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Cross-sectional Predictors of HIV Risk among Latino Migrant Workers

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CROSS-SECTIONAL PREDICTORS OF SEXUALLY-RELATED HIV RISK AMONG

LATINO MIGRANT WORKERS IN THE UNITED STATES

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Ailin Rodriguez

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To: Dean Tomás R. Guilarte
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This dissertation, written by Ailin Rodriguez, and entitled Cross-sectional Predictors of Sexually-Related HIV Risk among Latino Migrant Workers in the United States, having been approved in respect to style and intellectual content, is referred to you for judgement.

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Florida International University, 2018

DEDICATION

I dedicate this dissertation to my parents, Maria Elena Alvarez Oliver and Julio Cesar

Rodriguez Atia, to my late grandmother Clotilde Lilia Atia Barquet, to my grandfather

Nestor Julio Rodriguez Avila, and to my mentors Dr. H. Virginia McCoy, Dr. Jessy

Devieux, Dr. Maria Elena Villar, and Dr. Tan Li.

ABSTRACT OF THE DISSERTATION

CROSS-SECTIONAL PREDICTORS OF SEXUALLY-RELATED HIV RISK AMONG

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Latino migrant workers (LMWs), one of the most understudied populations in the United

States are at higher risk of HIV infection. Individuals at high HIV risk report high alcohol

usage, a positive history of *past* HIV risk and sexual abuse, low social support, and low

intentions to use condoms which, in turn, increase their HIV risk. This study examined

the relationship between alcohol use, past sexual abuse, social support, *past* HIV risk, and

behavioral intention, and *current* HIV risk as well as the relationship between known

antecedents of behavioral intention (self-efficacy, social norms, and expectancies) and

current HIV risk. Three research questions were explored: Do self-efficacy, expectancies,

social norms, and AOD use significantly predict intention to use condoms? Do behavioral

intention, past sexual risk, sexual abuse, and social support significantly *current* HIV

risk? Does behavioral intention mediate the relationship between self-efficacy, outcome

expectancies, social norms, and AOD use and sexual risk? To address these questions,

secondary analyses of baseline data, collected from 270 LMWs, were conducted. The

independent variables were self-efficacy, social norms, AOD use, behavioral intention,

outcome expectancies, social support, *past* HIV risk, and sexual abuse. The dependent

variable was *current* HIV risk. Descriptive statistics were used for demographic

characteristics, behavioral intention, and *current* HIV risk. F tests, Fisher's exact Chi-

squared tests, Spearman's correlations, generalized linear regression analyses, and

Bayesian path analysis were used for assessing associations and mediating effects.

The mean age of the sample was 38.79±11.65 years and 80% were men. About 57% of

participants were found in the high level of HIV risk group. The median self-reported

behavioral intention score was 10 out of 12 possible points. The median self-reported

alcohol use was 12 drinking days. Twelve percent of participants reported a positive

history of sexual abuse. The mean self-reported self-efficacy was 15.76 out of 30 possible

points while the mean self-reported expectancies was 17.74 out of 20 possible points. The

median self-reported level of social norms was 15 out of 40 possible points while the

self-reported level of social support was 61 out of 120 possible points. Adjusted

regression analyses showed that self-efficacy was directly associated with behavioral

intention ($\beta= 0.03$, p= 0.04) and expectancies was inversely related with behavioral

intention ($\beta= -0.01$, p = 0.04). *Past* HIV risk was directly associated with the dependent

variable, HIV risk ($\beta = 0.11$, p= 0.01), while behavioral intention was indirectly

associated with HIV risk ($\beta= -0.16$, p= 0.02). Bayesian path analyses showed behavioral

intention to partially mediate the significant association between self-efficacy and *current*

HIV risk ($\beta= 0.24$, 95% CI: 0.10, 0.38) and to fully mediate the association between

AOD use and *current* HIV risk ($\beta= 0.11$, 95% CI: -0.05, 0.26).

In summary, two socio-psychological and possibly modifiable variables emerged as

significant predictors of *current* HIV risk: Lower levels of behavioral intention and

higher levels of *past* HIV risk were associated with higher *current* HIV risk. These

findings are relevant for informing future studies on larger or similar populations and for

planning interventions designed to prevent and reduce HIV risk.

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CHAPTER I
INTRODUCTION

The United States (U.S.) is the nation with the largest immigrant population in the world (Penn Wharton Budget Model, 2016). Historically known as 'the land of opportunities,' with its productive economy and dynamic social structure, the country was founded on the basis of permanent and temporary immigration, a phenomenon that stretches forward to this day. Migrant workers, therefore, have been an intrinsic and necessary part of the economic, sociocultural, and even political process of building the nation. While some are lawful permanent residents or even U.S. citizens, the migrant workforce consists mainly of farmworkers from Latin America coming to the U.S. to perform seasonal or temporary labor in the most extreme working and living conditions (National Farm Worker Ministry (NFWM), 2017).

In the literature, the terms migrant and seasonal have been used indistinguishably to describe a mobile workforce. Despite the seasonal nature of being a migrant worker, however, the two terms have distinct properties in the context of characterizing a type of workforce or sector of the population. One of those distinctions refers to the fact that, "while seasonal workers can be U.S. and foreign-born, migrant laborers are typically considered foreign-born and most remain in the workforce as undocumented migrants" (Gonzalez, 2015; Wilson, 2013). In view of these considerations, migrant workers specifically, not seasonal workers, constitutes the population of interest in this research investigation.

Every year, hundreds of thousands of immigrants come to the U.S. looking for work. Most of them find it in farms or agricultural fields, "the second most (fatally) dangerous" occupation in the U.S. after mining (Persichino & Ibarra, 2012). Depending

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on the agency or research entity reporting, the number of migrant farmworkers ranges anywhere from three to well over four million (Gonzalez, 2015; Keim-Malpass et al., 2015; McCoy et al., 2015b; Persichino & Ibarra, 2012; Sharac et al., 2016). Most of them originate from Mexico (up to 95 percent of the estimated 72 percent of foreign-born farmworkers) and some do not speak Spanish but only an indigenous language (Keim-Malpass et al., 2015; Persichino & Ibarra, 2012; Sanchez, 2014).

This constant flow of migrant laborers, mainly to states where there is a higher concentration of agricultural labor such as Florida, Texas, California, Oregon, Washington, and North Carolina, has resulted in an exponential growth of a population that continues to face substandard living and working conditions such as lack of access to drinkable water, poorly-ventilated and unsanitary housing, exposure to harmful chemicals, such as pesticides. They also suffer from a lack access to healthcare services - even the most basic medical care (Albarrin & Nyamathi, 2011; Carroll et al., 2005; Coppel et al., 2001; Fitzgerald et al., 2003; Keim-Malpass et al., 2015; Organista et al., 1998; Passel et al., 2004; Rhodes et al., 2010; Weine & Kashuba, 2012).

Moreover, as Weine and Kashuba (2012) expose in their systematic review of the literature on labor migration and HIV risk, migrant workers are also afflicted by a lack of social support and social support networks. As Weine and Kashuba explain, not only are migrant workers "forced into physically demanding and dangerous jobs," live in "sub-par conditions," without proper remuneration; also, they are often separated from their romantic partners and/or their families in general, finding themselves propelled into a different social and cultural reality (Weine & Kashuba, 2012, p. 2). This pruning of their

social fabric plays a major role in migrant health, especially in the form of mental illness (Kawachi & Bergman, 2001).

Another layer of complexity and contributing factor to migrant health relates to the legal status, the transient nature of their stay, and the mobility patterns of this population. For instance, migrant workers are in constant mobility due to the changing of seasons, the very nature of the agricultural economy, and the lack of work. In addition, most migrant workers are undocumented (Persichino & Ibarra, 2012). Being undocumented or holding an illegal status in the country not only precludes these individuals from qualifying for medical care; their constant mobility and illegal status thwart health promotion and disease prevention efforts. To that extent, even data collection to assess this population's characteristics and needs remains a challenge (Apostolopoulos et al., 2006).

Notwithstanding their legal status, migrant farmworkers are one of the most vulnerable and at-risk populations. Their historically chronic lack of access to healthcare services is only more compelling and has more profound public health repercussions among the undocumented (McCoy et al., 2015). With an estimated eight million undocumented migrant workers currently living in the U.S. -over three million of which are migrant farmworkers-, the planning, monitoring, and evaluation of their health status and consequent prevention efforts have been overly challenging (NFW, 2017; Krogstad, Passel & Cohn, 2017).

With the passing into law of the Patient Protection and Affordable Care Act (ACA), the migrant workforce experienced an improvement in their access and utilization of health care services. That improvement however only translated into a modest increase

in the number of workers benefiting from the services since most migrant workers are undocumented. Being undocumented or holding an illegal status in the country may inhibit migrants from accessing federally-based assistance programs and/or services due to the fear of being deported.

The Human Immunodeficiency Virus (HIV) and the Acquired Immunodeficiency Syndrome (AIDS) have been two topics at the very top of the public health list of the human scourges to eradicate since the HIV epidemic first took foothold in 1980s. At least in the U.S., HIV/AIDS has affected society unequally. The epidemic has a relatively low prevalence in the general population but high prevalence among the "the socially disenfranchised and marginalized" (Pellowski et al., 2013, p. 197). This is especially true for Latino migrant workers living in the U.S. (Kissinger et al., 2013; Organista & Kubo, 2005). Despite the absence of data regarding the impact of HIV/AIDS among Latino migrant workers, estimates place the prevalence of the infection anywhere between 2.6 and 13 percent or, as Persichino and Ibarra word it, "at least four to eight times higher (rates) than the estimated HIV prevalence rates in the USA (0.6 percent) and Mexico (0.3 percent)" (2012, p. 122).

The use of alcohol and other drugs (AOD) among Latino migrant workers living in the U.S. is another issue of public health concern: High rates of AOD use have been reported by this population and hypothesized to be a potential coping mechanism but also a consequence of the consequent psychological stress that result from being a migrant worker (Kissinger et al., 2013). While some estimates seem to indicate that drug use is alarmingly high, alcohol consumption among Latino migrant workers ranges anywhere from 77 to 90 percent (Kissinger et al., 2013). Moreover, as high as 52 percent of Latino

migrant workers have consumed alcohol before or while having sex, which places this sector of the population at a higher risk for HIV infection (Albarrin & Nyamathi, 2011; Persichino & Ibarra, 2012).

Purpose of the study

This dissertation study is highly motivated by the social conditions and poor health outcomes that characterize Latino migrant workers in the U.S. The major driving force for the necessity of conducting this study is the gap in knowledge about those modifiable factors that could be playing a major role in defining the health status of this population. The study looks to find empirical support for the importance of selected psychological factors as cross-sectional predictors of *current* HIV risk. In doing so, the following aims have been proposed that guides the exploration.

Study aims, research questions and hypotheses

Aim 1. To examine the relationship between self-efficacy, expectancies, social norms, AOD use, and behavioral intention in a sample of Latino migrant workers living in the U.S.

Research question 1. Do self-efficacy, expectancies, social norms, and AOD use significantly predict intention to use condoms?

Hypothesis 1a. Among Latino migrant workers living in the U.S., self-efficacy for condom use is a significant predictor of behavioral intention.

Hypothesis 1b. Among Latino migrant workers living in the U.S., outcome expectancies about alcohol use is a significant predictor of behavioral intention.

Hypothesis 1c. Among Latino migrant workers living in the U.S., social norms regarding condom use is a significant predictor of behavioral intention.

Hypothesis 1d. Among Latino migrant workers living in the U.S., AOD use is a significant predictor of behavioral intention.

Aim 2. To examine the relationship between behavioral intention, past sexual behavior, sexual abuse, and social support, and *current* HIV risk in a sample of Latino migrant workers living in the U.S.

Research question 2. Do behavioral intention, past sexual risk, sexual abuse, and social support significantly predict *current* HIV risk?

Hypothesis 2a. Among Latino migrant workers living in the U.S., behavioral intention is a significant predictor of *current* HIV risk.

Hypothesis 2b. Among Latino migrant workers living in the U.S., past sexual behavior is a significant predictor of *current* HIV risk.

Hypothesis 2c. Among Latino migrant workers living in the U.S., having a positive history of sexual abuse is a significant predictor of *current* HIV risk.

Hypothesis 2d. Among Latino migrant workers living in the U.S., social support is a significant predictor of *current* HIV risk.

Aim 3. To assess whether behavioral intention poses as a mediator between self-efficacy and of *current* HIV risk, between outcome expectancies and of sexually-related HIV risk, between social norms and of *current* HIV risk, and between AOD use and *current* HIV risk in a sample of Latino migrant workers living in the U.S.

Research question 3. Does behavioral intention mediate the relationship between self-efficacy, outcome expectancies, social norms, and AOD use and *current* HIV risk?

Hypothesis 3a. Among Latino migrant workers living in the U.S., behavioral intention mediates the relationship between self-efficacy and *current* HIV risk.

Hypothesis 3b. Among Latino migrant workers living in the U.S., behavioral intention mediates the relationship between outcome expectancies and *current* HIV risk.

Hypothesis 3c. Among Latino migrant workers living in the U.S., behavioral intention mediates the relationship between social norms and *current* HIV risk.

Hypothesis 3d. Among Latino migrant workers living in the U.S., behavioral intention mediates the relationship between AOD use and *current* HIV risk.

Research design overview

Given the nature of the proposed questions, a quantitative research design is followed here. In quantitative research, data are quantifiable and results are generalized to the population of interest, i.e. Latino migrant workers in the U.S. The participants were migrant farmworkers who at the time of the study commencement were AOD users. Data were collected in the form of questionnaires administered in English or Spanish by an English or Spanish-speaking interviewer. To address the research questions, secondary data previously collected from a larger study "HIV risk reduction in migrant workers" that took place from 2005 to 2011 in Immokalee (Collier County, Florida) was analyzed. To analyze the data, traditional statistical tools such as linear regressions and less traditional techniques such as Bayesian path analysis was implemented. A more detailed discussion of the research approach is provided in Chapter III.

Delimitations

This dissertation study was set out to explore those variables suspected to play a role in understanding and predicting sexual risk in an understudied population: Latino migrant farmworkers living in the U.S. Only those intrapersonal, interpersonal, and psychosocial variables identified from the literature review was included. This last delimitation is also

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a potential limitation and theoretical bias. The study is also limited to migrant workers from Latino backgrounds working in agricultural fields in a small town in the state of Florida at the time data were collected.

Assumptions

The assumptions under which the parent study was conducted are expected to carry over to this study. Among them is the assumption that participants answered the questionnaire items in an honest manner, reflecting the most accurate information they were able to provide. Another assumption relates to the expectation that the final sample in the parent study was representative of all the Latino migrant farmworkers living in the U.S. For this study in particular, the topic of sexually transmitted infections, in particular HIV, as well as sexual risk among Latino migrant workers is assumed to continue to be relevant. Finally, the choice of analytical methods and techniques in this study is assumed to be the best possible way to explore the research questions given the specifics of the data collected such as types of variables, sample size, and the way different data follow different distributions.

Public health significance

In the U.S., HIV/AIDS disproportionately affects minority groups; more notably, Latinos (CDC, 2015). In 2014, 24 percent of the newly diagnosed HIV cases were Latinos (CDC, 2016). Migrants are another particularly vulnerable sector of the population also at a high risk of STIs, especially HIV (Organista & Kubo, 2005). Latino migrant farmworkers are therefore especially at risk. Despite the severity of this scenario, Latino migrant workers and the risk factors affecting their sexual risk that place this population at a higher risk for HIV/STI remains under-investigated. The proposed

dissertation intends to address this gap in knowledge by examining those modifiable factors affecting sexually-related HIV risk among Latino migrant workers living in the U.S. Findings from this study can be translated into further intervention efforts that can target those factors.

Summary

The migrant health landscape is fraught with a whole spectrum of public health problems, spanning from prenatal care and oral care disparities to higher risks of occupational-related illnesses. Migrant workers in general experience structural and cultural barriers to healthcare access, which only increases their vulnerability and contributes to the worsening of their health outcomes; a situation that reaches critical levels among the undocumented or so-called 'illegal' workers (Holmes, 2011; McCoy et al., 2015). Constant mobility, separation from their homes and family, low paying jobs, hard labor, and undocumented status characterize most Latino migrant workers who are also affected by higher rates of HIV infection.

Additionally, sexually risky behaviors account for most of the HIV infections worldwide; therefore, understanding and ultimately predicting sex risk conducive to higher HIV risk in an especially vulnerable sector of the population with high rates of geographic mobility necessarily involves teasing out the psychosocial protective and risk factors that play a role in sexual risk. This dissertation study focused on precisely that objective.

Despite the advent of pharmacological therapies and biomedical approaches to HIV/AIDS prevention, behavioral interventions that look at HIV risk reduction continue to be the basis of most prevention efforts (Huebner & Perry, 2015). For this reason and

because of the complex nature of the phenomenon of sexually-related HIV risk, especially in the context of im/migrant populations, the exploration into the cross-sectional predictors of sexually-related HIV risk behaviors must continue in order to inform the praxis of public health. Such is the goal of this study.

This intellectual quest begins with an examination of the literature on the topic in Chapter II. This is followed by an ample discussion of the methodology of choice, including the analytical plan, which makes up Chapter III. Chapter IV is dedicated to the actual disclosing of the results as they pertain to each aim; while Chapter V contains conclusive thoughts and discussion of the findings make up the final chapter (Chapter V).

<center>**CHAPTER II**</center>

<center>**LITERATURE REVIEW**</center>

A thorough examination of the literature surrounding migrant health, more specifically, HIV risk and sexual risk among migrant workers, has unearthed several issues of public health relevance which are presented in this section. The review consists of several sections that attempt to unearth a gamut of factors related to HIV risk among migrant workers and begins with a brief introduction to the issue of geographic mobility and the spread of diseases, followed by an overview of migrant workers and migrant health. In looking for those "potentially modifiable determinants about which sufficient evidence exists that we should consider trying to address them" (Weine & Kashuba, 2012, p. 2), a brief description of HIV-risk in the general population and among Latino migrants is provided from the point of view of the relationship between HIV-risk and some of the most important theoretical variables that have been identified by research and theory.

Latino migrant health in the U.S.

Migrant workers are also one of the most socio-economically disadvantaged populations in the U.S. Dubbed "our nation's invisible population," (Gonzalez, 2015), migrant workers are responsible for most of the farm-based economy, food growing and harvesting that takes place in the U.S. (Persichino & Ibarra, 2012). The epitome of this scenario has been Immokalee, Florida, a large agricultural area once called "America's 'ground-zero' for modern slavery" (Cohen, 2017, para. 10), a state of affairs that has since been improved thanks to efforts of a local community organization. Albeit success stories such as this one involving some localized improvements, for the most part,

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migrant farmworkers in the U.S. continue to endure slavery-like conditions (NFWM, 2017).

For years, debate involving migrant health has revolved around whether or not Hispanic or Latino migrant farmworkers in the U.S. experience a deterioration of many of the indicators of health compared to those who never left their country of origin. In the literature, this is source of contention is known as the Immigrant and Hispanic Paradox or the Healthy Latino Paradox. Another layer of complexity is added to the debate when the Healthy Immigrant Hypothesis (HIH) is considered. The HIH postulates that biased population samples and faulty research designs are to blame for those studies that have documented the arguably healthier status of those who migrate into the U.S. from countries such as Mexico (Teruya & Bazargan-Hejazi, n.d).

In the last five years, a group of studies have come to light bringing to an end the debate around the paradox. Among the most significant examples, a study published in 2011, concluded that, after accounting for all biases, migrants from Mexico did experience a worsening of some important health indicators such as presence of cardiovascular disease and psychiatric disorders but not others such as diabetes or hypertension (Ullmann et al, 2011). In another study of equal significance, the researchers were able to provide further evidence and determined that even after controlling for health selectivity of the sample, the overall health of the Latino migrant population did deteriorate over time (Goldman et al., 2014). Notwithstanding the veracity of the healthy Latino paradox argument, migrant farmworkers unquestionably "bear an unequal share of sickness" (Holmes, 2011, p.873), largely related to the factors discussed next.

The living and working conditions that migrants experience in the U.S. are implicated in their health outcomes. Along with a plethora of occupational hazards and ominous working conditions associated with the agricultural labor migrant workers face, "much of this workforce is still experiencing unwarranted risks to health associated with their housing conditions." As Arcury and colleagues continue to explain, "(p)esticides carried into a residence on work clothes, lack of refrigeration for food storage, absence of sanitary facilities, and extreme overcrowding have all been linked to adverse health outcomes in farm laborers" (Arcury, Jacobs, & Ruiz, 2015, p. 256). Additionally, migrants also experience a worsening of health outcomes is also related to the lack of medical care. Several studies on migrant health have identified access to the health care system as the main reason for the decline in health experienced by migrants in the U.S. and the most significant barrier to positive health outcomes within that population (Goldman et al., 2014; Holmes, 2012; McCoy et al., 2015; Persichino & Ibarra, 2012).

In a seminal study by McCoy and colleagues on migrant health, which was based on the same data as this dissertation study, only half of the females and less than 20 per cent of the male farmworkers had a primary care physician, which was the variable used to measure health care access (2015). As the authors point out, besides demographic factors such as "immigration status, education, language barriers, and migration patterns" related to health care access and utilization, other "structural and institutional factors, such as lack of transportation, culturally competent health care providers, and improper location of services are also likely to affect migrants" (McCoy et al., 2015a, para. 1).

