ALCOHOL USE AND RISKY SEXUAL BEHAVIOR AMONG PROBLEM DRINKING MEN WHO HAVE SEX WITH MEN: A COMPARISON OF TWO DATA COLLECTION METHODS

by

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Self-reports are the primary method for collecting data on alcohol use and risky sexual practices among men-who-have-sex-with-men (MSM). The TimeLine FollowBack method (TLFB) has been considered the gold standard for collecting data on alcohol use and risky sexual behavior. Interactive Voice Response (IVR) technology has become increasingly popular as a new data collection method and offers several advantages. Given this background, three aims were posited for the present study that was conducted among a sample of problem drinking MSM to: 1) examine the correspondence between the IVR and TLFB methods for the assessment of alcohol use and risky sexual behavior; 2) identify factors that influence correspondence between methods for select alcohol use and risky sex variables; and, 3) examine the conditional relationship between alcohol use and engagement in unprotected anal intercourse (UAI) using IVR daily data.

Participants (N = 84) were problem drinking MSM, who were participating in a combined pharmacotherapy and psychotherapy clinical trial to moderate their alcohol
consumption. Participants reported on their alcohol use and sexual risk behavior daily for 90-days using the IVR system. At treatment completion, participants were administered the TLFB interview and reported on their behavior during the same 90 day time frame. Study findings revealed moderate correlations between the IVR and TLFB methods for each of the alcohol use and sexual risk variables. T-tests indicated greater aggregate reports of drinking on the IVR, whereas greater aggregate reports for the sexual risk variables were generated from the TLFB method. A visual inspection of the limits of agreement indicated substantial individual variation for self-reports between methods across each of the alcohol use and sexual risk variables. Exploratory analyses revealed that TLFB-IVR correspondence for variables specific to alcohol use was affected by participant’s alcohol dependence severity, daily negative affect, and number of standard drinks consumed prior to or during data collection on the IVR. Multilevel analyses indicated that the risk of engaging in UAI was greater on days in which any alcohol use was consumed by the participant, regardless of the quantity of use. Findings are discussed regarding the utility of IVR data collection technology among MSM.
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Dedication

There is no one who deserves more than a thousand praises than my wife, Amy Cohn. Without her guidance and support, this project would have never been completed. I hope we continue to be successful in our research careers. I would also like to thank my parents, Sandy and Terry Hagman, and my brother, Eric Hagman, for their support and advice over the years. Finally, all of my other colleagues, including Alexis Kuerbis, Bram Heidinger, Lisa Hail, Katherine Schaumberg and Svetlana Zielberman, who spent the past two years working on this project, deserve many praises.
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CHAPTER 1
INTRODUCTION

Public health surveillance data indicates that HIV infection rates within the United States are on the rise (CDC, 2007), and that a sub-sample of these individuals, men-who-have-sex-with-men (MSM) represent the largest group of HIV infected individuals (Karon, Rosenberg, McQuillann, Khare, Gwinn & Petersen, 1996). Data also suggests that the frequency with which MSM engage in risky behaviors associated with HIV infection increases the likelihood of spreading HIV. For example, MSM have been reported to engage in high rates of unprotected anal intercourse (UAI), a known risk factor for HIV infection (Elkstrand, Stall, Paul, Osmond & Coates, 1999). Alcohol consumption is associated with HIV risky sexual behavior and several studies indicate that MSM consume alcohol at rates comparable to the general population (Stall et al., 2001). Several studies documented significant associations between alcohol use and risky sexual behavior among MSM (Greenwood et al., 2001; Koblin et al., 2006). In this regard, situational and event level analyses indicate that heavy drinking (defined as > 5 standard drinks per occasion) MSM are more likely to engage in unprotected anal sex with serodiscordant partners, an increased risk factor for HIV transmission (Irwin, Morgenstern, Parsons, Wainberg & Labouvie, 2006; Purcell, Parsons, Halkitis, Mizuno, & Woods, 2001) than their counterparts who consume less alcohol. A major methodological limitation associated with these studies, however, is the lack of control regarding proper temporal sequencing of the extent to which alcohol use precedes engagement in risky sexual behavior.
The primary method for the collection of individual-level data regarding alcohol use and risky sexual behavior is subject self-reports. An established (i.e., valid and reliable) methodology for the collection of retrospective event level data (e.g., alcohol use and risky sexual behavior) has been the TimeLine Follow-Back (TLFB) method (Sobell and Sobell, 1992). Since its inception, the TLFB has been considered the gold standard for the collection of self-report data specific to alcohol use (Maisto, Sobell, Cooper & Sobell, 1979). The TLFB is a calendar-based technique whereby participants report on their daily alcohol use and sexual behavior for a specific recall period such as the past 30 days. The TLFB has been validated for recall periods up to 12 months duration (Sobell & Sobell, 1992). It also involves several techniques to assist participants’ recall of specific behaviors. For example, participants identify specific events such as birthdays, holidays or other special occasions as well as specific behavioral patterns (e.g., periods of abstinence, typical quantity/frequency of alcohol use on certain days of the week) that occurred during the recall period of interest. In addition, recalling recent events first serves as a memory aide for the recall of more distal events. Extensive psychometric evaluation of the TLFB method has demonstrated it to be a reliable and valid data collection methodology; however, it has not been validated for the collection of date specific information (Carey, Carey, Maisto, Gordon & Weinhardt, 2001; Demarce, Burden, Lash, Stephens & Grambau, 2007) which is a necessary condition for demonstrating a causal relationship between alcohol consumption and risky sexual behavior.

Recently, an innovative technology (i.e., Interactive Voice Response; IVR) for the collection of self-report data has received increased attention. Interactive voice response
technology requires participants to call into an automated voice system, on a daily basis, and respond to a series of questions via a touch-tone telephone. Interactive Voice Response technology may provide a more rigorous assessment of alcohol use and risky sexual behavior compared to alternative data collection techniques, such as the TLFB method (Mundt, Searles, Perrine & Helzer, 1995; Searles, Helzer, & Walter, 2000) because it involves a computerized assessment procedure that limits recall to the past 24 hours. This method reduces concern regarding recall bias while simultaneously, enhancing respondent privacy, and perhaps eliciting a more honest response by eliminating interviewer reactions. It is important to note that the implementation of the IVR methodology can be expensive, contribute to respondent burden and non-compliance, and precludes verification procedures for ensuring that participants are alcohol and drug free at the time of data collection. Irrespective of methodological limitations, the use of daily reports of alcohol use and sexual risk behavior using IVR technology represents a unique opportunity to provide a more rigorous and potentially more accurate examination of the temporal relationships between alcohol use and risky sexual behavior.

Self-report data are neither inherently valid nor invalid, but vary based on several factors such as respondent characteristics, task attributes, social context, and the skill of the data gatherer. Along these lines, Babor and colleagues (1987, 1990, 1992) have developed a cognitive social-psychological model of the question-answer process with a specific focus on the collection of self-reported alcohol use data. The original Babor et al. (1992) model illustrates the inter-relationships among components of the question-answer process thought to influence response accuracy. These relationships include social
context (e.g., organizational setting, constraints of the present interpersonal situation),
respondent characteristics (e.g., alcohol dependency), task variables (e.g., mode of
administration, time interval for recalling events), motivation (e.g., current mood state),
and cognition (e.g., comprehension).

A primary assumption underlying the Babor and Del Boca (1992) model is that its
central principles can be extended to other forms of behavior (Del Boca and Noll, 2000).
In this regard, the model was modified to provide a guiding conceptual framework for
investigating factors that may influence correspondence between the IVR and TLFB data
collection methodologies. Specifically, the original model’s primary outcome variable
(i.e., low/high response accuracy) was modified to reflect correspondence. The revised
model is presented in Figure 1.

Specific Aims, Research Questions and Hypotheses

The proposed dissertation has three primary aims and uses data from an on-going
randomized clinical trial (RCT) investigating an alcohol use intervention among a sample
of problem drinking MSM. The rationale for each study aim, specific research questions,
and specific hypotheses, when warranted, are presented below.

Study Aim 1

While several studies have evaluated the statistical associations (i.e., correlations,
aggregate mean differences) between IVR and the TLFB methodologies with respect to
the assessment of alcohol use, no studies to date have evaluated the associations between
these two methodological approaches for the assessment of risky sexual behavior, defined
in the current dissertation as unprotected anal intercourse (UAI) and UAI on days in
which alcohol use occurs. In addition, the use of IVR technology to assess risky sexual
behavior and alcohol use among a sample of problem drinking MSM has yet to be investigated. Therefore, the first aim of this study is to evaluate the statistical associations and the degree of agreement between the TLFB and IVR methods for the assessment of alcohol use and risky sexual behavior among a sample of problem drinking MSM.

Research Question 1: What are the statistical associations (i.e., correlations, mean differences) between the IVR and TLFB self-report methodologies for the assessment of alcohol use among problem drinking MSM?

Research Question 2: What is the degree of correspondence (i.e., mean percent differences and 95% limits of agreement) between the IVR and TLFB methodologies for the assessment of alcohol use among problem drinking MSM?

No studies to date have examined the degree of agreement between both methods using measures of equivalence (i.e., assessment of percent differences and 95% limits of agreement). The lack of empirical research using equivalence statistics between the IVR and TLFB method with respect to the collection of alcohol use among problem drinking MSM, precludes articulation of specific research hypotheses.

Research Question 3: What are the statistical associations between the IVR and TLFB self-report methodologies for the assessment of risky sexual behavior among problem drinking MSM?

Research Question 4: What is the degree of correspondence between the IVR and TLFB self-report methodologies for the assessment of risky sexual behavior among problem drinking MSM?

Lack of empirical research regarding IVR and TLFB methodologies with respect to the collection of risky sexual behavior data among problem drinking MSM, precludes
the articulation of specific research hypotheses. Therefore, research questions 3 and 4 are considered exploratory.

*Research Question 5:* What are the statistical associations between the IVR and TLFB self-report methodologies for the joint assessment of risky sexual behavior and alcohol use among problem drinking MSM?

*Research Question 6:* What is the degree of correspondence between the IVR and TLFB methodologies for the joint assessment of risky sexual behavior and alcohol use among problem drinking MSM?

Similar to research questions 3 and 4, research questions 5 and 6 also are considered exploratory. In this regard, there is a lack of empirical research regarding IVR and TLFB methodologies, with respect to the collection of data requisite for assessing the joint association between alcohol use and risky sexual behavior among problem drinking MSM.

*Study Aim 2*

As previously noted, Babor and Del Boca (1992) have provided a theoretical framework that, with slight modification, can be used to identify factors influencing correspondence between the IVR and TLFB methodologies. The identification of factors such as respondent characteristics, motivation, and cognition that can influence correspondence between the IVR and TLFB methodological approaches has the potential to increase our understanding of the relative advantages and disadvantages of each data collection method and can lead to the provision of guidelines regarding the selective use of each methodological approach. Therefore, the second aim of this study is to apply Babor and Del Boca’s (1992) theoretical model of the question-answer process used in
self-report methodology (Figure 1) to investigate specific situational and respondent characteristics that influence correspondence between the IVR and TLFB methods for the assessment of alcohol use and risky sexual behavior among problem drinking MSM.

Research Question 7: Do factors such as respondent characteristics, motivation, and cognition influence correspondence between the IVR and TLFB methodologies for the assessment of alcohol use among problem drinking MSM?

Research Question 8: Do factors such as respondent motivation and cognition influence correspondence between the IVR and TLFB methodologies for the assessment of risky sexual behavior among problem drinking MSM?

Study Aim 2 and associated Research Questions 7 and 8 are considered exploratory and as such specific hypotheses related to each research question have not been articulated.

Study Aim 3

Men who have sex with men have been reported to engage in high rates of unprotected anal sex, which likely contributes to the recent increase in rates of HIV infection among MSM within the United States; however, research implicating alcohol consumption as a contributing factor to risky sexual behavior among MSM is equivocal. With the development and implementation of new self-report data collection technologies such as IVR, the ability to provide a more sensitive analysis (i.e., ability to detect a statistically significant association) of this relationship is possible given that there are certain task attributes that offer several advantages in comparison to other more traditional data collection methods. In addition, irrespective of findings, the current study has the potential to inform public health practice by providing recommendations for
population-based intervention to address the high rates of HIV infection among MSM). Given this background, a final aim of this dissertation is to examine the association between alcohol use and risky sexual behavior using IVR daily data collection technology among problem drinking MSM.

*Research Question 9:* Is there an association between alcohol use and risky sexual behavior among problem drinking MSM?

*Research Question 10:* Does subject HIV status moderate the relationship between heavy alcohol use and UAI?

*Hypotheses of Current Dissertation*

Based on a review of the literature and rationale for the current study, three hypotheses were developed. Specific hypotheses regarding Research Question 1, focus on assessing correlations between IVR and TLFB methods, as well as examining mean differences between IVR and TLFB methods specific to three measures of alcohol use.

*Hypothesis 1a:* The correlation between the IVR and TLFB methodologies for mean drinks per drinking day will be greater than \( r = 0.5 \).

*Hypothesis 1b:* The correlation between the IVR and TLFB methodologies for percent heavy drinking days will be greater than \( r = 0.5 \).

*Hypothesis 1c:* The correlation between the IVR and TLFB methodologies for percent of days abstinent will be greater than \( r = 0.5 \).

*Hypothesis 1d:* The overall mean for mean drinks per drinking day will be greater for the IVR approach relative to the TLFB approach.

*Hypothesis 1e:* The overall mean for percent heavy drinking days will be greater for the IVR approach relative to the TLFB approach.
Hypothesis 1f: The overall mean for percent of days abstinent will be greater for the TLFB approach relative to the IVR approach.

The final two hypotheses focus on an examination of the relationship between alcohol use and risky sexual behavior among problem drinking MSM.

Hypothesis 2: UAI will be more likely to occur on those days that alcohol use occurs.

Hypothesis 3: The relationship between alcohol use and risky sexual behavior will be moderated by the HIV status of the participant such that among HIV positive MSM, there will be a stronger positive association between alcohol use and unprotected anal intercourse in comparison to HIV negative MSM.

Definition of Acronyms

**ICC** refers to Intraclass Correlation Coefficient, a statistical technique that examines the relationship between two variables.

**IVR** refers to Interactive Voice Response Technology, which is a telephone-based data collection method.

**MDDD** refers to Mean Drinks per Drinking Day, a summary level drinking variable that reflects the degree of drinking intensity.

**MSM** refers to Men-who-have-sex-with men and includes both gay and bisexual men.

**PDA** refers to Percent Days Abstinent, a summary level drinking variable that reflects the degree of abstinence from drinking.

**PHDD** refers to Percent Heavy Drinking Days, a summary level drinking variable that reflects the degree of heavy of drinking.
**SI** refers to sexual incidents, a variable that reflects the frequency of sexual episodes.

**TLFB** refers to TimeLine FollowBack, which is an interview-assisted data collection method.

**UAI** refers to Unprotected Anal Intercourse, a form of risky sexual behavior that is a known casual risk factor for the spread of HIV infection among MSM.

**UIAI** refers to Unprotected Insertive Anal Intercourse, a form of risky sexual behavior that is a known casual risk factor for the spread of HIV infection among MSM.

**URAI** refers to Unprotected Receptive Anal Intercourse, a form of risky sexual behavior that is a known casual risk factor for the spread of HIV infection among MSM.

**UAIAU** refers to Unprotected Anal Intercourse on days Alcohol Use occurs, a variable that reflects the joint association between alcohol use and risky sexual behavior, and is a form of risky sexual behavior that is a known casual risk factor for the spread of HIV infection among MSM.

**UIAIAU** refers to Unprotected Insertive Anal Intercourse on days Alcohol Use occurs, a variable that reflects the joint association between alcohol use and risky sexual behavior, and is a form of risky sexual behavior that is a known casual risk factor for the spread of HIV infection among MSM.

**URAI** refers to Unprotected Receptive Anal Intercourse on days Alcohol Use occurs, a variable that reflects the joint association between alcohol use and risky sexual behavior, and is a form of risky sexual behavior that is a known casual risk factor for the spread of HIV infection among MSM.
Limitations and Delimitations

This study was limited to problem drinking MSM seeking treatment to moderate their alcohol use, which may limit the generalizability of study findings to other subgroups of MSM. However, representative samples of MSM are difficult to obtain. The present study design does not permit causal inferences. The majority of studies that have examined the relationship between alcohol use and risky sexual behavior have been correlational/descriptive designs. In addition, the prevalence of engaging in UAI and participant HIV status was low which may have reduced the ability to detect statistically significant associations. A major advantage to using IVR technology, however, is that it allows for estimation of within person associations between alcohol use and risky sexual behavior, and typically results in greater power to detect significant effects. Further, all data were based on self-report, but there were several procedures incorporated into the study protocol to enhance response accuracy such as assurances of confidentiality and use of psychometrically sound questionnaires.
CHAPTER 2
LITERATURE REVIEW

Rates of HIV infection and other sexually transmitted infections (STIs) continue to occur at alarming rates and remain a significant public health concern. According to the World Health Organization (WHO), rates of HIV infection worldwide increased significantly from 2001 to 2007 with an increase from 29 million to 33.2 million people living with HIV/AIDS (UNAIDS, 2007). Within the United States, surveillance data from the Centers for Disease Control (CDC) has indicated that approximately 475,220 individuals were currently living with HIV/AIDS with an estimated rate of 19.8 per 100,000 population at the end of 2005 (CDC, 2005). These statistics are disconcerting given that HIV/AIDS continues to be one of the leading causes of death worldwide, despite intensive global public health efforts to reduce rates of HIV transmission. Further, there is growing concern within the United States that rates of HIV/AIDS are on the rise, particularly among certain sub-populations.

HIV Infection Rates among MSM

Men-who-have-sex-with-men (MSM) represent an at-risk population, who constitute a growing faction of HIV infected individuals. In a meta-analysis of middle and low income countries, MSM were 19.3 (95% CI 18.8-19.8) times more likely to be infected with HIV in comparison to the general population (Baral, Sifakis, Cleghorn, & Beyrer, 2007). In the United States, it has been estimated that between 365,000 to 535,000 MSM are infected with HIV and MSM comprise approximately half of all people infected with HIV (Karon, et. al., 1996). Data from the CDC in 2005, indicated that MSM accounted for approximately 71% of adult males receiving an HIV/AIDS
diagnosis. Today, MSM account for over 50% of those currently living with HIV within the U.S. population (CDC, 2007). Emerging evidence indicates that rates of HIV infection are on the rise, having increased more than 10% from 2001 to 2005 (CDC, 2007; Wolitski, Valdiserri, Denning, & Levine, 2001). Similarly, rates of other sexually transmitted infections among MSM known to facilitate HIV transmission, such as gonorrhea, have increased nearly threefold from 4.5% in 1992 to 13.2% in 1999 (Fox et al., 2001). It becomes imperative, therefore, to further understand and identify specific contextual and risk factors that contribute to these high rates of HIV infection among MSM in order to tailor public health prevention and intervention efforts.

*Rates of Unprotected Sex among MSM*

Advances in medical science have assisted in delaying mortality of AIDS, but a cure has not been identified. Several risk factors that contribute to the spread of HIV/AIDS among MSM include engagement in unsafe sexual practices such as unprotected anal insertive or receptive intercourse among serodiscordant partners (Koblin et. al., 2006; Ruiz, Facer, & Sun 1998; Woolf & Maisto, in press) which are targets of public health prevention efforts.

Epidemiological data indicates that the prevalence of engaging in unprotected anal intercourse among MSM increased from 37% in 1993 and 1994 to 50% in 1996 and 1997 (Elkstrand, Stall, Paul, Osmond & Coates, 1999). More recently, data from the EXPLORE study (N = 4295), a large multi-site behavioral intervention designed to prevent the acquisition of HIV infection among HIV negative MSM, provided further evidence that MSM engage in high rates of unprotected anal intercourse (69.1%), unprotected anal receptive intercourse (48%), and unprotected insertive intercourse...
(54.9%) (Koblin et al., 2006). Collectively, these findings highlight the importance of understanding the specific correlates and contexts in which risky sexual behavior among MSM is likely to occur in order to tailor prevention efforts accordingly.

**Epidemiology of Alcohol Use among MSM**

Research has implicated alcohol consumption as a potential contributing factor to engagement in risky sexual behavior among MSM. Several studies have noted that MSM consume alcohol at comparable rates to those in the general population, but that problem-drinking MSM are less likely to abstain from alcohol use (Bux, 1996; Stall et al., 2001). Bergmark (1999) provides evidence that MSM consume alcohol at elevated rates, and that they are more likely to experience more negative consequences from drinking compared to heterosexual men. Moreover, MSM typically frequent bars and other social settings where alcohol is readily available which makes the avoidance of alcohol cues more difficult and provides a context for excessive drinking to occur (Grov, Parsons & Bimbi, 2007). This becomes particularly disconcerting when one considers that sexual encounters and the increased frequency of unprotected sex among MSM is preceded by social settings where drinking occurs (e.g., bars, nightclubs). This strongly suggests a potential link between engagement in risky sexual behavior and alcohol use among MSM.

**Summary of Rates of Risky Sex and Alcohol Consumption among MSM**

Rates of HIV/AIDS among MSM are increasing after nearly a decade of decline. Epidemiological data indicate that MSM continue to engage in high rates of UAI, despite intensive public health efforts. In addition, MSM consume alcohol at rates comparable to the general population, which has been implicated as a risk factor for engagement in UAI.
MSM represent a high-risk population who engage in multiple risk behaviors that may contribute to the high rates of HIV/AIDS among this group. As such, it remains important to further understand the extent to which alcohol use is related to engagement in UAI in order to tailor public health prevention efforts.

