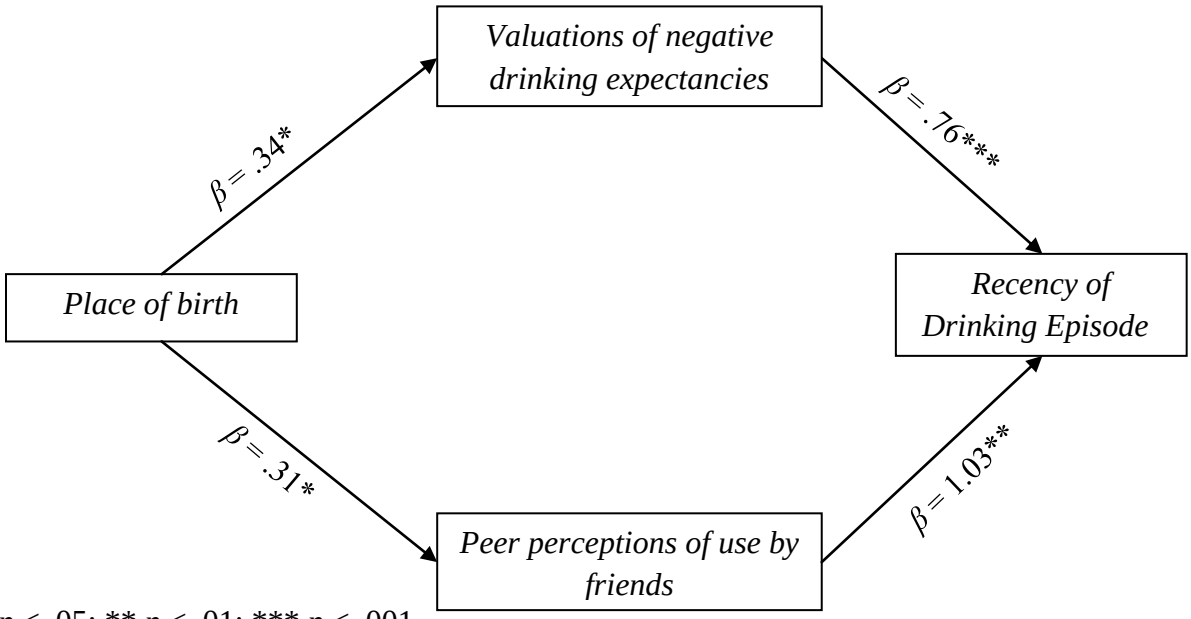


Figure 4. Multimediation model: Indirect effects of place of birth on recency of drinking through valuations of negative alcohol outcome expectancies and peer perceptions of substance use by friends.

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