Latino Migrant health and the ACA

With the advent of the Patient Protection and Affordable Care Act (ACA), which was signed into law in 2010 but of which its major provisions did not go into full effect until 2014, some stipulations where made that would improve migrant workers' access to healthcare. One such stipulation pertains to the increase of federal funding in order to "provide services to underserved populations and areas" (Udow-Phillips, Fangmeier, & Lawton, 2016, para. 1). This is carried out, under the Public Health Services Act (PHSA), via Federally Qualified Health Centers (FQHCs), which operate under "a sliding fee scale based on patient income, family size, and health insurance status" (Udow-Phillips, Fangmeier, & Lawton, 2016, para. 1). One type of FQHCs, stipulated in Section 330(g) of the PHSA, has been set out to provide primary care to migrant workers in the agricultural industry. There are only 165 of these centers distributed around the U.S.; yet, there are thousands of migrant workers in need of health services (22 percent of migrant workers reported having health coverage via Medicaid or private health insurance). With the average annual family income of a migrant farmworker lying between $12,500 and $14,499 (this is, 42 percent below the federal poverty guideline), these few centers are nevertheless able to serve an essential function ("Migrant Health Centers," 2017).

Research on how effective this federal program has been in expanding the reach of services to the underserved population in general and the migrant farmworkers, in particular, remains insufficient. A study carried out by University of Michigan's Center for Healthcare Research & Transformation found that, in Michigan at least, notwithstanding the overall increase in population covered via the ACA and specifically served by the FQHCs, migrant workers and their families remain largely underserved

(Udow-Phillips, Fangmeier, & Lawton, 2016). Among the reasons behind the existence of a gap in coverage, a gamut of barriers prevents migrants from being insured and accounting for the "relatively high proportions of (FQHC) patients who remain uninsured" (Udow-Phillips, Fangmeier, & Lawton, 2016, p. 5). Unaffordability, lack of understanding of how the system works, and the potential issue of ineligibility "for Medicaid or for subsidies to buy private coverage" because of legal status are among the main reasons (Udow-Phillips, Fangmeier, & Lawton, 2016, p. 5).

Migration and the spread of sexually-related infectious diseases.

The relationship between population mobility, in particular, migration, and the spread of infectious diseases has been widely acknowledged (The Joint United Nations Programme on HIV and AIDS (UNAIDS) & The International Organization for Migration (IOM), 1998). In the case of transmittable diseases such as HIV and other sexually transmitted infections (STIs), individual and population mobility has been recognized to be "an important factor in the spread of the virus" (Soskolne & Shtarkshall, 2002, p. 1297). Studies conducted on different regions of the world have confirmed the relationship between high mobility, in particular, constant change of residence, and increased risk of HIV and other STIs (Goldenberg et al., 2012; Netsanet & Mamo, 2014).

Even though additional risk factors must also be present, correlational data point at the possibility of a relation between migration and increased exposure to HIV/STIs. Migration or migrant status *per se* does not increase the risk of HIV transmission. Some researchers have explained this phenomenon by partially attributing the 'blame' to migrant workers themselves, especially male migrant workers who are said to pose as 'bridges' of transmission between the population at the location of work and that at home

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(UNAIDS & IOM, 1998; Nahmias & Nahmias, 2011). In recent years, however, the discourse has shifted from considering migrant laborers less of a public health threat to more of an at-risk group, "more vulnerable than local populations to acquiring the infection during migration" (UNAID & IOM, 1998, p. 446).

While HIV infection is ultimately seen as the result of individual behaviors such as sexual practices, many other factors are also at work; these include policy, socio-cultural, and mental health factors (Weine & Kashuba, 2012). Among the structural determinants, researchers have identified policy issues, length and frequency of absence from home, financial status, working and housing conditions, limited or no access to healthcare, legal status, and language barriers. Among the socio-cultural factors, social or cultural norms, family detachment, and social support are the three most identified risk factors (McCoy et al., 2015). The last two, separation from their nuclear family and level of social support, can affect work migrants in that, once in a new country, those individuals who left their families or who lack community support also report marked levels of stress and loneliness. Many migrant workers resort to coping mechanisms such as increasing substance use or by engaging in risky sexual acts, mainly, unprotected sex with new, casual partners (Organista & Kubo, 2005; Weine & Kashuba, 2012).

The phenomenon of migration has been suggested to affect sexual risk via psychosocial risk factors such as depression, loneliness and social isolation (Organista & Kubo, 2005; Rubens, McCoy, & Shehadeh, 2014). As Rubens and colleagues (2014) point out, migrant farmworkers experiencing these risk factors are also more vulnerable to risky sexual behaviors; which in turn place these individuals on a direct path to increased STIs and HIV/AIDS risk. Conclusively or not, few studies have attempted to

explain the mechanisms by which depression and loneliness for instance affect HIV risk via sexual risk. From the field of clinical psychology, a recent study conducted on African American women living in the U.S. analyzed participants' narratives to suggest the possibility that the very "psychopathology of depression may create situations where the target population could become exposed to HIV" (Brawner et al., 2012, p. 618). As Brawner and colleagues explained in their 2012 study, individuals suffering or experiencing depression also reported "feelings of loneliness, isolation and wanting somebody to 'comfort them'" (p. 618). The authors sustained that these "aspects of depression" can in turn have a negative effect on the way sufferers make decisions about sex; maybe because, as the participants reported, sex can be viewed as a stress reliever, an anti-depressant, and a way to increase self-esteem. (Brawner et al., 2012, p. 618).

Researchers have found that like the general population, Latino migrant workers seem to be equally affected by risk factors associated with higher rates of HIV infection such as poverty, lack of education, language and culture barriers, and use and abuse of alcohol and other drugs play a detrimental role. In the case of migrant workers, however, some have also pointed at other potential risk factors such as depression, loneliness, social isolation (lack of social support) that could also be playing a role (Organista & Kubo, 2005; Rhodes et al., 2006; Rubens, McCoy, & Shehadeh, 2014; Sowell et al., 2008). The evidence for the direct association between each of these factors and sexually-related HIV risk however remains conjectural.

Sexual risk and HIV among Latino migrant workers.

The exact impact of HIV/AIDS among Latino migrant workers living in the U.S. is unknown. The last reported estimates date back to 2004. Nevertheless, researchers

place the prevalence of HIV among migrant farmworkers at no less than four times that found in the general population. Despite the lack of accurate, recent data, the fact remains: HIV affects migrant workers at a higher rate (Persichino & Ibarra, 2012; Shehadeh & McCoy, 2014).

In addition to higher-than-average rates of substance use and higher risk for HIV infection, Latino migrant workers in the U.S. are also affected by a reported increase in frequency of unprotected vaginal and anal sex. Male migrant workers, in general, and those who leave their families back in their countries of origin, in particular, engage in unprotected vaginal and anal sex with sex workers and/or with other men (Persichino & Ibarra, 2012; Sangaramoorthy & Kroeger, 2013). Female migrant workers also experience a higher exposure to unprotected vaginal and anal sex along with a higher incidence of sexual victimization, sex slavery, and/or prostitution (Munoz-Laboy et al., 2009; Organista & Kubo, 2005; Persichino & Ibarra, 2012).

Similar to the general population, sexually risky behaviors and substance use are at the epicenter of HIV risk among migrant workers (Shehadeh & McCoy, 2014). Still a gap in knowledge, identifying those cultural or ethnic-specific factors that play a role in shaping the behaviors that place Latino migrants are a higher risk for STIs, especially HIV, remains a priority. This is especially so given that the behavioral, not the biomedical, approach to HIV prevention is still the only feasible one, as "no prophylactic or therapeutic HIV vaccine strategies with satisfactory efficacy are available to date" (Richert et al., 2015).

The exploration into identifying those modifiable predictors or factors affecting HIV-related sexual behaviors among Latino migrant workers has been guided by

previous findings in the literature around the topic of HIV risk and sexual risk. The most significant variables identified as a result of this review of the literature in terms of their empirical or theoretical support for their association to HIV risk via sexual risky behaviors are each discussed next.

Use of alcohol and other drugs.

For decades now, the presence of alcohol use as a prominent risk factor in sexually-related HIV risk has been consistent in the literature. This relationship has been extended to other substances as well. This resulted in the more general category known as alcohol and other drugs or AOD, which some researchers consider to be among the five strongest determinants or predictors of sexual risk and sexually-related HIV risk (Huebner & Perry, 2015). Many observational and even experimental studies have provided evidence of the relationship between alcohol use and sexual risk-taking behaviors, irrespective of gender, cultural setting, or even age (Schacht et al., 2010, Dilorio et al., 2002). As Rehm and colleagues (2012) eloquently put it, "the role of alcohol consumption in the transmission of HIV and other STIs may be of public health importance" (p. 51). As McCoy and colleagues assert, "alcohol consumption, which is associated with uninhibited behaviors and impaired judgment, has been implicated as a risk factor for negative sexual outcomes, such as failure to use condoms and HIV transmission" (McCoy et al., 2014, p.1).

The relationship between AOD use, sexual risk and HIV infection has been explored from different disciplinary fields and with different study populations (Sanchez, 2014). Time and again, AOD use has been found strongly associated with increased sexual risk and, therefore, with higher HIV risk across all populations (Hoffman et al.,

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2000; Stein et al., 2005; Calsyn et al., 2010; Schacht et al. 2010; Turchik & Gidycz, 2012). Some have even argued that "(d)rug and alcohol use are the most common correlates, with numerous studies finding positive relationships between substance use and risky sexual practices" (Turchik & Gidycz, 2012, p. 412). After a thorough review of the literature on the topic, Lin and colleagues suggested that knowledge of individuals' patterns of substance use -in particular, alcohol use-, is a *sine qua non* for understanding sexual behaviors (Lin et al., 2006).

When analyzing AOD use in terms of both frequency and intensity, researchers have been able to obtain a more nuanced picture of the relationship between that variable and risk behaviors (Hoffman et al., 2000). For instance, a Hoffman, Klein, & Crosby (2000) reported a strong, positive correlation between AOD use and sexual risk behaviors and rates of HIV. After controlling for alcohol use in terms of frequency and intensity, the researchers concluded that the groups with higher levels of consumption were the ones in which the participants reported higher engagement in risky sexual practices and behaviors and higher rates of HIV infection (Hoffman et al., 2000). Additionally, data from a more recent study found that, in terms of sexual risk behaviors and levels of AOD use, binge drinkers were at 177% increased risk of HIV-related risk behaviors, relative to non-binge drinkers, after controlling for several confounders (Wen et al., 2012).

Despite these results, the need for further exploration of the relationship between AOD use and sexual risk in the context of other influential variables, particularly in the context of minorities and at-risk population groups, such as migrant workers or even im/migrants from Latin countries, comes from the realization that, at the intrapersonal level, the relationship remains "elusive" (Turchik & Gidycz, 2012, p. 412). Additionally,

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some researchers have even indicated the strong possibility that "the relationship may be mediated by a third underlying variable" (Turchik & Gidycz, 2012, p. 412). Such mediator could be the variable behavioral intention, as a recent systematic review of dozens of observational and experimental studies reported (Scott-Sheldon et al., 2016).

In this regard, a systematic review and meta-analytic report by Rehm and colleagues found that "the larger the alcohol intake and the subsequent level of (blood alcohol content) BAC, the higher the intentions to engage in unsafe sex" (Rehm et al., 2012, p. 51). In that report, for which a dozen experimental studies were analyzed, the reviewers found that, after adjusting for publication and other types of biases, the "likelihood of engaging in unprotected sex was still at a significant 2.9 percent for every unit increase of blood alcohol content" (Rehm et al., 2012, p. 51).

For the purposes of this study, after scouting the Latino migrant literature for evidence, the relationship between AOD use and sexually-related HIV risk seems to remain largely underexplored in the context of this population. Furthermore, given that association between AOD use, behavioral intention and HIV risk, in the context of Latino migrant farmworkers, has not been investigated, such gap in knowledge will be addressed here.

Sexual abuse and HIV risk.

Clinical, social, and health researchers have identified exposure to sexual abuse has one of the most important variables to consider when attempting to understand and predict sexual risk. Unlike other forms of mistreatment such as physical and mental abuse and neglect, sexual abuse is the only form of mistreatment that has been distinctively associated with adult sexual risk behaviors and, therefore, HIV risk (Senn & Carey,

2010). Although lack of theoretical consensus might exist around the psychological mechanisms via which sexual abuse, current or past, affect sexual risk, the negative consequences that the phenomenon bring on the abused could be of little question.

Evidence for the importance of including sexual abuse in predicting engagement in sexual risk behaviors and thus higher exposure to HIV risk has mainly originated from descriptive or correlational studies in which the researchers have used a cross-sectional design to unveil the risk factors associated with adult sexual risk behavior such as unprotected anal or vaginal sex, prostitution, and sexual promiscuity (Bensley et al., 2000; Dilorio et al., 2002; El-Bassel et al., 2001; Mullings et al., 2000; Senn & Carey, 2010; Senn et al., 2006). As illustrated next, most of that evidence largely originated from samples of HIV-seropositive individuals, from female sexual workers, or from men who have sex with men (MSM).

Evidence from observational studies does not abound. One experimental study, however, by Schacht and colleagues in 2010 was found that explored this topic. The authors concluded that women who were sexually abused during childhood (CSA) were "more likely than non-CSA women to have risky sex and be HIV positive while being less likely than their non-abused peers to report using condoms and less confident about refusing unprotected sex" (Schacht et al., 2010, p. 40). Even though sexual victimization is more common against women, sexual abuse, especially early sexual abuse, is not exclusive to this population. Many researchers have documented the higher-than-expected prevalence of male sexual abuse in many different parts of the world, including the U.S (Essabar, Khalqallah, & Dakharma, 2015).

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Many studies, mostly focusing on HIV infection and sexual risk behaviors among specific population such as HIV-seropositive men who have sex with men (MSM), have documented how sexual abuse or sexual victimization increased the likelihood of risk behaviors such as substance use and sexual compulsivity as well as the number of self-reported STI infections (Hequembourg et al., 2011; Whetten et al., 2012). For over a decade, most of those studies have focused on HIV risk and sexual risk behaviors in relation to male sexual abuse but solely from the perspective of MSM. A recent systematic review of 12 cross-sectional studies on early sexual abuse among MSM found that early history of sexual abuse was highly prevalent (over one quarter of the overall sample). The review compared MSM with a history of early sexual abuse to MSM without a history of early sexual abuse on indicators such as "HIV serostatus, sexually transmitted infections (STIs), sexual behaviors, and illicit drug use" (Lloyd & Operario, 2012, p.228). Overall, the odds of HIV seropositive status was 1.54 higher for the MSM with a positive history of sexual abuse while the odds of engaging in risky sexual behaviors was 1.85 higher.

These studies show how sexual risk and substance use are interrelated, at least for individuals with a history of CSA. Whether the same relationship can be found among groups other than MSMs is still to be investigated. In general, the interplay between a positive history of sexual abuse and other variables in the context of exploring the patterns of HIV risk and sexually risky behaviors is missing from the scientific literature. Albeit the documented importance of including sexual abuse history when studying risk behaviors, the relationship has not been sufficiently explored. Moreover, such exploration

has not been extended to vulnerable populations such as migrant workers in general and Latino migrant workers in particular, a gap in knowledge addressed in this study.

Past sexually-related HIV risk.

To date, a handful of studies have been conducted in which evidence of the importance of 'past behavior' as a predictor of sexual risk behavior is provided; although, across studies, past sexual behavior has not always been found consistently related to the outcome behavior or to behavioral intention (Lin et al., 2006; Turchik & Gidycz, 2012). On the other hand, most researchers, especially those interested in the Theory of Planned Behavior (TPB), have hypothesized about past sexual behavior as one of the non-TPB variables associated with sexual risk intentions and sexual risk behaviors (Turchik & Gidycz, 2012).

An important study on psychosocial determinants or predictors of sexual risk among gay and bisexual men found that past sexual behavior predicted future sexual behavior, even after controlling for several demographic variables and other empirical variables. That prospective cohort study followed over 600 men who have sex with men (MSM) for a period of four years (Ekstrand & Coates, 1990). Another study on early adolescents considering past sexual behavior as a predicting tool of present or future engagement in sexual risk behaviors found that past sexual behaviors was an indirect significant predictor of sexual risk behaviors via sexual intentions (Lin et al., 2006).

Additionally, a review of the literature on substance abuse carried out by Huebner and Perry (2015) confirmed these earlier studies about the role of past sexual behavior as a predictor. The reviewers analyzed longitudinal and experimental studies and identified past sexual behavior or having been diagnosed with an STD as the only strong and

consistent association with future risk behavior. Unlike popular variables such as self-efficacy, social norms, and behavioral intentions which had "inconsistent longitudinal associations with sexual risk," the less popular variable past sexual behavior was found to predict future sexual risk over time (Huebner & Perry, 2015, p. 1927). In light of these results and given that the relationship between these variables has not being examined in the context of a Latino migrant workers, this study attempts to address such gap in knowledge by examining the relationship between *past* HIV risk and *current* HIV risk, hypothesizing the former to be a predictor of the latter.

Behavioral intention and HIV risk.

Among the various correlates of sexual risk behaviors in the context of HIV risk identified by researchers and theorists alike, behavioral intention has been a salient one (Huebner & Perry, 2015; NIMH Workshop, 1991). Behavioral intention or the self-reported likelihood to perform a behavior has been found to be strongly predicted by attitudes and by subjective norms or perceived social expectations ever since it was first introduced to the health and social sciences by renowned theorists M. Fishbein and I. Ajzen who, in the 1960s, developed the Fishbein model to predict behavior and behavior change (Ajzen & Fishbein, 1969; NIMH Workshop, 1991). Later contributions and adaptations to the Fishbein model also included variables such as self-efficacy (also known as perceived behavioral control) as an antecedent of behavioral intention.

Since first introduced in the academic literature, the construct has been invoked as a direct predictor when studying a whole array of behaviors. Researchers subscribing to theoretical propositions such as the Motivational Model, the Health Belief Model, the Protection Motivation Theory, the Theory of Reasoned Action (TRA) and Planned

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Behavior (TPB), or Social Cognitive Theory (SCT) have all supported the idea that intentions can be the strongest predictor of behavior. Since the 1990s, the construct has been consistently found to be among the most significant predictors of sexual risk behavior(s), if not the most significant (Albarracin et al., 2001; Brodbeck et al., 2006; Fisher & Fisher, 1992; Huebner & Perry, 2015, Lin et al., 2006). A few reviewers of behavioral intention studies have found that, in some studies, the construct has only explained from 20 to 30 percent of the variance in behavior (Baban & Craciun, 2007, p. 50). In their meta-analytic quest of how "changes in intention lead to changes in behavior," researchers Baban and Craciun (2007) found that "a medium to large change in intention (d=0.66) leads to a small to medium change in behavior (d=0.36)" (Baban & Craciun, 2007, p. 58). The studies reviewed had explored the role of intentions mostly from the motivational model or from the Theory of Planned Behavior.

Irrespective of the factors that could explain those results, the evidence is there to assert that intention is a necessary condition for behavioral change to occur and also the strongest predictor of behavior. For instance, Rehm and colleagues' 2012 systematic review with meta-analysis of a dozen randomized-controlled studies found inequivocal evidence that "risky sex intentions" are strongly associated with the "actual risk behavior" (p. 51). In the context of experimental designs, this can be transalted into affirming that intentions to perform a specific behavior strongly predict that specific behavior (Rhem et al, 2012). Moreover, as reviewers Buhi and Goodson (2006) found, behavioral intention has appeared, time and again in the behavioral literature, as "stable predictor" of sexual behavior outcomes (Buhi & Goodson, 2006, p. 4). As behavioral intention became "the most proximal determinant of behavior" in most scientific circles,

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the construct has been used in many research studies and publications as the sole primary outcome (Baban & Craciun, 2007, p. 47).

Despite the breadth evidence pointing at the importance of including behavioral intention to perform a protective or risky behavior when analyzing risk behavior or behavioral change, the gap in knowledge surrounding the role of this variable in mediating and predicting a certain behavior continues to be insufficient or inconclusive. Moreover, the association between behavioral intention and each of the antecedents and sexually-related HIV risk has not been explored, especially in the context of Latino migrant workers, a gap in knowledge this study sets out to reduce.

Self-efficacy for condom use.

Described as a person's confidence in his or her capacity to perform a behavior or 'know-how', the notion of self-efficacy has been present in the behavioral research literature since the 1970s when eminent psychologist A. Bandura, a subscriber to social learning theory and proponent of Social Cognitive Theory (SCT), attempted to create a unified theory of behavioral change (Bandura, 1977). The construct later appeared under the name 'perceived behavioral control' in the Theory of Reasoned Action (TRA) and the Theory of Planned Behavior (TPB) (Baban & Craciun, 2007, p. 47). Notwithstanding, the construct has been used to explain eating, exercise, smoking cessation, alcohol use, among other topics. The "intuitive appeal" of self-efficacy as an investigative tool in HIV-prevention research "has encouraged its use" (Carey & Forsyth, 2016, para. 3).

The predictive and explanatory power of self-efficacy for condom use has been well documented in the health behavior literature. For over a decade, study after study has confirmed the association. For instance, a study on men who have sex with men

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found the relationship between social norms about condom use and sexually-related HIV risk behavior to be mediated by self-efficacy and behavioral intention; although the association between these two was not confirmed (Miner et al., 2009). In another large study of cannabis users, Brodbeck and colleagues found HIV self-efficacy, along with condom-related behavioral intention, to be "key mediators of the linkage between cannabis use and sexual risk behavior" (Brodbeck et al., 2006, p. 601). Moreover, reviewers of health behavior studies found, for instance, that among women who refuse to perform a certain protective behavior, self-efficacy was found the best predictor of intention, seeing as planning to perform that protective behavior; while intention "proved to be the best predictor of the actual behavior" (Baban & Craciun, 2007, p. 57). More recently, a study on HIV seropositive women found the construct to be significantly associated with sexual risk behaviors (Boone et al., 2015).