*The Relationship between Alcohol Use and Risky Sex*

Over the past twenty years studies have examined the association(s) between alcohol consumption and risky sexual behavior among MSM. This line of inquiry can be categorized into three tiers with respect as to how the relationship between alcohol use and risky sexual behavior has been operationalized and examined: 1) *Global association studies* correlate the overall frequency/quantity of alcohol use and frequency of risky sexual behavior over a particular reference period; 2) *Situational association studies* assess the frequency with which alcohol use is consumed before and during specific events or situations, specifically sexual encounters; 3) *Event level studies* provide the most rigorous analysis of the temporal relationship(s) between alcohol use and risky sexual behavior and involve an examination of a sexual event with the frequency/quantity of alcohol use that occurred before and during that specific sexual event and other contextual factors related to the event (e.g., other drug use; number of sexual partners involved).

*Global Association Studies*

Studies that examine global associations focus on assessing the overall relationship between these two behaviors. Global association studies can be differentiated from situational association studies and event-level studies in that the purpose is to investigate the statistical associations (i.e., correlations) between sexual behavior and
alcohol use during a specific recall period. There have been several studies that have examined global associations between these two behaviors among MSM, and the findings have been mixed.

To date, several studies have identified significant, positive associations between alcohol use and HIV status among MSM (Chesney, Barrett & Stall, 1998; Greenwood et al., 2001; Koblin et al., 2006). In one of the largest multi-site study (N = 4295) of HIV-negative MSM, Koblin and colleagues (2006) examined the relationship between HIV seroconversion status and specific risk behaviors, including alcohol use, semi-annually for up to 4-years follow-up. Participants who consumed alcohol during the prior 6-months at each assessment period were categorized as light, moderate or heavy users. In a multivariate analysis, the heavy use of alcohol (defined as 4 or more drinks every day or six or more drinks on a typical day) was significantly associated with HIV seroconversion with an odds ratio of 1.97 (95% C.I. 1.32-2.96). In addition, an attributable risk analysis indicated that over one-quarter of HIV seroincidence was accounted for by alcohol or drug use before sex. In a similar vain, Chesney and colleagues (1998) followed a sample (N = 337) of HIV-negative MSM for six years, with assessment every six-months, to examine the extent to which heavy drinking and substance use distinguished those who did and did not seroconvert. They found that among those who did seroconvert, heavy drinking (i.e., ≥ 5 drinks in a sitting at least once a week) was more prevalent than those who did not seroconvert. Lastly, Greenwood and colleagues (2001) examined specific correlates of alcohol and other drug use among MSM participating in a cross-sectional analysis of the San Francisco Young Men’s Health Study. Bivariate analyses indicated that heavy drinkers were 2.53 times more
likely to be seropositive, although this finding was not statistically significant after controlling for several socio-demographic and sexual risk factors.

Other global association studies, however, have not found significant associations between alcohol consumption and HIV status among MSM (Kippax et al., 1998; Ruiz et al., 1998). In a sample of gay men from Australia, Kippax and colleagues (1998) compared sexual behaviors and related contextual factors among men who did and did not seroconvert. Alcohol use did not distinguish between those who did seroconvert (cases) and those who did not (controls), however, cases were more likely to use alcohol or other drugs to enhance sexual pleasure with casual sex partners than controls. Similarly, Ruiz, Facer and Sun (1998) examined specific risk factors for HIV infection and UAI among young MSM between the ages of 17 and 25. They found that a history of alcohol use was not a significant predictor of HIV seroprevalence, despite the fact that it was the most frequently used substance reported by individuals in the sample.

Additional global association studies have examined the association between alcohol consumption and UAI, a known causal risk factor for the spread of HIV infection. Similar to the pattern of findings with HIV risk, these studies provide mixed results. Early research has found that quantity and frequency of drinking to be significant predictors of UAI (Myers et. al., 1992). Specifically, Myers and colleagues (1992) found that those who engaged in UAI reported a higher quantity of alcohol consumed in the previous week in comparison to three other less risky sexual activity groups. Similarly, among an HIV-positive MSM sample, findings revealed that men were more likely to engage in unprotected sex with a male casual partner, rather than a steady partner, when they had consumed moderate amounts of alcohol (OR = 2.26; Morin, et. al., 2005).
Other studies have found significant positive associations between heavy alcohol consumption and engagement in unprotected anal intercourse among MSM. For example, Elkstrand, Stall, Paul, Osmond and Coates (1999) examined factors and patterns that were related to UAI among MSM between the ages of 18 to 29 in the San Francisco’s Young Men Health Study. They found that MSM who were classified as high-risk (i.e., engaged in UAI with a casual partner with unknown or serodiscordant status) were 8.54 times more likely to engage in heavy drinking during the previous 30 days (defined as > 5 standard drinks within a sitting at least once a week) than those who were defined as being low-risk (no UAI). In a large sample of MSM in the EXPLORE study, individuals who engaged in heavy alcohol consumption (daily drinking of ≥ 4 standard drinks or drinking ≥ 6 standard drinks on any day) were 1.7 times more likely to engage in serodiscordant unprotected anal intercourse (SDUA) compared to those who did not drink, and were 1.4 times more likely, relative to those who did not drink, to engage in SDUA after controlling for select socio-demographic factors (Colfax, Vittinghoff, Husnik, McKirnan, Buchbinder, Koblin et al., 2004).

Collectively, studies that have assessed the global association between alcohol use and risky sexual behavior in MSM samples have been mixed. Some studies have demonstrated that alcohol use is related to engagement in unprotected anal sex among those who seroconvert, but others have yielded null findings. These inconsistent findings may be attributed to several factors, including differences in the extent to which alcohol use and risky sexual behavior were operationalized and the reliance on self-report data, which may be subject to memory or recall bias. Further, conflicting results about the relationship (or lack thereof) between alcohol use and risky sexual behavior among MSM
may be explained, at least in part, by the use of global indicators that do not permit inferences to be made with respect to how alcohol is involved during risky sexual encounters.

*Situational Association Studies*

Situational association studies provide a more in-depth assessment, relative to global association studies, because the extent to which alcohol is involved in sexual situations is examined (Woolf & Maisto, 2007). Similar to findings presented in the previous section on global association studies, results from situational studies also have been mixed.

The association between alcohol use prior to sex and the occurrence of contracting a sexually transmitted infection (STI) has not been extensively examined. Hirshfield, Remien, Walavalkar and Chiasson (2004) conducted an anonymous cross-sectional case-control study over the internet to identify specific risk factors associated with acquiring a STI or not acquiring one among MSM. Acquiring a STI can have implications for HIV risk behavior because of evidence suggesting that the presence of an STI is a known risk factor for HIV, and may even facilitate HIV transmission. The authors (2004) assessed sexual risk behavior by asking participants to report on the type of sexual contact (anal intercourse with or without condoms), type of partner (main or casual), and knowledge of the partner’s HIV status. In addition, participants were asked if they had used alcohol before or during sex. Overall, 48% of the sample indicated consuming alcohol before or during sex. Binary logistic regression analyses indicated an association between alcohol use before or during sex and the likelihood of reporting an incident STI (OR = 1.6), but this finding was not significant after controlling for
sociodemographic factors. To date, this is the only situational association study that has examined the relationship between alcohol use before or during sex and the likelihood of having a STI.

The majority of situational assessment studies examining risky sexual behavior have focused on UAI as the primary outcome. Hirshfield and colleagues (2005) further investigated the association between substance use and unprotected sex among MSM who were recruited online. Bivariate analyses indicated that both alcohol use before and/or during sex, as well as “drinking until drunk” 1 to 3 days per week, were significant predictors of engaging in UAI. In addition, alcohol use (before and/or during sex) was a significant predictor of UAI (OR = 1.5), even after adjusting for demographic factors. Similarly, research has shown an independent association between UAI and men’s reports of being “high or buzzed” during sex in a six month period (OR = 1.58) among an ethnically diverse sample of young Asian-American and Pacific Islander MSM; however, this finding did not remain significant after adjusting for other demographic factors (Choi, et. al., 2005).

Other situational assessment studies have focused on higher-risk HIV transmission samples, such as HIV-positive men who consume alcohol and engage in unprotected insertive anal intercourse (UIAI) with a partner with unknown or serodiscordant status. Purcell, Parsons, Halkitis, Mizuno & Woods (2001) examined the association between drinking before or during sex and the likelihood of engaging in high sexual transmission risk (UIAI with serodiscordant or unknown partners) in a sample of 456 HIV-positive MSM. Of the men who reportedly consumed alcohol, 79.9% reportedly drank before or during sex, and among those who engaged in UIAI with a
In addition, men who reported frequent use of alcohol before or during sex were more likely to engage in UIAI with casual partners with serodiscordant/unknown status compared to those who drank less, even after controlling for several respondent characteristics (i.e., race/ethnicity, club drug use) in a multivariate analysis (OR = 4.68). The confirmation of these findings was supported within a sub-sample of HIV-positive MSM recruited to participate in a study of substance use and high-risk sexual behavior among three HIV exposure groups: MSM, intravenous drug users, and individuals infected with HIV through heterosexual contact (Beckett, Burnam, Collins, Kanouse & Beckman, 2003). The authors found that MSM were twice as likely to engage in high-risk sex, defined as UAI with a partner of unknown or serodiscordant status, relative to intravenous drug users and HIV-infected heterosexual individuals.

In contrast to study findings demonstrating a significant association between alcohol consumption during UAI and situations involving HIV-risk transmission, other studies have not yielded significant findings. Crosby, Stall, Paul and Barrett (1996) modified the TLFB to examine the frequency of anal intercourse while under the influence of alcohol between MSM who use condoms during sex and those who typically do not use condoms during sex. The authors found that on the days in which sex occurred, amount of alcohol consumed did not distinguish between MSM who did and did not use condoms. In addition, in a sample of 78 HIV-positive MSM, the frequency in which alcohol was consumed one hour prior to sexual intercourse did not vary significantly for the number of UAI incidents with either seroconcordant or serodiscordant partners, although 51% of the sample did report consuming alcohol at
least once prior to engaging in UAI (Theodore, Duran, Antoni & Fernandez, 2004). The relationship between alcohol use and UAI among an ethnically diverse sample of MSM from Spain was examined by Folch and colleagues (2006) and study findings indicated that only 18% of their sample consumed alcohol regularly or occasionally before or during sex, and such alcohol use was not associated with UAI with either steady or casual partners when controlling for several socio-demographic variables.

Similar to global association research, situational assessment studies have yielded mixed findings with respect to the relationship between alcohol use and engagement in HIV sexual risk behavior. Study findings provide less than definitive evidence that alcohol use is a major contributing factor to HIV status, although data indicate that alcohol consumption is associated with UAI in sexual encounters. It appears that the association between alcohol use and risky sexual behavior may be more pronounced in samples who are at high-risk (e.g., HIV positive MSM) or engage in multiple risk behaviors (e.g., use of illicit drugs). Data suggest that the potential causal pathway between alcohol use and engagement in HIV risk behavior is complex and may be moderated by several factors.

**Event Level Studies**

Event level studies provide the most rigorous evaluation of the association between alcohol use and HIV risk behavior by examining the extent to which alcohol is involved during a specific sexual episode and assesses for several contextual factors associated with each event (Woolf and Maisto, in press). Although event level studies do not involve an experimental investigation of a causal link between alcohol use and risky
sexual behaviors, such studies do have the advantage of controlling for the proper
temporal ordering of alcohol use and HIV risk behavior.

The use of event-level studies to assess daily behavior patterns has improved upon
previous methods of self-report for several reasons. First, event-level studies allow for
inclusion of highly detailed information regarding alcohol involvement before and during
sex. Second, event-level studies allow for the assessment of specific contextual factors
(anal insertive or receptive, number of partners, condom use) that may occur during each
sexual episode. For example, Colfax et al., (2004) asked MSM to describe recent sexual
episodes involving up to three of their most recent sexual partners. Inquiries included
type of sexual encounter (unprotected oral sex with ejaculation, unprotected or protected
receptive or insertive sex), the amount of alcohol consumed two hours before and during
sex, and the use of other drugs immediately before sex. Other questions included the
serostatus of each partner, the location of the event, and type of relationship with the
sexual partner (steady partner, non-primary/casual partner). Multivariate analyses that
included demographic covariates indicated that participants who consumed \( \geq 6 \) standard
drinks before or during sex were 2.4 times more likely to engage in unprotected anal sex
with a partner with serodiscordant status. In addition, participants who reported that their
partners consumed alcohol before or during sex were 1.8 times more likely to engage in
UAI with a serodiscordant partner.

Vanable and colleagues (2004) examined specific contextual factors thought to
moderate the relationship between alcohol use and risky sex in a large sample (N=1700)
of MSM recruited for a vaccine-preparedness study that assessed HIV seroincidence risk
behaviors. Event-level assessments occurred at two time-periods, and each interview
focused on the most recent sexual encounter. The primary outcome measure was engagement in UAI with a sexual partner, dichotomized as “yes” or “no.” Event-level information consisted of the number of standard drinks consumed prior to the sexual episode and whether sex occurred with a primary or casual/anonymously partner. Study findings indicated that UAI events involving a primary partner did not vary as a function of alcohol consumption. The number of alcohol beverages that were consumed prior to a sexual event did not significantly influence whether participants engaged in a sexual encounter with their primary partner or a casual partner; however, when alcohol consumption was operationalized as heavy drinking (defined as > 4 standard drinks on one occasion, situations involving non-primary partners and alcohol use nearly tripled the likelihood of engaging in UAI.

Recently, Irwin, Morgenstern, Parsons, Wainberg, and Labouvie (2006) provided an event-level analysis of the relationship between alcohol consumption and risky sexual behavior involving a sample of problem-drinking HIV-negative MSM. The TLFB interview was the primary data collection method used to assess both daily alcohol use and risky sexual behavior during the prior 30-day period. Variables of interest were the proportion of UAI events that occurred while drinking and not drinking alcohol. Analysis indicated that UAI was more likely to occur when men reported being under the influence of alcohol (60%) compared to when they were sober (47%). Alternatively, between group analyses did not yield significant differences between those who always consumed alcohol during sex, sometimes during sex, and never during sex for the number of UAI occasions. Additional secondary data analyses, however, indicated that among those who had sex under the influence of alcohol, unprotected sex was more likely to occur for anal
receptive occasions than for anal insertive occasions, which is typically viewed as a more risky form of sexual behavior among MSM.

In contrast to these findings, results from other event-level studies have not yielded significant associations between alcohol use and risky sex. Clutterbuck, Gorman, McMillan, Lewis and Macintyre (2001) examined the relationship between alcohol use and unsafe sex among MSM from Edinburgh, Scotland using an anonymous questionnaire, wherein participants were asked to provide a detailed account of their last sexual experience that included partner type, location, time of day, partner’s HIV status, and the type of sexual activities that occurred. Trained interviewers assessed the frequency and quantity of alcohol use and sexual activity during the three-month period preceding the interview. Alcohol use before, defined as less than two hours before sex or more than two hours but less than 12 hours or during sex for each participant, was collected. Overall, results did not support a significant association between the consumption of alcohol in the two hours leading to a UAI sexual encounter (OR = 1.29; 95% C.I.s .61-2.73), although a greater percentage of participants who reported alcohol use prior to having sex were more likely to have sex with a casual partner in comparison to a primary partner.

Gillmore and colleagues (2002) asked MSM to record their alcohol consumption and sexual behavior in daily diaries for 8 weeks. The type of sexual behavior assessed included the time sex occurred, type of sex (oral, anal), condom use, and partner type. Alcohol consumption was assessed for up to three occasions per day and focused on the beginning and end of a drinking episode, as well as the quantity and type of alcoholic
beverage that was consumed. Data analyses yielded non-significant associations between condom use and alcohol consumed within four hours prior to engaging in UAI.

**Summary of Findings (Alcohol Use and Risky Sexual Behavior)**

Collectively, study findings that have examined the statistical associations between HIV-risk, UAI, and alcohol use among MSM are mixed. Several studies have shown that alcohol use among MSM is related to seroconversion and UAI, but such findings have not been robust. Other studies have yielded ambiguous findings regarding the extent to which alcohol consumption is significantly related to HIV-risk sexual behavior. According to Woolf and Maisto (in press), inconsistent findings are likely attributed to three varying factors: (1) the selected risky sexual behavior outcome; (2) the operationalization of alcohol use; and (3) samples comprised of individuals that engage in high rates of other drug use and have multiple risk factors that preclude definitive conclusions about the independent risk of alcohol use to HIV-risk sexual behavior. An additional limitation associated with the aforementioned studies is reliance on self-reported data, which is subject to recall and memory bias. In conclusion, study findings across each methodological approach suggest that the associations between alcohol use and HIV risky behavior are complex and may involve multiple causal (i.e., direct and indirect) pathways.

**Self-Report Data Collection Methodologies**

Self-reported information is the predominant method of data collecting specific to alcohol use and risky sexual behavior. Self-report methods have several advantages relative to other data collection methods (e.g., biochemical assays) such as providing a comprehensive assessment of contextual factors associated with each behavior, ease of
administration and relatively low cost. Irrespective of these advantages, self-report methods also have limitations as they can be influenced by internal mood states such as depression and subject to memory/recall biases. To address these concerns, several data collection methods have been developed to generate greater response accuracy when collecting sensitive data such as alcohol use and risky sexual behavior.

**TimeLine FollowBack (TLFB) Method and the Collection of Alcohol Data**

The TLFB method is a calendar-based technique that assists individuals in recalling daily information over a specific period (prior 90 days) in order to provide summary level data. The TLFB interview method was developed by Linda Sobell and Mark Sobell in the late 1970’s to enhance response accuracy for the collection of retrospective self-reported alcohol use data (Sobell, Maisto, Sobell & Cooper, 1979). Participants engage in aided recall, prompted by a trained interviewer for pencil and paper versions of the TLFB, by identifying specific events referred to as anchor points (periods of abstinence, birthdays, vacations) that assist in probing an individual’s memory to recall the amount of alcohol consumed. In addition, the research interviewer assists the respondent in filling in all days of a blank calendar identifying specific patterns of his/her alcohol consumption. Since its inception, the TLFB has been considered the gold standard for the collection of alcohol consumption summary level data, and has recently been extended to the collection of other behaviors, including risky sexual behavior. A review of studies that have examined the psychometric properties of the TLFB for the assessment of alcohol use is presented first followed by a review of studies assessing the psychometric properties of the TLFB for the assessment of sexual behavior.
Sobell, Maisto, Sobell and Cooper (1979) examined the test-retest reliability of the TLFB interview among twelve male clients in an outpatient alcohol treatment program. Participants were given a blank calendar that covered the prior 360 days (pre-admission), and asked to report the number of standard drinks consumed each day, and the number of days incarcerated for alcohol-related reasons. To assist in recalling daily information, participants were asked by the interviewer to identify specific time bound events (e.g., birthdays, holidays), as well as arrests, hospitalizations, illnesses, and periods of invariant drinking behaviors. As each of these events was identified, the interviewer assisted the participant in recording his drinking on the calendar for each day in the recall period. Approximately six weeks later, each participant was interviewed again using the same procedure, and reported on their drinking for the same time period. Overall, results indicated that self-reports of drinking, alcohol-related incarcerations, and history of problem drinking over the past year were reliable with correlations ranging from .79 to .98.

Maisto and colleagues (1979) examined the test-retest reliability of the TLFB method for the collection of alcohol use data among three independent samples of 12 male alcohol abusers from three different treatment settings (i.e., outpatient, inpatient, and residential). Participants were interviewed about their alcohol use during the past year and re-interviewed approximately two weeks later. For both time points, drinking data were coded into five mutually exclusive categories (days abstinent, days of limited alcohol intake ($\leq$ 3 standard drinks), days of heavy alcohol intake ($>3$ standard drinks), days of alcohol-related incarcerations, and days spent in residential treatment) during four specific periods (30, 90, 180 and 360 days pre-treatment). Overall, test-retest correlations
specific to each timeframe indicated a moderate-to-high (r’s ranging from .69 - .98) degree of reliability across each of the time points for each of the constructed alcohol use measures.

The TLFB’s test-retest reliability has been demonstrated across diverse samples. For example, the TLFB method has been shown to provide reliable reports for recent drinking behavior among both male and female college students (Sobell, Sobell, Klajner, Pavan & Basian, 1986). Carey (1997) also found high test-retest stability for the TLFB method for frequency of drinking days and maximum amount of alcohol consumed over a 30-day period with administrations occurring 6-days apart among a psychiatric outpatient sample. Similarly, Sacks and colleagues (2003) evaluated the test-retest reliability of the TLFB method among a sample of homeless drinkers enrolled in a homelessness prevention program, and found high correlations over a one- to two-week test-retest interval for number of days alcohol was consumed and the number of drinks consumed per day during the prior six-months. In a sample of normal drinkers within the general population, Sobell and colleagues (1988) found a high degree of test-retest reliability for the TLFB method reports of quantity (drinks per drinking day) and frequency of alcohol use (number of days abstinent) during a 90-day recall period. Drinking data derived from the TLFB method also have been shown to be reliable when collected via the telephone or computerized assessment among problem drinkers (Sobell, Brown, Leo, & Sobell, 1996; Vinson, Reidinger & Wilcosky, 2003).