Despite the numerous findings pointing at the significance of self-efficacy in predicting behaviors, evidence of the contrary exists. For instance, in their 2016 contribution to an online learning resource for HIV/AIDS intervention techniques, Forsyth and Carey assert how despite the presence of the concept in HIV prevention research, the "evidence for the relationship between self-efficacy (for safer sex) and sexual risk behavior" has been inconsistent (Carey & Forsyth, 2016, para. 4). Although the authors do not support their claim, they do warn researchers that their findings should not be interpreted as a need to exclude self-efficacy from the analysis of HIV-related risk behaviors; not when "reliable and valid measurement of self-efficacy is very challenging" (Carey & Forsyth, 2016, para. 4).

Thus far, the importance of self-efficacy as a predictor or correlate of behavioral intention and ultimately HIV risk is of little questioning. This argument however cannot be extended to populations such as Latino im/migrants living in the U.S. The absence of studies that have examined the relationship between self-efficacy and HIV risk and behavioral intention, particularly in the context of Latino migrant workers, must be addressed; thus, in this study, the relationship between the three variables is explored, in their connection to other variables.

Outcome expectancies about alcohol use

Those scholars who support the view of the mediating role of behavioral intention in the relationship between alcohol or substance use and risk behaviors argue that, yet, another variable mediates that relationship; that is, outcome expectancies (Leigh, 1989; Lin et al., 2006; Olin et al., 2010). Similar concepts have appeared in the literature -e.g. behavioral beliefs and expected values. Outcome expectancies as a construct and explanatory variable has been central to Social Learning theory and, thus, Social Cognitive Theory (SCT) and the Unified Theory of Behavior (UTB).

Interest in studying outcome expectancies can be traced back to 1970s (Leigh, 1989, p. 361; Olin et al., 2010). Understood as those "individuals' beliefs about the effects of alcohol on their own behavior, moods, and emotions," the role and the nature of expectancies has been studied in close relation to perceived social norms. The shared aspect of these beliefs about the behavioral and emotional effects of alcohol has been extensively documented in anthropological-like accounts which have linked the effects of alcohol on alcohol users to alcohol expectancies. In those accounts, expectancies were

found to be a form of shared culture in that they are culturally learned and have a high degree of variability from one cultural group to another (Leigh, 1989). From the social learning theory perspective, its proponents sustained that "behavioral changes result from increasing the strength of the perceived relationships of a behavior and its consequences, in addition to how these consequences are evaluated (Lin et al., 2006, p. 169).

As early as 1990, a seminal study by Leigh (1990) found the first piece of evidence of the relationship between alcohol use and behaviors to be mediated by people's sex-related alcohol expectancies. The researcher, implementing a balanced placebo design, concluded that while alcohol does have active pharmacological properties, changes in sexual and/or social behavior were yet determined by the "beliefs about alcohol's effects," in other words, an individual's expectancy about the effects of alcohol in general and the effects of alcohol in relationship to sex (Leigh, 1990, p. 919). More recently, Lin and colleagues (2006), after reviewing the literature on sexual risk behaviors, also support the claim that outcome expectancies -i.e. beliefs- was as strong a predictor as alcohol use (Lin et al., 2006).

None of this evidence, however, has originated from studies that have considered Latino im/migrants; in particular, migrant farmworkers living in the U.S. Despite the recognized importance of eliminating health disparities in this population, for which the study of factors conducive or protective of HIV risk becomes indispensable, there has been a gap in knowledge, which is addressed in this study.

Perceived social norms about condom use.

By now a well-established fact, unprotected sex is the leading behavioral factor behind HIV as well as other sexually-acquired infections (Charania et al., 2011). In

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preventing HIV and other STIs, condom use is the most important behavioral factor among the sexually active, only second to abstinence and mutual monogamy (Singh et al., 2003; "Prevention," 2005). In the general, sexually active population, however, condom use seems to stand as the only practical strategy in terms of prevention efforts, considering the infeasibility of sexual abstinence or monogamy-promoting interventions. The research and practice of public health promotion and disease prevention has long recognized the particularly challenging problem of achieving proper and consistent use of condom use in any given population, not just adolescents, substance users, or any other specifically at-risk group (Catania et al., 1994). Part of the problem appears to relate to social norms regarding condom use.

In general terms, social norms theorists seem to agree that "behavior is often influenced by how individuals perceive that other members of a social group behave" (Scholly et al., 2005, p. 160). Often, these mental representations of what is normative turn out to be misperceptions of what others think about a specific behavior (Scholly et al., 2005). Yet, individuals decide to perform a risky behavior or a behavior that threatens their health or wellbeing based on these misrepresentations. This is because, as Perkins (2002) puts it, "norms can be powerful agents of control as 'choices' of behavior are framed by these norms and as the course of behavior most commonly taken is typically in accordance with normative directives of 'reference groups' that are most important to the individual" (p. 164)' regardless of whether those norms are accurate or inaccurate representations of the actual beliefs of a population or group of individuals. This dual aspect of the subjective-objective nature of the psychosocial and cultural phenomenon of social norms has been best captured when measuring the construct via self-reported

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perceptions. The concept of perceived social norms (also referred to as social expectations or subjective norms), this is, the beliefs individuals may or may not have about what others think about a certain behavior, has been found to play a more significant role than the what the actual norms may be, on predicting behavioral intention or the actual behavior; although that relationship has been inconsistently strong, according a systematic review (Rivis & Sheeran, 2003).

In the psychosocial and health education research literature, the relationship between norms and risk behavior has significantly varied: From social norms directly influencing a specific type of risk behavior to indirectly influencing that behavior via intentions (Jill et al., 1987; Catania et al., 1994; Scholly et al., 2005; Miner et al., 2009; Newcomb & Mustanski, 2014). Moreover, despite the importance of social norms in understanding most behaviors and the role of condom social norms in predicting sexual risk behavior (Fishbein et al., 1993), disagreement on how social norms influence a particular behavior exists. For instance, a study performed on white college students, found the relationship between perceived peer norms and condom use to be unmediated (Boone & Lefkowitz, 2004). More recently, Miner and colleagues, in an interventional study of men who have sex with men, found norms about condom use to affect sexually-related HIV risk behavior; although the relationship was mediated by self-efficacy and behavioral intention (Miner et al., 2009).

Irrespective of the potentially mediated nature of the relationship, perceived norms seem to affect sexual risk behaviors and even behavior change by acting as a facilitator or a barrier. For instance, as Boone and Lefkowitz (2004) concluded, the effects of social norms on sexual risk is such that "individuals who believe their peers

would approve of their sexual behavior reported more frequent lifetime condom use" (p. 65). In their systematic review with meta-analysis of 69 peer-reviewed studies, Buhi and Goodson (2006) found that, along with behavioral intention, perceived norms was a "stable" predictor of sexual behavior (p. 4). In an equally conclusive study, prominent researcher and theorist C. DiClemente and colleagues emphasized the role of perceived norms about condom use and other sexually-related risk behaviors as "key influencers" of sexual risk behaviors (DiClemente et al., 2008, p. 599).

As seen here, any model or conceptual framework designed to explain a behavioral process must include perceived norms in order to strengthen its "ability to understand and predict the sexual behaviors" (Boone & Lefkowitz, 2004, p. 65). From M. Fishbein's Integrative Model to the Health Behavior Model to social norm theories, the (perceived) peer or social norms has been featured in a variety of theories and had stood among the preferred constructs by sociopsychologists and health behavior experts alike. Yet, as researchers Huebner and Perry concluded in their recent review of dozens of longitudinal and experimental studies, despite the theoretical prominence of perceived norms in the health behavior and psychosocial literature, the construct has remained as an understudied predictor (Huebner & Perry, 2015). This has been especially so among Latino migrant workers, a gap in knowledge that this study is aiming to fill.

Social support and HIV risk.

Another salient construct identified by both researchers and theorists as important in understanding and predicting risk behaviors is that of social support. Multiple theories such as Cognitive Theory, Stress and Coping Theory, Social Network theories, and Social Constructionism have claimed the construct and its counterpart: social isolation.

While lack of social support, i.e. social isolation, has been considered a risk factor in a wide gamut of phenomena that span from morbidity and mortality in the adult population to behavioral and academic performance issues in children and adolescents, the opposite scenario holds true as well, where the presence of social support has been considered a protective factor (Holt-Lunstad, Smith, & Layton, 2010; Uchino, 2006).

This protective view of social support in relation to behavioral risk and even health and mental health outcomes seem to prevail among researchers across fields and theoretical backgrounds. Explanations for explaining this phenomenon vary in degrees and levels of scientific evidence and a lack of consensus pervades the literature. Notwithstanding, sufficient evidence does exist for asserting the protective role that social support exerts on individuals. One of the most popularized views on social support and health outcomes is that of its role as a "stress-buffer," not only "during stressful situations" but it also "an everyday occurrence in personal relationships" (in Ko et al., 2013, p. 195).

One of the earliest appearances of social support in the literature stressed the "verbal and nonverbal" aspect of the communication between "recipients and providers;" which has been said to "reduce uncertainty about the situation, the self, the other, or the relationship, and functions to enhance perceptions of personal control in (someone's) experience" (Ko et al., 2013, p. 195). Other conceptualizations have emphasized the subjective or perceived aspect of social support. For instance, Cobb (1970) defined social support as "(t)he information leading the subject to believe that he is cared for and loved, esteemed and a member of a network of a mutual obligation" (in Salgado et al., 2012, p. 380).

Irrespective of the various theoretical stances and conceptualizations, empirical support for the importance of including social support in understanding and predicting risk behavior particularly among vulnerable and highly at-risk populations such as Latino immigrants, drug users, among others, has been increasing since the 1990s (Qiao, Li, & Stanton, 2004). Since then, the relationship between social support and HIV risk or sexual risk behaviors has been explored from a variety of fields and studies (Qiao et al., 2014).

A recent systematic review performed on 40 peer-reviewed articles by Qiao and colleagues (2014) closely meta-analyzed the extant literature on this specific topic. All the reviewed studies focused on the relationship between social support and HIV risk, from the point of view of sexually-related or drug-related HIV behaviors. After carefully examining the data, the authors found that "higher level of social support (either general or HIV-specific) might be generally related to fewer HIV-related risk behaviors (…)" (Qiao et al., 2014, p. 428). However, as the reviewers warn, these findings may only be generalizable to the specific population included in the studies -e.g. drug users, heterosexual adults, female sex workers, and White, middle-class adolescents (Qiao et al., 2014).

Regarding the relationship between social support with other variables, in particular behavioral intention, in predicting sexually-related HIV risk, there has been few and inconsistent findings. For instance, across-sectional study carried out on HIV-positive homosexual men found some evidence of the association between social support and intention to perform the behavior in predicting the actual behavior (Qiao et al., 2014). Nevertheless, a cross-sectional study on African American female adolescents also found

that there was no relationship between traditional predictors of behavioral intention such as self-efficacy, HIV knowledge, and social support and sexually-related HIV risk behaviors (Bachanas et al., 2002). The implications of these results are discussed in the Methods section.

As seen here, social support has been extensively studied even among Latino im/migrants. However, a subsector of that population comprised by migrant workers living and working in agricultural areas of the U.S. has remained excluded from the analysis. Such gap in knowledge is recognized in this study. As such, the exploration of HIV risk among Latino migrant farmworkers in this study includes social support as predictor of the dependent variable.

The Unified Theory of Behavior.

In the field of public health and in health promotion and disease prevention, in particular, one theory has stood out from the rest when examining HIV risk and sexual risk behaviors: The Unified Theory of Behavior (UTB) espoused by J. Jaccard and colleagues. Few other theories have gained the level of academic acceptance and application acquired by this theory. The theoretical model first appeared in Jaccard, Litardo, & Wan (1999) and was said to stem from applied decision theory and social psychology. The UTB is a research-based theory and the direct result of a systematic review of hundreds of research studies that, at the time the review was performed, were the most successfully promising results regarding the prediction of behavior and behavior change (NIMH Workshop, 1991). The reviewers' quest for building a general theory of behavior was a continuation of the efforts from behavioral theorists Bandura, from the Social Cognitive Theory, and Fishbein, from the Theory of Reasoned Action, among

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others, and had as sole objective the finding "the core elements that influence behavior and behavior change" (NIMH Workshop, 1991; Olin et al., 2010, p. 467). Despite few disagreements, all theorists "agree(d) upon a general framework that has since been expanded to the Unified Theory of Behavior (UTB)" (Olin et al., 2010, p. 467).

Basing their argument on previous studies that have "supported the main constructs", the proponents of the UTB have expressed their confidence that "the core constructs and general theoretical structure are a sound basis for analyzing a wide range of behaviors (Jaccard et al., 1999, p. 101). At the center of the UTB lies the concept of behavioral intention: The UTB contains six classes of variables which have been empirically found to be the main predictors of an individual's decision or not to carry out a particular behavior.

The antecedents or behavior-specific determinants of behavioral intention - understood as an individual's decision to perform or not to perform the behavior in question- are: behavioral beliefs or expectancies, normative beliefs or social norms, self-concept or social image, affect and emotions, and self-efficacy Jaccard, Litardo, & Wan (1999). The UTB model is said to "represent a synthesis of constructs" emanating from the Fishbein and Ajzen's Reasoned Action Model, the Health Belief Model, Bandura's social learning theory, Triandis's theories of subjective culture, and Gross's emotion regulation theories (Jaccard & Levits, 2013, p. 8).

Like any other theory, the UTB is not a fixed model. In the case of the UTB, this consideration comes from acknowledging the partial effect each variable has on behavioral intention varies. In the words of Olin and colleagues, "(t)he relative importance of (all these) variables in influencing behavior differs from population to

population, from behavior to behavior, and across various situations" (Olin et al., 2010, p. 467). For instance, as these authors illustrate, "for some individuals, normative influences may be a primary determinant of the decision to perform a behavior (…); (for) other individuals, attitudes of mistrust towards health care providers (…) may be a primary determinant of behavioral intentions" (Olin et al., 2010, p. 467).

In the field of public health, the UTB has been highly regarded for being not just a theory of the problem but also a theory of the solution. The theory has been implemented it not just when studying a whole array of health and health-related behaviors but also when delivering health prevention programs, especially those relating to risky behaviors (Chowdhury et al. 2013; Coletti et al. 2012; Jaccard & Levitz, 2013; Jaccard et al., 1999; Olin et al., 2010).

Summary

With the exact HIV incidence or prevalence affecting the migrant workforce remaining unknown and the paucity of studies aimed at understanding the phenomenon of sexually-related HIV risk behaviors in this population, a gap in knowledge that continues to pervade the literature, the importance of exploring these issues becomes salient from a public health perspective, especially health promotion and disease prevention. In the state of Florida, HIV infection has been a growing concern, with over 135,000 existing cases and approximately 4,000 new cases being diagnosed each year (AIDS, 2017); of which up to 13 percent could be Latino migrant workers who are HIV-positive (Rubens, McCoy, & Shehadeh, 2004). Given this scenario, the study of HIV risk factors affecting the health outcomes of migrant workers, a particularly at-risk and vulnerable population, is crucial in order to improve their health outcomes.

In reviewing the literature on HIV risk and sexual risk behaviors, a constellation of constructs emerged and, thus, the most significant ones were selected as part of the conceptual framework proposed here (Figure 1). Theoretical inspiration for the framework guiding this exploration comes from the Unified Theory of Behavior and Behavior Change (UTB) by Jaccard and Levitz (2013). This unifying theory of behavior also contains most of the constructs identified in this literature review as potential predictors of *current* HIV risk. These are: self-efficacy for condom use, social norms about condom use, alcohol-related outcome expectancies, AOD use, behavioral intention, social support, history of past sexual abuse, and *past* HIV risk.

CHAPTER III

METHODS

In this chapter, a brief description of the parent study from which the data for this study was collected is offered in terms of the objectives of the study, the sampling strategy, the characteristics of the sample, and the data collection techniques. In terms of the current study, a discussion of the conceptual framework and the analytic strategy developed to confront the data and carry out the study aims is also provided. This dissertation study relies on secondary data from the parent study "HIV risk reduction in migrant workers" described below. This present study examines *current* HIV risk, the outcome variable, among Latino migrant workers to determine which of the hypothesized factors are associated with that outcome.

The parent study.

This dissertation study used data from a larger study, "HIV risk reduction in migrant workers," referred here as the parent study, which took place in Immokalee, in Collier County, Florida, from 2005 to 2011. The parent study was approved by Florida International University Institutional Review Board (IRB) and aimed to assess the long-term effectiveness of a cognitive behavioral program known as Peer Education Ends Risky Behaviors (P.E.E.R) versus the health promotion program Health Education Always Leads to a Healthy You (H.E.A.L.T.H.Y) in lowering HIV risk and increasing health behaviors among sexually active, AOD-using migrant workers. Both programs were carried out in two consecutive weekends, as four-hour long workshops.

Data in the parent study were collected in four assessment or observation points (baseline, 3, 6, and 12 months). Paper-based and Audio-Computer Assisted Self

Interview (A-CASI) were used for data collection. All data were self-reported and gathered via the HIV Risk Reduction Questionnaire (HRRQ), composed of 13 sections that collected information on demographics, HIV risk reduction behavior, sex behavior, sex related alcohol expectancies, alcohol and drug use, and other variables of interest to the parent study researchers.

Participants in the parent study were recruited from Immokalee, a largely agricultural town in Collier County, Florida. Participants were migrant workers who, at the time of the study, were "employed in agricultural labor, either seasonal or migratory, and live in temporary housing," who traversed "75 miles or cross county lines to work," directly or indirectly in agriculture (Shehadeh, 2013, p. 3).

The parent study was delimited to those who were migrant or seasonal workers, aged 18 years or older, and who at intake reported sexual activity and AOD use within the past 30 days. Participants also had to be fluent in English and/or Spanish and must have agreed to the study and have signed the informed consent. After recruitment and signed consent, participants were randomly assigned to one of the two intervention programs -i.e. P.E.E.R or H.E.A.L.T.H.Y.

Even though the study design was not a clinical one per se as the participants were non-treatment seeking migrant workers who used AODs, the parent study was a community trial. As such, the participants were selected from a randomized sample of locations and days among seasonal or migrant workers with a reported history of sexual activity and AOD use. Targeted sampling was the sampling strategy of choice. This technique has been successfully implemented as an alternative to the more biased sampling strategy known as convenience sampling. Both techniques are used when

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studying vulnerable and/or hard-to-reach populations such as migrants whose legal status might be a concern to them and HIV-positive individuals. Additionally, as researchers Watters and Biernacki argue, when dealing with high risk behaviors, sampling techniques that are more receptive to the place(s) where those behaviors take place; therefore, finding the participants of interest wherever they are (Watters & Biernacki, 1989).

In the parent study, the size of the sample was n= 431 participants at baseline and, overall, 160 participants were lost to follow-up. The composition of the overall final sample as well as the distribution of participants from each of the two programs was about 75 percent male and almost half were native English speakers while the other half were native Spanish speakers.

The current study.

  Study design and methods. The present study is limited to those participants from the parent study who reported Hispanic or Latino ethnicity at baseline. All variables of interest were measured in the parent study via the HRRQ using baseline data. Linear regression and path analytic techniques are the main statistical procedures. Considering that only pre-intervention or baseline data were used, the effects of the intervention and, thus, assignment to control or intervention groups do not represent a statistical confounder. The final sample size for this study was n=270 participants, the entire sample of Hispanic participants in the parent study.

  Conceptual framework. The conceptual framework proposed for this study (see Figure 1 below) is a theoretical one in that it incorporates some of the constructs found in Jaccard & Levits, 2013. The framework therefore subscribes to the Unified Theory of Behavior (UTB), a theory of behavior of empirical validity and utility, in that self-

efficacy, expectancies, and social norms are hypothesized to be direct antecedent predictors of behavioral intention (see Aim 1) and that behavioral intention is an important predictor of behavior (see Aim 2). In this dissertation study, these relationships were explored in a study sample of migrant workers who, at the time of the parent study, were engaging in sexual activities and in the consumption of alcohol or other drugs in the last 30 days.

As seen in previous discussions, in the context of Latino migrant workers or even Latino im/migrants in general, the relationship between self-efficacy, social norms, outcome expectancies about alcohol use, *past* HIV risk, AOD use, and behavioral intention and *current* HIV risk have not been explored. Consequently, the need to consider the role some of these variables play in predicting intention to behave and *current* HIV risk among Latino migrants has been long overdue. Moreover, because the existing evidence on the effect of self-efficacy, social norms, expectancies, and AOD use in explaining sexual risk behaviors have not be consistent, the importance of including the construct in this study is justified and pertinent for the purposes of this study. Moreover, because sufficient evidence was not found to support the proposition that behavioral intention could mediate the relationship between social support, sexual abuse, and past sexual behavior (past HIV risk) and the outcome variable (HIV risk), these variables were entered in the model as part of Aim 2 as having a direct effect on the outcome variable.

In elaborating a conceptual framework to guide this intellectual exploration, the model hypothesized here differs from the theoretical model proposed by Jaccard and colleagues, mainly in that, for the purposes of this study, two of the determinants of

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behavioral intention, self-concept or social image and affect or emotions, as well as all

the moderators have been excluded given that they were not measured in the parent

study. Furthermore, the conceptual framework in this study also incorporates variables or

possible predictors of sexually-related HIV risk behaviors found in the literature. The

proposed conceptual framework guiding this dissertation study is illustrated in Figure 1

below. This dissertation, via the proposed framework, will advanced the science of HIV

prevention by contributing to the knowledge regarding those modifiable factors that

influence HIV risk among Latino migrant workers and their interplay; all of which could

be specific to this population but which could also be generalizable to other similar

populations. This particular combination of variables has never been explored as a

predictor of HIV risk, especially in the context of Latino migrant workers.

Figure 1. Hypothesized conceptual framework

H3a:

Behavioral intention

Self-efficacy ⟶ *Current* HIV risk

H3b:

Behavioral intention

Expectancies ⟶ *Current* HIV risk

H3c:

Behavioral intention

Social norms ⟶ *Current* HIV risk

H3d:

Behavioral intention

AOD use ⟶ *Current* HIV risk
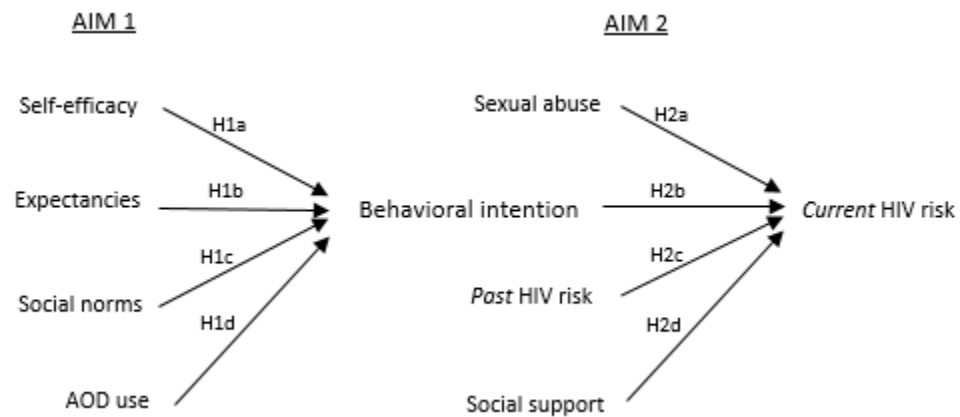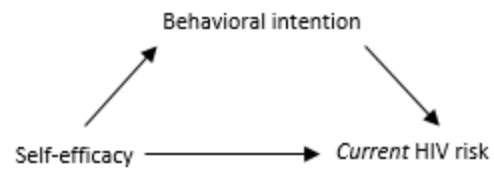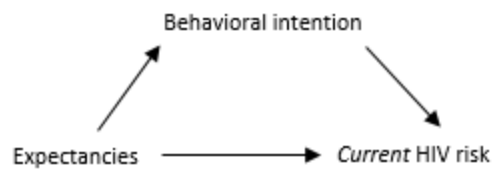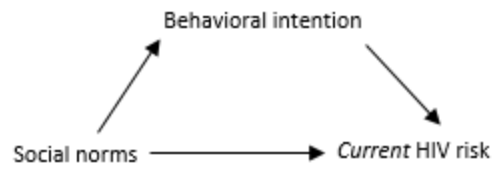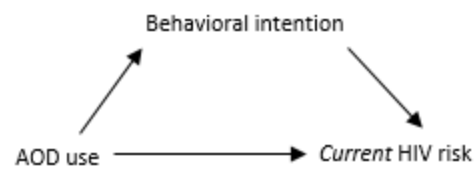
Variables and measures.

Demographic data of interest were age, gender, marital status, level of educational attainment, native main language spoken, country of birth, religiosity, level of income, living arrangement, and length of stay in the Immokalee area. However, only specific variables such as age, gender, educational attainment, and length of stay in Immokalee were included in the multivariate analyses involving aims 1 and 2 as covariates or controls.

All data were self-reported. This way of collecting data is a suitable alternative when data cannot be collected via observational methods; however, self-reported data poses some challenges in terms of the validity of the data and, thus, in terms of the validity of the conclusions. This is especially so when health and health-related risk behaviors are examined. In this context, the risk of recall bias and social desirability bias increase (Brener, Billy, & Grady, 2003). Given this, researchers have proposed ways in which self-reported data can be validated within a study. One such recourse has been the use of biochemical indicators to measure risky behaviors such as the use of alcohol and other drugs (AOD) and other risky behaviors (Brener, Billy, & Grady, 2003). This is not only costlier but also more demanding in terms of the feasibility of the investigational study. Additionally, in a 2003 systematic review of dozens of research studies to assess cognitive and situational factors affecting self-report data, the authors concluded that none of the factors identified threatened the validity of those behaviors being self-reported Brener, Billy, & Grady, 2003). More conclusively, as Babor and colleagues (2000) found, evidence from empirical studies indicates that self-reported data, even of

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those of sensitive nature, can be as accurate or even more accurate than other more "objective" alternatives (Babor et al., 2000).

Reliability analysis: The validity of the instruments described below which were used to measure the variables of interest in this and in the parent study was assessed in this study, as well as in the parent study, using Cronbach's alpha, also known as alpha coefficient. Widely implemented since the 1990s, Cronbach's alpha indicates the internal consistency of an instrument or measure by analyzing the homogeneity across all factors or items that constitute such instrument. In other words, the coefficient estimates how much or how little the scores resulting from items are free of measurement error (Pedhazur & Schmelkin, 1991).

Current HIV risk: Many different conceptualizations, indicators and measures of HIV risk in the context of sex-related risky behaviors, exist in the literature. In this study, the outcome variable, HIV risk, specifically refers to the likelihood of performing the protective behavior, this is, carrying condoms, a proxy for measuring the actual behavior: using condoms -which cannot be directly observed and, thus, can only be measured by asking participants to report their behavior retrospectively, once the behavior has occurred.

The outcome variable has been selected from a questionnaire item from the parent study which specifically asked participants "Do you carry condoms with you?" This question about condom use reflects a more accurate measure of risk of engaging in unprotected sex in that time-wise, this questionnaire item captures future exposure to sexual risk for those who answer "No." In the public health literature, not only are

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dichotomous measures of the outcome variable such as the one just mentioned proper for capturing HIV risk but they are also encouraged (Fonner et al., 2014).

When searching for predictors of risk behaviors, whether using a cross-sectional or longitudinal design, researchers have resorted to measures of risk that capture past behaviors or acts (for an example, see Stappenbeck et al., 2013). In cross-sectional studies similar to this one, HIV risk has been consistently measured by asking participants for their sexually risky behaviors or acts within the last number of days. For instance, in a seminal study on Latino migrant workers by Organista and Kubo, the researchers, implementing a cross-sectional design, used a measure of HIV risk operationalized as "the number of sexual behaviors and partners during the past two months" (Organista & Kubo, 2005, p. 274). Asking participants to recall past events in terms of their frequency or otherwise should not be a suitable proxy for future or even present risk and should not, therefore, be used as a dependent variable or outcome in a regression model, irrespective of whether such model is anchored in a cross-sectional or longitudinal/cohort design. This way of assessing risk tampers with maintaining the necessary temporality between the independent and the dependent variables in any regression model in the sense that the independent variables must precede in time the dependent variable (Shahar, E., & Shahar, 2013).

As researchers Fonner and colleagues conclusively assert in their 2014 systematic review of hundreds of studies on sexually-related HIV transmission, condom use is the one single behavioral act that can reduce HIV infection; a fact that explains why the variable condom use has been a useful proxy for HIV risk (Fonner et al., 2014, p. 2374). Several researchers, in fact, have adopted this view and used 'condom carrying' as the

outcome variable in their studies, a strategy that was followed in the present study (Fonner et al., 2014; Maxwell, Bastani, & Warda, 2002; Organista et al., 2000).

One of the issues with using only one single questionnaire item to capture the outcome variable HIV risk behavior pertains to content validity, where the measure fails to represent all facets of the variable or construct (Bergkvist & Rossiter, 2007). Secondly and more importantly, because individuals at risk may still choose not to use condom even when they carry one, this measure of risk may not be the more reliable proxy for HIV risk. Given these considerations, other possible measures of HIV risk were closely considered. One such alternative was the Vaginal Episode Equivalent Risk Index (VEE), which in the parent study and in subsequent studies (e.g. Shehadeh et al., 2012) was used as an outcome variable to represent HIV risk. Such measure, however strong in terms of its reliability and validity, captures past behavior, not present or future behavior given that participants are asked to recall whether they had used condoms in the past. Therefore, VEE alludes to past sexually-related HIV risk, not present or future risk. Additionally, VEE as the measure for past HIV risk, captures behavior that took place before other variables in the hypothesized model, mainly behavioral intention.

In this study, since the variable is binary or binomial, participants' answers were scored as 0 (zero) for "Yes" and 1 (one) for "No" to the question "Are you carrying condoms on you?" A "Yes" answer was equated with low risk while a "No" answer represented high risk. Lastly, answers coded as 0 were assigned to the low HIV risk and those coded as 1 were assigned to the high HIV risk group. Once again, this way of assessing risk, although not ideal, is considered in this study and given the data at hand, a pertinent way of capturing sexually risky behavior that takes place between the intention

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to perform or not the behavior and the behavior itself (using condoms when performing sexual acts).

Behavioral intention: In the parent study, intention to perform the behavior was measured as intention to perform protected sex with condoms, using a 3-item, 4-point Behavioral Intentions Scale (BIS). The BIS measures intention to engage in HIV-risk reducing behaviors or actions. The items ask participants to assess whether they agreed with statements "I plan to use a condom the next time I have sex;" "I plan to use a condom every time I have sex;" and "I plan to use a condom the next time I have sex even if I've been drinking." Items were scored according to the answers, from 1 (Definitely will not do) to 4 (Definitely will do). To add to the reliability of the measure, a "Don't know" option was added to the list of choices. In previous studies, a Cronbach's alpha of 0.90 and over was reported for this scale, indicative of high reliability (Lucenko et al., 2033; McCoy et al., 2014). In this study, the internal consistency of the scale for this specific sample was also high, with a Cronbach's alpha=0.91. The sum score of all items was calculated and used to create the dependent variable Behavioral intention. All "Don't know" answers were excluded from the final composite score, given that the question is not part of the original scale.

Self-efficacy about condom use: Self-efficacy in the parent study was measured via a 6-item, 5-point scale self-efficacy scale, which measured perceived ability to perform sexually protective acts and behaviors related to condom use. Items were worded as "Using condoms isn't that difficult;" "It's hard to always use condoms;" "Using condoms takes a lot of effort;" "When you're really turned on, using condoms is hard;" "It's easy to use condoms when you're trying not to get pregnant;" and "It's hard to use

condoms if you feel you really know someone." Participants were asked to record their level of agreement (or disagreement) with those statements. Moreover, in this study, the sum score of all six items was used to create the final variable. In doing so, negatively worded items were reverse-coded. In a study by McCoy, Shehadeh, and Rubens, the scale was reported to have a somewhat low Cronbach's alpha of 0.59 (McCoy, Shehadeh, & Rubens, 2016). In this study, however, the scale had a somewhat higher reliability (Cronbach's alpha=0.66) for the sample selected.

Outcome expectancies regarding alcohol use: Since the notion of expectancies was first introduced in academia, one instrument, in particular, has become popular among researchers: A scale developed in the 1990s by K. H. Dermen and M. L. Cooper known as the Sex-Related Alcohol Expectancies (SRAE). The SRAE was created from items originally found in the Adolescent Alcohol Expectancy Scale and assesses the following five expectancies-related domains or subscales: global positive transformations, improved cognitive-motor abilities, social-emotional facilitation, negative emotion regulation or tension reduction, and impairment of judgment and cognitive functioning (Dermen & Cooper, 1994b).

The SRAE has widely appeared in the literature pertaining to sexually-related HIV risk behavior, alcohol use, and alcohol expectancies and the interplay among them. However, such body of evidence has been constricted to a specific study population: U.S.-born, adolescent or young adult, mostly women, mostly educated, and mostly of Caucasian background (Leigh, 1990; Gordon et al., 1997; Dermen et al., 1998; Brown & Vanable, 2007; Bryan et al., 2007; Pumphrey-Gordon & Gross, 2007; White et al., 2009). The SRAE has not been implemented in the study of minority and/or vulnerable

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population such as Latinos and migrant workers. Furthermore, the relationship between expectancies and *current* HIV risk behavior is yet to be explored in conjunction with other important variables such as behavioral intentions, social norms, social support, self-efficacy, and sexual abuse.

Behavioral or outcome expectancies was measured in the parent study via the Sex-Related Alcohol Expectancies (SRAE), a 13-item, 6-point scale developed by B. C. Leigh in 1990 (Gilmore et al., 2014). The scale has been found to be both valid and reliable since it was first introduced (Cronbach's alpha of 0.91; Dermen & Cooper, 1994a; Gilmore et al., 2014). The scale measures themes such as sexual enhancement, sex risk, and disinhibition. All items were assessed using Likert scales ranging from 1 (strongly disagree) to 6 (strongly agree), including a neutral point (Dermen & Cooper, 1994a). A total SRAE scale score can be created by averaging across all items, "with higher scores denoting stronger beliefs of sex-related alcohol expectancies" (Celio et al., 2016, p. 643). In this study, however, a composite measure of this variable was computed by adding all scores and was internally consistent (Cronbach's alpha=0.88).

Condom-use related social norms: This dissertation study explores social norms; more specifically, condom social norms, as measured in the parent study, in the context of sexually-related HIV risk behaviors among Latino migrant workers living in the U.S. Unlike the parent study in which the variable 'condom social norms' was presented in the model as an antecedent of behavioral intentions, in the present study, the variable was tested as direct co-predictor of *current* HIV risk.

Condom-related social norms or social norms toward protected sex, the behavior, was assessed using an 8-item scale adapted from an earlier 19-item scale developed by

Organista and colleagues (1997). The items assessed the frequency at which study participants approved of condom use. They also measured the frequency at which participants perceived their family and friends to approve of condom use. Items were scored on a 5-point scale ranging from 1 (very frequently) to 5 (never). To add to the reliability of the measure, a "Don't know" option was added to the list of choices. In previous studies, the scale had shown a high internal consistency (Cronbach's alpha=0.84). Because "Don't know" was not part of the scale, the answers were excluded from the final computation of the composite measure; which, in this study, was highly reliable (Cronbach's alpha=0.83).

Social support: Regarding the measuring of the construct, the most widely used instrument is the typology provided by Cutrona & Russell (1987) and the five general categories of social support: (a) emotional support or attachment, (b) social integration, (c) reassurance of worth (later renamed 'esteem'), (d) social network support, and (e) material help or tangible support. In the parent study, Cutrona and Russell's Social Provisions Scale (SPS) was used to assess social support; more specifically, the quality of social support. The scale is said to capture "the degree to which respondent's social relationships provide various dimensions of social support" (Cutrona & Russell, 1987). The SPS is said to identify six components of social support -each component has four items for a total of 24 items. Each item response receives a 1 to 5 score. The scale ranged from 24 to 120, with higher scores representing higher self-reported quality of social provision. In the parent study, a neutral point was added to increase reliability. In the parent study, Cronbach's alpha for this scale was 0.87. This dissertation study analyzed perceived social support via the Social Provisions Scale (SPS-24, Cutrona & Russell,

1987), as it was measured in the parent study. The final variable was a composite measure created by adding up the individual scores, which resulted in a Cronbach's alpha=0.78 for the specific sample in this study.

Sexual abuse history: Sexual abuse history was measured in the parent study via a three-item, binary scale. The questionnaire asked participants whether she or he has ever been sexually abused in the past 30 days (raped, forced sexual advances or non-consensual sexual acts); sexually abused in the past months (raped, forced sexual advances or non-consensual sexual acts); and sexually abused in your lifetime (raped, forced sexual advances or non-consensual sexual acts). The items were specifically worded as "Have you been… Sexually abused in the past 30 days? (raped, forced sexual advances or non-consensual sexual acts); Sexually abused in the past months? raped, forced sexual advances or non-consensual sexual acts); Sexually abused in your lifetime? raped, forced sexual advances or non-consensual sexual acts)." Three separate, binary variables were created to reflect those three different timeframes.

Past HIV risk: Few studies that have included past behavior in the context of understanding and predicting *current* HIV risk. They have measured the concept by asking participants about their behavior in the past six months for each type of sexual risk behavior under investigation (Turchik & Gidycz, 2012). In this study, a scale of sexual risk behavior developed by Susser and colleagues (1998) known as the Vaginal Episode Equivalent Risk Index (VEE) was used to assess *past* HIV risk. The scale measures overall sexual risk that produces ratio level data. Individual sexual risk items were used to calculate the composite measure via the formula (see below) as suggested by Susser and colleagues, which assigns different weights to the different sexual behaviors:

VEE Risk Score = (Number of unprotected vaginal episodes) + (2 x Number of unprotected anal episodes) + (0.1 x Number of unprotected oral episodes).

The formula allows researchers to assign risk scores at the individual level depending on the type and frequency of the sex act. Each individual score represents the total amount of different types of sexual acts within a recollection time period (e.g. past 30 days). The higher the VEE score, the higher the levels of HIV risk. As Kingree et al. (2000) noted that by focusing on one discrete event (e.g., most recent sex episode), event-based analyses should yield more accurate recall than the other methods.

Use of alcohol and other drugs (AOD): In the parent study, participants' AOD use was assessed via the Timeline Followback Interview (TLFB). This method was developed by Sobell & Sobell (1988) to assess alcohol use in a manner that improves accuracy and, thus, minimizes recall error. This is accomplished by asking participants to use a calendar format to record their alcohol using behaviors. Resulting from this is a variable, AOD use, that includes de sum of the total number of days in which alcohol was used, 2) the total number of drinks consumed, 3) the total number of days in which drugs were used, 4) the longest period of time in which alcohol was not consumed, and 5) the longest period of time in which drugs were not consumed.

Analytic strategy.

Descriptive statistics were computed for all variables. Means and standard deviations were calculated for continuous variables and frequencies and percentages, for categorical variables. For continuous or quantitative variables, normality was assessed via normality tests and with the aid of skewness and kurtosis values and Q-Q plots.

Correlation analysis: To check the association or correlation between variables prior to carrying out regression analyses, Pearson's product-moment correlation coefficient *r* was conducted to assess the relationship between continuous or numerical variables and Spearman's rank coefficient *p* (rho) to assess the association between categorical and continuous variables were computed. The correlation coefficient r assumes the absence of significant outliers and the presence of linearity between the two variables under analysis. To check for the linearity assumption, scatterplots of each pair of variables of interest were produced -if not met, this is, if the relationship between two variables is nonparametric, data were either transformed or a nonparametric correlation coefficient such as Spearman's *p* was calculated instead.

When interpreting these coefficients, a coefficient of +1, for instance, indicates a strong positive correlation, while -1 is traditionally suggestive of a strong negative correlation or association. Additionally, a zero is interpret as an absence of a relationship between the two variables. In this study, hypotheses 1a through d state the positive relationship between independent variables outcome expectancies and AOD use and the dependent variable behavioral intention and the negative relationship between independent variables social norms and self-efficacy and the dependent variable behavioral intention. Hypotheses 2a through d, on the other hand, state the positive relationship between independent variable sexual abuse, behavioral intention, and past sexual behavior and the dependent variable *current* HIV risk behaviors and the negative relationship between the independent variable social support and the dependent variable *current* HIV risk behaviors.

In this study, even though relationships have been hypothesized to be unidirectional 1-tailed tests are traditionally considered to strengthen the power of the study to detect an effect in one single direction solely (Ruxton & Neuhäuser, 2010) and, some statistical tests are inherently 1-tailed or 2-tailed, depending on the test. When possible, 1-tailed results are reported.

Regression analysis: Two specific forms of multiple regression analyses were conducted to accomplish aims 1 and 2. These regression analyses were carried out for Aim 1 via zero-inflated Poisson regression analysis in SAS® 9.4 Software and for Aim 2 via Binary Logistic Regression in IBM® SPSS® Statistics, Version 23.

Aim 1 entails the evaluation of the relationship between three theoretical predictors, namely, self-efficacy, social norms, and outcome expectancies and behavioral intention as the dependent variable, as well as the relationship between empirical predictor AOD use and behavioral intention. For this, zero-inflated Poisson regression was the analysis of choice. The dependent variable, behavioral intention, was initially considered a true continuous or interval variable and therefore multiple linear regression was the technique of choice. However, upon checking for the assumptions involved in multiple linear regression regarding the normality of residuals, the relation was not linear. Therefore, other techniques had to be considered for which the linearity of the residuals involving the independent variables is not assumed.

In this regard, Chi-square (χ^2) goodness of fit tests were performed to assess whether the variable behavioral intention followed a specific probability distribution as a categorical variable, in which case Poisson regression analysis would be conducted. The p-value for $\chi^2_{(12)} = 560.75$ was significant (p<0.00), which was interpreted as a lack of

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evidence in support of that hypothesis. Given this result and because of the large number of observations were found concentrated around the largest value of the variable, the decision was made to carry out zero-inflated Poisson regression. For this, behavioral intention was transformed via the technique called zero-inflation.