In an effort to examine the validity of the TLFB method, Maisto, Sobell, Cooper and Sobell (1982) compared results from two different retrospective reports of daily drinking behavior in a sample of 15 male alcohol abusers entering outpatient treatment.
Using both the TLFB method and single-item alcohol-related questions, each participant was asked to report on his drinking behavior in the month prior to treatment admission. Findings indicated that the correlations between the TLFB and single item alcohol use questions for number of days abstinent and number of drinking days were both high, $r = .81$ and $.79$, respectively. Given that single item variables of drinking provide only a gross measure of quantity and frequency of alcohol use, relative to summary level drinking variables that can be constructed by the TLFB method (e.g., mean drinks per drinking day), other correlations that examine the intensity of drinking over the recall period were not obtained.

Sobell, Sobell, Leo and Cancilla (1988) also sought to establish the validity of the TLFB in assessing alcohol use by comparing drinking data derived from the TLFB and Quantity-Frequency (QF) questionnaire methods among a non-treatment seeking sample of drinkers. As part of a larger study, participants were asked to report on their alcohol consumption during the prior 90-days via the TLFB method, and additionally were asked to fill out a brief QF measure that assessed typical frequency and quantity of drinking. Based on QF reports, participants were categorized into either one of two groups: 1) low consumers (defined as consuming less than six standard drinks; or 2) high consumers (defined as consuming equal to or greater than six standard drinks). In addition, three separate drinking variables from the TLFB were constructed (total number of drinking days, total number of drinks consumed, and mean drinks per drinking day). Study findings indicated substantial variation in the ranges of the TLFB variables among the QF groups providing evidence that the QF measure provided an inaccurate categorization of individual differences in drinking behavior.
Among a clinical sample of individuals with co-morbid psychiatric disorders, DeMarce and colleagues, (2007) examined the validity for specific summary level alcohol use variables constructed by the TLFB method, alcohol use composite scores derived from the Addiction Severity Index (ASI), a widely used instrument that assesses specific domains of alcohol and other drug-related problems (e.g., illegal activity, psychiatric history), and alcohol reports obtained from collateral informants from the FORM-90. Study findings indicated that drinking estimates obtained from the TLFB and ASI were moderately correlated with one another ($r = .69$) for the number of drinking days during the prior 30-days. Similarly, a moderate correlation ($r = .52$) was found between participants’ and collaterals’ reports of the frequency of days participants consumed alcohol during the prior 30 days.

Validation of the TLFB method also has been examined using a community-based sample of problem drinkers (Sobell et. al., 2003). Sobell and colleagues (2003) compared drinking data from the TLFB and Quick Drinking Screen (QDS), a brief screening measure that assesses the quantity-frequency of alcohol use over a one-year recall period, with five separate questions. Across five summary drinking measures (mean drinks per drinking day; days drinking per week, drinks per week, days drinking > 4 drinks per day, and greatest number of drinks in one day) correlations were moderate to high ranging from $r = .66$ to $r = .82$. Most striking was that the aggregate means for each of the five alcohol use measures obtained from the TLFB method were higher than the drinking data obtained from the QDS, although, statistically, the estimates did not vary significantly from one another.
Summary of Research on Reliability and Validity of TLFB: Alcohol Data

Since its inception, the TLFB method has been one of the most widely used data collection methods to obtain retrospective reports of alcohol use. Extensive psychometric evaluation of the TLFB method for the collection of alcohol use data indicates a high degree of test-retest reliability over recall periods ranging from 30 days to approximately one-year in duration across a number of diverse populations. Similarly, findings from validation studies using the TLFB method to assess drinking behavior have indicated reasonable concurrent and construct validity across a range of summary drinking variables reflecting both quantity and frequency of use across a number of different populations. The primary advantage of using the TLFB method is the construction of summary drinking variables that reflect an individual’s pattern, variability, and level of drinking when compared to other data collection methods. A second benefit of the TLFB method is that it can be reliably administered in-person, by telephone, or via computer. Third, the TLFB method can be used as an assessment for other contextual factors related to drinking (e.g., drug use; engagement in unprotected anal sex), which is typically not afforded by other data collection methods (i.e., single item assessments). A major methodological shortcoming of the TLFB, however, is that it has not been validated for the collection of date specific alcohol use, which is necessary for demonstrating a temporal relationship between alcohol consumption and engagement in risky sexual behavior.

Research on the Reliability and Validity of the TLFB: Risky Sexual Behavior Data

The TLFB method has been used to collect high-risk sexual behavior data, although few studies have documented its psychometric properties with respect to these
type data. In this regard, Crosby, Stall, Paul and Barrett (1996) were the first to modify the TLFB method for the assessment of alcohol use and risky sexual behavior among a sample of MSM. In doing so, Crosby et. al. (1996) were able to identify specific protective factors (demographic characteristics, types of drug use during sex) that distinguish between substance using MSM who use condoms during sex and those who do not. Participants (N = 131; 73% Caucasian; 59% HIV-positive) were recruited from a gay-identified outpatient substance abuse center. The TLFB was used to collect information on sexual behavior (substance use with anal sex, proportion of anal sex incidents while using specific drugs, number of anal sex events) and substance use behavior during the thirty-day baseline period. Results indicated that men who engaged in unprotected anal sex while under the influence of alcohol or drugs had no college education, had an annual income of less than $20,000, were more likely to use illicit drugs, and engaged in a greater number of anal sex acts compared to men who did not engage in unprotected anal sex while under the influence.

In one of the first psychometric evaluations of the Sex-TLFB, Weinhardt, Carey, Maisto, Carey, Cohen, and Wickramasinghe (1998) evaluated its reliability among 110 college students enrolled in an introductory psychology course. The specific sexual behaviors assessed during the prior 90-day period were insertive and receptive vaginal, oral, and anal intercourse. In addition, participants were asked to report the type of relationship with his/her partner (e.g., monogamous), antecedents of HIV-risk behavior such as alcohol or other drug use, and certain types of HIV preventative behavior. Individuals who reported any sexual behavior during the interview were invited to return one week later and were re-interviewed using the TLFB procedure for the same 90 day
time-frame. Results indicated that the variables obtained from the TLFB assessment yielded greater frequencies of sexual behavior in comparison to single item variables. The test-retest reliability coefficients for the TLFB interview ranged from $r = .86$ to $r = .97$ for all sexual behaviors assessed, such as frequency of sexual occasions, UAI incidents, and UAI incidents under the influence of alcohol, which provided evidence that the estimates of the TLFB sexual risk variables for each month assessed across the 90 day recall period remained stable.

Carey, Carey, Maisto, Gordon, and Weinhardt (2001) conducted one of the most comprehensive studies to date that assesses the reliability and validity of the Sex-TLFB method, using a psychiatric outpatient sample. In this study, the TLFB method was used to collect information on risky sexual behavior as well as alcohol and other drug use during a 90-day period. Participants were asked to identify their number of sexual partners, partner characteristics (regular or casual partner), risk status of the partner (HIV serostatus, IV drug user), penetrative sexual acts (insertive or receptive vaginal, anal, and oral), whether or not a condom was used, use of alcohol or other drugs during sex, and whether sexual trading or coercion occurred. The sex-TLFB method demonstrated good inter-rater consistency across different coders and evidence showed that sexual behaviors derived from the Sex-TLFB for frequency of sexual intercourse, number of vaginal insertion occasions, number of anal insertion occasions, frequency of unprotected sexual intercourse) were highly reliable (correlations ranging from .85 to .94), with consistent reports occurring as long as one-week apart. Lastly, the sex-TLFB was moderately correlated with single item questions ($r$’s ranging from .52 to .61) that assessed the same
type of sexual behavior with greater estimates of sexual behavior generated from the TLFB method.

**Summary of Research on the TLFB for Sexual Behavior**

Psychometric validation using the TLFB for the collection of sexual behavior has not been studied extensively; however, preliminary findings provide data that it is a valid and reliable method for collecting information on sexual behavior. There is evidence from both college student and psychiatric outpatient samples that use of the TLFB method for the collection of specific types (frequency of sexual incidents, frequency of UAI occasions) of sexual behavior generates greater estimates relative to single item questions that assess the same behavior, but it does not necessarily imply that the TLFB-sex is more valid. In addition, test-retest reliability coefficients among both samples has indicated that the TLFB provides consistent reports for specific types of sexual behavior (frequency of sexual incidents, frequency of UAI occasions, frequency of UAI occasions under the influence of alcohol), across a 90 day recall period. An advantage of the sex TLFB method is that it affords an event level analysis of alcohol and other drug use and yields a range of summary level variables specific to various types of sexual behavior (e.g., unprotected anal receptive intercourse; unprotected anal insertive intercourse under the influence of alcohol), which can be valuable information for public health intervention planning, implementation, and evaluation. Similar to the assessment of alcohol use, a primary disadvantage of the TLFB for the collection of sexual behavior is that it has not been validated for the collection of date specific data, which precludes definitive conclusions regarding the extent to which alcohol consumption influences engagement in high-risk sexual behavior.
**Background on Interactive Voice Response (IVR) Assessment**

Interactive Voice Response represents an integration of computer assessment methods and novel telephone technologies (Mundt, Searles, Perrine, & Walter, 1997) in which participants call in daily to a telephone system and respond to automated questions by the use of a touch tone telephone. It is a data collection method that encompasses a broader range of behavioral assessments commonly referred to as ecological momentary assessment (EMA), which affords the opportunity to collect near real-time data on behavior that occurs within the natural environment (Shiffman, Stone & Hufford, 2008). One of the primary aims of IVR data collection is to examine specific daily micro-processes that impact behavior within a more realistic setting, which is often not permissible with other data collection methods within the context of a research or public health setting that requires participants to retrospectively recall their behavior. As such, IVR daily data collection represents a unique opportunity for the advancement of assessment of alcohol use and sexual risk behavior.

**IVR Assessment of Alcohol Use**

Over the past decade, IVR applications for the assessment of self-reported alcohol use have become increasingly popular (Heltzer, Badger, Searles, Rose, & Mongeon, 2006; Kranzler, Abu-Hasaballah, Tennen, Feinn, & Young, 2004; Mundt & Bean, 2006; Searles, Perrine, Mundt, & Helzer, 1995). Searles et al. (1995) conducted one of the first feasibility studies that examined self-reported drinking behavior utilizing IVR technology, Fifty-one problem drinking participants (98% white; 88% currently employed) responded daily by telephone for 112 days to an automated IVR system and answered 11 questions specific to quantity/frequency of alcohol consumption. Drinking
characteristics of the sample indicated that alcohol use occurred on 46.3% of the reporting days, with participants consuming, on average, 4.9 standard drinks per day.

Similarly, Kranzler, et al., (2004) demonstrated the feasibility of IVR daily data collection of drinking behavior during a 12-week assessment period for nine subjects receiving a combination of naltrexone and brief behavioral therapy to reduce heavy drinking. The authors concluded that IVR daily data collection could occur within a short time period (less than 5 minutes per call) and generated greater aggregate reports of drinking intensity when compared to drinking reports obtained from the TLFB method.

These studies highlight several important characteristics of the IVR: data collection specific to alcohol use behavior via IVR technology is feasible, the IVR can provide summary level drinking characteristics, and the IVR provides information on drinking behavior that is comparable to what is collected from a more common retrospective method. Currently, the feasibility of collecting drinking data using the IVR method among problem drinking MSM has not been examined. Further, the extent to which IVR technology can be used to collect risky sexual behavior remains unknown and suggests that more research is warranted, especially in view of its purported advantages and current use.

Advantages of IVR Data Collection

IVR technology offers several advantages for the assessment of alcohol consumption in comparison to other data collection methodologies such as the TLFB method. For example, IVR technology affords the opportunity for greater response privacy (Heltzer et al., 2006), permits a more comprehensive examination of contextual factors related to alcohol use (Kranzler et al., 2004), provides information on daily
consumption patterns (repeated daily sampling of drinking behavior; Searles et al., 1995), and allows for greater speed of data collection (Mundt & Bean, 2006).

A primary advantage of IVR data collection is that it provides greater ecological validity by offering a unique opportunity to examine the daily within-person association among study variables which are dynamic and affected by varying environmental factors, (Kranzler et al., 2004). For example, the IVR can provide a more rigorous and sensitive analysis of the within day-to-day relationship between alcohol use and engagement in risky sexual behavior, relative to retrospective self-report methods, such as the TLFB. Thus, the application of IVR technology to address important public health problems, such as the relationship between alcohol use and risky sexual practices among MSM, can assist in informing public health practice and provide recommendations for HIV prevention among this at-risk group.

A major disadvantage of the TLFB method is the reliance on retrospective recall of behavior, which is subject to memory and recall biases (Sobell et al., 2002). Interactive Voice Response technology minimizes this pitfall, because it involves a shorter recall period (e.g., past 24-hours), thereby reducing concerns regarding recall/memory bias (Searles et al., 1995). It has the potential, therefore, to become the new gold standard for the assessment of alcohol use and risky sexual behavior because it is better suited to address how these behaviors change over time and across specific contexts.

Limitations of IVR Method

Despite these advantages, there are several potential factors that may limit the utility of IVR data. It is assumed that participants under the influence of alcohol at the time of data collection do not accurately report on their own use (Babor et al., 1987). The
influence of alcohol may interfere with the ability to cognitively retrieve (i.e., recall) drinking behavior (Babor, Steinberg, Anton & Del Boca, 2000). A primary concern associated with the IVR method is that it can not be assured that participants are alcohol free at the time of data collection (Kranzler et al., 2004), whereas during implementation of the interviewer-assisted TLFB method, participants are breathe tested to ensure that they are not intoxicated prior to providing drinking data. Another potential concern regarding IVR daily data collection is the potential for non-compliance to report on a daily or event-contingent fashion, with studies reporting compliance rates varying from 53% to 93%, which has the potential to negatively affect summary level alcohol use estimates derived from IVR as well as violate statistical assumptions (Heltzer et al., 2006; Toll, Cooney, McKee, & O’Malley, 2006). It has been suggested that assessment reactivity, defined as the potential for behavior to be modified by assessment exposure, is a possible limitation of IVR data collection, because the target behavior of assessment may be modified as a result of interacting with the system (Shiffman et al., 2008). Further, other factors such as day-to-day negative mood states may diminish efforts to respond accurately on the IVR system.

**IVR and TLFB Comparisons for Alcohol Use**

Several studies have assessed the statistical associations between IVR and TLFB estimates of alcohol consumption. In one of the first studies conducted to assess estimates of alcohol use using IVR and alternative data collection methods, Perrine, Mundt, Searles and Lester (1995) compared summary level variables of drinking behavior obtained using an IVR system to more traditional methods of assessment (breath and salivia samples, collateral reports, and participant reports obtained from the TLFB procedure) in a
community sample of males (N = 30; median age = 36). Each subject was instructed to call the IVR system daily, for 28-days, and asked to report on the number of standard drinks they consumed on the previous day. In addition, breath and saliva samples were obtained each night by a trained research assistant and daily collateral reports of the participants’ drinking were collected by a voice-mail answering service. At the conclusion of the 28-day period, the TLFB interview was administered to each participant. Correlations across both methods pertaining to number of drinking days (r = .80), total drinks consumed (r = .81), and average consumption per occasion (r = .82) were high. In addition, findings revealed that participants’ aggregate reports of alcohol use were greater from the IVR relative to the TLFB method. These findings suggest that, while the correlations between the TLFB and IVR are high, data collected using IVR generates greater aggregate reports of alcohol use.

Searles, Heltzer, and Walter (2000) recruited 33 men (67% met DSM-IV lifetime alcohol abuse or dependence criteria) from the Vermont Alcohol Research Center to participate in a study involving daily reporting of alcohol use. Daily data collection consisted of calling into a computer automated system via telephone and responding to questions about their drinking (e.g., How many beers did you drink yesterday?) for a total of 366 days. The TLFB was administered every 13 weeks for the duration of the study, (e.g., the first TLFB covered the first 13-week period, and the second TLFB covered a 26-week period). The overall correlations between the IVR and TLFB for the three time-frames (180, 270, and 366 days) were in the moderate range for mean total consumption per day (r’s ranging from .57-.60), number of days with any consumption (r’s ranging from .44 to .49), and number of days with heavy consumption (r’s ranging from .47 to
These data indicate that the correlations between the IVR and TLFB for the collection of summary level alcohol use variables do not vary significantly as a consequence of the recall period involved, but do vary by the type of summary level alcohol use variable constructed.

To examine the extent to which different recall periods may influence IVR-TLFB correspondence, Searles, Helzer, Rose and Badger (2002) examined differences between the IVR and TLFB over three recall periods (30-, 90-, 366-days), and across five measures of alcohol consumption (drinks per day, drinks per drinking day, number of drinking days, number of heavy drinking days, and maximum amount consumed on a given day). Overall, significant mean differences emerged between methods for four of the five outcome measures across each follow-up period. Reports of drinking generated from the TLFB were consistently lower for drinks per day, drinks per drinking day, number of heavy days, and maximum drinks consumed across all three recall periods relative to the estimates generated from the IVR method, but were approximately equivalent for frequency of drinking days. These findings suggest that mean aggregate TLFB reports of drinking behavior resulted in lower self-reports of drinking behavior in comparison to the IVR method, and did not change as the interval of time of retrospective assessment increased.

Toll, Cooney, McKee and O’Malley (2006) examined correspondence between IVR and TLFB drinking reports among a sample of smokers enrolled in a cessation trial (n=182; 89% Caucasian; 78.2% employed full-time). Once a smoking quit date was established, during the first week, participants were asked to call into the IVR telephone line in the morning for seven consecutive days and report on the number of standard
drinks they consumed the previous day. The TLFB was administered to each participant covering the same time-period (past seven days). The correlations for the number of standard drinks consumed for each assessment day were in the moderate to high range (r’s ranging from .56 to .79) with a higher aggregate 7-day total correlation (r = .87). Discrepancy analyses indicated that, in 8.1% of the cases, drinking reports from the IVR approach generated greater drinking reports, while the TLFB values revealed that no drinking had occurred. Alternatively, in 3.9% of the cases, drinking reports from the TLFB indicated greater estimates of drinking, whereas the IVR indicated that no drinking had occurred. Consistent with prior studies, the drinking data generated from the IVR method within this study is greater in comparison to the TLFB method.

**Limitations of IVR and TLFB Correspondence for Alcohol Use**

A common assumption within the alcohol treatment field is that the data collection method that generates greater drinking reports is associated with greater response accuracy (Del Boca & Noll, 2000). It has been assumed, therefore, that alcohol use estimates obtained from the IVR when compared to estimates obtained from the TLFB are more accurate. This may be an inaccurate assertion. There could be other factors that contribute to greater drinking reports on the IVR that may be associated with methodological characteristics of the IVR method. For example, it is possible that alcohol use during or prior to calling in to the IVR system has the potential to interfere with the ability to accurately recall drinking, which may lead to participants to produce a greater response (i.e., upwardly bias estimates). It is also possible that the degree of correspondence between the IVR and TLFB methods for summary level drinking
measures may be impacted by missing data from the IVR system, therefore upwardly biasing the number of responses.

Another reason why the IVR and TLFB methods may yield different estimates for drinking behavior may be the result of the statistical methods used to analyze correspondence. Studies that examined correspondence between the TLFB and IVR methodologies have been limited to an examination of statistical associations such as correlations and aggregate mean differences, which do necessarily demonstrate correspondence between the two methods. As noted by Bland and Altman (1986), the use of the correlation coefficient as a measure of agreement has limitations associated with it. A correlation coefficient measures the strength of a linear relationship between two variables, and can be impacted by a number of factors, including the range of values obtained in a sample. It is reasonable to assume that two methods that measure the same behavior would be correlated with one another. Thus, aggregate comparisons between the IVR and TLFB methods for the assessment of alcohol use may not be optimal to understand the individual variation between methods. An examination of mean percent differences and calculation of 95% limits of agreement (Bland and Altman, 1999) provides a more detailed inspection of the degree of correspondence between the TLFB and IVR methods for summary level alcohol use variables.

**Summary of IVR and TLFB Correspondence Regarding Alcohol Use**

Studies have indicated that the correlations between IVR and TLFB methods for estimates of summary level drinking variables range from moderate-to-high, and do not vary as a function of the recall period involved. More specifically, correlations were typically greater than 0.5 and higher for frequency of alcohol consumption in comparison
to quantity of alcohol use. With respect to aggregate means for each drinking variable, estimates from the IVR were higher and statistically significantly different from estimates obtained from the TLFB method. This implies that drinking estimates obtained from the IVR are greater in comparison to the TLFB method. Further, one study has revealed that drinking reports tend to generate a greater percentage of participants reporting greater alcohol use on the IVR relative to the TLFB method.

Currently, no studies have examined the statistical associations or assessed the degree of correspondence between IVR and TLFB estimates of drinking behavior among a sample of problem drinking MSM. Other factors such as IVR non-compliance and the use of alternative statistical techniques (mean percent differences, 95% limits of agreement) may provide greater insight into the degree of correspondence between the IVR and TLFB methods. The assessment of agreement between both methods for the collection of risky sexual behavior has not been examined. An evaluation of the degree of correspondence between the IVR and TLFB methods for the collection of sexual risk data among MSM has the potential to inform public health practice and research regarding the utility of the IVR method.

Correspondence of TLFB and IVR Derived Measures: A Theoretical Basis

Babor and colleagues have developed a framework for understanding and identifying the optimal conditions necessary for enhancing the accuracy and validity of self-report data (Babor, Brown, & Del Boca, 1990; Babor & Del Boca, 1992; Babor, Stephens & Marlatt, 1987; Del Boca & Noll, 2000). Specifically, Babor and Del Boca (1992) developed a cognitive social-psychological model of the question-answer process that integrates theory and research from areas such as human learning, cognition and
memory, eyewitness testimony, motivation and social influence processes, and survey methods. The authors outlined several components of the question-answering framework thought to influence response accuracy that include the social context (e.g., organizational setting), respondent characteristics (e.g., cognitive impairment, state of sobriety), task variables (e.g., question form and wording, mode of administration, time interval for recalling events), motivation (e.g., degree of threat or embarrassment associated with the question), and cognition (e.g., comprehension, retrieval, integration). Overall, the theoretical model proposed by Babor and Del Boca (1992) reflects the interplay among components and specifies sources of unreliability and invalidity that are inherent in the self-report process (Del Boca and Noll, 2000).