Zero-inflated Poisson regression is a technique used when the dependent variable has an excess of zeroes. This type of generalized Poisson regression offers some advantages; the main one being the analysis of count data that is dispersed (Famoye & Singh, 2006). In these types of analyses, however, the interpretability of the results becomes less straightforward (Lambert, 1992). Since the variable behavioral intention had a large frequency of maximum scores, i.e. 12, a new version of the variable was produced by deducting each individual score from the highest score. In zero-inflated Poisson regression, two separate regressions are performed, a logistic regression for the zero scores and a Poisson regression for the non-zero scores. This technique produces two distinct regression models, one in which only certain zero cases are analyzed and another one in which non-zero cases are analyzed against the non-zero scores. Consequently, the direction of the distribution of the variable was reversed. The interpretation of results takes this into account.

Regarding Aim 2 and the exploration of the potential predicting effects of behavioral intention, social support, *past* HIV risk, and sexual abuse history on *current* HIV risk, binary logistic regression was the technique of choice. This type of regression analysis involves few assumptions regarding the normality of the data and, therefore, is a more robust approach to analyzing models involving a dependent variable with only two categories, as in this case. Binary logistic regression has been used in a plethora of

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studies to calculate odds ratio and indirect probability or relative risk in the context of risk analysis, not just in the context of public health. Logistic regression is "the most common method used to model binary response data but it is one that introduces additional bias into the coefficients or parameter estimates (Hilbe, 2011).

Overestimation of the odds ratios or beta regression coefficients was analyzed by Nemes and colleagues in their 2009 study. In such study, the researchers examined the effects of sample size on bias size in logistic regression and concluded that smaller samples produced studies in which the effects of the predictors on the dependent variable were overestimated. They also remind readers that when the outcome under investigation is rare, larger sample sizes should be employed (Nemes, 2009). In line with the recommendation that in general and logistic regression in particular, a sample larger than 100 minimize the risk of estimate overestimation, logistic regression analysis will be conducted on a sample larger than 200 participants.

To control for the effect of important sociodemographic characteristics, the variables age, gender, marital status, level of education, and amount of time Latino migrant workers have spent in Immokalee (the agricultural town where participants work and reside) will be entered in each of the two regression models pertaining to aims 1 and 2. All other independent variables were also evaluated to determine whether they met the assumptions for the analyses. These regression techniques are considered fairly unbiased and therefore reliable due to the 'robust' nature of these analytical tools.

Path mediation analysis: With respect to Aim 3 involving the exploration into the mediating effects of behavioral intention on the relationship between self-efficacy and *current* HIV risk, condom social norms and *current* HIV risk, outcome expectancies

about alcohol use and *current* HIV risk, and AOD use and *current* HIV risk, a series of path mediation analyses were conducted. In implementing path analysis as the confirmatory technique of choice to examine behavioral intention as a mediator as stated in Aim 3, IBM® SPSS® Statistics, Version 23.

More specifically, a module known as IBM® SPSS® Analysis of Moment Structures (AMOS), Version 21 was used. This module is suitable when testing complex mediation models, this is, when the specified path analytic models testing mediation moves beyond the single mediation model or for testing single mediation models, as in this study, when the dependent variable is categorical. AMOS was designed to assist researchers with the analytical requirements of conducting covariance structure modeling, when alternatives to sequential linear regressions techniques are needed (AMOS, 2017).

Mediation analysis tests for indirect causal relationships between variables. The simplest model tests the intervening or mediating effects that a variable exerts on the relationship between two variables (Fritz & MacKinnon, 2007). Contained in Figure 1 are each and all the mediation paths that were tested in this study. Mediational models are theoretically causal models in that statistical methods and techniques are used to confirm or not the causal paths and not vice versa (Kenny, 2016).

In testing for mediation effects, researchers attempt to understand a causal process or mechanism by which one variable, the causal variable, affects another -the outcome or dependent variable via a third variable, the mediator or intervening variable (Kenny, 2016). One way of carrying out mediation analysis is via path analysis; other researchers have also tested mediation effects via Ordinary Least Squares (OLS) methods, namely, multiple regression. Other methods involve Maximum Likelihood (ML) estimation.

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Given that the outcome variable in this study is binary in nature, ML estimation is recommended. Irrespective of the method, experts prescribe the four steps, described next, which need to be followed for mediation effects to be established (Fritz & MacKinnon, 2007; Kenny, 2016).

Known as the Baron and Kenny's causal-step method, the approach consists of four steps for assessing the presence of mediation effects for single mediation models (see Figure 2 below). First, the researcher must demonstrate that the causal or independent variable and the outcome or dependent variable are correlated; second, that the causal variable and the hypothesized mediator are correlated; third, that the mediator has an effect on the outcome variable; and fourth, that the mediator completely (if the path coefficient *c′* equals zero) or partially (if the path coefficient *c′* is different from zero) mediates the relationship between the causal variable and the outcome (Kenny, 2016). In the words of Baron and Kenny (1986), "(m)odels in which all four steps are satisfied are called fully mediated models" (Fritz & MacKinnon, 2007, p. 2). When carrying out the third step and because mediation effects can be complete but could also be partial, the causal variable should be present in the model testing the effect of or path between the suspected mediator and the outcome variable (Kenny, 2016). In this study, four path mediation analyses were modeled in order to test the effect of behavioral intention on the relationship between each of the causal or independent variables self-efficacy, outcome expectancies, social norms, and AOD use and the dependent or outcome variable *current* HIV risk behaviors (see Figure 1).

Figure 2. Path diagram for the regression model (top) and the single mediation model (bottom), from MacKinnon, 2008.
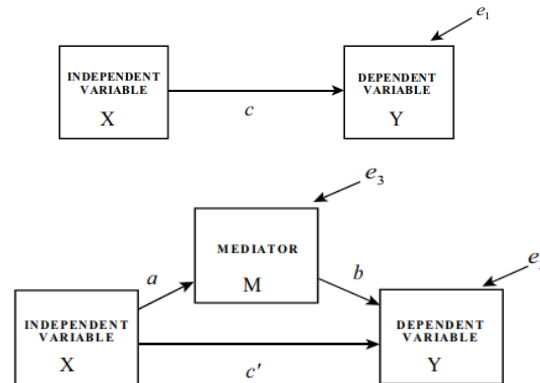
As Figure 2 shows, the prime ($'$) sign on coefficient c indicates that the relationship between X and Y has been adjusted for mediation effects; thus, in the regression model, the path coefficient denoted by c is not adjusted. The parameter e_3 or third error term provides a measure of how much of the mediator variable is not being explained by its relationship with the causal or independent variable and the outcome or dependent variable (McKinnon, 2008).

The following regression equations which have been used to establish mediation are:

$$(1)\ Y = \beta_1 + cX + e_1$$

$$(2)\ M = \beta_2 + \alpha X + e_2$$

$$(3)\ Y = \beta_3 + \beta M + c'X + e_3,$$

where Y is the dependent variable; X is the independent variable; M is the mediator; c is the path coefficient measuring the relation between X and Y in the equation 1; c' is the path coefficient measuring the relationship between X to Y, adjusted for the effects of M in equation 2; b is the parameter for the relationship between M and Y, adjusted for the effects of the Y; a is the parameter for the relationship between M and X; e_1, e_2, and e_3 are the error terms capturing unexplained variation. Regarding the intercepts, since they are not "involved in the estimation of mediated effects," (MacKinnon, 2008, p. 50), they were excluded from the equations.

Regarding confirmatory test for complete mediation, when this type of mediation can be hypothesized about because enough evidence exists from theory or from prior research, the complete mediation model is recommended to be tested first. In the words of MacKinnon, "the complete mediation model consists of testing whether or not the c' coefficient is statistically significant (MacKinnon, 2008, p. 72). In this study, despite the hypothesized complete mediation effects of behavioral intention (see Aim 3 and hypotheses 3a-d) on the causal path between the independent variables self-efficacy, outcome expectations, social norms, and AOD use and the dependent or outcome variable sexual risk behaviors, complete or full mediation was not expected, considering that complete mediation and simple mediation models are not depictive of real life scenarios (MacKinnon, 2008).

One assumption of the regression equation in a single mediation model is that "the relation from the mediator to the dependent variable is the same across levels of the independent variable; that is, the M to Y relation does not differ across levels of X" (MacKinnon, 2008, p. 279). When this assumption is not met, this is, when the

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coefficient *h* for the XM interaction term is not zero (see the equation below), the causal

or independent variable X has an effect on the M-Y relationship. In this scenario, X is not

a moderator if X is a random variable. Additionally, a nonzero the relationship between X

and Y could also expose the variation of the X-Y relationship across the different levels

of M. To test for XM interaction effects, research use the following regression equation:

$$Y = i_2 + c'X + bM + hXM + e_2$$

where *h* is the coefficient for the interaction term (MacKinnon, 2008).

The four-step approach, also known as the causal step method, espoused by D. A.

Kenny and colleagues in the 1980s, has been considered "the most widely used method to

test for mediation because of the clear conceptual link between the causal relations and

the (…) statistical tests" (MacKinnon, 2008, p. 70). The approach tests mediation via

direct effects or path ***c'***. Other approaches rely on testing indirect effects or path ***ab*** to

confirm mediation: "In contemporary mediational analyses, the indirect effect or ***ab*** is the

measure of the amount of mediation" (Kenny, 2006, para. 10).

Some of these more contemporary approaches include the joint test of

significance, the Sobel test, bootstrapping, and the Monte Carlo method. The last two are

suggested preferred approach in that they accommodate for when the paths ***a*** and ***b*** are

correlated; however, even though the un-correlation of ***a*** and ***b*** is not an assumption

neither the bootstrapping nor the Monte Carlo method, the latter can be more

advantageous than bootstrapping in most situations. The Sobel test, named after

statistician M. E. Sobel, is the least recommended of the four because it requires ***a*** and ***b***

to be independent, an assumption difficult to meet (Kenny, 2006).

In this study, IMB® SPPSS® Statistics-AMOS, Version 22 was used. AMOS can be used to bootstrap in order to test indirect effects or path *c′*. AMOS can also be used to test the direct effects using Kenny's approach. In path analysis, for mediation procedures that use Bayesian inference when one of the variables is dichotomous or binary, the Markov chain Monte Carlo (MCMC) method is applied to infer the posterior distribution of the sample.

Model specification was accomplished by a priori identification of the variables and their relationships in a path diagram depicted in Figure 1. The figure illustrates an input path diagram of the hypothesized relationship between the variables and the directionality of that relationship. Path analysis was used as confirmatory analysis to test the mediation model (Figure 1). Additionally, model estimation was performed in a similar fashion as to that in multiple linear regression. Because path analysis is performed as a series of linear regressions, the estimated coefficients are partial, given that each independent variable contributes only partially to the explanation of the dependent variable; as there are other variables in the model or regression equation which are held constant.

In this study, model identification was performed using an algorithm, a heuristic tool which relies on the degrees of freedom to identify the structural model. According to such algorithm, the degrees of freedom equal the number of observations (O) minus the number of parameters (Pr). The number of observations (O) results from dividing 2 from the number of measured variables (MV), multiplied by the number of measured variables (MV) plus 1. The number of parameters equals the number of paths, plus the number of unexplained variances (UVr), plus the number of exogenous variables (EV). The

calculation was only performed once, even though four mediation models were to be analyzed, given that the values for all the different parameters were the same in all four models.

In this study, all four of the single-level models tested here as part of Aim 3 had DF=0. This indicated that each and every one of the models was just-identified. Conventionally, whereas an over-identified model (when DF>0) is ideal, an under-identified model (DF<0) is suboptimal and path analysis cannot be performed (Grace, 2015).

Conceptualized as a series of linear equations which are applied sequentially to the analysis of the data, path analysis could be considered variation or extension of multiple regression. As such, in path analysis, the assumptions are similar to those pertaining to multiple linear regression. Similar to multiple linear regression, in path analysis, the estimated coefficients are partial in that each independent variable contributes only partially to the explanation of the dependent variable while any other variables in the model or regression equation are held constant.

Path analysis is also considered a special case of Structural Equation Modeling (SEM) of covariance and correlation matrices, -a procedure in which all measured variables are manifest or observed -i.e. only one indicator per variable (MacKinnon, 2008). Unlike SEM, however, path analysis is performed under the assumption that the variables in the model have no measurement error. In path analysis, there is no measurement model: Only the structural relationship between observed/measured variables, not the measures, is modeled. At the expense of potentially compromising the reliability of the measures in the absence of latent variables, path analysis allows

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researchers to fit complex, multiple-component models to the kind of sample sizes most commonly available to researchers (Bryan et al., 2006).

Path analysis serves as a causal modeling approach to exploring the correlations between variables in a specified -theoretical, conceptual, or empirical- model. Among the advantages of performing path analysis via covariance-based structural modeling, there is the one related to the researcher's ability to handle more complex relations between variables or multiple regression equations within one model and do so simultaneously - not sequentially. Additionally, as a type of multivariate analysis also allows researchers to estimate how well the final model fits the data. Furthermore, as a model-fitting approach, path analysis also allows to evaluate the fit of the model to the sample data. Retaining parsimony and simplicity in the interpretation of the results can be a challenge in path analysis when the final model contains more than five variables. In the case of this study, single mediator models were evaluated in order to assess whether the mediation is partial or full.

Depending on the complexity of the model, path analysis can be conducted as a series of Ordinary Least Square (OLS) regression analyses (for specified model which are not a single mediator model) or via Maximum Likelihood (ML) estimation methods. The causal step mediation approach proposed in Judd & Kenny (1981) and Baron & Kenny (1986) is based on ML for estimating coefficients and error terms (MacKinnon, 2008).

In this study, however, because the dependent variable pertaining to Aim 3 is dichotomous and thus follows a binomial (nonlinear) distribution, conventional estimation methods have limitations or can simply not be applied. For instance, ML estimation does not allow for nonlinearity. In AMOS, path analysis involving categorical

responses can be modeled via Bayesian estimation. Moreover, Markov Chain Monte Carlo (MCMC) family of algorithms are available in AMOS in order to perform Bayesian estimation.

In path analysis, model appropriateness is not determined in a straightforward manner; rather, multiple test statistics are examined. When the model is overidentified or not saturated, i.e. when the model has positive degrees of freedom because the number of unique pairs of variables is higher than the number of causal or correlational relationships between those variables, model appropriateness or fit can be ascertained via the Chi-squared test of model fit, the Comparative Fit Index (CFI), and the Root Mean Squared Error Approximation (RMSEA) fit indices. In SPSS AMOS, however, since path analysis involves a binary outcome or dependent variable, goodness of fit can be approximated via the Posterior Predictive p-value, which provides some information on the overall model fit to the data (a value close to 0.50 is desirable).

Power analysis. A series of power analyses were performed for all aims. In the words of Fritz and MacKinnon (2007), "statistical power refers to the sensitivity of a null-hypothesis test to detect an effect when an effect is present… (Power) is equal to 1 minus the Type II error rate (i.e., the probability of failing to reject the null hypothesis when an effect is present) (and) is conventionally considered adequate at 0.8" (p. 3). In view of the exploratory nature of the undertaking, power was not calculated moderation analysis.

Power calculations were performed for multiple linear regression for Aims 1 and 2 via the PASS 11 software. Due to a lack of previous studies in which similar research aims were explored, the effect size or the detectable difference, for four (4) within subject

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factors, was set to 0.4 in order to achieve 80 percent power for an estimated sample size N=270, for both, aims 1 and 2. Since the effect sizes were unknown and could not be estimated from previous studies, minimum effect sizes detectable at 80 percent power and sample size N=270 were calculated instead via the Mixed Models procedure in PASS 11. For Aim 1, a sample size of N=270 was estimated to achieve 80 percent power to detect a minimum effect size (R^2) of 0.025 attributed to three independent variables using an F-test with a sig. level alpha=0.05. For Aim 2, a sample size of N=270 was estimated to achieve 80 percent power to detect a minimum effect size (R^2) of 0.029 attributed to five independent variables using an F-test with a sig. level alpha=0.05.

For the purposes of path mediation analyses pertaining to Aim 3, power calculations were also performed. The minimum sample size needed was calculated to achieve 80 percent power. Using a sample size calculator tool, for 28 *df*, a significance level α=0.05, a desired power of 0.80, RMSEA (H_0) of 0, and RMSEA (H_1) of 0.06, the required sample size obtained was N=239 (see MacCallum et al., 1996). This encompasses what most researchers recommend when conducting path analysis; this is, that at least 10 observations be had per model parameter (for an overview, see Kline, 2010, pp 11-12).

Alternatively, when carrying out mediation analysis, irrespective of the type of test used to perform mediation analysis, MacKinnon and colleagues suggest an empirical rule to detect mediated effects which has been included in Appendix A of this study. According to that rule, in a single mediated model scenario, when complete mediation (no effect of the causal variable X on the dependent variable Y or c′=0) and large partial effects (paths *a* and *b*) are expected, a sample size of 92 is sufficient to keep power at 80

percent (MacKinnon et al., 2002). A sample size N=270 is, then, by this account, a sufficient sample size. Furthermore, relatively small sample sizes can be used in models with no latent variables, as is the case in this dissertation study.

Summary

In this chapter, a brief description of the parent study which provided the data for this study was offered. Attention was given to the particulars of the parent study in terms of the study design, the sampling procedures, the sample size, the sample type and the methods used for capturing the data. In terms of this present study, a thorough discussion was offered regarding the choice of measures and the indicators used to operationalize the study variables as well as the analytical plan to be followed in order to address the three research questions. For Aim 1, the analytical plan involves the implementation of zero-inflated Poisson regression given the manner in which the dependent variable behavioral intention was measured; while, for Aim 2, the evaluation of predictors of the outcome variable *current* HIV risk was carried out via Binary Logistic regression. A discussion of path mediation analysis, the technique that was used to carry out Aim 3, was also provided. The next chapter (Chapter IV) presents the findings collected from the application of these analyses, followed by a discussion of the results in Chapter V.

CHAPTER IV

RESULTS

This chapter provides the outcomes of those statistical tests and procedures that were carried out in order to accomplish the study aims. In doing so, findings and consequent outputs from descriptive statistics, reliability analyses, multiple regressions, and path mediation analysis are presented here. As previously stated, IBM® SPSS® 23, SAS® 9.4, and IMB® SPSS® AMOS 21 were used to perform the analyses, using baseline data from the parent study.

For univariate analysis, frequencies, percentages, means, standard deviations were reported for each variable of interest. For bivariate analysis of correlations and associations, Spearman's rank ρ (rho) correlations, two-sample independent *t*-tests, one-way Analysis of Variance (ANOVA) F-tests, and cross-tabulations to obtained Pearson Chi-squared and Fisher's Exact Chi-squared tests statistics were performed. The demographic variables included in the models were age, gender, marital status, education, and length of stay (amount of time living in Immokalee). The means and standard deviations, along with p-values for bivariate analyses are displayed in Table 1.

While cross-tabulations and two-sample independent *t*-tests were carried out to assess whether participants fell in the high or low group of *current* HIV risk, multiple linear regressions were conducted to examine the relationship between self-efficacy, social norms, and outcome expectancies and changes in behavioral intention scores. To evaluate the predicting significance of changes in behavioral intention scores on *current* HIV risk, binary logistic regression was the analysis of choice. The decision to include age, gender, marital status, education, and length of stay as the control variables in each

of the regression models pertaining to Aims 1 and 2 was not based on whether they had demonstrated an association or correlation with the dependent variable. The rationale for this decision was based on the consideration that many variables become significant in regression models under the effect of other variables.

Univariate and bivariate analyses.

Table 1 presents summary statistics in the form of means ($\bar{x}$) and standard deviations (*SD*) for scale-level variables and frequencies (n) and percentages (%) for categorical-level variables. P values correspond to independent-samples (2-tailed) t-tests for differences in mean behavioral intention (BIS) scores by gender, education, native language, and country of origin, and differences in mean age, mean length of stay by levels of *current* HIV risk; one-way ANOVAs F-tests for associations between behavioral intention and marital status, level of religiosity, level of income, and type of living arrangement; Spearman's rank-order tests for correlations between BIS scores and age and length of stay; and Pearson's or Fisher's Exact Chi-squared (χ^2) tests for associations between binomial or dichotomous variables, i.e. *current* HIV risk and gender, marital status, education, native language, country of origin, level of religiosity, level of income, and type of living arrangement.

As seen in Table 1, the mean age of the baseline sample (*n* = 270) of Latino migrant workers was 38.79 years old (*SD* = 11.65 years). Males accounted for 80 percent (n=216) and only 25 percent (n=67) of participants were married or cohabitating (living as married). With respect to education attainment, more than half (n=147) the sample had the equivalent of an 8th grade or less. Eighty percent (n=215) of participants' native language was Spanish and 65 percent (n=176) of the sample migrated from Mexico. Most

Latino migrant workers are somewhat religious (n=108, 40%) or a little religious (n=84, 31%), while 14 percent (n=38) are very religious and 15 percent (n=39) are not religious at all. Reported overall income from all sources such as a job, unemployment benefits, or another financial assistance program was very low and only 24 percent (n=60) of participants made more than $600 in one month. The mean length of time participants had spent in Immokalee was 168 months (SD=276). Lastly, while more than half the workers were living in their own house or apartment, 28 percent (n=58) were sleeping in shelters or flophouses and eight percent (n=16) were homeless.

Regarding the dependent variable in Aim 1, behavioral intention, measured as BIS scores, the median score was 10 (IQR=3) for this sample. There were no statistically significant differences in behavioral intention scores between female and male participants. Similarly, there were statistically significant differences in terms of any other sociodemographic characteristic of this sample. Spearman's rank-order tests for correlation between length of time spent in Immokalee and behavioral intention (BIS) was weak and non-significant at the 0.05 level (2-tailed), although it was significant at the 0.05 level (1-tailed).