The social context comprises the question-answer process, which is affected by a number of factors such as the assessment setting, broad cultural norms, and the interpersonal context that defines the social desirability of the behavior of interest (Del Boca and Noll, 2000). A primary component of the social context is the extent to which anonymity or confidentiality is implied within the self-report process. For example, Werch (1990) examined how confidentiality and anonymity implied within the consent process influences reports of alcohol consumption among 156 students and faculty attending a health fair at a southern university. Participants were randomized to receive one of two types of instruction regarding informed consent: 1) participants were told that their responses would remain anonymous; or 2) participants were told that their responses would remain confidential and asked to provide the names of three significant others to verify their responses. Each participant filled out a 7 day Quantity-Frequency measure and a 7 day retrospective diary of his/her alcohol consumption. Results indicated that
those participants who were provided assurances of anonymity were more likely to sign the consent and provide drinking data compared to those who were told that their answers might be verified. These findings imply that when anonymity is assured, participants were more likely to participate in the study and provide drinking-related behavior.

One of the more critical components of the model is the task attributes of the situation, which describe the characteristics of the task itself; the factors that make an assessment method unique. The task attributes are related to the context in which the assessment occurs, as well as define the purpose for the assessment (Babor et al., 1987). For example, the contextual task attributes of the TLFB and IVR methods are in-person or electronic administration, respectively. The task attributes of a particular assessment method can have implications for the level of demand, or burden, which is placed on the respondent, as well as influencing motivation to respond accurately (Del Boca and Noll, 2000). Several factors specific to the task attributes of the data collection method have been implicated as critical elements of the process. Those factors that received empirical support include the duration of recall, mode of data collection, and use of aided recall techniques.

The length of the recall period can influence the accuracy of self-reported behavior. In the typical assessment of alcohol use and sexual behavior the recall period can vary substantially, from the prior day to one-year. Assessments involving shorter recall periods (e.g., past 24 hours) may enhance response accuracy because problems associated with memory bias are significantly reduced. Several studies have shown that IVR data collection, which consists of a 24-hour recall period, is associated with greater estimates of summary level alcohol use variables in comparison to data collection
methods that involve lengthier recall periods such as the TLFB method (Toll et al., 2006; Searles et al., 2002).

Data collection methods involving computerized assessment (e.g., audio computer assisted self-administered interview; ACASI) generate greater estimates of sensitive types of behavior including illicit drug use and sexual behavior in comparison with interviewer assisted methods (Tourangeau & Smith, 1996). Computer based assessments such as ACASI may provide a greater sense of privacy and reduced interviewer reactions which, in turn, reduce socially desirable response sets. Interviewer assisted methods, such as the TLFB method, have been shown to generate greater responses of both summary level alcohol use and sexual behavior estimates in comparison to standard global quantity-frequency type questions (Carey et al., 2001; Sobell et al., 1988).

Respondent characteristics refer to both stable characteristics such as personality traits, personal circumstances (justice system involvement), and other temporary states such as current state of intoxication at the time of data collection (Del Boca and Noll, 2000). Babor and colleagues (2000) used the project MATCH data sets (both the aftercare and outpatients arms, N=1,726) to examine factors that influenced correspondence between self-reported alcohol use and alternative verification measures (liver enzyme tests; collateral reports). Findings indicated that participants who produced discrepant self-reports in comparison to alternative verification methods had more severe drinking problems, more prior treatment episodes, greater alcohol use involvement at baseline, and greater levels of cognitive impairment.

Cognitive factors affect the process by which participants comprehend and retrieve a particular response from memory. Whereas, motivation refers to the extent to
which the perceived contingencies, such as the degree of embarrassment or threat, affect responses during data collection (Del Boca & Noll, 2000). Empirical support for motivation influencing response accuracy has been limited, but it has been suggested that respondent characteristics, including state of sobriety and negative psychological states such as depression and anxiety may impede efforts to respond appropriately (Del Boca and Noll, 2000). Since these factors typically are not assessed when responding on the IVR system, it is possible that IVR related response accuracy may be jeopardized by participants providing inaccurate information or unwilling to respond to the IVR system during certain periods due to negative affective states, which contributes to missing data.

With respect to cognitive factors, several data collection methods are available that incorporate either aided recall techniques (TLFB) or shorter recall periods (IVR), which may contribute to enhanced response accuracy (Searles et al., 2000; Sobell et al., 1979). Each approach is aimed at enhancing the respondent’s ability to remember. The TLFB method utilizes an interview assisted aided recall technique to facilitate responding which helps participants to provide more accurate information by using strategies such as recalling specific events, estimating the rate of occurrence if the behavior occurs on a regular basis, or using cognitive shortcuts (i.e., heuristics; Del Boca and Darkes, 2003). The IVR method, on the other hand, typically involves a shorter recall period, which assists in generating more accurate responses by being less prone to memory errors or recall bias.

A primary assumption of Babor and Del Boca’s (1992) social-cognitive model of the question-answer process is that its central principles can be extended to other forms of behavior (Del Boca & Noll, 2000). As such, this model provides a framework for
understanding specific factors that influence correspondence between the IVR and TLFB data collection methods. In this regard, the model’s primary outcome (i.e., low/high response accuracy) was modified to reflect correspondence (Figure 1). Studying factors that influence correspondence between the IVR and TLFB data collection methods may provide greater understanding regarding the relative advantages and disadvantages of each method.

In summary, valid self-report data are contingent upon the proper conditions being implemented to enhance response accuracy. Along these lines, Babor and Del Boca (1992) have developed a theoretical model of the question-answer process that specifies components that may influence response accuracy when collecting self-reported alcohol use data. Empirical support of the model has been limited to specific model components and research has indicated that respondent characteristics such as greater alcohol involvement, task attributes such as a longer recall period, motivational factors such as non-sobriety and negative affective states, and data collection methods that utilize recall assistance techniques all affect response accuracy. The model provides a useful framework for identifying specific factors that may influence correspondence between the TLFB and IVR methods.

Summary of Literature Review

Rates of HIV infection among MSM are on the rise and warrant public health attention. A primary causal factor among MSM that may explain this resurgence is engagement in UAI. Although study findings have been mixed, alcohol use among MSM is considerable and has been implicated as a contributing factor to engagement in UAI. In
to order to continue to tailor public health efforts accordingly, it would be necessary to demonstrate a relationship between these two behaviors.

Self-reports are the primary method for collecting data on alcohol use and risky sexual behavior. It is critical to ensure that data collection methods yield accurate self-reports of sensitive behavior. The TLFB method is considered the gold standard for collecting data on alcohol use and risky sexual behavior. It is an interviewer-assisted method, whereby participants engage in aided recall techniques to probe an individual’s memory to remember occurrences of behavior. Recently, IVR technology has been used to collect daily drinking data and offers several advantages in data collection compared to the more commonly used TLFB method.

Several studies have demonstrated that the IVR method typically generates greater estimates of summary level drinking data in comparison to the TLFB method, but its utility for the assessment of risky sexual behavior remains unknown. Interactive Voice Response technology may provide a more rigorous assessment of the relationship between alcohol use and risky sexual behavior among MSM. Few studies have identified factors that influence the degree of correspondence between the IVR and TLFB methods for alcohol use or risky sexual behavior variables. An examination of factors that influence correspondence between both methods provides greater insight into the relative advantages and disadvantages of using each approach. Babor and Del Boca’s (1992) model that outlines components that affect response accuracy provides a useful framework for identifying factors that influence correspondence between the IVR and TLFB methods for alcohol use and risky sexual behavior variables.
CHAPTER 3

METHODS

Parent Study: Procedures and Experimental Design

The present study is a secondary data analysis that uses data from a double-blind randomized clinical trial that employed a 2 (Naltrexone vs. placebo medication) X 2 (Brief Supportive Therapy vs. Cognitive-Behavioral Therapy) factorial design. Primary outcome measures of interest were frequency of heavy drinking, and sexual risk behavior. The study sample consisted of problem drinking (without physical dependence) MSM, who chose moderate alcohol use as a treatment goal.

The parent study protocol included screening and baseline assessments, 12 weeks of treatment, up to 90 days of daily data collection using IVR technology, and post-treatment follow-up assessments at 3, 6, and 9 months post-treatment. Medication compliance and adverse events were monitored at biweekly intervals by a psychiatrist, and by daily self-reports. Study participants were assessed for HIV sexual risk behaviors, alcohol and drug use, and psychosocial functioning, and were compensated $50.00 for each quarterly follow-up assessment. All participants were compensated $1.00 each day for calling into the IVR system and rewarded an additional $3.00 bonus for calling in all seven days during the week (maximum compensation of $10.00 per week). Participants were breath tested at the beginning of each in-person assessment interview to ensure that they were alcohol free. The breath assessment did not occur for those calling in to the IVR system.
Parent Study Recruitment Methods

Participants were recruited through advertisements and active recruitment within the MSM community in New York City. This approach employed direct personal contact with potential participants within the greater NYC area (active recruitment), where outreach workers set up information tables at gay venues and potential participants inquired about the study. When circumstances permitted privacy, and if the participant was interested and provided verbal consent, outreach workers also conducted preliminary screening for study eligibility and obtained contact information for later scheduling. When privacy was not possible participants were given wallet-sized cards with the study contact number and encouraged to call to complete a telephone screening interview.

Indirect means of reaching participants (e.g., posting flyers, distributing wallet-sized cards, and media advertising in the community) was also used. These materials provided a basic description of study eligibility requirements and a telephone number to call to schedule an appointment. Individuals who called were provided a brief description of the study and then, after providing verbal consent, completed a brief prescreening telephone interview.

Parent Study Inclusion Criteria

Listed below are the parent study inclusion criteria.

1) Must be between the ages of 18 and 65 years

2) Males cannot have undergone surgery for a sex change

3) Self-identify as being sexually active with men (i.e., gay or bisexual)
4) Alcohol ingestion at an average weekly rate of > 23 standard drinks (excess of non-hazardous drinking levels)

5) Demonstrate no evidence of significant cognitive impairment

6) Must be willing to reduce drinking to non-hazardous levels

7) Must be willing to provide informed consent to participate

Exclusion Criteria

Parent study exclusion criteria are listed below:

1) Current physical disease or condition making the participant inappropriate for a medication trial, including total bilirubin > 110%, AST or ALT elevations 300%

2) History of serious psychiatric illness (e.g., psychotic disorder, bipolar disorder or psychiatric illness requiring hospitalization), current psychiatric illness (e.g., major depression or post-traumatic stress disorder) that requires treatment but that is currently untreated, or serious risk of suicidal or violent behavior

3) Recent (i.e., past three months) initiation of psychotropic medication or psychotherapy, or recent change in psychotropic medication treatment

4) Current DSM-IV diagnosis (other than nicotine) dependence, or lifetime diagnosis of opioid dependence
5) DSM-IV alcohol dependence diagnosis judged by a clinician to be too clinically severe, history or current evidence of alcohol withdrawal symptoms, or recurrent use of alcohol to alleviate withdrawal

6) Regular use of opioids in the past month

7) Prior history of sensitivity to Naltrexone’s effects

8) Considered by study physician not to be suitable for an investigational drug

9) Likely to require treatment with opiate pain medication during the study

Parent Study Assessments

Approximately two weeks after the in-person screening interview, participants completed a baseline assessment, which lasted approximately three hours. Prior to participants receiving their first counseling session, they were administered measures via self-report and responded to questions using computerized software. After completing the screening, participants received their first counseling session and first supply of medication.

To monitor stability, participants were interviewed at each medication visit about quantity/frequency of drinking, quantity/frequency of other drug use, and psychiatric symptoms. The nurse/physician also inquired about their use of concurrent medications, the occurrence of adverse events, and protocol compliance. In addition, liver enzyme tests were assessed at monthly intervals to monitor liver toxicity due to Naltrexone.

Participants completed an end of treatment follow-up assessment (week 13 assessment), which was the same as the baseline assessment. Participants were also
interviewed by the psychiatrist about their use of other medications, occurrence of adverse events, compliance with the protocol, and their assessment of the effectiveness and acceptability of the treatment procedures. Those participants requesting or determined by a member of the medical staff or treating clinician to need additional treatment for alcohol problems were referred to local treatment facilities.

Participants who completed treatment or who discontinued treatment were unblinded to their medication condition assignment. The research pharmacy provided an envelope containing the participant’s actual medication condition, which was included in the participant’s medication kit. The physician/nurse provided the participant with the envelope at the point of treatment completion or discontinuation, with instructions not to disclose his medication assignment to any staff associated with the study. In this way, study staff (study physicians, nurses, therapists, and research assistants) remained blind to study medication assignments.

*Parent Study Description of Therapy Conditions*

**Brief Supportive Therapy (BST)**

There were a total of six 20 minute visits with the research nurse or physician for participants in this treatment condition. This condition was a bio-psychosocial intervention that combined standard medication management with compliance enhancement techniques. It included an assessment of alcohol use, education about drinking behavior, supportive counseling, and direct advice about taking medication and establishing goals for moderated drinking. Treatment in the BST condition occurred bimonthly during the 3-month treatment phase for a maximum of eight sessions.
Cognitive-Behavioral Therapy (CBT)

The CBT therapy protocol was designed for trained therapists to provide 12-weeks of psychotherapy for problem drinking focused on reduction of alcohol consumption and, when appropriate, HIV risk behaviors. The style of therapy was designed to modify behavior patterns that maintain excessive drinking by addressing motivational issues, conducting a functional analysis, and addressing specific coping skills for moderation of drinking behavior. Participants randomized to receive CBT were required to come in weekly for a total of 12 therapy sessions that occurred once a week.

Dissertation Study: Procedures and Methods

The following assessment periods were included as part of the current dissertation study: screening, baseline and end of treatment (week-13) treatment assessments. The screening and baseline appointments were included in order to provide demographic and descriptive information regarding the final sample. The end of treatment (week 13) assessment was included because this was the period in which the participants responded daily (i.e., total of 90-days from baseline assessment to week 13) to the IVR system as well as the end of treatment administration of the TLFB method.

TimeLine FollowBack Method Procedure

The TLFB was administered by a trained research assistant working in a collaborative manner with the participant to identify days alcohol was consumed, and if sex occurred on that day during a specific recall period. In order to enhance recall, memory aids were implemented by the RA to help the participant identify specific patterns of alcohol use and sexual behavior. Special events (e.g., birthdays, holidays, periods of abstinence) that occurred during the specified time frame were recorded and
used as a memory aid. Both of these techniques (i.e., patterns of use and recording of events) were used in order to assist the participant in recalling event level information. The recall periods for the TLFB administration were 90 days, approximately 2 weeks, and approximately 90 days for the in-person screen, baseline assessment, and end of treatment assessment, respectively. In order to evaluate the TLFB statistical associations and degree of correspondence with the IVR method, the 13-week end of treatment assessment was used because it covered the same time period as the IVR assessment period.

*Interactive Voice Response Data Procedure*

During study weeks 1 to 12 (90 days), participants called an automated telephone system and responded to a series of questions using the telephone keypad. At the baseline assessment, an RA provided each participant a brief, approximately 15 minute training session on how to use the IVR system. Each participant was provided a toll-free phone number, and an anonymous participant identification number to ensure confidentiality. In addition, each participant was given a brief instruction manual for using the IVR system that included descriptions of the types of questions and response options.

The IVR system could be accessed between 5:00 pm and 9:00 p.m. This time period was judged to be when participants most likely would be able to reflect on their alcohol use and risky sex behavior that occurred post the prior day’s assessment, and before most individuals would be likely to consume large amounts of alcohol. This time window had the advantage of providing consistent report timing, and facilitated compliance. If participants failed to call into the system by 8:00 p.m., an automated reminder message was sent. Participants failing to call into the system were coded as
missing, and called by an RA the next business day to address potential problems and remind the participant of the importance of calling into the system each and every day.

Once the participant was familiar with the system, the daily IVR session required approximately 5-minutes to complete. If a participant wanted to change his response, he could do so by pressing the star (i.e., *) button on the telephone keypad and then reenter his response selection. To minimize underreporting, participants responded to the same number of questions irrespective of their alcohol use or sexual behavior. Upon completion of the automated interview, the participant’s data was downloaded to a data file (Microsoft Access). The IVR assessment was developed using TELESAGE SmartQ 5.2, a software package specifically designed for the administration of automated surveys.

Data Collection Procedure

The majority of the self-report measures for the proposed study were administered using the Audio Computer Assisted Survey Instrumentation system (ACASI), using a computer and voice recordings. Participants wore headphones and viewed a computer screen to hear and see each question and the associated response options. All responses were entered directly into the ACASI assisted computer, which was chosen as a primary means for collecting self-reported information because it afforded participants greater privacy than the traditional interviewer data collection format.

Research interviewers received extensive training that involved both didactic and role-play sessions, prior to administering study data collection instruments. In addition, research interviewer proficiency was maintained throughout the study by conducting supervisory sessions that included reviewing select audio recorded assessment sessions.
Prior to administration, all participants were breathe tested, reminded that their answers would remain confidential, and that they should be sure to use their assigned participant identification number when providing information.

**Measures used in Dissertation Study**

**Screening Instruments**

To determine initial eligibility, the telephone screen consisted of assessing basic demographics (age, sexual orientation, and HIV status), residential stability, current psychological functioning, current engagement in mental health or substance abuse treatment, and frequency of alcohol and other drug use in the past 90 days.

Socio-demographic information was collected during the in-person screening and included assessments of medical history, family psychiatric and substance abuse history, martial status, educational and occupational information. The socio-demographic questionnaire was self-administered during the in-person screen.

The Structured Clinical Interview (SCID) for DSM-IV, Psychotic, and Bipolar disorder sections were administered and assessed for severe psychiatric status (First, Spitzer, Gibbon & Williams, 2001). In addition, the Mini-Mental Status Examination (MMSE; Folstein, Folstein, & McHugh, 1975) was administered to assess for current memory impairments.

**Assessment of Alcohol and Other Drug Use**

The Composite International Diagnostic Instrument, Substance Abuse Module (CIDI-SAM) was administered to evaluate for alcohol and other drug abuse/dependence based on the DSM-IV-TR classification system, which is a well established instrument exhibiting a high degree of reliability and validity (Cottler, Robins & Helzer).
The Time-Line Follow-Back (TLFB) method was used to collect alcohol use data during the in-person screening (past 90 days), baseline (past 14 days), and end of treatment (past 90 days) assessment periods. For each day during the recall period, the participant was asked to report the amount of alcohol he consumed in standard drink equivalents. The TLFB method has been considered the primary alcohol use assessment method and extensive psychometric work indicates good test-retest reliability, convergent validity, and predictive validity (Demarce et al., 2007; Sobell et al., 1979).

Similar to the assessment of alcohol use on the TLFB, participants were asked to report their alcohol use (in standard drink equivalents) for each of three categories of alcoholic beverages: beer, wine and liquor on the IVR. Participants rated how much alcohol they consumed the day of the IVR phone call as well the amount they consumed the previous evening after the previous evening’s phone call. The IVR method has been utilized in prior research with several studies providing evidence that participants were able to reliably report alcohol use the day after its occurrence (Searles et al., 2000, 2002).

The Form 90 was administered to assess lifetime and recent frequency of illicit drug use (Miller and Del Boca, 1994; Tonigan, Miller & Brown). For the dissertation study, lifetime use was assessed in terms of the number of weeks the participant used each specific drug at least once, and recent illicit drug use was assessed by asking participants to report the number of days they used each drug during the prior 90 days. Psychometric evaluation of the Form 90 has indicated good test-rest reliability as well as reasonable correlations with drug screens providing evidence of its validity (Westerberg, Tonigan & Miller, 1997). The Form 90 was administered at baseline and the end of treatment.
Alcohol consequences were measured with the Short Inventory of Problems (SIP), a brief 15 item self-report measure of alcohol related negative consequences that occurred within the prior three-month period (Miller, Tonigan, J.S. & Longabaugh, 1995). Each SIP item response option ranged from 0 (never) to 3 (daily or almost every day). Psychometric evaluation of the SIP indicates a high degree of internal consistency, concurrent validity and adequate test-retest stability (Feinn, Tennen & Kranzler, 2003; Kenna, Longabaugh, Gogineni, Woolard, Nirenberg, Becker et al., 2005). The SIP was administered at baseline and end of treatment using the ACASI. For the dissertation study, the 15 SIP items were summed together to create composite scores reflecting the severity of negative consequences. Internal consistency reliability estimates (Cronbach’s Coefficient Alpha) were .87 and .90, respectively, for the baseline and end of treatment composite scores.

The Alcohol Dependence Scale (ADS) is a 25 item self-report measure with response options ranging from 0 (no) to 2 (several times) and was used to measure the severity of alcohol dependence symptoms during the prior three month period (Skinner and Allen, 1982). Psychometric evaluation of the ADS has indicated good test-retest reliability and internal consistency as well as predictive and concurrent validity (Kahler, Strong, Hayaki, Ramsey & Brown, 2003). The ADS was administered at baseline and end of treatment via ACASI. For the dissertation study, the 25 ADS items were summed together to create composite scores reflecting alcohol dependence severity. Internal consistency reliability estimates (Cronbach’s Coefficient Alpha) were .75 and .81, respectively, for the baseline and week 13 end of treatment composite scores.
The Obsessive Compulsive Drinking Scale (OCDS) is a 10 item self-report measure with response options ranging from 0 to 4 and was used to measure obsessions and compulsions related to alcohol use (Anton, Moak & Latham, 1995). Psychometric evaluation of the OCDS has indicated good internal consistency, excellent test-retest reliability, and good convergent validity with measures of alcohol dependence severity (Anton et. al., 1995). The OCDS was administered at baseline and end of treatment via ACASI. For the present dissertation, the 10 OCDS items were summed together to create composite scores reflecting obsessions and compulsions related to alcohol use drinking. Internal consistency reliability estimates (Cronbach’s Coefficient Alpha) were .73 and .70, respectively, for the baseline and end of treatment composite scores.

Motivation to Change Alcohol Consumption

The Readiness to Change Questionnaire-Treatment Version (RCQ-TV) is a 15 item self-report measure with response options ranging 0 to 5 and was used to assess the participants’ readiness to change his alcohol consumption (Heather, Luce, Peck, Dunbar & James, 1999). Individuals were categorized into one of three stages of change: Pre-contemplation, Contemplation, or Action. Psychometric evaluation of the RCQ-TV has demonstrated it to have good internal consistency, adequate test-retest reliability, and good convergent validity with other measures of motivation to change alcohol use. The RCQ-TV was assessed at the baseline and week 13 assessments via ACASI.

The level of commitment not to drink heavily over the next 24 hours was rated daily on the IVR with response options ranging from 0 (not at all) to 4 (extremely). For the present dissertation study, an aggregated mean commitment composite score was created for each participant.
Sexual Risk Taking Behaviors

The TimeLine FollowBack Method was modified to assess for frequency of sexual behavior (TLFB-sex) and was implemented concurrently with the TLFB-alcohol assessment. Each sexual event was coded for the following contextual factors: partner type (primary, casual), partner serostatus, type of sexual behavior (anal insertive or receptive), condom use during sex, and drinking/drug use during sex. Studies that have evaluated the psychometric properties of the TLFB-sex have demonstrated it to have good test-retest reliability and moderate correlations with other sex behavior questionnaires (Carey et al., 2001; Weinhardt, Carey, Maisto, Carey, Cohen, & Wickramasinghe, 1998). The TLFB-sex was administered at the baseline assessment (prior 45 days) and end of treatment (prior 90 day treatment period).

Similar to the assessment of sexual behavior on the TLFB, occasions of sexual activity were reported each day and the prior evening on the IVR. For each occasion, the number of male partners, number of partners with whom the participant engaged in receptive and insertive anal sex, sex with or without a condom, and the number of partners who were HIV-positive and HIV-negative were reported.

The Yale-Brown Obsessive Compulsive Scale, Compulsive Sexual Behavior (YBOCS-CSB) is a 10-item self report scale with response options ranging from 0 (none) to 4 (Extreme) that was adapted to assess compulsive sexual thoughts and behaviors (Goodman, Price & Rassmussen, 1989). Psychometric evaluation of the YBOCS-CSB has indicated it has good internal consistency reliability and concurrent validity (Wainberg, Muench, Morgenstern, Hollander, Irwin, Parsons et al., 2006). The YBOCS-CSB was administered baseline and end of treatment assessments via ACASI. For the
present dissertation, the YBOCS-CSB items were summed together to create composite scores reflecting symptoms of CSB. Internal consistency reliability estimates (Cronbach’s Coefficient Alpha) were .83 and .90, respectively, for the baseline and end of treatment composite scores.

Other Psychopathology

The Beck Depression Inventory-II (BDI-II) is a 21 item self-report measure with response options ranging from 0 (symptom not present) to 3 (experience symptom all the time) that was used to assess symptoms of depression during the previous three month period (Beck, Steer & Brown, 1996). Psychometric evaluation of the BDI-II has indicated good internal consistency reliability, test-retest reliability, construct validity, and it has been shown to reliably differentiate depressed and non-depressed individuals. The BDI-II was administered baseline and end of treatment assessments via ACASI. For the present dissertation, the 21 BDI items were summed together to create composite scores reflecting symptoms of depression. Internal consistency reliability estimates (Cronbach’s Coefficient Alpha) were .86 and .86, respectively, for the baseline and end of treatment composite scores.

The State version of the Spielberger State-Trait Anxiety Inventory (STAI) is a 20 item self-report questionnaire with response options ranging from 1 (not at all) to 4 (very much) that was used to assess symptoms of anxiety (Speilberger, Gorusch & Lushene, 1970). Psychometric evaluation of the STAI indicates good internal consistency reliability with a high degree of construct and concurrent validity. The STAI was administered at the baseline and week-13 assessment periods. For the present dissertation, the 20 STAI items were summed together to create composite scores
reflecting symptoms of anxiety. Internal consistency reliability estimates (Cronbach’s Coefficient Alpha) were .83 and .86, respectively, for the baseline and end of treatment composite scores.

Participants rated their intensity of mood on the IVR using an adjective checklist with response options ranging from 0 (not at all) to 4 (very much). Four mood states (sad, nervous, tense and angry) were assessed daily. For the present dissertation study, the four items were combined to create a daily negative affect composite score for each participant. The four items were aggregated to create four means and submitted to a higher order exploratory principal components analysis. A single dominant factor emerged with factor loadings ranging from .73 to .88 and accounted for 67.54% of the variance, with a high degree of internal consistency reliability (Cronbach’s Coefficient Alpha = .82). The four means were summed to create a daily negative affect composite score that ranged from a possible score of 0 to 16.

Data Analyses

To evaluate overall correspondence between the IVR and TLFB methods regarding alcohol consumption (Study Aim 1), three alcohol consumption variables were constructed: mean drinks per drinking day (MDDD; the sum of the total number of standard drinks consumed divided by the number of days alcohol was consumed during recall period), percent of days abstinent (PDA; the number of days when no alcohol was consumed divided by the total number of days reported on during recall period), and percent of heavy drinking days (PHDD; the number of days alcohol consumption exceeded 5 standard drinks divided by the total number of days reported on during the recall period).
Prior to conducting any statistical analyses, variable distributions were examined and appropriate transformations applied to improve each variable’s distributional characteristics. Correlational analyses (Pearson and Intraclass Correlations) were performed to assess the degree of association between the IVR and TLFB methods for each drinking measure. To test for differences between the overall pattern of means produced by the IVR and TLFB methods, paired sample t-tests were conducted for each alcohol use measure. In addition, IVR-TLFB discrepancy score variables, one for each alcohol use measure, were calculated by subtracting the TLFB estimates from the IVR estimates. Thus, a positive difference score reflected greater use reported with the IVR method.

To examine the degree of correspondence between obtained values for the IVR and TLFB methods, measures of equivalence were conducted for each alcohol use measure. Following the procedures outlined by Bland and Altman (1999), 95% limits of agreement were calculated, for each alcohol use measure, by subtracting the TLFB and IVR generated estimates to provide a mean difference score \(d = \text{IVR value minus TLFB value}\) referred to as the bias between methods. In addition, the upper and lower limits of agreement were created using the following formula \(d \pm 1.96(s_d \text{ of mean difference score})\) based on the available data for each alcohol use measure. To visually inspect the degree of correspondence and identify the number of observations outside the limits of agreement, a graphical representation of the data was constructed for each alcohol use variable. The subtracted differences between each participant’s TLFB and IVR measurements formed the y-axis (discrepancies between reports) and the combined average of TLFB and IVR measurements formed the x-axis with the 95% limits of agreement added to the graphical
plot. In order to visually determine if the limits of agreement fit the data, and to determine if both methods generated estimates that had a high degree of correspondence, the shape and distribution of observations within the 95% limits of agreement were assessed. If the data points vary and if a large number of the observations lie outside the 95% limits of agreement confidence band, then visual evidence is provided that suggests variation in reporting differences between each method (Bland and Altman, 1986).

A major limitation to examining the plot of the 95% limits of agreement is that it relies on visual inspection to assess correspondence between two methods (Yi, Wang & He 2008). To address this concern, an overall 10% mean percent difference was selected \textit{a priori} as an unacceptable limit of agreement with which each variable between both methods would be considered equivalent. Although the IVR-TLFB correspondence literature does not provide a specific cut off for what would be considered an unacceptable limit of agreement, several studies have used 10% as an unacceptable limit of agreement to assess the degree of correspondence between two similar methods that measure the same behavior (Andersson, Niklasson, Lapidus, Hallberg, Bengtsson & Hulthen, 2000; Cahan, Decker, Hoekje & Strohl, 1990). The mean percent difference (PD) between methods, for each alcohol use variable, was constructed by dividing each participant's derived difference score \((d = \text{IVR value} - \text{TLFB value})\) by the averaged method score \((\text{IVR value} + \text{TLFB value divided by two})\) and multiplying by 100. Then, a 95% confidence interval (C.I.) was constructed for the overall mean percent difference by using the following formula: \((\text{mean PD} \pm 1.96 \times \text{SE of PD})\). If the 95% mean PD C.I.s are less than 10% and do not have overlapping distributions \(\pm 10\%\) (the \textit{a priori} identified
mean PD unacceptable limit), then the two methods are considered to be reasonably correspondent with each other.

To evaluate the overall correspondence between the IVR and TLFB methods for risky sexual behavior and alcohol use/risky sexual behavior, the same analytical strategy used to analyze the alcohol use measures was implemented. The following variables for sexual risk were examined: number of sexual incidents (SI); frequency of unprotected anal intercourse (UAI); frequency of unprotected anal receptive intercourse (URAI); and frequency of unprotected anal insertive intercourse (UIAI).

With respect to examining correspondence between the IVR and TLFB methods for the joint assessment of risky sexual behavior and alcohol use, the following variables were constructed: frequency of occasions of unprotected anal intercourse on days in which alcohol use occurred (UAIAU); frequency of occasions of unprotected anal receptive intercourse on days in which alcohol use occurred (URIAU); and frequency of occasions of unprotected anal insertive intercourse on days in which alcohol use occurred (i.e., UIAIAU).

To identify specific factors that influenced correspondence between the IVR and TLFB methods for alcohol use and risky sexual behavior (Study Aim 2), regression analyses were conducted. For these analyses, three alcohol use discrepancy scores (mean drinks per drinking day, percent days abstinent, and percent of heavy drinking days) and one sexual risk behavior discrepancy score (proportion of UAI incidents) were constructed, by subtracting the values obtained from the IVR and TLFB methods for each variable of interest (i.e., primary dependent variable in each regression analysis). The three alcohol use variables were selected a priori because they reflect different alcohol
use patterns and represent the most commonly used outcome variables in randomized clinical trials of alcohol use disorders (AUDs) treatment (Babor et al., 2000). Unprotected anal intercourse was selected as the primary measure for sexual risk, because it represents one of the primary outcome variables of risky sexual behavior among MSM (Irwin et al., 2006).

The following predictor variables were selected to represent three of the four constructs outlined in the Babor and Del Boca (1992) model: respondent characteristics (i.e., baseline demographic characteristics: age, race, HIV status, frequency of illicit drug use), end of treatment (week 13) variables (i.e., BDI-II score, ADS score, STAI score, and SIP score); motivational factors (aggregated mean commitment to drinking responses assessed daily on IVR); and cognitive factors (aggregated mean composite negative affect mood scores assessed daily the IVR, and aggregated mean number of standard drinks prior to or during data collection reported daily on IVR). The same predictor variables outlined in the alcohol use analyses were entered into the sexual risk model along with additional variables representing respondent sexual characteristics (i.e., sexual compulsivity score-week 13). Task attributes, on the other hand, represent those factors that distinguish between the IVR and TLFB methods such as recall period (24 hrs vs. past 90-days), mode of assessment (computerized vs. in-person), and type of recall (aided recall vs. non-aided recall). As such, they need to be manipulated prior to being measured as potential covariates, which was not permitted as part of the parent study methodology.

Multilevel modeling (Hierarchical Modeling: HLM) was used to examine the conditional relationships between alcohol use and risky sexual behavior utilizing the daily IVR data (Study Aim 3) (Raudenbush and Bryk, 2002). This analytic procedure
accounts for the dependency of observations given that the data have a nested, multilevel structure (i.e., days are nested within person). In this regard, the relationship between alcohol use and sexual risk was modeled for each participant (Level 1) and modeled for the average relationship across participants (Level 2). Specifically, the primary dependent variable was unprotected anal intercourse (coded 1 = yes and 0 = no) with alcohol use entered as the primary Level 1 predictor to test Hypothesis 2. Two advantages associated with multilevel modeling is the ability to include Level 2 variables to account for differences between participants (e.g., HIV status), and to use Level 2 variables as moderators of Level 1 relationships (cross-level interaction terms). In this regard, to examine the extent to which subject HIV status moderates the relationship between alcohol use and risky sexual behavior, main effects for HIV status (Level 2 predictor), aggregated mean daily alcohol use (Level 2 predictor) and daily number of standard drinks (Level 1 predictor) as well as a cross-level interaction term (daily number of standard drinks X subject HIV status) were included in the model to test the hypothesis that alcohol use will exert a stronger influence on sexual risk among those who are HIV positive (Hypothesis 3) For the multilevel analysis, a Bernoulli distribution was specified, since the primary dependent variable represents a dichotomous outcome, and permits the calculation of odds ratios. All Level 1 predictors varied randomly and were estimated using an Empirical Bayes estimation procedure; Level 2 predictors were estimated via generalized least squares estimation; and a maximum-likelihood estimation procedure was used for the variance component (Raudenbush, Bryk, Cheong, Congdon & du Toit, 2004).
To examine how the operationalization of alcohol use affects the risk of engagement in UAI, an additional follow-up analysis was conducted in which alcohol use was dichotomized (1 = alcohol use; 0 = no alcohol use) using the same analytical approach as outlined in the prior multilevel analysis.

*HLM Model 1 Equation: \( Y_{ij} (UAI) = B_{0j} + B_{1j}X_{ij} (alcohol\ use) + r_{ij} \)

*HLM Model 2 Equation: \( Y_{ij} (UAI) = \gamma_{00} + \gamma_{01}W (alcohol\ use) + \gamma_{10}X (HIV\ status) + \gamma_{11}W*X (alcohol\ use \times HIV\ status) + u_{0j} + u_{1j}X + r_{ij} \)

Participant compliance is a limitation associated with IVR methodology. Because of this limitation, two separate exploratory analyses were conducted to examine compliance with the IVR system. First, to examine specific factors that influence overall compliance, a multiple regression analysis was conducted. The primary dependent variable for this analysis was an overall IVR compliance ratio constructed by taking the total number of times the participant called into the IVR system and dividing this number by number of days in the recall period (90). The primary predictor variables included baseline socio-demographic characteristics (i.e., HIV status, age, and race/ethnicity), frequency of alcohol and other drug use during the treatment period, TLFB mean drinks per drinking day, TLFB proportion days abstinent, TLFB proportion of heavy drinking days, mood and alcohol use severity during the treatment period variables (BDI-II, ADS, STAI, and SIP scores), and number of treatment sessions attended. Each of these variables was selected a priori because it was thought that they would represent specific respondent characteristics and motivational factors based on the Babor and Del Boca model (1992) that might influence IVR compliance.
Additional analyses examined the extent to which IVR compliance affected the statistical associations and percent differences between the IVR and TLFB methods for summary level alcohol and sexual risk variables. To assess a compliance effect, two groups were formed (high and low IVR compliance) by taking a median split of the overall IVR percent compliance (Median = 87.78) variable. Those participants who were above the median were categorized into the high IVR compliance group and those below the median were placed into the low IVR compliance group. The same descriptive analyses as outlined for Study Aim 1 were conducted across both groups.

**Power Analysis**

The following *a priori* power calculation(s), based on differences between the means obtained from the TLFB and IVR methods, assumes that the data will be analyzed using paired-sample t-tests. The proposed analysis was designed to provide 80% power to detect medium sized effects (d = .5), based on Cohen (1988). Power calculations were based on two-tailed tests with an alpha of .01, yielding a sample size requirement of 51 participants. Variables are expected to be approximately normally distributed, after data transformation, when necessary.

Tests of the effect of alcohol use on HIV risk behavior and the combined effects of alcohol use and HIV status of the participant (Hypotheses 2 and 3) involve IVR data. These data provide numerous repeated observations for each participant. In a review of Monte-Carlo simulation studies of multilevel power, Kreft and DeLeeuw (1998) suggest that the power of multilevel statistical models is affected by both the number of Level 1 units (days) and Level 2 units (participants). For example, designs having at least 60 level
2 units with 25 observations (a total of 1500 observations) will provide power >.80 to detect small-to-moderate effects sizes.
CHAPTER 4
RESULTS

Study Sample Demographic Characteristics

To date 100 study participants have been enrolled in the parent study and have provided end-of-treatment (i.e., week 13) data. Of these 100 participants, 84 (84%) met criteria for this dissertation (i.e., completed treatment and provided data at the week 13 end of treatment assessment). Among those who were excluded (n=16), 8 (8%) dropped out of the parent study during treatment and were considered lost to follow-up, and the remaining 8 (8%) participants dropped out of therapy and discontinued calling into the IVR system, but completed a week-13 end of treatment assessment. As shown in Table 1, study participants (N=84) were between 18 and 65 years of age (M = 42.8; SD = 10.4), 71.1% were Caucasian, 10.7% Hispanic or African-American, and 17.9% represented mixed or other racial/ethnic groups. The majority of participants was HIV negative (76.2%), currently employed (90.3%), and had received a college degree (85%). In addition, 79 participants (94%) met DSM-IV-TR criteria for alcohol dependence with an overall mean of 4.98 (SD = 1.56) symptoms endorsed. With respect to assignment to therapy condition, there was an approximately equal distribution of participants across treatment conditions [CBT (48.8%; n = 41) vs. BST (51.2%; n = 43]. On average participants attended 9.2 (SD = 2.02) treatment sessions. The number of treatment sessions attended among participants in each condition was 7.58 (SD = .88) and 10.9 (SD = 1.39) for BST and CBT, respectively. Frequency of baseline drug use was low with participants reporting, on average, 8.2 (SD = 10.2) days of drug use during the prior 90 days.
Baseline Participant Alcohol Use and Sexual Risk Characteristics

Measures of baseline alcohol use and sexual risk were derived from the baseline TLFB method. During the 90-day baseline period, participants reported, on average, 8.29 (SD = 5.23) Mean Drinks per Drinking Day (MDDD), 45.1 (SD = 28.12) Percent Heavy Drinking Days (PHDD), and 22.12 (SD = 21.3) Percent Days Abstinent (PDA). During the 45 days prior to study entry, the average number of reported SI(s) was $M = 6.85$ (SD = 8.6). The frequency of UAI was low, with participants engaging in, on average, 1.76 (SD = 5.4) episodes. Participants reported a greater frequency of UIAI occasions ($M = 1.14$; SD = 3.7) compared to URAI occasions ($M = 0.62$; SD = 2.4). On days in which drinking occurred, the frequencies of UAI, UIAI, and URAI were lower. Baseline descriptive statistics associated with the alcohol and sexual risk variables are presented in Table 2.

Other Baseline Characteristics

As shown in Table 3, with respect to alcohol and other drug related negative consequences at baseline, participants reported a composite mean score of 12.7 (SD = 4.7) on the OCDS, 13.7 (SD = 5.5) on the ADS, and 16.1 (SD = 7.9) on the SIP. The negative affect composite score for the BDI was $M = 18.5$ (SD = 8.4) and $M = 40.6$ (SD = 5.7) for the STAI.

IVR Compliance

Participants completed a total of 5,653 calls to the IVR system (maximum number of IVR calls was 7,560), resulting in an overall compliance rate of 75.6%. Compliance with the IVR system was statistically equivalent across therapy conditions. Participants assigned to the CBT condition had a mean compliance rate of 79.1% (SD = 24.1), and
those in the BST condition had a mean compliance rate of 74.1% (SD = 23.1). Approximately, 44.1% completed 90% or more of the required IVR calls, 32.5% completed between 80 to 89% IVR calls, 15.9% completed between 70 to 79% IVR calls and only 7.5% completed less than 60% IVR calls.

To identify specific factors that influence IVR compliance, a regression analysis was conducted. The primary dependent variable was an overall IVR compliance ratio. Several respondent characteristics were selected *a priori* as potential predictors to limit the number of predictors and ensure that the model was not over-parameterized. To do this, Pearson correlations were computed between each of the *a priori* selected variables (i.e., baseline demographic characteristics, frequency of alcohol and other drug use during the treatment period, TLFB mean drinks per drinking day, TLFB proportion days abstinent, TLFB proportion of heavy drinking days, mood and alcohol use severity during the treatment period variables, and number of treatment sessions attended) and the IVR compliance ratio (see Table 4). Variables that showed a significant value of $p < .10$ were retained. Next, to reduce concerns regarding multicollinearity, the intercorrelations among the predictor variables retained from Step 1 were inspected and variables that were highly correlated ($r$’s > .5) were identified, and collinearity diagnostics conducted. Any predictor variable with a Variance Inflation Factor (VIF) > 10 was considered to have a high degree of multicollinearity with the other predictors and was dropped from the model (Cohen & Cohen, 1983; Jaccard & Turrisi, 2002). Predictor variables were entered into the regression model simultaneously because previous research provided little guidance about the ordering (i.e., importance) of variables that may influence IVR
compliance. Statistically non-significant variables (p < .05) were excluded from the final model.