In terms of the dependent variable in Aims 2 and 3, *current* HIV risk, more than half the sample, 57 percent, reported not carrying condoms and was therefore in the high-risk group. Level of educational attainment was significantly associated with HIV risk ($\chi^2_{(1)}$=4.01, 2-tailed p-value=0.05). Here too, no statistically significant differences were found between women and male participants, given that the proportion of *current* HIV risk among females was not significantly different that among males.

Table 1: *Demographic characteristics and differences in behavioral intention (BIS) scores (n=270) and current HIV risk (n=270) among Latino migrant workers*

Demographic Variable	BIS 10(3)	Test statistic	*p* value	Current HIV Risk		Test statistic	*p* value	Descriptive statistics
				Low 115 (43%)	High 155 (57%)			
Age	----	ρ=-0.04	0.49	39.32±11.53	38.06±11.81	t=0.88	0.38	38.79±11.65
Gender		t=-0.62	0.54			χ^2=0.10	0.76	
Female	8.91±3.56			24(9%)	30(11%)			54(20%)
Male	9.28±3.03			91(34%)	125(46%)			216(80%)
Marital Status		F=1.22	0.30			χ^2=4.68	0.10	
Single	9.53±2.97			62(23%)	70(26%)			132(49%)
Married/LAM	8.67±3.55			21(8%)	46(17%)			67(25%)
Divorced/Widowed	9.10±2.98			32(12%)	39(14%)			71(26%)
Education		t=-0.35	0.73			χ^2=4.01	0.05*	
8th grade or less	9.19±3.10			55(21%)	92(34%)			147(55%)
Some high school or higher	9.25±3.15			60(22%)	61(23%)			121(45%)
Native Language		t=0.67	0.50			χ^2=2.65	0.10	
English	9.34±3.35			28(10%)	25(9%)			53(20%)
Spanish	9.20±3.03			87(33%)	128(48%)			215(80%)
Country of Origin		t=0.92	0.36			χ^2=0.26	0.61	
Mexico	9.16±3.25			73(27%)	103(38%)			176(65%)
Other	9.228±2.94			42(16%)	52(19%)			93(35%)
Religiosity		F=0.74	0.53			χ^2=1.18	0.28	
Very religious	9.24±3.15			16(6%)	22(8%)			38(14%)
Somewhat religious	8.77±3.23			41(15%)	67(25%)			108(40%)
A little religious	9.56±3.12			39(15%)	45(17%)			84(31%)
Not religious	9.54±2.86			19(17%)	20(7%)			39(15%)
Income (past 30 days)		F=1.64	0.18			χ^2=1.08	0.30	
Less than $200	8.83±3.29			19(8%)	37(15%)			56(23%)
$200-$399	9.04±3.24			41(17%)	50(20%)			91(37%)
$400-$599	10.10±2.48			18(7%)	22(9%)			40(16%)
$600 or more	9.23±3.07			27(11%)	33(13%)			60(24%)
Length-of-Stay (Immokalee)	----	ρ=-0.12	0.06	163.5±168.2	171.0±162.9	t=-0.36	0.72	168(276)
Living Arrangement		F=1.84	0.16			χ^2=1.48	0.48	
House/Apartment	9.15±3.14			75(28%)	99(37%)			174(64%)
Shelter/Flophouse	9.69±3.35			27(10%)	31(12%)			58(28%)
On the Streets	8.71±2.76			13(5%)	25(9%)			16(8%)

Notes: LAM=Living as Married.

*. Association is significant at 0.05 (2-tailed).

ρ= Spearman rank-order test statistic; F= one-way ANOVA F-test statistic; t= independent sample t-test statistic; χ^2=Fisher's Exact Chi-squared test statistic.

For the variable behavioral intention, the Median and InterQuartile Range were reported in lieu of Mean and Standard Deviation.

Table 2 displays the correlation matrix for all hypothesized independent variables, the dependent variable, behavioral intention, and the outcome variable, *current* HIV risk. Unlike regression techniques, correlations test crude or unconditional linear associations between two given variables at the scale level of measurement. Statistically significant correlations are shown with asterisks. The decision of executing Spearman's rank-order correlations versus Pearson Product Moment correlations was based on the fact that some variables displayed a level of skewness between ±1 and ±6. Extreme outliers were removed from past HIV-risk (VEE), and AOD use (Number of Drinks), a recommended procedure when skewness persists and normality tests are statistically significant, even after variable normality via logarithmic transformation was attempted.

Given that a few other variables also contained outliers and therefore deviations from normality, the decision was made to keep those outliers, except for the cases described above, was based on the fact that they were not extreme values and/or that they did not create significant associations. Given this scenario, logarithmic transformations of these variables and Pearson Product Moment correlations, which assume linear distributions, was considered; however, the straightforwardness interpretability of the results would have been compromised as the results would have undergone back-transformations, a process that results in exponential rather than linear (arithmetic) associations between the variables. In this scenario, the results below pertain to Spearman's rank-order correlation coefficient ρ (rho), known for the robust nature of the procedure. Unadjusted linear relationships or correlations were interpreted using a popular rule of thumb where a coefficient between 0.00 and 0.19 denotes a very weak correlation, between 0.20 and 0.39, a weak correlation, between 0.40 and 0.59, a

moderate correlation, between 0.60 and 0.79, a strong correlation, and between 0.80 and 1.0, a very strong correlation (Dudley et al., 2017).

As illustrated in Table 2, only two independent variables were related to the dependent variable behavioral intention (BIS). Behavioral intention (BIS) and *past* HIV risk (VEE) were negatively but weakly correlated at the 0.05 level of significance, $r_{(223)}$= -0.35, p=0.00. AOD use (#Drinks) was negatively and very weakly related to behavioral intention (BIS) at the 0.05 level of statistical significance, $r_{(268)}$= -0.19, p0.01. With regard to independent variables, number of drinks and number of drinking days, both measures of alcohol and other drugs usage, were moderately correlated at the 0.001 level of significance, $r_{(268)}$=0.54, p=0.01. Outcome expectancies (SRAE) and social support (SPS) were significantly but weakly correlated to AOD use (Number of Drinks), $r_{(268)}$= 0.12, p=0.05 and $r_{(268)}$= 0.15, p=0.01, respectively. Social norms and outcome expectancies (SRAE) scores were significantly but weakly related to AOD use (Drinking_Days), $r_{(268)}$= -0.13, p=0.04 and $r_{(268)}$= 0.19, p=0.00, respectively. Social support (SPS) and *past* HIV risk (VEE) were negatively and weakly correlated at the 0.05 level of significance, $r_{(223)}$= -0.14, p=0.04. Finally, outcome expectancies (SRAE) and social support (SPS) scores were significantly but weakly related to self-efficacy ($r_{(270)}$= 0.15, p=0.01 and $r_{(270)}$= 0.14, p=0.02, respectively) and to social norms ($r_{(270)}$=0.15 , p=0.01 and $r_{(270)}$= -0.19, p=0.01, respectively).

Table 2. *Correlations between scale-level variables.*

Independent variables	1	2	3	4	5	6	7	8
1. AOD use (#Drinks)	----	-----	-----	-----	-----	-----	-----	-----
2. AOD use (Drinking_Days)	0.54**	----	-----	-----	-----	-----	-----	-----
3. *Past* HIV Risk (VEE)	0.06	0.06	-----	-----	-----	-----	-----	-----
4. Self-efficacy	0.06	0.07	0.07	-----	-----	-----	-----	-----
5. Social Norms	-0.10	-0.13*	0.11	-0.09	-----	-----	-----	-----
6. O. Expectancies (SRAE)	0.12*	0.19**	0.05	0.15*	0.15*	-----	-----	-----
7. Social Support (SPS)	0.15*	0.12	-0.14*	0.14*	-0.19**	0.06	-----	-----
8. Behavioral Intention (BIS)	-0.19**	-0.12	-0.35**	-0.11	-0.07	0.05	-0.02	-----

Notes: Spearman's rank-order correlation coefficient ρ (rho)
*. Correlation is significant at 0.05 (2-tailed)
**. Correlation is significant at 0.01 (2-tailed)

Table 3 displays the test statistics and p-values of two-sample independent *t*-tests and Pearson's or Fisher's Exact Chi-square (χ^2) tests of independence performed to look for associations between the independent variables and the outcome variable *current* HIV risk. Table 3 also includes summary statistics expressed as means ($\bar{x}$) and standard deviations (*SD*) or medians and InterQuartile Range for those variables with outliers, and frequencies (n) and percentages (%), depending on the level of measurement of the independent variable. As the table shows, *past* HIV risk (VEE), self-efficacy, social support, and behavioral intention were independently and significantly associated with the outcome variable, *current* HIV risk. In the case of the first three independent variables, *past* HIV risk (VEE), self-efficacy, and social support (SPS) were found to be significantly higher among the proportion of participants at high risk of HIV ($t= 4.40$, p= 0.01; $t= 3.30$, p= 0.01; and $t= 2.28$, p= 0.02, respectively). In the case of behavioral intention (BIS), lower scores, i.e. lower intention to perform the protective behavior was associated with being in the 'higher' category of *current* HIV risk ($t= -3.66$, p= 0.01).

Table 3. *Associations between independent variables and current HIV risk (n= 270).*

Independent	*Current* HIV Risk		Test	*p*	Descriptive
Variables	Low	High	statistic	value	statistics
	115 (43%)	155 (57%)			
AOD use (#Drinks)	53.37±70.91	61.15±80.35	t=0.82	0.41	24(36)
AOD use (Drinking Days)	15.11±15.02	16.14±15.04	t=0.55	0.58	12(24)
Sexual Abuse Hx (Lifetime)			χ²=0.20	0.14	
No	97(36%)	140(52%)			237(88%)
Yes	18(7%)	15(6%)			33(12%)
Past HIV Risk (VEE)	2.62±5.15	6.70±10.25	t=4.40	0.01*	1(5.0)
Self-efficacy	14.99±3.14	16.34±3.42	t=3.30	0.01*	15.76±3.37
Social Norms	13.23±8.00	13.55±9.27	t=0.30	0.77	15(11)
Expectancies (SRAE)	18.97±9.01	16.93±9.49	t=-1.86	0.64	17.74±9.35
Social Support (SPS)	62.23±8.51	64.77±9.40	t=2.28	0.02*	61(11)
Behavioral Intention (BIS)	10.06±2.51	8.57±3.40	t=-3.66	0.01*	10(3)

Note: All p-values are 2-tailed.

*. Association is significant at 0.05 (2-tailed).

Generalized linear regression analyses

Multiple linear regression analyses were conducted to test the hypotheses associated with research questions 1 and 2. Sociodemographic variables age, gender, marital status, education, and length of stay were included in the models as covariates. To avoid what researchers often refer to as the malpractice of 'fishing for results," all tested regression models were restricted to the variables hypothesized in the conceptual framework; except for potential confounders, those sociodemographic variables included in the models as controls.

Aim 1. Zero-inflated Poisson regression: To address the first aim and after checking for possible violation of the assumptions, a zero-inflated Poisson (ZIP) model using Maximum Likelihood (ML) estimation was fit to the dependent variable behavioral intention (BIS) scores. Therefore, two models were specified: The full model and the zeroes-only model. SAS® 9.4 for Windows was used. Results are displayed below (Table

4). In ZIP regression, two models are produced: A count model modeling the probability of those individuals who have a certain zero count, the zero-inflated model, and a second model in which the probability of having any other score is predicted by a Poisson regression. For the purposes of this study, only results from the count model coefficients are reported and interpreted.

As table 4 shows, except for gender ($p<0.01$) and length of stay in Immokalee ($p= 0.04$) which were significantly associated with the dependent variable, behavioral intention (BIS), none of the other demographic variables included in the model as covariates showed any adjusted correlation with the dependent variable. The expected behavioral intention (BIS) scores for a Latina migrant worker is $\exp(0.40)=1.49$ times the expected BIS scores for a Latino migrant worker, while holding all other variables constant in the model, and this is statistically significant ($p<0.01$). In other words, being male is related with higher behavioral intention scores. With respect to length of stay, the amount of months living in Immokalee was not found to affect the expected behavioral intention scores ($\exp^{(0.00)}=1.00$), and this was significant ($p=0.04$).

Regarding the theoretical predictors, multicollinearity statistics, i.e. tolerance or VIF, were checked and none of the independent variables were correlated to one another. Moreover, only two of these variables, self-efficacy ($p= 0.04$) and outcome expectancies ($p=0.04$), were found significantly associated with the outcome, after controlling for all the other variables in the model. With respect to the former, if a participant were to increase their self-efficacy score by one unit point, the expected level of behavioral intention would increase by a factor of $\exp^{(0.03)}=1.03$, and this was statistically significant ($p<0.05$). In other words, the higher a participant's self-efficacy score, the lower their

intention to use condoms the next time that a sexual act was performed. Lastly, if a participant were to increase their sex-related alcohol expectancies (SRAE) score by one point, the BIS score would significantly decrease by a factor of $\exp^{(-0.01)} = 0.99$ ($p<0.05$), after holding all other variables constant in the model. In other words, the higher a participant's SRAE score, the lower her or his intention to use condoms, as reported.

Regarding goodness of fit, the Likelihood Ratio Chi-square was manually calculated via the formula: 2* (log likelihood for the full model – log likelihood for the null model). The Chi-squared value was 2* (-442.72 – -519.82) = 154.2. With nine predictors in the full model, the degrees of freedom to calculate the p-value of the Chi-squared test statistic was 9, which yielded a p-value of less than 0.01 and, thus, the full model was statistically significant, compared to the intercept-only model. Another measure, the coefficient of determination R^2 was calculated via the McFadden's log-linear ratio $R^2 = 1 - (\frac{logL(1)}{logL(0)})^n$, where $LL_{(0)}$ is the natural logarithmic likelihood of the model with only one intercept and $LL_{(1)}$ is the natural logarithmic likelihood of the estimated model. Following this formula, $R^2 = 1 - (-442.72/-519.82) = 0.15$. Given the p-value of <0.01 for the Chi-squared test on the difference of log likelihoods and the small ratio of log likelihoods obtained from McFadden's R^2, an argument can be made about the full model fitting the data significantly better than the null or intercept-only model.

Table 4. Adjusted zero-inflated Poisson (ZIP) regression predicting behavioral intention (BIS) from demographics and theoretical variables (n=233)

Parameter estimates	B	SE	χ^2	p-value	$\exp^{(B)}$	95% CI
Age	0.00	0.01	0.16	0.69	1.00	0.59; 2.99
Gender (Female)	0.40	0.14	8.26	<0.01**	1.49	1.09; 1.89
Marital Status	------	------	4.32	0.12	------	-------
Marital Status (Married/LAM)	0.21	0.12	------	------	1.24	0.95; 1.53
Marital Status (Divorced/Widowed)	0.21	0.12	------	------	1.23	0.95; 1.51

Education (≤8 grade)	0.07	0.11	0.39	0.53	1.07	0.81; 1.29
Length-of-Stay	0.00	0.00	4.28	0.04*	1.00	0.99; 1.03
AOD use	0.00	0.00	1.30	0.26	1.00	0.86; 1.14
Self-Efficacy	0.03	0.02	4.10	0.04*	1.03	1.01; 1.08
Social Norms	0.00	0.01	0.56	0.45	1.00	0.99; 1.03
Outcome Expectancies (SRAE)	-0.01	0.01	4.33	0.04*	0.99	0.96; 0.99

Notes: χ^2: Likelihood Ratio Chi-squared coefficient.
*. Association is significant at 0.05 (2-tailed).
**. Association is significant at 0.01 (2-tailed).
Confidence Intervals calculated as $\exp^{(B)} \pm 1.96 * SE(\exp^{(B)})$, where $SE(\exp^{(B)}) = \exp^{(B)} * SE$.

Aim 2. Binary Logistic Regression: To address the second aim and after checking for possible violation of the assumptions, binary logistic regression was performed to ascertain the effects of past sexual abuse, *past* HIV risk (VEE), social support (SPS), and behavioral intention (BIS) on the likelihood that participants are found in the 'high' category of *current* HIV risk, i.e. not carrying condoms. IBM® SPSS® Statistics, Version 23 was the software of choice. These are the results.

Multicollinearity statistics, i.e. tolerance or VIF, showed that none of the independent variables were correlated to one another. The logistic regression model was statistically significant, $\chi^2_{(10)} = 37.91$, p=0.01. The accuracy or discriminant ability of the test or model, this is, the c statistic or area under the ROC curve was 0.708. Given that a value of 1 is interpreted as a model having perfect ability and that a value of 0.50 indicates no ability, a value between 0.70 and 0.80, which is the case here, can be interpreted as the test or model being fair at correctly classifying those in the 'high' category of *current* HIV risk and those in the 'low' category of *current* HIV risk. Even though the model explained only 22 percent of the variance, as per the Nagelkerke (pseudo) R^2, in sexually-related HIV risk (not carrying a condom), the model correctly classified 66.7% of cases.

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Furthermore, as Table 5 illustrates, only one demographic variable and two hypothesized predictors were significantly associated with *current* HIV risk, in the adjusted model. These were education, *past* HIV risk, and behavioral intention. In regard to education (p=0.03), the odds of being in the 'high' *current* HIV risk group was $\exp^{(0.83)}$= 2.30 higher for those with less educational attainment, compared to the higher educational attainment group; in other words, participants with an 8th grade level of education or lower were 2.30 times more significantly likely not to be carrying condoms, i.e. being sexually risky, than those who had some high school or higher education.

In the case of *past* HIV risk, the odds of participants being in the 'high' *current* HIV risk group were found to increase significantly by a factor of $\exp^{(0.11)}$= 1.12, for each increase in VEE score (p=0.01). Additionally, behavioral intention (p=0.01) was significantly associated with high HIV risk in that, as the coefficient of -0.16 indicates, behavioral intention scores incrementally decreased, the odds of being in the 'high' category of *current* HIV risk increased, in the presence of all other variables in the model, and this was statistically significant (p=0.02). No other demographic or the independent variable was associated with the dependent variable; age (p=0.43), gender (p=0.38), marital status (p=0.72), length of stay (p=0.82), past sexual abuse (p=0.16), and social support (p=0.26) did not significantly add to the model.

Table 5. Adjusted binary logistic regression predicting *current* HIV risk from demographic and theoretical variables

(n=216)

Parameter estimates	B	SE	Wald χ^2	*p* value	$\exp^{(B)}$	95% CI
Age	-0.01	0.02	0.62	0.43	0.99	0.96; 1.02
Gender (Female)	0.42	0.49	0.76	0.38	1.53	0.59; 3.96
Marital Status	-----	-----	0.73	0.69	-----	------
Marital Status (Married/LAM)	-0.09	0.39	----	----	0.92	0.43; 1.98

Marital Status (Divorced/Widowed)	0.27	0.44	----	----	1.31	0.55; 3.11
Education (≤8 grade)	0.83	0.37	5.04	0.03*	2.30	1.11; 4.74
Length of Stay	0.00	0.01	0.05	0.82	1.00	0.99; 1.00
Sex. Abuse Hx L/T	0.69	0.49	2.02	0.16	2.00	0.77; 5.20
Past HIV Risk (VEE)	0.11	0.03	8.80	0.01**	1.12	1.03; 1.15
Social Support (SPS)	0.02	0.02	1.28	0.26	1.02	0.98; 1.06
Behavioral Intention (BIS)	-0.16	0.06	7.02	0.02*	0.85	1.04; 1.33

Notes: $\chi^2_{(10)}$=37.91 (p=0.00, p<0.01), Nagelkerke (pseudo) R^2=0.22.

*. Association is significant at 0.05 (2-tailed).

**. Association is significant at 0.01 (2-tailed).

Mediation analysis

Aim 3. Bayesian path analysis: To address the third and final aim, mediation analysis was

carried out via Bayesian estimation in the IBM® SPSS® AMOS 21 structural modeling

package. Bayesian path analysis can be considered as an extension of the probit model, a

type of regression where the outcome variable is dichotomous. Path mediation analysis

was performed to test whether the relationship between self-efficacy, social norms,

outcome expectancies, AOD use, and the outcome, *current* HIV risk, were mediated by

behavioral intention as specified in Aim 3 and depicted in Figure 2 (Chapter III).

Four single-level mediation models were tested using Bayesian estimation path

analysis (Figures 3 – 6). In AMOS, direct paths from each independent variable to the

outcome dependent variable were assessed first. The second step was to test

simultaneously the three direct paths and the indirect path for each of the relationships

(H3a – H3d) hypothesized in Figure 2. From these analyses, the two variables that

showed any association with both the suspected mediator variable, behavioral intention

(BIS), and the outcome or dependent variable *current* HIV risk were self-efficacy and

AOD use. The parameter of interest was the indirect effect *ab*. Unlike linear models, in

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logistic analyses, the indirect effect *ab*, a measure of the amount of mediation, is only approximately equivalent to the difference between unmediated direct path c and mediated direct path *c'*. Each Bayesian analysis was carried out without inputting any prior information regarding. For each analysis, 1,000 burn-in iterations were used and 75,000 posterior draws were collected to make inference. Only standardized coefficients are reported. Results are disclosed next.