Using the model building approach, age, PHDD, end of treatment SIP composite scores, HIV status and total of number of treatment sessions attended met criteria for inclusion in the final IVR compliance model. The overall model was statistically significant $F(2, 82) = 7.2, p = .01$ and accounted for approximately 22% of the variance in IVR compliance. Significant predictors that emerged were number of treatment sessions attended ($\beta = .43, p = .04$), age ($\beta = .51, p = .01$), and PHDD ($\beta = -.19, p = .04$). This model indicated that IVR compliance was higher among those who were older and attended a greater number of treatment sessions. Alternatively, lower IVR compliance was associated with greater reports of heavy drinking (PHDD).

*Study Aim 1:*

**TLFB-IVR Correspondence for Alcohol Use**

Irrespective of data collection method (i.e. TLFB or IVR), the MDDD and PHDD variables required logarithmic transformations due to positive skewness. IntraClass Correlations (ICCs) were calculated to examine the linear associations between the TLFB and IVR methods across each of the drinking variables, which ranged from 0.51 to 0.85. In this regard, the ICCs between the TLFB and IVR methods for MDDD, PHDD, and PDA were 0.51, 0.57 and 0.85, respectively. All correlations were in the moderate-to-high range and statistically significant ($p < .01$). The correlations were higher for the frequency of drinking variables relative to drinking intensity. Additional analyses focused on the pattern and direction of the overall mean differences between the TLFB and IVR reports of participant alcohol use. At the aggregate level, the IVR-TLFB reports were
significantly different from one another for MDDD \( t(82) = 3.39, p < .001 \) and PHDD \( t(82) = 2.24, p < .03 \), but not PDA \( p > .05 \). Drinking reports from the IVR system were greater for MDDD (\( M = 5.62; SD = 2.35 \)) and PHDD (\( M = 26.1; SD = 20.8 \)) compared to drinking reports obtained from the TLFB for MDDD (\( M = 4.84; SD = 2.46 \)) and PHDD (\( M = 22.03; SD = 24.8 \)). Table 6 presents correlations, means, standard deviations, and t-test values for all drinking variables.

Discrepancy analyses were conducted to examine the degree of individual variability between the IVR and TLFB methods for each of the drinking variables; results obtained from these analyses indicated that the percentage of participants reporting equivalent use on both methods (i.e., defined as \( \pm 1 \) MDDD or \( \pm 10\% \) on PHDD and PDA) were 41.7\% for PHDD, 47.6\% for MDDD, and 57.2\% for PDA. Furthermore, the percentage of participants reporting greater alcohol use on the IVR method (i.e., defined as \( > 1 \) MDDD or \( > 10\% \) PHDD and PDA) was 22.6\% for PDA, 36.9\% for PHDD, and 38.6\% for MDDD. Alternatively, a lower percentage of participants reported greater alcohol use on the TLFB method relative to the IVR. These percentages were 13.8\% for MDDD, 20.2\% for PDA, and 21.4\% for PHDD.

Table 7 presents the mean discrepancies and standard deviations as well as the 95\% limits of agreement for each of the alcohol use variables. Overall, the limits of agreement were wide, with each of the discrepancy means indicating an overall aggregate mean bias for reporting greater alcohol use on the IVR compared to the TLFB method. The data pertaining to each alcohol use variable was used to generate a graphical representation by plotting the difference between the TLFB and IVR measurements for each subject (discrepancies; y-axis) against the mean of both methods (x-axis). Within
each graph, the middle dotted line represents that mean bias between methods and the outer dotted lines represent the 95% limits of agreement. Across each of the drinking variables there was substantial individual variability between methods (see Figures 2 through 4).

A major limitation of the 95% limits of agreement plot is that interpretation is based on a visual inspection. To address this concern, mean percent differences between the IVR and TLFB method were calculated for each alcohol use variable, and an overall mean percent difference of 10% was selected \textit{a priori} as the unacceptable limit of agreement cutoff point. The overall percent difference means, standard errors (SEs) and 95% confidence intervals (C.I.s) were $M = 16.5$ (SE = 4.45; 95% C.I.s 7.79, 25.23) for MDDD, $M = 39.71$ (SE = 11.08; 95% C.I.s 18.1, 61.41) for PHDD, and $M = 44.95$ (SE = 9.51; 95% C.I.s 26.32, 63.56) for PDA. Overall, each of the mean percent difference 95% C.I.s overlapped with the 10% unacceptable level of agreement, indicating that the degree of agreement between the IVR and TLFB methods, for the alcohol use variables, was not within the acceptable range.

\textit{TLFB-IVR Correspondence: Risky Sexual Behavior}

For the risky sexual behavior measures, irrespective of data collection method (i.e., IVR or TLFB), the following variables required logarithmic transformations due to positive skewness: SI, UAI, URAI, and URAI. The ICCs between the TLFB and IVR for each of the risky sexual behavior variables ranged from 0.45 to 0.58. Each ICC was statistically significant ($p < .01$) and in the moderate range. In this regard, the ICCs between the TLFB and IVR methods were 0.45 for URAI, 0.51 for SI, 0.54 for UAI, and 0.59 for UIAI. At the aggregate level, IVR and TLFB reports were significantly different
from one another for URAI \( t(82) = 3.53, p < .001 \) and UAI \( t(82) = 2.11, p < .03 \), but not for SI \( p > .05 \) or UIAI \( p > .05 \). The TLFB reports were greater for UAI (\( M = 2.7; SD = 9.6 \)) and URAI (\( M = 1.9; SD = 6.8 \)) compared to similar reports obtained from the IVR (UAI: \( M = 2.08 \) and \( SD = 4.4 \); URAI: \( M = 1.11 \) and \( SD = 3.2 \)). Table 8 shows correlations, means, standard deviations, and t-test values associated with each IVR and TLFB sexual risk variable.

Discrepancy analyses involving the IVR and TLFB methods indicated that the percentage of participants reporting approximately equivalent risky sexual behavior (i.e., defined as \( \pm 1 \) episode of risky sexual behavior) were 38.1% for SI, 76.2% for UAI, 83.3% for UIAI, and 84.5% for URAI. Furthermore, the percentage of participants reporting greater risky sexual behavior via the TLFB method (i.e., defined as \( > 2 \) episodes of risky sexual behavior reported on the TLFB) were 9.5% for URAI, 10.2% for UIAI, 16.7% for UAI, and 45% for SI. The percentages of participants reporting greater risky sexual behavior when reporting on the IVR method were 6% for URAI, 6.5% for UIAI, 7.1% for UAI and 16.9% for SI.

The 95% limits of agreement were constructed for each risky sexual behavior variable (see Table 9). Overall, the discrepancy means were negative for SI, UAI, and UIAI, indicating greater reports of risky sexual behavior on the TLFB method. With respect to the graphical depiction of the 95% limits of agreement (Figures 5 through 8), across each of the risky sexual behavior variables, there was individual variation between methods with some outliers that extended beyond the limits of agreement. The mean percent differences, SEs and 95% C.I.s were \( M = -1.55 \) (\( SE = 12.48 \); 95% C.I.s -26.01, 22.99) for SI, \( M = 14.13 \) (\( SE = 9.79 \); 95% C.I.s -5.07, 33.33) for UIAI, and \( M = 44.97 \)
(SE = 11.86; 95% C.I.s 26.32, 63.56) for UAI, and $M = 47.93$ (SE = 10.95; 95% C.I.s
26.47, 69.39) for URAI. Overall, each of the mean percent difference 95% C.I.s
overlapped with the 10% unacceptable level of agreement, which indicates that the
degree of agreement between methods was not within the acceptable range.

**TLFB-IVR Correspondence: Risky Sexual Behavior on Days in which Drinking Occurred**

The following IVR and TLFB derived variables required logarithmic
transformations: UAIAU, URAIAU, and URAIAU. The ICCs between the IVR and TLFB methods for risky sexual behavior on days in which drinking occurred ranged from 0.44 to 0.55, which were in the moderate range and statistically significant ($p < .01$). In this regard, the ICCs between the TLFB and IVR methods were 0.48 for URAIAU, 0.55 for UAIAU, and 0.55 for UIAIAU. At the aggregate level, the IVR and TLFB reports were significantly different from one another for URAIAU [$t(82) = 2.92, p < .001$], but not for UAIAU ($p > .05$) and UIAIAU ($p > .05$). Risky sexual behavior reports from the TLFB method were greater for URAIAU ($M = .76; SD = 1.63$) compared to reports obtained from the IVR ($M = .55; SD = 2.62$). Table 10 shows correlations, means, standard deviations, and t-test values associated with each risky sexual behavior on days in which drinking occurred variables.

Discrepancy analyses indicated that the percentages of participants providing
approximately equivalent reports across the IVR and TLFB methods for variables that reflected the joint alcohol use/risky sexual behavior relationship (i.e., defined as $\pm 1$ episodes of risky sexual behavior) were 59.5% for UAIAU, 69.7% for URAIAU and 75.1% for UIAIAU. Furthermore, the percentages of participants reporting greater
alcohol use/risky sexual behavior on the TLFB method (i.e., defined as > 1 episodes of risky sexual behavior) were 15.2% for UIAIAU, 19.7% for URAIAU, and 25.6% for UAIAU. The percentages of greater risky sexual behavior while using alcohol variables reported using the IVR method were 9.7% for UIAIAU, 10.6% for URAIAU, and 14.9% for UAIAU.

As shown in Table 11, 95% limits of agreement were calculated for each of the risky sexual behavior on days in which drinking occurred variables. The discrepancy means were negative for UAIAU, and UIAIAU, indicating that the TLFB method was associated with greater aggregate reporting of the joint risky sexual behavior/alcohol use variables. The graphical depiction of the 95% limits of agreement (Figures 9 through 11), indicate significant variation across methods for each of the joint alcohol use/risky sexual behavior variables. The mean percent differences, SEs and 95% C.I.s were $M = 12.78$ (SE = 9.2; 95% C.I.s -5.25, 30.8) for UIAIAU, $M = 33.97$ (SE = 11.3; 95% C.I.s 11.8, 56.14) for UAIAU, and $M = 37.08$ (SE = 10.6; 95% C.I.s 16.3, 57.86) for URAIAU. The mean percent difference 95% C.I.s for each of the risky sexual behavior variables on days in which drinking occurs overlapped with the 10% level of unacceptable agreement. These data indicate that the degree of agreement across methods for the variables that reflected the joint assessment of risky sexual behavior and alcohol use was not within the acceptable range.

Secondary Post-hoc Exploratory Analyses: Effect of IVR Compliance on IVR-TLFB Correspondence

To evaluate the extent to which missing IVR data affected the degree of correspondence between the IVR and TLFB methods, compliance was dichotomized into
“high” and “low” groups based on a median split. Descriptive statistics (i.e., means, standard deviations, paired sampled t-tests, correlations, 95% limits of agreement, and calculation of mean percent differences) were then conducted within each compliance group for each outcome variable.

**TLFB-IVR Correspondence: Alcohol Use within Compliance Group**

Among those in the low compliance group, the ICCs between the IVR and TLFB methods across each of the drinking variables ranged from 0.31 to 0.81. The correlations were 0.31 for MDDD, 0.59 for PHDD, and 0.81 for PDA. All were statistically significant ($p < .05$). For the aggregate means within the low compliance group, paired-sampled t-tests for each alcohol use measure did not reveal significant differences between the IVR and TLFB methods. See Table 12 for descriptive statistics specific to IVR compliance group.

With respect to the high compliance group, the ICCs between the IVR and TLFB methods were higher than those in the low compliance group and ranged from 0.51 to 0.91. The correlations were 0.51 for PHDD, 0.58 for MDDD and 0.91 for PDA. Each ICC was statistically significant ($p < .001$) and in the moderate-to-high range. The paired-sample t-tests comparing the aggregate mean differences between the IVR and TLFB methods within the high compliance group indicated that PHDD ($t(82) = 3.25, p < .001$) and MDDD ($t(82) = 3.46, p < .001$) varied significantly across methods, but not PDA ($p > .05$). Drinking reports obtained from the IVR method were greater for MDDD ($M = 5.17; SD = 2.34$) and PHDD ($M = 24.36; SD = 21.2$) compared to drinking measures derived from the TLFB method for MDDD ($M = 4.22; SD = 1.99$) and PHDD ($M = 15.65; SD = 20.1$).
As shown in Table 13, the 95% limits of agreement were wider for those in the low compliance group relative to those in the high compliance group for each alcohol use measure. For those in the low compliance group, the overall mean percent differences, SEs and 95% C.I.s were $M = 13.37$ (SE = 7.23; 95% C.I.s -.83, 27.54) for MDDD, $M = 13.88$ (SE = 15.97; 95% C.I.s -17.42, 45.18) for PDA, and $M = 59.34$ (SE = 14.88; 95% C.I.s 30.18, 88.5) for PHDD. Among those in the high compliance group, the overall mean percent differences, SEs and 95% C.I.s were $M = 19.36$ (SE = 5.4; 95% C.I.s 8.76, 29.96) for MDDD, $M = 31.85$ (SE = 11.91; 95% C.I.s 8.61, 55.19) for PDA, and $M = 63.17$ (SE = 14.68; 95% C.I.s 34.4, 91.94) for PHDD. All of the 95% C.I.s for the mean percent differences within each IVR compliance group overlapped with the 10% unacceptable level of agreement.

**TLFB-IVR Correspondence: Risky sexual behavior by Compliance Group**

Among those in the low compliance group, the ICCs between the IVR and TLFB methods ranged from 0.17 to 0.43. The ICCs for the risky sexual behavior variables were 0.17 for URAI, 0.26 for SI, 0.31 for UAI, and 0.43 for UIAI. All ICCs were statistically significant ($p < .05$) and in the low to moderate range. For the aggregate means, the paired-sampled t-tests did not reveal statistically significant differences across methods for the risky sexual behavior variables. See Table 14 for descriptive statistics pertaining to the risky sexual behavior variables by IVR compliance groups.

In the high compliance group, the ICCs between the IVR and TLFB methods were higher and ranged from 0.51 to 0.69. Each ICC was statistically significant ($p < .001$) and in the moderate to high range. The ICCs specific to each risky sexual behavior variable were 0.57 for URAI, 0.67 for UAI, 0.69 for UIAI, and 0.73 for SI. The paired-
sample t-tests indicated that the IVR-TLFB reports were significantly different from one another for URAI \([t(82) = 2.85, p < .001]\) in the high compliance group. Risky sexual behavior reports on the TLFB were greater for URAI (M = 1.41; SD = 2.27) relative to reports obtained from the IVR for URAI (M = 1.36; SD = 5.65).

As shown in Table 15, the 95% limits of agreement for each of the risky sexual behavior variables varied across the two compliance groups. In the low compliance group, the overall mean percent differences, SEs and 95% C.I.s were M = 2.13 (SE = 12.12; 95% C.I.s -23.78, 25.88) for UIAI, M = 14.25 (SE = 14.6; 95% C.I.s -14.37, 42.87) for SI, M = 29.96 (SE = 14.8; 95% C.I.s .95, 58.97) for UAI, and M = 52.86 (SE = 14.83; 95% C.I.s 23.79, 81.93) for URAI. Among those in the high compliance group, the overall mean percent differences, SEs and 95% C.I.s were M = -18.96 (SE = 20.55; 95% C.I.s -59.24, 21.32) for SI, M = 27.33 (SE = 15.53; 95% C.I.s -3.09, 57.75) for UIAI, M = 42.5 (SE = 16.36; 95% C.I.s 10.44, 74.56) for URAI, and M = 61.48 (SE = 18.66; 95% C.I.s 25.03, 97.94) for UAI. All of the 95% C.I.s for the mean percent differences within each IVR compliance group overlapped with the 10% level of unacceptable agreement.

**TLFB-IVR Correspondence: Risky Sexual Behavior on Days in which Drinking Occurred by Compliance Group**

Among those in the low compliance group, the ICCs between the TLFB and IVR methods ranged from 0.24 to 0.51 (See Table 14). Each ICC was statistically significant \((p < .05)\) and in the low to moderate range. The correlations were 0.24 for URAIAU, 0.41 for UAIAU, and 0.51 for UIAIAU. For the aggregate means, paired-sampled t-tests among those in the low IVR compliance group did not reveal significant differences across methods for any of the joint risky sexual behavior/alcohol use variables.
Within the high compliance group, the ICCs between the IVR and TLFB methods ranged from 0.48 to 0.62. The correlations were 0.50 for URAIAU, 0.56 for UIAIAU, and .61 for UAIAU. All correlations were statistically significant \((p < .05)\). Paired-sample t-tests comparing the IVR and TLFB methods within the high compliance group indicated that the IVR-TLFB reports were significantly different from one another for URAIAU \((t(82) = 2.61, p < .001)\). Risky sexual behavior reports on the IVR were greater for URAIAU \((M = 1.14; SD = 2.01)\) relative to risky sexual behavior reports obtained from the TLFB for URAIAU \((M = .89; SD = 2.35)\).

As shown in Table 17, the 95% limits of agreement, across the risky sexual behavior variables, varied between compliance groups. In the low compliance group, the overall mean percent differences, SEs and 95% C.I.s were \(M = 17.28\) (SE = 14.19; 95% C.I.s -16.58, 51.15) for UIAIAU, \(M = 27.15\) (SE = 14.72; 95% C.I.s -1.7, 56.01) for URAIAU, and \(M = 41.4\) (SE = 17.3; 95% C.I.s 7.52, 75.29) for UAIAU. Among those in the high compliance group, the overall mean percent differences, SEs and 95% C.I.s were \(M = 8.67\) (SE = 12.03; 95% C.I.s -14.89, 32.23) for UIAIAU, \(M = 27.23\) (SE = 14.93; 95% C.I.s -2.03, 56.49) for URAIAU, and \(M = 46.13\) (SE = 15.31; 95% C.I.s 16.12, 76.14) for URAIAU. All of the 95% C.I.s for the mean percent differences within each IVR compliance group overlapped with the 10% level of unacceptable agreement.

**Study Aim 2: Factors that Influence Correspondence by IVR and TLFB**

To identify factors that influence correspondence between the IVR and TLFB methods for the alcohol use and risky sexual behavior variables, four regression analyses were conducted. For each analysis, the following discrepancy variables were entered into the model as the primary dependent variable: MDDD, PHDD, PDA and UAI. The
predictor variables were selected *a priori* and reflect the constructs of respondent characteristics, cognitive factors, and motivational factors that are outlined in Babor and Delboca’s (1992) model. To control for Type 1 error inflation and to maintain an overall experiment-wise error rate of 5%, a Bonferroni correction was applied by dividing the traditional $p$-value of .05 by the number of analyses to be conducted (4), yielding a statistical significance cutoff value of $p = .0125$.

To reduce the number of predictor variables entered into each model, a series of analyses were conducted. First, four correlation matrices were constructed to show the associations between each primary dependent variable and the related set of predictor variables; correlations with a $p$-value less than .10 were retained. Next, to reduce concerns regarding multicollinearity, the intercorrelations among the predictor variables retained from Step 1 were inspected, and variables that were highly correlated (r’s > .5) were identified and collinearity diagnostics conducted. Any predictor variable with a VIF > 10 was considered to have a high degree of multicollinearity and dropped from the model. Lastly, predictor variables were entered into the model simultaneously because previous research provided little guidance regarding the ordering (importance) of variables that may influence correspondence between the IVR and TLFB methods. Variables that remained significant ($p < .05$) were included in the final model.

*IVR-TLFB Correspondence for Mean Drinks per Drinking Day*

Results from the model building approach indicated that mean number of standard drinks consumed on the day of the IVR call and ADS composite scores were significant correlates of average drinking (MDDD) discrepancy scores across the IVR and TLFB methods. Therefore, these variables were included in the subsequent regression analysis.
Table 18 shows the correlation matrix between MDDD discrepancy scores and predictors. As shown in Table 19, the overall regression model was statistically significant $F(2, 82) = 19.5, \ p = .001$ and accounted for approximately 33% of the variance. A greater mean number of standard drinks reported on the day of IVR call ($\beta = .51, \ p < .001$) was associated with greater reporting of average drinking on a drinking day (MDDD) on the IVR. Alternatively, greater ADS composite scores ($\beta = -.23, \ p < .01$) were associated with lower IVR reports of average drinking.

**IVR-TLFB Correspondence: Percent Heavy Drinking Days**

Results from the model building approach indicated that mean number of standard drinks reported on day of IVR call, race/ethnicity, participant HIV status and ADS composite scores were significant correlates of heavy drinking (PHDD) discrepancy scores between IVR and TLFB methods and met criteria for inclusion into the regression analysis. Table 20 shows the correlation matrix between PHDD discrepancy score and predictors. As shown in Table 21, the overall regression model was statistically significant $F(2, 82) = 10.7, \ p = .001$ and accounted for approximately 19% of the variance. A greater number of standard drinks reported on day of the IVR call ($\beta = .38, \ p < .001$) was associated with greater IVR reporting of heavy drinking days (PHDD), and a greater negative affect IVR composite score ($\beta = -.27, \ p < .01$) was associated with lower IVR reporting of heavy drinking days.

**IVR-TLFB Correspondence: Percent Days Abstinent**

Results from the model building approach indicated that the end of treatment composite scores for the SIP, OCDS, ADS, and participant HIV status were significant correlates of the abstinence from drinking (PDA) discrepancy scores (i.e., IVR and
TLFB) and therefore were included in the subsequent regression analysis. Table 21 presents correlations pertaining to the PDA discrepancy score and predictor variables. As shown in Table 9, the overall regression model was statistically significant $F(1, 82) = 7.9$, $p = .007$ and accounted for approximately 9% of the variance. Greater end-of-treatment ADS composite scores ($\beta = -.296$, $p < .001$) were associated with lower IVR reports of drinking abstinence.