In the first model (Figure 3) involving self-efficacy, behavioral intention, and *current* HIV risk, posterior standardized direct effect or path coefficient *c* (not in figure) was significantly different from zero (0.24), at a 95 percent credible interval (0.10, 0.38). Given this result, the model was tested for full or partial mediation. The posterior model fit the data well (Posterior Predictive p-value=0.50). All the standardized paths were significantly different from zero. The posterior mean of the mediated or indirect effect *ab* was 0.04 for a 95 percent credible interval of (0.00, 0.08), which rendered the mediated regression path significantly different from zero. The posterior distribution of *ab* is displayed in Appendix B. To evaluate the convergence of the MCMC samples, Appendix C shows the trace plot for the posterior samples of the mediated effect *ab*. As the plot suggests, convergence was achieved, based on the choice of 1,000 burn-in iterations. Because *c'* (0.20) was significantly different from zero at the 95 percent credible interval (0.06, 0.34) and smaller than path *c* (0.24), partial mediation can be said to be present. Finally, 17 percent of the total effect of self-efficacy on *current* HIV risk can be attributed to the effect of behavioral intention.

Figure 3. *Path diagram for the interrelationship between self-efficacy, behavioral intention and current HIV risk.*
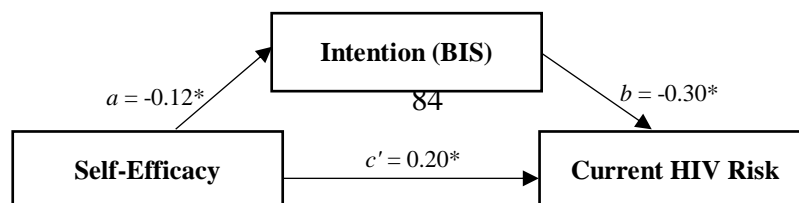
Figure 4 shows the path coefficients that resulted from modeling single-level mediation involving this time the variables social norms, behavioral intention, and *current* HIV risk. The direct, unmediated, relationship between social norms and *current* HIV risk was tested first which resulted in path *c* (not in figure) being different from zero (0.09) but nonsignificant given the 95 percent credible interval of (-0.07, 0.24). This result precluded the possibility of full or partial mediation. Given this scenario, the full single-level model was then tested for indirect effects (Figure 4). Although path *b* was significant at the 95 percent credible interval (-0.45, -0.16), path *a* and *c'* were nonsignificant, as per the 95 percent credible intervals of (-0.20, 0.06) and (-0.09, 0.22), respectively. Lastly, indirect effects were assessed via path *ab* (0.02) and were nonsignificant, at 95 percent credible interval of (-0.02, 0.07). These observations suggest that mediation was not present.

Figure 4. *Path diagram for the interrelationship between social norms, behavioral intention and current HIV risk.*
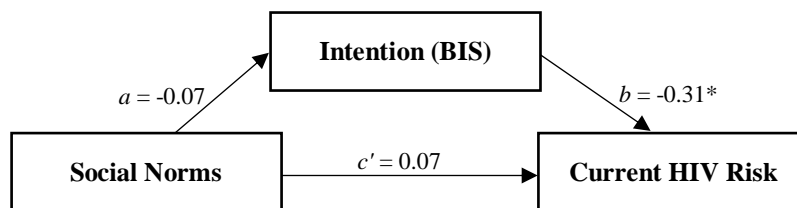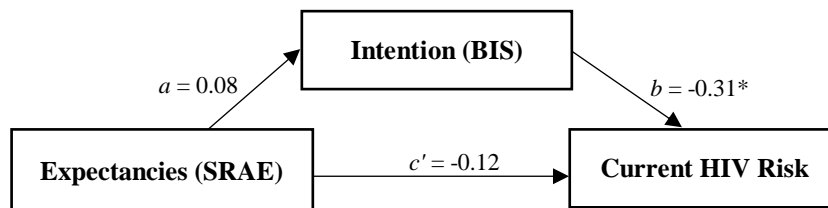

Notes: Standardized path (beta) coefficients (regression weights).
*. Path coefficient is significant at the 95 percent credible interval.

The third model that was fitted to the data tested the potentially mediated relationship between outcome expectancies (SRAE) and *current* HIV risk (Figure 5). Initially, path *c* (not in figure) was different from zero (-0.14) and significant, at a 95 percent credible interval of (-0.29, 0.00). Considering this result, paths *a*, *b* and *c'* were tested for indirect mediation effects to determine whether mediation was full/complete or partial. Figure 5 illustrates the path coefficients obtained from single-level path mediation analysis. Although path *b* (-0.31) was significant, at a 95 percent credible interval of (-0.45, -0.16), path *a* and *c'*, however, were nonsignificant: 95 percent credible intervals of (-0.04, 0.20) and (-0.26, 0.02), respectively. More notably, indirect effects, as assessed by path *ab* (-0.03), were nonsignificant as per the 95 percent credible interval of (-0.07, 0.01); therefore, behavioral intention did not have mediating effects on the relationship between outcome expectancies and *current* HIV risk. In this model, total effects or path *c* was only approximately but not exactly equal to the sum of indirect or mediated effects *ab* and direct effect *c'*.
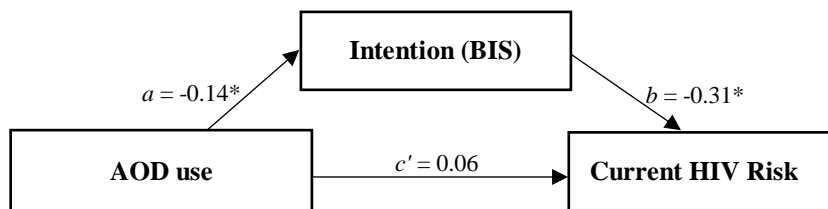
Figure 5. *Path diagram for the interrelationship between outcome expectancies, behavioral intention and current HIV risk.*

Notes: Standardized path (beta) coefficients (regression weights).
*. Path coefficient is significant at the 95 percent credible interval.
Posterior Predictive p-value= 0.50, Posterior Mediated= 0.20.

The last model (Figure 6) involving AOD use (#Drinks) as the independent

variable was tested and path c (not in figure) was different from zero (0.11) but

nonsignificant at the 95 percent credible interval of (-0.05, 0.26). Given this result, paths

a, b and c' were tested for indirect effects mediation, not for full/complete or partial

mediation effects. As Figure 6 depicts, path a (-0.14) and b (-0.31) were significant, with

95 percent credible intervals of (-0.26, -0.02) and (-0.45, -0.16), respectively. Path c'

(0.06) was different from zero but nonsignificant, given the 95 percent credible interval

of (-0.09, 0.22), and the standardized indirect path ab (0.04) was very small but

significant, given the 95 percent credible interval of (0.00, 0.09). These results suggest

that behavioral intention fully mediates the relationship between AOD use and *current*

HIV risk. The posterior distribution of ab is displayed in Appendix D. To evaluate the

convergence of the MCMC samples, Appendix E shows the trace plot for the posterior

samples of the mediated effect ab. As the plot suggests, here, too, convergence was

achieved, based on the choice of 1,000 burn-in iterations. The posterior model fitted the

data well (Posterior Predictive p-value=0.50). Lastly, 40 percent of the total effect of

AOD use on *current* HIV risk could be explained by the mediating effect of behavioral

intention.

Figure 6. *Path diagram for the interrelationship between AOD use, behavioral intention and current HIV risk.*

Notes: Standardized path (beta) coefficients (regression weights).
*. Path coefficient is significant at the 95 percent credible interval.
Posterior Predictive p-value= 0.50; Posterior Mediated= 0.40.

Summary

In this chapter, a detailed presentation of the results obtained from a battery of statistical tests performed in order to accomplish the study aims was offered. Beyond univariate analysis, the first set of tests involved bivariate analysis between the demographic variables and behavioral intention and *current* HIV risk, respectively. In doing so, a few adjustments had to be made on some of the independent variables; namely, for *past* HIV-risk (VEE), and AOD use (Number of Drinks) extreme outliers were removed due to the high levels of skewness, which could not be improved on via popular techniques such as logarithmic transformation. Behavioral intention, measured as BIS scores, was the outcome or dependent variable in Aim 1, while *current* HIV risk, measured as carrying condoms or not, was the outcome or dependent variable in Aims 2 and 3.

From the bivariate analyses, two demographic variables showed significant associations with behavioral intention and *current* HIV risk, respectively: Length of stay in the agricultural town where participants lived and worked was negatively correlated to behavioral intention, while educational attainment, more specifically, having an educational grade of 8 or less was associated with a high risk of HIV (i.e. not carrying condoms). Additionally, theoretical and empirical variables self-efficacy, social support (SPS), and *past* HIV risk (VEE) were associated with HIV risk in that higher scores of each of these variables were found among those participants found in the 'high' category of *current* HIV risk (i.e. those who reported not carrying condoms); while higher behavioral intention (BIS) scores were associated with being the 'low' category of *current* HIV risk (i.e. those who reported carrying condoms).

From the multivariate or adjusted analyses, sociodemographic variable gender and theoretical variables self-efficacy and outcome expectancies (SRAE) were significant predictors of behavioral intention; however, the last two variables had negligible effects on the dependent variable, as evident from the size of the beta coefficients which were reported here. On the other hand, education, behavioral intention (BIS), and *past* HIV risk (VEE) were significant predictors of *current* HIV risk, measured as carrying condoms or not. Here too, the theoretical variables had very small effects on the dependent variable. From the path mediation analyses, behavioral intention (BIS) partially mediated the relation between self-efficacy and *current* HIV risk and completely mediated the relationship between AOD use and *current* HIV risk. However, behavioral intention did not mediate the relationship between social norms and *current* HIV risk and between outcome expectancies and *current* HIV risk. These results are discussed next.

CHAPTER V

Conclusions

Introduction

This dissertation study identified a gap in the scientific literature pertaining to the predictors of HIV risk among Latino migrant workers. In addressing such gap, a set of theoretical constructs and empirical variables were identified from the scientific literature. A conceptual framework, inspired by the Unified Theory of Behavior (UTB) by J. Jaccard and colleagues, was proposed, which guided this exploration. Furthermore, research questions with their respective hypotheses were developed in order to formalize the research quest. Following are the study aims and research questions that were formulated to guide this scientific exploration into the predictors of HIV risk among Latino migrant workers:

Aim 1. To examine the relationship between self-efficacy, expectancies, social norms, AOD use, and behavioral intention in a sample of Latino migrant workers living in the U.S.

Research question 1. Do self-efficacy, expectancies, social norms, and alcohol and other drugs (AOD) use significantly predict intention to use condoms?

Aim 2. To examine the relationship between behavioral intention, *past* HIV risk, past sexual abuse, and social support, and *current* HIV risk in a sample of Latino migrant workers living in the U.S.

Research question 2. Do behavioral intention, *past* HIV risk, sexual abuse, and social support significantly predict *current* HIV risk?

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Aim 3. To assess whether behavioral intention poses as a mediator between self-efficacy and of *current* HIV risk, between outcome expectancies and of *current* HIV risk, between social norms and of *current* HIV risk, and between AOD use and of *current* HIV risk in a sample of Latino migrant workers living in the U.S.

Research question 3. Does behavioral intention mediate the relationship between self-efficacy, outcome expectancies, social norms, and AOD use and *current* HIV risk?

In addressing these aims, secondary data collected from a major study on the effectiveness of a health promotion disease prevention study conducted in 2005 by H. Virginia McCoy, PhD was used. Statistical techniques such as multiple regression and path mediation analyses were implemented. Next is a summary of the results obtained from the analysis of the three research questions.

Regarding the first research question, only self-efficacy and outcome expectancies, measured via the Sex-related Alcohol Expectancies (SRAE) scale, were statistically significant predictors of behavioral intention, measured via the Behavioral Intention Scale (BIS). Contrary to expectations, social norms and AOD use were not statistically significant predictors of behavioral intention. Regarding the second research question, behavioral intention and *past* HIV risk, measured the Vaginal Episode Equivalent (VEE) scale, were statistically significant predictors of *current* HIV risk. Contrary to expectations, however, social support, measured as SPS scores, and past history of sexual abuse were not statistically significant predictors of *current* HIV risk. Regarding the third and final research question, which involved the use of path mediation analysis, evidence for the statistically significant role of behavioral intention as a mediator in the relationship between outcome expectancies and social norms and *current*

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HIV risk, respectively, was not found. As expected, however, behavioral intention appeared as a statistically significant mediator of the relationship between self-efficacy and AOD use and *current* HIV risk, respectively. These results merit further discussion, which is provided next.

Discussion

Similar to what the few researchers who study Latino migrants living in the U.S. have found, most migrant workers in this study were predominantly Mexican males in their 30s and with less than a ninth-grade education and who had an income of $500 or less in the last month (Organista & Kubo, 2005; Valenzuela, 2002). Unlike the findings from those studies, however, the majority of migrant farmworkers in this study were not in a relationship, as only a quarter of the sample were married or living with their romantic partner as married (Organista & Kubo, 2005; Valenzuela, 2002).

Behavioral intention to use condoms among Latino migrant workers.

Regarding the variable behavioral intention, 38.5 percent of participants scored the highest possible level of behavioral intention to use condoms (12 out of 12) while half the sample had a score of at least 9, which indicates that half the participants showed high levels of intention to use condoms. These results appear to be consistent with most of the latest research on behavioral intention to perform a sexually protective behavior. For instance, a recent study on HIV risk reported comparably high levels of risk reduction behavioral intention and no differences in intention levels among participants (Kelly et al., 2013). Another study found that almost 75 percent of those interviewed adults who have sex with men (MSM) had high levels of intention to use condoms; although, in that study, behavioral intention was measured by asking participants whether they agreed with

one single questionnaire item (Li et al., 2015). Similarly, a 2017 intervention study of Latino MSM living in the U.S. found high levels of behavioral intention to condom use among those in the control and the treatment group and no differences in sociodemographic characteristics (Rhodes et al., 2017).

Contrary to expectations and with the exception of the sociodemographic variable length of stay, unadjusted (bivariate) analyses between each of the main sociodemographic variables and the dependent variable behavioral intention were not significant. Levels of sexually protective intention were homogenous across participants given that no differences in terms of age, gender, marital status, and other characteristics were encountered. However, with respect to the amount of time the migrant worker had spent in the agricultural town of Immokalee, Florida, the finding that the longer the length of stay, the lower the intention to use condoms was significant. A few studies conducted overseas that have looked at the predictors of behavioral intention to use condoms among migrants also reported a lack of correlation between length of stay and the dependent variable in the absence of other variables (Bandyopadhyay & Thomas, 2002; Kocken, van Dorst, Schaalma, 2006; Martijn et al. 2004).

In the adjusted regression model, the effect of length of stay on behavioral intention became significantly zero. Yet, this finding that time spent in Immokalee could reduce the intention of the individual to perform protective acts or behaviors, in this case, use condoms, could be related to a larger phenomenon involving migration, temporal or permanent, to the U.S. and increases in risky behaviors in general and sexually-related risk behaviors in particular. In a review of the Latino migrant literature, researchers

Worby and Organista found enough evidence to state that "exposure to the United States is unhealthy for im/migrants" (Worby & Organista, 2007, p. 420).

Gender, behavioral intention, and *current* HIV risk.

Other variables were significantly related to behavioral intention only insofar as other variables were present in the multiple logistic regression model. This is precisely the case with the variables gender, self-efficacy, and outcome expectancies. In the case of gender, other studies have also encountered an absence of bivariate association with behavioral intention; although, in some, gender emerged as a significant moderator of the relationship between behavioral intention and some of its antecedents (Brodbeck, Matter, & Moggie, 2006; Faqih, 2016). Testing for moderation effects was, however, beyond the scope of this study.

Moreover, in this study, gender differences were not significant in the multivariable model predicting *current* HIV risk but they were significant in the multivariable model predicting behavioral intention, with Latina migrant workers having lower levels of intention to use condoms. This is quite alarming, especially when considering the results from the bivariate analysis that more than half the women and more than half the men in the sample did not carry condoms (although, such association became insignificant in the presence of other variables).

These findings challenge others in which being a Latina was associated with lower risk for HIV among migrant workers in the U.S. (Fernandez et al., 2004). However, these findings are consistent with the more general fact that, in the U.S., HIV/AIDS disproportionally affects not just Latinos in general but Latinas in particular; with some recent reports indicating rates of HIV infection and AIDS for this group as five times that

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of white women (Castillo-Mancilla et al., 2012). Moreover, in a study by Denner and

colleagues on Latino migrants in the U.S. in which sexually-related HIV risk was

predicted by low condom self-efficacy and being female, in the presence of other

variables in the model (Denner et al., 2003). As Organista and others have suggested, this

could be explained, at least in part, by the fact that, in most Latino societies, condom-

carrying among women is largely frowned upon (Organista et al., 1996).

Self-efficacy, behavioral intention, and *current* HIV risk.

Self-efficacy or an individual's confidence in their ability to use condoms was a

significant predictor of behavioral intention; however, the effect on the dependent

variable was quite small (almost zero). This can be explained by the finding that, in this

study, self-efficacy was strongly associated with *current* HIV risk, the outcome variable,

and that the association remained significant even under the mediating effect of

behavioral intention. Lower self-efficacy and thus higher HIV risk had been reported in a

study of female migrant workers in China (Lin et al., 2005), as well as in an earlier study

of Latino migrant workers in the U.S. (Denner et al., 2003). This could be related, at least

in part, to the finding from mediation analysis in which self-efficacy was related to both

the outcome variable, *current* HIV risk, and the mediating variable, behavioral intention.

Furthermore, self-efficacy had a stronger effect on the outcome variable than it did on

behavioral intention. This is consistent with what has been found in the Latino migrant

literature. For instance, Denner and colleagues had also reported the inversely

proportional relationship between condom self-efficacy and HIV risk. In their study, self-

efficacy was the strongest predictor of HIV risk among the theoretical variables included

in the model (Denner et al., 2003). In this study, the most puzzling piece of information

comes from the finding that, after controlling for other variables, self-efficacy scores had a negative effect on behavioral intention -notwithstanding the small size of the effect. Similar findings could not be found in the literature. However, given that the size of the effects was close to zero and, thus, trivial, the finding is not substantially relevant so as to warrant further discussion or replication.

AOD use, behavioral intention, and *current* HIV risk.

Given the role that substance use plays in the transmission of HIV/AIDS and other STIs, with substance users being known to engage in risky behaviors such as unprotected vaginal and anal sex (Calsyn et al., 2010), special attention was given to AOD use in this study; however, results are inconsistent and equivocal. Despite previous findings and assumptions and a whole body of literature supporting the contrary (Scott-Sheldon et al., 2016), neither the intensity nor the frequency of AOD use was found to be correlated with behavioral intention, even after controlling for other variables. In Scott-Sheldon and colleagues' review of dozens of observational and experimental studies, higher alcohol use had a direct detrimental effect on intention to perform unprotected sex (Scott-Sheldon et al., 2016), a finding that could not be replicated here. Nevertheless, in this study, AOD use emerged as a significant factor having an indirect influence on *current* HIV risk but only in the path mediation analysis performed as part of Aim 3. In a study by Brodbeck and colleagues (2006) of heterosexual adults in the U.S., AOD use was not a direct predictor of sexual risk behavior given that the relationship was fully mediated by behavioral intention. In other words, AOD use was a predictor of behavioral intention to use HIV protection in that higher levels of AOD use were related to lower intentions to perform the protective behavior (Brodbeck, Matter, & Moggie, 2006).

Social norms, behavioral intention, and *current* HIV risk.

In this study, social norms or the shared beliefs about condoms was not related to behavioral intention to use condoms in this study, nor did the construct emerge as a predictor of intention or the outcome variable, *current* HIV risk, in the multivariable regression models. This is quite unexpected given that a great deal of evidence from cross-sectional studies has been produced that indicate norms about condom use as a predictor of intention to condom use (Huebner & Perry, 2015). Even outside the U.S. this has been the case. For instance, a study comparing South African adults to their Americans counterparts found that normative perceptions about condom use predicted intention in both samples (Heeren et al., 2007).

Outcome expectancies, behavioral intention, and *current* HIV risk.

A similar case involves the variable sex-related alcohol expectancies (SRAE) or, simply, outcome expectancies widely treated in the literature as another significant antecedent of behavioral intention and which was found significant in the regression analysis in Aim 1. Nevertheless, the size of the effect, as captured in the value of regression coefficient beta, was very close to zero which is interpret here as outcome expectancies having no practical significance as a predictor of behavioral intention. This is consistent with the results obtained from path mediation analysis pertaining to Aim 3, in which the simple mediation model involving the three variables, outcome expectancies, behavioral intention, and *current* HIV risk, was not significant.

These results somewhat differ from most of the psychosocial and health behavior literature in the sense that, most commonly, 'outcome expectancies' is referred to as an antecedent of behavioral intention, rather than a direct predictor of the actual behavior per

se. In this study, evidence for the support of such scenario could not be found. This could be related to the fact that 'expectancies' was measured in relation to alcohol consumption in relation to sex, not to condom use per se, whereas behavioral intention alludes to intent to use condoms. The asymmetry between these two constructs could account for their lack of association both in the regression and path mediation models in this study. Interestingly, in the mediation analysis, 'outcome expectancies' was directly related to *current* HIV risk, a result that echoes only a handful of studies, such as that of Hendershot and colleagues (2007) in which expectancies about alcohol directly predicted sexually-related HIV risk among heterosexual young adults in the U.S.

HIV risk among Latino migrant workers.

With respect to the main variable of interest in this study, *current* HIV risk, more than half the participants were at high HIV risk because they do not carry condoms. This finding is consistent with most of the literature on vulnerable populations such as migrant workers in the U.S., especially Latinos (Fernandez et al., 2004; Organista & Kubo, 2005). For instance, field expert and researcher K. C. Organista and colleagues found that 66 percent of the Latino migrant workers almost never carried condoms and that most of the condom carrying individuals were those who reported being married and having friends who were married and who carried condoms (Organista et al., 1996, 2002).

Social norms and *current* HIV risk.