**IVR and TLFB Correspondence: Unprotected Anal Intercourse**

Results from the model building approach indicated that there were no significant correlates of the engagement in unprotected anal intercourse (UAI) discrepancy scores. Table 22 shows the correlation matrix between UAI discrepancy score and predictors. A regression analysis specific to UAI was not conducted because the model building approach used to identify potential predictor variables failed to yield any significant variables.

**Study Aim 3: The Relationship between Alcohol Use and Unprotected Anal Intercourse**

Participants reported a total of 486 (8.5% of 5,653 IVR observations) occasions of anal insertive intercourse. Of these 486 incidents, 235 (48%) were unprotected anal insertive. Over the entire 90-day reporting period, 71 (84%) of the 84 study participants reported engaging in at least one anal insertive intercourse occasion and 41 (57.7%) reported engaging in at least one UAI episode. The mean percent of engagement in UAI was 29.39% (SD = 34.66) and the mean number of standard drinks consumed during the 24-hour period prior to IVR call was 5.67 (SD = 6.26).

An independent samples t-test was conducted to assess for mean differences between those who did and did not engage in UAI ($N = 71$) with respect to the mean
number of standard drinks consumed since the prior IVR call (i.e., prior 24 hours). A
significant difference \([t(69) = 2.15, p < .035]\) was detected between those who engaged in
UAI and those who did not, indicating that the mean aggregated number of standard
drinks consumed was higher for those who engaged in UAI (\(\bar{M} = 6.34; SD = 4.52\))
compared to those who did not engage in UAI (\(\bar{M} = 4.16; SD = 3.71\)).

To examine how the day-to-day within person alcohol use behavior variability
related to engagement in UAI (Hypothesis 2), a multilevel logistic regression was
conducted to model the probability that UAI occurred on days when individuals
consumed alcohol. A Bernoulli sampling distribution at Level 1 and a logit link function
were specified for this analysis, because UAI represents a dichotomous outcome (0 = no
UAI; 1 = UAI occurred). This yields an outcome that is the logarithm of the odds of
success (i.e., likelihood of UAI occurring), which is defined as engagement in UAI. For
this analysis, the within-person day-to-day number of standard drinks was entered as a
Level 1 (within-person) predictor and person mean centered. The within aggregated mean
number of standard drinks was entered as a Level 2 predictor (between groups) and grand
mean centered. The intercept and slope were modeled as random effects, and the logistic
model was reported using odds ratios. As shown in Table 25, the within day-to-day
number of standard drinks (\(\beta = -.02, p = .28\); OR = .97 (95% CI .92, 1.03), and
aggregated mean number of standard drinks (\(\beta = -.05, p = .28\); OR = 1.04 (95% CI .96,
1.14) were not associated with day-to-day engagement in UAI.

**HIV Status as a Moderator of Within Day-to-Day UAI and Alcohol Use**

Of the 84 participants, 20 (20.2%) were HIV-positive. Among those who reported
anal insertive sex (n=71), 17 (23.9%) were HIV-positive. A total of 13 (18.1%) HIV
positive and 29 (40.8%) HIV-negative participants reported engaging in at least one UAI episode over the 90-day reporting period. The aggregated mean percent engagement in UAI was 34.98% (SD = 32.53) and 27.63% (SD = 35.41) for HIV positive and HIV negative participants, respectively. In regards to the within aggregated mean number of standard drinks, HIV positive participants (M = 6.64; SD = 4.59) did not differ significantly in comparison to HIV negative participants (M = 5.03; SD = 4.19).

Three independent sample t-tests were conducted to examine the associations between percent engagement in UAI and the aggregated mean number of standard drinks reported using IVR. There were no significant differences detected between HIV-positive (M = 34.98%; SD = 32.53) and HIV-negative (M = 27.63%; SD = 35.41) participants with respect to the percent who engaged in UAI, [t(69) = .760, p > .05]. In addition, among the subset of individuals who engaged in UAI, there was not a statistically significant difference [t(39) = .795, p > .05] between HIV positive (n = 13; M = 7.2; SD = 5.01) and HIV negative (n = 28; M = 4.32; SD = 8.2) participants with respect to the mean number of standard drinks consumed per drinking day. Similarly, an independent samples t-test revealed no significant differences [t(39) = .719, p > .05] between those who were HIV positive (M = 45.74%; SD = 29.62) and HIV negative (M = 53.29%; SD = 32.3) and reported UAI with respect to percent engagement in UAI.

**Moderating Effect of HIV Status on Relationship between Alcohol Use and UAI**

To test whether HIV status moderates the relationship between the within day-to-day alcohol use and engagement in UAI (Hypothesis 3) a second multilevel analysis was conducted. In this model, the day-to-day number of standard drinks measure was entered as a Level 1 predictor. Participant HIV status and within aggregated mean number of
standard drinks were entered as Level 2 predictors. This model permitted an examination of the cross-level or moderating effect of HIV status (Level 2) on the within person day-to-day association between number of standard drinks and engagement in UAI. For this analysis, number of standard drinks was person mean centered (Level 1 predictor), and within aggregated participant mean number of standard drinks and participant HIV status were grand mean centered (Level 2 predictors).

As shown in Table 26, results from the final model indicate that HIV status did not moderate the within day-to-day relationship between alcohol use and engagement in UAI ($\beta = -0.003$, $p = .95$; OR = .99 (95% CI .89, 1.11). In addition, the within day-to-day number of standard drinks measure ($\beta = -.03$, $p = .54$; OR = .97 (95% CI .89, 1.06), and the within aggregated mean number of standard drinks measure ($\beta = .04$, $p = .38$; OR = 1.04 (95% CI .95, 1.14), and participant HIV status ($\beta = .39$, $p = .54$; OR = 1.47 (95% CI .45, 4.02) were not significant predictors of within day-to-day engagement in UAI.

*Post-hoc Exploratory Data Analyses*

To further examine the extent to which day-to-day alcohol consumption was associated with engagement in UAI, an additional multilevel follow-up analysis was conducted, where alcohol consumption was measured as a binary variable (drinking or not drinking). For this analysis, the within day-to-day number of standard drinks variable was dichotomized (0 = no alcohol use; 1 = alcohol use). All follow-up analyses were conducted in the same manner as the previous multilevel analysis that examined the day-to-day associations between alcohol use and engagement in UAI. As shown in Table 27, results from this analysis indicated that within day-to-day alcohol use was associated ($\beta = .82$, $p = .048$; OR = 2.28 (95% CI 1.01, 5.2) with within day-to-day engagement in UAI.
such that on days in which alcohol was consumed, UAI was more likely to occur. The within aggregated mean level percent of any alcohol use variable (Level 2), however, was not associated ($\beta = .37$, $p = .67$; OR = $1.45$ (95% CI .26, 8.23) with within day-to-day engagement in UAI.

Multilevel analysis also was conducted to examine the extent to which subject HIV status moderated the relationship between alcohol consumption measured as a binary variable (drinking or not drinking) and engagement in UAI. As shown in Table 28, results from this analysis indicated that participant HIV status was not a moderator of the within day-to-day relationship between alcohol use and engagement in UAI ($\beta = .39$, $p = .45$; OR = $1.48$ (95% CI .53, 4.19). Within day-to-day alcohol use, however, was a significant predictor ($\beta = .99$, $p = .049$; OR = $2.66$ (95% CI 1.01, 7.05) of within day-to-day engagement in UAI, such that UAI was more likely to occur on days in which participants reportedly consumed alcohol use occurred. Alternatively, the aggregated mean percent of alcohol use variable ($\beta = .35$, $p = .68$; OR = $1.42$ (95% CI .252, 8.02) and subject HIV status ($\beta = .39$, $p = .45$; OR = $1.48$ (95% CI .525, 4.19) were not significant predictors of within day-to-day engagement in UAI.

Summary of Findings

Overall, study findings for Study Aim 1 indicated that the correlations between the IVR and TLFB methods were higher for the alcohol use variables (i.e., moderate to high range) in comparison to the risky sexual behavior variables (i.e., moderate range). With respect to the aggregate mean differences between methods, results indicated that reports generated from the IVR were statistically significantly greater for alcohol use in comparison to the TLFB method, whereas risky sexual behavior reports on the TLFB
were significantly greater in comparison to IVR reports. An examination of the 95% limits of agreement revealed a high degree of variability for reporting both alcohol use and risky sexual behavior across the IVR and TLFB methods. Further, calculation of mean percent differences, across each of the alcohol and risky sexual behavior variables, provided additional evidence that the IVR and TLFB methods did not have a high degree of correspondence.

With respect to Study Aim 2, several factors emerged as significant predictors of the discrepancy scores between the TLFB and IVR methods for MDDD, PHDD and PDA. Specifically, greater levels of daily negative effect, mean number of standard drinks consumed prior to IVR data collection, and alcohol dependence symptoms were associated with discrepancies in reporting alcohol use behavior between the IVR and TLFB methods. Greater levels of daily negative affect and alcohol dependence symptoms were associated with reporting less drinking on the IVR, whereas a greater alcohol use on the day of IVR call was associated with reporting less alcohol use on the TLFB. There were no factors that influenced correspondence between the IVR and TLFB methods for unprotected anal intercourse.

Findings from Study Aim 3 did not reveal a significant positive association between daily alcohol use and engagement in risky sexual behavior or a significant moderating effect of participant HIV status on this relationship when alcohol use was treated as a continuous measure in the model. However, when alcohol use was dichotomized (i.e., no alcohol use vs. any alcohol use), a significant positive association between daily alcohol use and engagement in risky sexual behavior was found, but this relationship was not moderated by participant HIV status.
CHAPTER 5
DISCUSSION

Study Aim 1, hypothesis 1 posited that the correlations between the IVR and TLFB methods for each alcohol use variable would be greater than $r = 0.5$, and that there would be significant aggregate mean differences between the methods such that the IVR assessment would yield greater aggregate reports of alcohol use. Consistent with prior research (Kranzler et al., 2004; Toll et al., 2006), findings from the current dissertation revealed moderate-to-high correlations between the IVR and TLFB methods, with greater aggregate estimates reported via the IVR method, relative to the TLFB, for Mean Drinks per Drinking Day (MDDD) and Percent Heavy Drinking Days (PHDD). With respect to statistical associations between the IVR and TLFB methods, specific to the assessment of risky sexual behavior as well as the joint occurrence of alcohol use/risky sexual behavior, correlations between the IVR and TLFB were in the moderate range. More specifically, greater aggregate estimates were found for the TLFB with regard to frequency of unprotected anal intercourse (UAI), unprotected receptive anal intercourse (URAI), and unprotected receptive anal intercourse on days in which alcohol use occurred (URAIAU) compared with the IVR method.

Discrepancy analyses revealed individual variation in the degree of correspondence between both IVR and TLFB methods for all study variables. Across each of the alcohol use variables, participants were more likely to report greater alcohol use when reporting via the IVR method relative to the TLFB. A minority of participants (up to 20%) reported greater alcohol use and abstinence when using the TLFB relative to the IVR method. Conversely, there was a tendency for participants to report greater
sexual risk behavior via the TLFB relative to the IVR method. These findings were further supported by an examination of the plots of the limits of agreement, which revealed substantial individual variability across both methods for all study variables. Additionally, the mean percent differences for each variable did not reach an acceptable level of agreement. These data suggest that there is a high degree of variation in the direction and magnitude of reports regarding alcohol use and risky sexual behavior between the IVR and TLFB methods.

To investigate the influence of IVR compliance on the degree of IVR-TLFB correspondence, post-hoc exploratory analyses were conducted to examine whether the associations between the IVR and TLFB methods, as well as aggregate mean differences for the two methods, were statistically significantly different between individuals with high and low levels of IVR compliance, based on a median split of the overall IVR compliance rate (Median = 78.8%). Findings indicated higher correlations for all variables among the high IVR compliance group relative to those in the low IVR compliance group. Furthermore, among members of the low IVR compliance group there were no significant mean differences between methods for any study variables. Alternatively, a number of summary level variables specific to alcohol use and risky sexual behavior were significantly different from one another among those in the high IVR compliance group. The mean percent differences for any variables within either the high or low groups, however, did not approach an acceptable level of agreement. In other words, the degree of correspondence, across each of the study variables, between IVR compliance groups was not within an acceptable range. Additionally, analyses of factors associated with IVR compliance revealed that participants who were older, had greater
treatment attendance, and fewer heavy drinking days were more likely to comply with the IVR system.

Explanation of Study Aim 1 Findings

These findings may be explained, at least in part, by the differences in task attributes associated with each method. With respect to differences between the IVR and TLFB methods for alcohol consumption, a primary advantage associated with the IVR method is the shorter recall period associated with it in comparison to the TLFB method (Toll et al., 2006; Searles et al., 2002). Participants may have been able to more accurately recall their recent alcohol use on the IVR, because they were able to engage in a process of enumeration (i.e., count the number of standard drinks during the prior 24-hours; Del Boca and Darkes, 2003). The tendency to report less alcohol use via the TLFB method may be due to the participants’ inability to remember their daily alcohol consumption. When reporting information via the TLFB, participants’ may have to rely on cognitive short-cuts (e.g., heuristics; Tversky and Kahneman, 1974) or intuitive judgments, which may contribute to memory bias. Further, the TLFB methodology itself (e.g., use of patterns to complete the calendar) may also contribute to less reporting as the emphasis is placed on typical use.

Differences in the magnitude and direction of reporting alcohol use via the IVR and TLFB methods also may exist as a function of the social context of the assessment method. During IVR data collection, participants reported their behavior to an automated system without having to travel to a research laboratory, which afforded a greater degree of freedom regarding the provision of data (e.g., at home) and perhaps greater privacy to report on socially undesirable behavior. The TLFB, on the other hand, was administered
in the treatment setting, and therefore, may have been viewed as a component of the treatment process and as a consequence motivation for some participants to respond accurately may have decreased because of an unwillingness to reveal behavior that was either socially undesirable or inconsistent with treatment goals (Searles et al., 2000).

One of the more notable findings of this study was that greater reports of risky sexual behavior occurred via the TLFB method in comparison to the IVR method, which is inconsistent with findings from the alcohol use data. This may be partially explained by the extent to which alcohol use and risky sexual behavior were operationalized. The alcohol use variables from each method were constructed by aggregating (e.g., proportion variables) the drinking data for each participant into summary level variables. These type data are less likely to be influenced by missing data or outliers because they are based on the amount of information available for each participant and provide an average or pattern of alcohol behavior (Sobell et al., 2002). With respect to the measurement of risky sexual behavior, frequency counts of each behavior were constructed from each method. Thus, it is possible that non-compliance with the IVR system may have artificially reduced the number of reported instances of sexual behavior. Reports of sexual behavior via the TLFB, however, may contain fewer missing days of data because a trained interviewer prompts the study participant in an attempt to obtain complete data. Therefore, the differences in the reporting of sexual behavior across data collection methods may be an artifact of missing IVR data.

To further elucidate the extent to which missing data on the IVR may have affected correspondence between the IVR and TLFB methods, risky sexual behavior variables were re-operationalized as proportions (i.e., frequency of type of sexual
behavior / frequency of sexual events) and comparative descriptive analyses were conducted (i.e., correlations, paired-sample t-tests, discrepancy analyses). The results indicated that the Intra Class Correlations (ICCs) between the methods increased for the risky sexual behavior proportion variables (i.e., range from .54 to .59) in comparison to the frequency of risky sexual behavior variables. In addition, the paired-sample t-tests revealed that the overall aggregate reports of UAI, URAI, UIAIAU, and UAIAU were significantly greater for the IVR method in comparison to the TLFB method. Discrepancy analyses further indicated that participants were more likely to report a greater proportion of risky sexual behavior events on the IVR in comparison to the TLFB for the majority of the variables. Overall, these secondary post-hoc findings indicate that correspondence between the IVR and TLFB methods was affected by the manner in which the risky sexual behavior variables were operationalized.

It also may be that method variance contributed to the observed differences across reporting methods. In this regard, the sexual risk questions occurred at the end of the IVR interview, and it is possible that participants became too discouraged to accurately report on their sexual behavior. In addition, since participants were primarily seeking treatment for their alcohol use, motivation to respond to the sexual behavior questions may have decreased, and in the absence of a trained interviewer to prompt the participant, less responding occurred via the IVR method. Thus, it may be that the tendency to report less risky sexual behavior via the IVR was due, at least in part, to a placement effect (i.e., mode effect; Beebe, Jenkins, Andersen, Davern & Rockwood, 2008), which also may contribute to missing data problems.
Study Aim 2: Factors that Influence Correspondence between the IVR and TLFB Methods

A secondary aim of the current study was to identify factors that influenced correspondence between the IVR and TLFB methods for variables specific to alcohol use and sexual risk among problem drinking MSM. Exploratory analyses revealed that TLFB-IVR correspondence for variables specific to alcohol use was influenced by the participant’s severity of alcohol dependence, reports of daily negative affect, and alcohol use on the day of IVR data collection. More specifically, there was a strong positive association between MDDD and PHDD and the number of standard drinks that participants’ reportedly consumed prior to or during IVR data collection. However, greater alcohol dependence severity during treatment was associated with reporting fewer DDD (i.e., MDDD) via the IVR method. In addition, greater daily negative affect scores were associated with reporting a lower PHDD via the IVR method compared to the TLFB method. No variables significantly influenced TLFB-IVR correspondence with respect to the assessment of UAI. Finally, contrary to expectation, respondent characteristics such as HIV status, race/ethnicity, age, alcohol related negative consequences, depression and anxiety severity, sexual compulsivity, obsessive-compulsive thoughts about drinking, and motivational factors were not associated with TLFB-IVR correspondence for any of the sexual risk or alcohol use variables.

The present study’s findings suggest that the Babor and Del Boca (1992) question-answer model provided a useful framework for identifying factors that influenced correspondence between the IVR and TLFB methods. Specifically, three of the model’s four constructs (i.e., respondent characteristics - greater alcohol dependence
severity, motivational factors - negative affective states, and cognitive factors - alcohol consumption prior to data collection) influenced the direction and magnitude of alcohol use reports across the IVR and TLFB methods.

Explanation of Findings for Study Aim 2: Factors that Influence Correspondence between the IVR and TLFB

Cognitive factors (e.g., diminished cognitive functioning resulting from alcohol use prior to or during the IVR session) may have been associated with discrepancies in reporting alcohol use behavior across the TLFB and IVR methods. In this regard, individuals under the influence of alcohol at the time of data collection may not accurately report their behavior (Babor et al., 1987, 2000). The present study findings indicated alcohol use that occurred before or during IVR data collection was associated with reporting greater alcohol use via the IVR method relative to that reported via the TLFB method. It is not clear why alcohol use on the day of reporting is associated with the reporting of greater alcohol use, although method variance may play a role. In this regard, data from the TLFB reflects patterns of use across an extended period of time and as such is subject to the biasing effects of memory. Alternatively, alcohol use prior to or on the day of IVR call is a subset of daily drinking behavior as reported via the IVR method, and it would be expected to be positively correlated with summary alcohol use variables. Therefore, these data do not provide strong evidence of cognitive factors accounting for discrepancies between the TLFB and IVR methods with respect to alcohol use behavior.

Respondent characteristics such as greater alcohol dependence severity may have contributed to discrepancies in alcohol use reporting behavior across the TLFB and IVR
methods. Study findings indicated that individuals’ with greater alcohol dependence symptoms reported less drinking when using the IVR method relative to the TLFB method. This finding is consistent with prior studies that have demonstrated that greater alcohol dependence severity negatively affects response accuracy (Babor et al., 2000). The exact mechanism of how greater alcohol dependence severity interferes with the reporting of alcohol consumption when using the IVR method is unknown. It is possible that participants suffering a more severe alcohol use disorder had greater difficulty interacting daily with the IVR system; such individuals may have been experiencing greater psychosocial problems that impeded their ability and/or motivation to respond appropriately during some of their calls to the IVR system. However, it is important to note that individuals physically dependent on alcohol and requiring a greater level of care were excluded from study participation.

Motivational factors such as daily psychological symptoms of anxiety or depression also may have influenced differential reporting across the TLFB and IVR methods. The study’s findings provide initial evidence that greater daily negative affect (i.e., feeling sad, nervous, angry, and tense) is associated with reporting a fewer proportion of heavy drinking days via the IVR system. This suggests that individuals experiencing decreased energy or significant fatigue resulting from depression and/or concentration difficulties associated with the effects of anxiety (DelBoca and Darkes, 2003) may have less motivation to provide daily drinking data via the IVR methodology. Alternatively, the use of a trained interviewer during the TLFB administration may have provided an opportunity to assist participants who were depressed and/or experiencing greater negative affect by providing a more supportive reporting environment.
A primary assumption of Babor and Del Boca’s (1992) model of the question-answer process is that self-report accuracy is embedded within the social context in which data collection occurs and can be influenced directly by the interplay of all constructs of the model, namely task attributes, respondent characteristics, motivational, and cognitive factors. For example, the degree of correspondence between the IVR and TLFB methods for the assessment of alcohol use may be affected concurrently by the interaction of respondent characteristics and motivational factors. Those participants who experience greater levels of daily negative affect may be more likely to experience greater dependence symptoms, which, in turn, may affect a participant’s willingness to respond appropriately to the IVR system. The pathways to accurate reporting are varied and complex and may involve interactions across model constructs. Given the exploratory nature of the current dissertation study aim, specific interaction terms were not hypothesized as the presented aim sought to examine whether any factors influenced correspondence between the IVR and TLFB methods, not necessarily the mechanism in which they may occur. It is important, therefore, to consider the magnitude and direction of reporting behavior when comparing and contrasting reporting behavior across data collection methods such as the TLFB and IVR.