When exploring potential predictors of HIV risk in terms of condom use, Organista and colleagues reported that (perceived) social norms, along with condom self-efficacy, was a significant regressor, after controlling for other variables in the model (Organista et al., 1996, 2002). Elsewhere, negative social norms regarding condom use

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among Latino migrant workers has predicted sexually related HIV risk; a process which has been related to the abandoning of more traditional, protective norms about sexual risk once those migrants, especially male, leave their home countries where these beliefs are held (Wiener & Kashuba, 2012). In the present study, however, perceived norms about condom use was neither a direct nor indirect predictor of the outcome variable, *current* HIV risk.

Educational attainment and *current* HIV risk among Latino migrant workers.

In this study, *current* HIV risk was predicted by only one of the sociodemographic variables that had been entered in the model as controls, i.e., education. As described earlier, in this study, most participants had an expectedly low level of educational attainment. This is a common finding, especially in the Latino migrant literature. For instance, in their 2002 study, Organista and colleagues found that the level of educational attainment significantly predicted HIV risk (Organista et al., 2002; Organista & Kubo, 2005). Later, Fernandez and colleagues also found very low levels of educational attainment (less than six years of education completed) among Latino migrants which was associated with HIV risk, although these results were not significant (Fernandez et al., 2004). Similar results were obtained in this study. More specifically, having an eighth grade or lower was associated with a high HIV risk; an association that remained significant in the adjusted regression analysis. As Ugarte and colleagues suggest, education affects HIV risk in that individuals with less than sixth grade education were simply not exposed to information about sexual health topics contained in the educational curriculum in later grades (Ugarte et al., 2013).

Behavioral intention and *current* HIV risk.

In regard to the relation between behavioral intention and *current* HIV risk, studies where the former has been conceptualized as the likelihood of performing a sexually risky behavior, the variable has been used as a proxy for the actual behavior (Albarracin et al., 2001). For instance, a study by Stappenbeck and colleagues, which focused on non-problematic alcohol drinkers living in the U.S., found that alcohol-related expectancies, measured via the Alcohol Expectancies Questionnaire (AEQ), predicted sexually-related HIV risk, measured as behavioral intention to have unprotected sex (Stappenbeck et al., 2013), a strategy commonly used but poorly recommended, given the lack of strong relationship between intention and the actual behavior. This is perhaps explained by the fact that most theorists still regard behavioral intention as the strongest and most significant predictor of behavior, in this case sexually risky behavior, even though other non-theoretical variables depression, alcohol use, and sexual history or *past* HIV risk have been found to strongly predict sexually-related HIV risk (Huebner & Perry, 2015).

Past HIV risk, behavioral intention, and *current* HIV risk.

Analyses involving the independent variable past HIV risk, measured as Vaginal Episode Equivalent (VEE) scores, produced interesting results. As anticipated, the variable was a significantly strong, although not the strongest, predictor of the outcome variable *current* HIV risk. However, the variable was also related to the dependent variable, behavioral intention; although, the correlation disappeared in the presence of other variables. In most of the health behavior literature, *past* HIV risk has been considered a direct or proximal predictor of sexually-related HIV risk; although in a

meta-analysis by Abarracin and colleagues, the authors found that in some studies past risk has been consistently related to behavioral intentions (Albarrracin et al., 2001). Not surprisingly, then, from the unadjusted (bivariate) analyses carried out in this study, higher levels of VEE scores were found to be associated with both the dependent variable behavioral intention, measured as BIS scores, and the outcome variable, *current* HIV risk, measured as the act of carrying condom or not. Future studies should explore, via mediation analysis, the relationship between these three variables.

Investigational value of the UTB.

From the point of view of the theory, this study was inspired by a known theory in health and health-related behavior research: The Unified Theory of Behavior (UTB) by Jaccard and colleagues (Jaccard et al., 1999, 2002). One of the most significant aspects of this theory lies on the creation process, as many theory-based observational and intervention studies were revised in order to select the most consistently significant theoretical predictors supported by the data. In this study, however, the significance of those variables and therefore, the model proposed by the UTB in ultimately predicting HIV risk is questionable.

In terms of the first part of the theoretical model put forth by UTB proponents, and which was adapted and formalized as Aim 1 in this study, evidence was not found to support the relationship between the theoretical variables self-efficacy, social norms, and outcome expectancies (SRAE), known as the antecedents of behavioral intention, and behavioral intention (BIS). Regression analyses for Aim 1 showed how only self-efficacy and outcome expectancies had almost no effect on behavioral intention and that the relationship between the last two was negative, a result that contradicts a long tradition of

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research on the topic. Furthermore, when evaluating the mediating role of behavioral intention between each of its antecedents and HIV risk, which constituted Aim 3 of this study, the relationship was only significant for self-efficacy. Lastly, when evaluating the second part of the model, reflected in Aim 2 in this study, behavioral intention (BIS) was indeed a significant predictor of *current* HIV risk, although the size of the effect was considerably small.

In terms of the conceptual framework that was proposed here, which not only included theoretical variables from the Unified Theory of Behavior but also empirical variables, namely, AOD use, past HIV risk and past sexual abuse, only *past* HIV risk, measured as VEE scores, was a significant predictor of *current* HIV risk. Given this scenario, an argument can be made about the lack of effectiveness and, therefore, the utility of the proposed framework in guiding the analysis of the predictors of *current* HIV risk among Latino migrant workers living in the U.S.

As these results suggest, the phenomenon of sexually-related HIV risk, especially in the context of an understudied and highly vulnerable population such as Latino migrant workers, is very complex. Some results contradict previous findings from the literature while others are inconsistent within the study. Overall, this study could only confirm the role of self-efficacy, *past* HIV risk, and behavioral intention in predicting *current* HIV risk. Additionally, because in this study some variables were included in the proposed conceptual framework as a direct predictor of the outcome variable, *current* HIV risk, and not hypothesized to be related to behavioral intention, future studies should further look into the results discussed here by testing a model of behavior that

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incorporates these results. This way, migrant health theory and praxis can continue to be informed.

Summary

Overall, the analyses performed in this study unearthed an interesting while, at times, inconsistent picture regarding sexually-related HIV risk in the context of the variables proposed as affecting that risk among AOD-using Latino migrant workers living in Immokalee, Florida. Self-efficacy and outcome expectancies are significant but weak predictors of behavioral intention; while behavioral intention along with *past* HIV risk, is a significant but also weak predictor of *current* HIV risk. However, social norms and social support were not predictors of HIV risk in this sample. As anticipated, evidence was found that support the notion that behavioral intention partially mediates the relationship between self-efficacy and HIV risk as well as the relationship between AOD use and *current* HIV risk. In other words, AOD use influences the likelihood of performing the protective behavior (carrying condoms) but only via behavioral intention; while self-efficacy for condom use influences that likelihood, both, directly and indirectly, via the effect of behavioral intention. Contrary to expectations and previous findings, however, evidence of the mediating effects of behavioral intention on the relationship between the outcome variable *current* HIV risk and social norms and outcome expectancies, respectively, could not be found.

Public Health Implications

This study and the results obtained pose important consequences for the public health praxis. The pattern of findings exposed here suggests that Latino migrant workers' likelihood to carry condoms, and therefore, be at a lower risk of HIV infection can be at

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least in part influenced by interventions set out to improve their intention to perform the protective behavior via improving their self-efficacy for condom use and their outcome expectancies about alcohol use. Special attention should be given to the finding that Latina migrant workers in this sample were found at a higher risk to acquire HIV and other STIs. Not only does this need further exploration but also consideration when designing interventions for this population. Such interventions should empower women to take control of their own health outcomes. Interventions that look at educating Latino im/migrants about cultural factors such as the deleterious effects of stigma associated with carrying condoms could also be beneficial. Future studies should be carried out that seek to expose all those significant factors affecting women's likelihood to carry condoms in the Latino community at large. Additionally, the very low levels of education among Latino migrant workers must be addressed in order to reduce structural-based disparities which, as seen here, have detrimental public health consequences. Furthermore, public health interventions that increase sexual health knowledge must be implemented with this population in mind. This as well as other interventions could be carried out through Federally Qualified Health Centers (FQHCs) that operate in agricultural areas and that provide primary care services to migrant workers, regardless of their immigration status.

Lastly, special attention should be brought to the fact that Latino migrant workers in this sample were sexually active, yet less than half the women and less than half the men reported carrying condoms. Considering the potential effects of social desirability bias, these results could be more dramatic. Future interventions must be developed that increase the condom-carrying practices of this at-risk population. In this regard, this study

made an important contribution to the public health theory and practice in terms of the methodology used when approaching the measuring of the outcome variable. In using the question "Do you carry condoms with you?" as a proxy for *current* HIV risk, a whole field of possibilities emerged regarding the developing of a more accurate way of capturing *current* HIV risk. Future studies need to consider the problematic nature of using measures of HIV risk that capture past, not present or future, events. In this study, a case was made for the use of a dichotomous, one-item measure of sexually-related HIV risk that asked participants whether they were carrying condoms or not. Improvements over this measure can be made, nonetheless. Alternative, future studies can confirm whether carrying condoms translates into actual condom-wearing behaviors or acts, and, thus, lower HIV risk.

Limitations

Potential limitations from the parent study carried over to the present study. One of them relates to the sampling technique initially implemented, i.e. targeted sampling in a community trial in which random selection was performed by residential site. This form of selection bias however might influence the generalizability of the findings because of non-random selection of participants is, nevertheless, warranted. For instance, experts on the field of HIV-related high-risk behaviors recommend this sampling technique over more traditional ones, given the advantages it creates for accessing the population of interest in the environment in which those risky behaviors take place. More on this is offered in Chapter III (Methods). Nonetheless, in line with the research goals of this study, findings and conclusions from this study are consequently limited to Latino migrant workers over 18 years old who reside in Collier County, Florida, and who are

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sexually active and alcohol and/or drug (AOD) users. In this regard, an obvious but unavoidable bias pertains to the inclusion criterion in the parent study whereby only AOD users were included.

Further sources of systematic biases could also stem from the manner in which data were collected, i.e. self-reported, making the study susceptible to social desirability error, recall error and surrogate information error. Most importantly, self-reported health-related risk behaviors such as drug or alcohol use or risky sex is sensitive to underreporting. As discussed in Chapter III (Methods), however, most self-reported data are, in most cases, valid. Additionally, in the parent study, a data-recording method was used to help minimize recall error (see Chapter III).

Additionally, the dependent variable in this study, HIV risk, was operationalized as a single questionnaire item from the parent study which asked participants "Do you carry condoms with you?" This way of assessing HIV risk poses obvious shortcomings; the most important one pertains to the decreasing of power or validation of the research study, in this case, the probability of finding an effect when there is one. An in-depth discussion of the rationale for this decision was offered in Chapter III (Methods).

Finally, the last piece of methodological concern relates to the fact that, in this study, a cross-sectional design was implemented. Cross-sectional studies are limiting in that inferences about causality cannot be made because the temporality assumption cannot be satisfied. This renders any prediction model that is not based on longitudinal or cohort data potentially misleading, as they cannot be cross-validated. To attenuate this shortcoming, the outcome variable was selected from a group of possibilities according to

the criterion that the measure reflected a more present or futuristic behavioral measure of sexually-related HIV risk.

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APPENDICES

APPENDIX A

Empirical Estimates of Sample Sizes Needed for .8 Power

Test	Condition															
	SS	SH	SM	SL	HS	HH	HM	HL	MS	MH	MM	ML	LS	LH	LM	LL
BK ($\tau' = 0$)	20,886	6,323	3,039	1,561	6,070	1,830	883	445	2,682	820	397	204	1,184	364	175	92
BK ($\tau' = .14$)	562	445	427	414	444	224	179	153	425	178	118	88	411	147	84	53
BK ($\tau' = .39$)	531	403	402	403	405	158	124	119	405	125	75	59	405	122	60	38
BK ($\tau' = .59$)	530	404	402	403	406	158	124	120	405	125	74	58	404	122	59	36
Joint significance	530	402	403	403	407	159	124	120	405	125	74	58	405	122	59	36
Sobel	667	450	422	412	450	196	144	127	421	145	90	66	410	129	67	42
PRODCLIN	539	402	401	402	402	161	125	120	404	124	74	57	404	121	58	35
Percentile bootstrap	558	412	406	398	414	162	126	122	404	124	78	59	401	123	59	36
Bias-corrected bootstrap	462	377	400	385	368	148	115	118	391	116	71	53	396	115	54	34

Note. All sample sizes have been rounded up to the next whole number. In the condition labels, the first letter refers to the size of the α path, and the second letter refers to the size of the β path; S = 0.14, H = 0.26, M = 0.39, and L = 0.59 (e.g., condition SM is the condition with α = 0.14 and β = 0.39). All results, except for those for Baron and Kenny's (1986) test (BK), have been collapsed across τ' conditions.
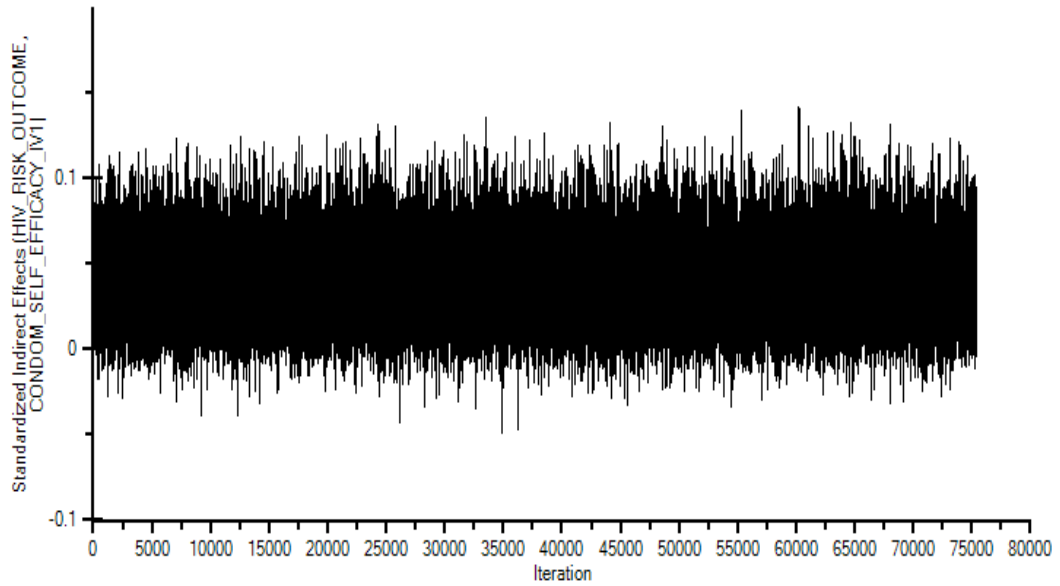
From MacKinnon et al., 2002

Posterior distribution of the mediated effect for the Bayesian mediation analysis of

self-efficacy, behavioral intention (BIS), and HIV risk.
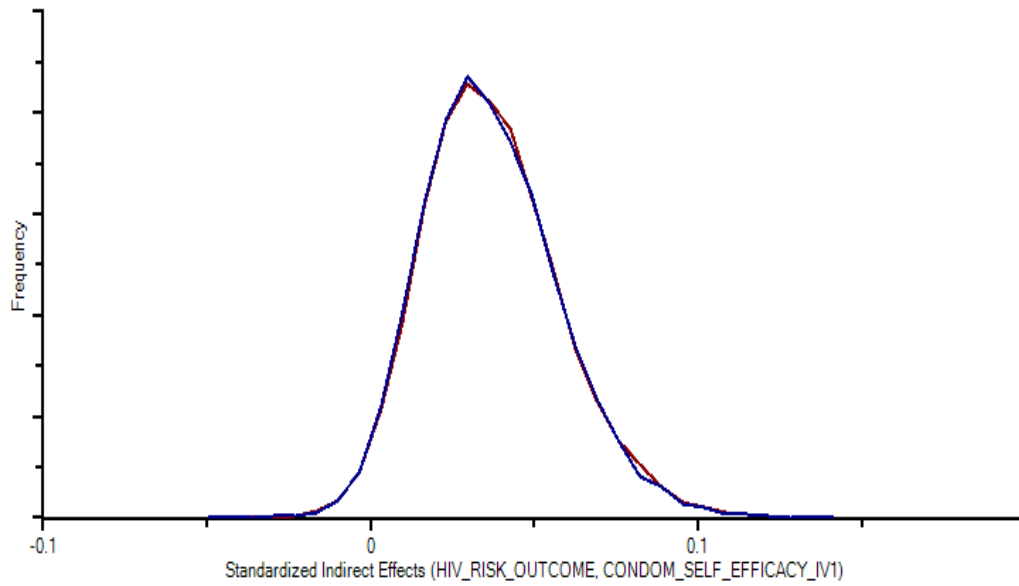
Shape of the posterior for the parameter for the specified path.
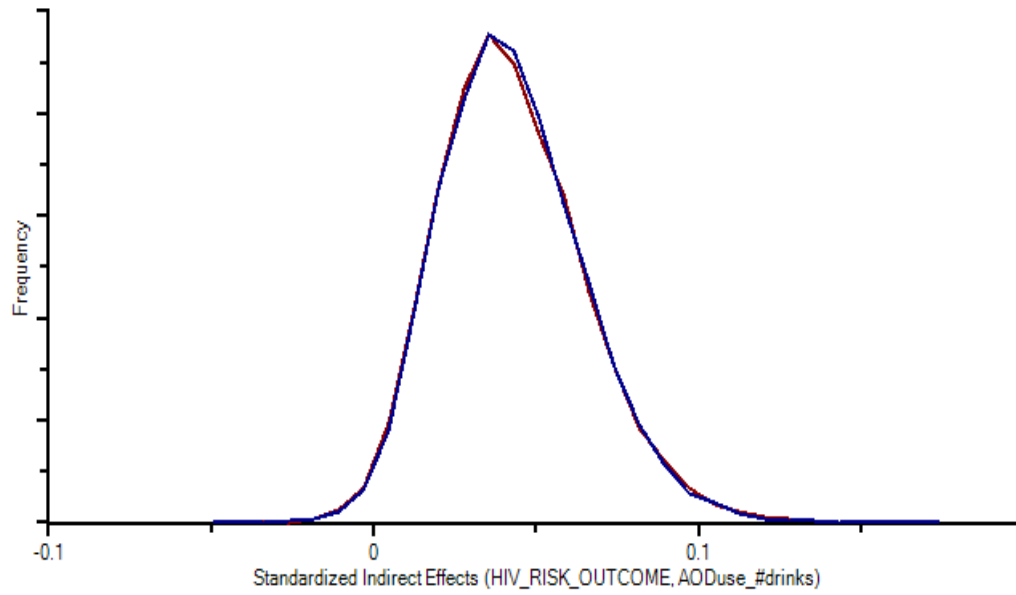
APPENDIX C

Trace plot for posterior samples of the mediated effect for the Bayesian mediation analysis of self-efficacy, behavioral intention (BIS), and HIV risk.

This trace shows that, during the analysis, the estimate was stable (no long-term directional changes) for this specified path.
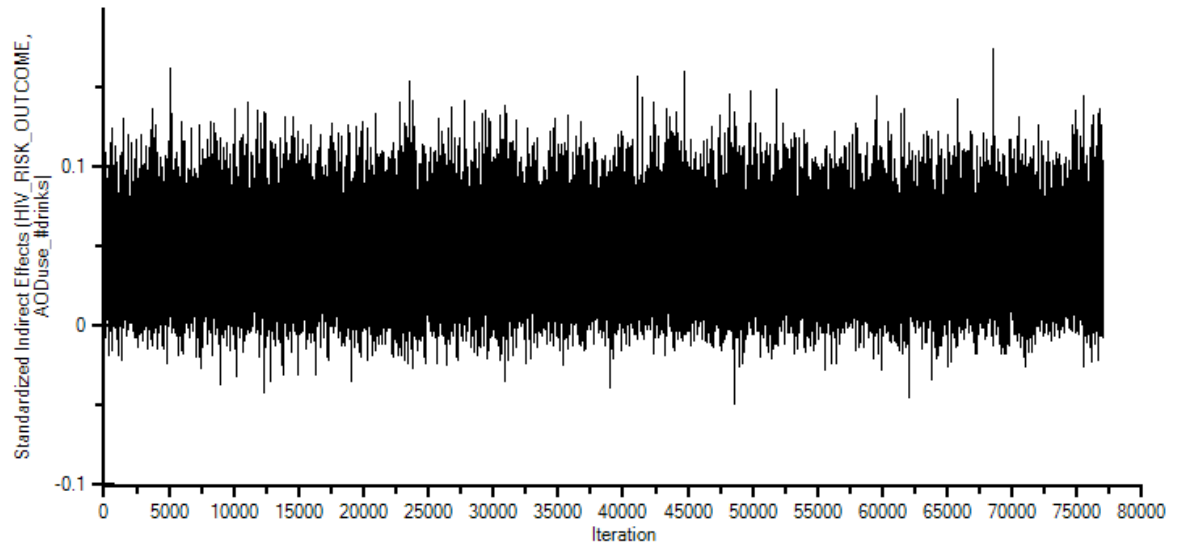
Posterior distribution of the mediated effect for the Bayesian mediation analysis of

AOD use, behavioral intention (BIS), and HIV risk.

Shape of the posterior for the parameter for the specified path.

APPENDIX E

Trace plot for posterior samples of the mediated effect for the Bayesian mediation

analysis of AOD use, behavioral intention (BIS), and HIV risk.

This trace shows that, during the analysis, the estimate was stable (no long-term directional changes) for the specified path.

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