Study Aim 3: The Relationship between Alcohol Use and Risky Sexual Behavior

The final aim of this study was to examine the association between alcohol consumption and engagement in UAI among problem drinking MSM using IVR technology. The study results provided partial support for hypothesis 2, which posited that UAI would be more likely to occur on those days that alcohol use occurred. Study findings indicated that this relationship was dependent on how alcohol use was
operationalized. Specifically, when alcohol use was examined as a dichotomous criterion (yes or no), the risk of engaging in UAI was greater on days in which alcohol use was consumed compared to days when no alcohol use was consumed. However, when alcohol use was examined as a continuous criterion variable, UAI was not a significant predictor. This finding suggests that the amount of alcohol consumed does not necessarily increase the risk of engaging in UAI among MSM, which may be a function of homogeneity of the sample (i.e., comprised of heavy drinkers) or the fact that the alcohol use data among this sample was skewed, which is typical of heavy drinking clinical samples. These findings are inconsistent with prior studies, which have indicated that the risk of engaging in UAI is more likely to occur in situations involving heavy alcohol consumption in comparison to low to moderate amounts (Colfax et al., 2004; Seage et al., 1998), although study findings regarding this relationship have been mixed.

Additional analyses (Hypothesis 3) were conducted to examine whether participant HIV status moderated the relationship between alcohol use and risky sexual behavior. Specifically, it was posited that among HIV positive MSM, there would be a stronger positive association between alcohol use and UAI in comparison to HIV negative MSM. Irrespective of how alcohol use was operationalized (i.e., dichotomous or continuous), findings from this study did not support this hypothesis.

Explanation of Findings from Study Aim 3: The Relationship between Alcohol Use and Risky Sexual Behavior

Data regarding the relationship between alcohol use (quantity) and sexual risk appear to be inconsistent with previous findings in the literature. This may be attributed to situational factors that were not assessed in the current study such as type of risky sex,
degree of intimacy with partner, and other drug use. For example, Irwin and colleagues (2006) found that the relationship between alcohol use and risky sex varied as a function of whether one engaged in unprotected anal receptive or insertive intercourse. The relationship was stronger in sexual risk episodes involving unprotected receptive anal intercourse. Vanable et al., (2004) found that the relationship between quantity of alcohol consumed and UAI was twice as likely to occur for sexual episodes involving a casual partner, compared sexual episodes involving a steady partner among MSM. Finally, other factors among MSM, such as co-morbid drug use, have been implicated as contributors to unsafe sex. Clutterbuck et al., (2001) found that the use of marijuana and nitrites by MSM prior to or during sex was associated with participants reporting greater frequency of engagement in UAI. Overall, the relationship between alcohol use and engagement in risky sex is complex and appears to be moderated by several factors.

The statistically non-significant interaction effect of HIV status on the relationship between alcohol use and engagement in UAI may reflect the presence of a non-linear relationship between these two behaviors (Cohen & Cohen, 1983; Jaccard & Turrisi, 2003). In principle, there is a wide variety of moderated relationships that can characterize the conditional effects of a focal independent variable on a dependent variable at specific values of a given moderator, and the number of possible functional forms can be infinite. The functional form used in the present study examined the slope between alcohol use and UAI as it changes in a linear, monotonic function at particular values of HIV status. However, other types of functional forms were not tested in the present study. For example, the relationship between alcohol use and may be nonlinear and the failure to obtain statistically significant interactions may reflect the presence of
an alternative functional form such as a curvilinear relationship rather than the absence of a moderated relationship (Jaccard & Turrisi, 2003).

Other potential reasons for the inconsistent findings from this study and those reported previously in the literature, include methodological and sample related limitations. First, the prevalence of engaging in UAI and participant HIV status was rather low, which may have reduced the likelihood of detecting statistically significant associations. The lack of effect on the relationship between alcohol use and engagement in UAI may be attributed to the fact that participants were a relatively homogenous sample of heavy drinkers. The extent of heavy drinking among the study sample may have minimized effects on participants’ risky sexual behavior because alcohol use was perceived as normative and likely to occur irrespective of engagement in UAI (Parsons et al., 2005), which may have diminished group differences. Finally, reductions in risky sexual behavior may have occurred as a result of participants’ enrollment in treatment. A central tenet regarding the alcohol use/UAI relationship is that alcohol use is a causal risk factor for engagement in UAI among MSM. Because participants were seeking to reduce their alcohol consumption, reductions in drinking behavior as a result of treatment may have reduced the frequency of engaging in UAI, which may been one reason why the findings did not yield a significant main effect with respect to this relationship.

**Implications and Recommendations of the Dissertation Findings**

The purpose of the present study was to provide a detailed evaluation of the IVR and TLFB self-report methodologies for the collection of alcohol use and risky sexual behavior among a sample of problem drinking MSM. The present study findings have
several implications for researchers and public health practitioners involved in HIV prevention and interventions involving MSM.

Overall, study findings have several implications regarding data collection specific to alcohol use and sexual risk behavior among problem drinking MSM. The use of IVR technology appears to be feasible for the collection of summary level alcohol use and risky sexual behavior variables, but not for the collection of frequency of risky sexual behavior variables. The present study findings indicated that summary level variables specific to alcohol use and risky sexual behavior were greater when generated via the IVR system versus the TLFB method. This suggests that data collected via the IVR is associated greater reporting of summary level alcohol use and risky sexual behavior variables in comparison to the TLFB, which may be attributed to the social context in which IVR data collection occurs (e.g., greater privacy), respondent characteristics (e.g., less dependence severity), motivational factors (e.g., less daily negative affect) and certain task attributes of IVR (e.g., shorter recall period).

A commonly held assumption within the alcohol treatment literature is that greater reporting is associated with greater response accuracy, at least among clinical samples (Del Boca & Noll, 2000). It should be noted, however, that more reporting via the IVR method does not necessarily indicate greater response accuracy. Thus, the high degree of individual variation observed, in this study, across both the IVR and TLFB methods with respect to alcohol use and risky sexual behavior does not allow for a definitive answer regarding a gold standard method of data collection. It is recommended that other corroborative measures be used to ensure response accuracy (e.g., biochemical verification, collateral informants). In addition, procedures such as assurances of
confidentiality, maintaining research interviewer proficiency, emphasizing the importance of accurate data, and reducing demand characteristics of the response tasks also may be beneficial in increasing response accuracy. In addition, study findings also suggest that daily IVR reporting may be influenced by the physical and psychological state of the participant. Therefore, it is important to incorporate efforts (e.g., courtesy phone calls) within a study protocol to address the psychological needs of participants in order to provide greater encouragement for responding and to reduce potential negative perceptions regarding the purpose of the IVR assessments (Del Boca & Noll, 2000).

The social context and task components of the Babor and Del Boca (1992) model were not able to be examined in the current study, because it would be necessary to manipulate them as independent variables prior to study implementation. It is important to understand how specific task variables or the social context associated with each method may influence IVR-TLFB correspondence; such factors may partially explain the high degree of reporting variability across methods. Another assumption of the model is that the constructs may interact with one another to influence self-report behavior. Additional investigation of the interactions among study variables and an examination of other model components may assist in providing increased understanding of the model and potential refinement in our understanding of factors that influence correspondence between the IVR and TLFB methods. A major criticism of the model is that the authors do not explicitly state the pathway or manner in which the components of the model interact, which does not provide a strong basis for testing hypotheses regarding specific interactions. Collectively, the present study findings indicate that discrepancies in participant reporting behavior across the IVR and TLFB method among problem drinking
MSM appear to be a function of both one’s current psychological state and/or a more chronic and severe course of alcohol involvement, and it remains less clear regarding the extent to which cognitive factors such as recent alcohol consumption affects IVR reporting behavior, although it is a common assumption that recent alcohol intoxication reduces response accuracy.

Given the reasonably high degree of individual variability when reporting alcohol use and risky sexual behavior across the IVR and TLFB methods, it is important to consider the pros and cons of each method prior to implementation. For example, the primary advantages of using the IVR method include ease of data entry, proximal recall (i.e., past 24-hours), reduced effects of memory decay, and potentially increased privacy and confidentiality when reporting sensitive behaviors. Alternatively, it appears that several factors such as greater alcohol dependence symptoms and negative affective states may bias drinking estimates obtained via the IVR methodology. In addition, data collection using IVR technology can be expensive and contribute to greater respondent burden.

A major limitation specific to IVR data collection is non-compliance with report schedules. This concern is of practical significance because missing IVR data may contribute to biased estimates and violate statistical assumptions (e.g., observations not missing at random). The present study’s findings indicate that IVR compliance does affect statistical associations (e.g., correlations) among study variables. Thus, IVR non-compliance can influence statistical decision-making and bias study findings. It is recommended, therefore, that efforts to increase IVR compliance (e.g., more frequent daily reminder calls) be incorporated within study protocols. Further, future research
should examine the extent to which data imputation techniques affect findings obtained via IVR. A greater understanding of the consequences of missing data problems can enhance our knowledge regarding the utility of IVR data collection.

The TLFB method also has several advantages associated with it such as ease of administration (self-administered or by trained interviewer), cost-effectiveness, assurance that participants are alcohol and drug free at time of data collection, and may be less affected by daily negative affective states or consequences experienced from greater alcohol involvement. The primary disadvantages associated with using the TLFB are an inability to examine date specific alcohol use, potential memory bias, and responses given by the participant during administration can be influenced by demand characteristics of the interviewer and/or environment.

The present study’s findings regarding the extent to which alcohol use is related to engagement in unprotected anal intercourse are inconclusive. Data derived from the IVR yielded a statistically significant effect between alcohol use and engagement in UAI among MSM, but this relationship was detected only when alcohol use was treated as a dichotomous variable, which suggest more research is needed to provide further insight regarding the extent to which alcohol use is involved in risky sexual encounters among MSM. For example, this relationship may be complex and moderated by factors such as type of relationship, co-occurring substance use, and form of risky sexual behavior. In addition, to further understand how IVR can be used to assess the conditional relationship between alcohol use and risky sexual behavior, it is important to replicate the current study with a non-treatment seeking group of MSM.
There were several strengths of this current study that warrant further discussion. Prior studies that have compared drinking estimates obtained via the IVR and TLFB methods have relied on statistical associations (e.g., correlation coefficients) to establish correspondence. This study, on the other hand, was one of the first to use measures of equivalence (e.g., 95% limits of agreement; mean percent differences) to assess correspondence between the IVR and TLFB methods. Use of these statistical methods afforded greater insight into the degree of variability across methods for alcohol use and sexual risk variables. It is recommended that this statistical technique be used when examining correspondence across data collection methods.

A major advantage of using IVR data is that it provides near real-time assessments, and provides an estimate of within person associations that can be analyzed using statistical techniques such as Hierarchical Linear Modeling, which generally have greater statistical power than more tradition statistical approaches. This form of data collection (IVR) also avoids some of the methodological limitations associated with other data collection methods (e.g., reliance on more distal recall periods). Given the technological advantages associated with IVR data collection as well as the likelihood that IVR data collection will continue, further research using this technology is recommended.

Limitations of Dissertation Study

Overall, findings from this study preclude firm conclusions regarding the relationship between alcohol use and unprotected anal intercourse among MSM. A major limitation to the current study, similar to other investigations in this area, is a necessary reliance on observational designs, which does not afford causal inferences (Woolf and
Maisto, in press). Experimental designs that examine risky sexual behavior within a laboratory setting can only focus on dependent variables that are analogues of risky sexual behavior because to conduct such research on actual risky sexual practices would be unethical. An additional limitation to the present study is the lack of theory-based guidance with respect to study hypotheses involving the relationship between alcohol use and engagement in unprotected anal intercourse. Thus, the development and application of a theoretical conceptualization regarding the associations between alcohol use and risky sexual behavior is an important area of inquiry and research development.

Concluding Remarks

Advantages and disadvantages are associated with each form of data collection activity. The TimeLine FollowBack method has been considered the gold standard for the collection of alcohol use and risky sexual behavior data. Interactive Voice Response (IVR) technology represents a novel innovative approach in the assessment of alcohol use and risky sexual behavior, particularly with respect to problem drinking MSM. It combines many ideal features in comparison to more traditional methods of data collection such as the TLFB method. Specifically, IVR technology may reduce potential memory bias and the influence of interviewer reactions, although data collection involving IVR does have limitations such as the potential for respondent burden and missing data. Conceptual models, such as the Babor and Del Boca model, provide a framework for identifying factors that influence reporting behavior and can help guide recommendations for when the selective use of the IVR and TLFB methods might be most beneficial.
Despite the inconsistent findings regarding the association between alcohol use and engagement in risky sexual behavior, it is recommended that HIV prevention programs continue to focus awareness of the sexual risk associated with alcohol use among MSM. Public health efforts should continue to focus on alcohol intervention and prevention programs for high-risk drinking MSM until an alternative recommendation can be made regarding the influence of alcohol’s effects on decision making involving participation in sexual behavior, especially high risk sexual behavior. Further, it is important to continue to examine methodological technologies such as IVR in order to make definitive recommendations regarding its utility for assessing the relationship between alcohol use and engagement in risky sexual behavior among MSM in order to better inform public health practice.
REFERENCES


Table 1: *Study sample (N = 84) demographic characteristics*

<table>
<thead>
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Table 2: Baseline alcohol use and sexual risk characteristics

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<tr>
<td>Mean Drinks per Drinking Day (MDDD)</td>
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<td>Mean Percent Days Abstinent (PDA)</td>
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<td>Mean Percent Heavy Drinking Days (PHDD)</td>
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<td><strong>TLFB Sexual Risk Estimates in Past 45 Days</strong></td>
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<td>Frequency of Sexual Incidents (SI)</td>
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<td>Frequency of Unprotected Anal Intercourse (UAI)</td>
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<td>Frequency of URAI on Days Alcohol Consumed</td>
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Table 3: Baseline and week 13 end of treatment descriptive statistics for alcohol severity and mood state variables

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<td>Number of standard Drinks on day of IVR call</td>
<td>*</td>
<td>*</td>
</tr>
<tr>
<td><strong>Alcohol Dependence Severity (ADS) Composite Score</strong></td>
<td>13.7</td>
<td>5.5</td>
</tr>
<tr>
<td><strong>Alcohol Dependence Status</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Alcohol Dependence Criteria Met</td>
<td>94</td>
<td>79</td>
</tr>
<tr>
<td><strong>Short Inventory of Problems (SIP) Composite Score</strong></td>
<td>16</td>
<td>7.9</td>
</tr>
<tr>
<td><strong>Obsessive Compulsive Drinking Scale (OCDS) Composite Score</strong></td>
<td>12.7</td>
<td>4.7</td>
</tr>
<tr>
<td><strong>Frequency of Drug Use in Past 90 Days</strong></td>
<td>9.4</td>
<td>20.1</td>
</tr>
<tr>
<td><strong>Sexual Risk Taking Measures</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sexual Compulsivity Scale (SCS) Composite Score</td>
<td>15.7</td>
<td>5.1</td>
</tr>
<tr>
<td><strong>Mood/Psychological State</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Beck Depression Inventory Composite Score</td>
<td>18.5</td>
<td>8.4</td>
</tr>
<tr>
<td>State-Trait Anxiety Inventory (State Version) Composite Score</td>
<td>40.6</td>
<td>5.7</td>
</tr>
<tr>
<td>Daily IVR Negative Affect Composite Score</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Motivation</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Daily IVR Commitment Composite Index Score</td>
<td>*</td>
<td>*</td>
</tr>
</tbody>
</table>
Table 4: Correlation matrix: the IVR compliance variable and a priori identified predictors

<table>
<thead>
<tr>
<th>Variables</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
<th>11</th>
<th>12</th>
<th>13</th>
<th>14</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. IVR compliance</td>
<td>1</td>
<td>-.17</td>
<td>-.28*</td>
<td>.05</td>
<td>.28**</td>
<td>.33**</td>
<td>-.20</td>
<td>-.08</td>
<td>-.09</td>
<td>.08</td>
<td>-.03</td>
<td>-.03</td>
<td>-.14</td>
<td>.17</td>
</tr>
<tr>
<td>2. MDDD</td>
<td>1</td>
<td>.56*</td>
<td>.14</td>
<td>-.15</td>
<td>-.17</td>
<td>.30**</td>
<td>.37**</td>
<td>.12</td>
<td>-.21*</td>
<td>.18</td>
<td>.31**</td>
<td>-.07</td>
<td>.17</td>
<td></td>
</tr>
<tr>
<td>3. PHDD</td>
<td>1</td>
<td>-.35*</td>
<td>-.22</td>
<td>-.11</td>
<td>.15</td>
<td>.15</td>
<td>.19</td>
<td>-.03</td>
<td>.22**</td>
<td>.13</td>
<td>.04</td>
<td>.08</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. PDA</td>
<td>1</td>
<td>.21</td>
<td>-.24*</td>
<td>.09</td>
<td>.25**</td>
<td>.10</td>
<td>-.01</td>
<td>-.06</td>
<td>.10</td>
<td>-.22**</td>
<td>.11</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. Total Sessions Attended</td>
<td>1</td>
<td>.08</td>
<td>-.18</td>
<td>-.06</td>
<td>-.01</td>
<td>.05</td>
<td>-.05</td>
<td>-.03</td>
<td>-.08</td>
<td>.04</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. Age</td>
<td>1</td>
<td>-.13</td>
<td>-.05</td>
<td>.01</td>
<td>-.03</td>
<td>-.01</td>
<td>-.02</td>
<td>.08</td>
<td>.19</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7. SIP composite W/13</td>
<td>1</td>
<td>.48**</td>
<td>.42**</td>
<td>-.26**</td>
<td>.34**</td>
<td>.13</td>
<td>-.16</td>
<td>-.02</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>8. ADS composite W/13</td>
<td>1</td>
<td>.37**</td>
<td>.04</td>
<td>.57**</td>
<td>.39**</td>
<td>-.04</td>
<td>.07</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9. BDI composite W/13</td>
<td>1</td>
<td>-.23</td>
<td>.32**</td>
<td>.20*</td>
<td>.02</td>
<td>-.11</td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>10. STAI composite W/13</td>
<td>1</td>
<td>-.06</td>
<td>.04</td>
<td>.01</td>
<td>-.05</td>
<td></td>
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<tr>
<td>11. OCDS composite W/13</td>
<td>1</td>
<td>.18</td>
<td>.01</td>
<td>-.04</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>12. SCS composite W/13</td>
<td>1</td>
<td>-.26**</td>
<td>.17</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>13. Race/Ethnicity</td>
<td>1</td>
<td>.26*</td>
<td></td>
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</tr>
<tr>
<td>14. HIV status</td>
<td></td>
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</tr>
</tbody>
</table>

* p < .05, ** p < .01
Table 5: Multiple linear regression analyses for factors the influence IVR compliance

<table>
<thead>
<tr>
<th>Variable</th>
<th>B</th>
<th>SES</th>
<th>β</th>
<th>$R^2$</th>
<th>F</th>
<th>df</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overall Model</td>
<td></td>
<td></td>
<td></td>
<td>.22</td>
<td>7.22</td>
<td>3, 79</td>
</tr>
<tr>
<td>Total number of sessions attended</td>
<td>.03</td>
<td>.01</td>
<td>.21</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age</td>
<td>.01</td>
<td>.002</td>
<td>.29</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TLFB percent of heavy drinking days W/13</td>
<td>-.19</td>
<td>.09</td>
<td>-.20</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Table 6: TLFB and IVR correspondence descriptive statistics (means, stds, correlations, t-tests) associated with alcohol variable

<table>
<thead>
<tr>
<th></th>
<th>IVR Method</th>
<th>TLFB Method</th>
<th>t(df)</th>
<th>p-value</th>
<th>Pearson's r</th>
<th>p-value</th>
<th>ICC*</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Percent of Days Abstinent</td>
<td>33.98</td>
<td>24.8</td>
<td>31.3</td>
<td>29.2</td>
<td>1.51(82)</td>
<td>.14</td>
<td>0.86</td>
<td>.001</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mean Drinks Per Drinking Day</td>
<td>5.62</td>
<td>2.35</td>
<td>4.84</td>
<td>2.46</td>
<td>3.39(82)</td>
<td>.001</td>
<td>0.53</td>
<td>.001</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Percent of Heavy Drinking Days</td>
<td>26.1</td>
<td>20.8</td>
<td>22.03</td>
<td>24.8</td>
<td>2.24(82)</td>
<td>.03</td>
<td>0.59</td>
<td>.001</td>
</tr>
</tbody>
</table>

Note: The following variables required logarithmic transformations: MDDD and PHDD for both IVR and TLFB methods; *refers to Intraclass Correlation Coefficient (ICC); t-tests were conducted using paired sample t-tests
Table 7 Ninety-five percent limits of agreement associated with the alcohol use variables

<table>
<thead>
<tr>
<th></th>
<th>95% Limits of Agreement</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean*</td>
</tr>
<tr>
<td>Proportion of Days Abstinent</td>
<td>2.44</td>
</tr>
<tr>
<td>Mean Drinks Per Drinking Day</td>
<td>.755</td>
</tr>
<tr>
<td>Proportion of Heavy Drinking Days</td>
<td>4.21</td>
</tr>
</tbody>
</table>

Note: *refers to the discrepancy mean (IVR value minus TLFB value)
Table 8 TLFB-IVR descriptive statistics (means, stds, correlations, t-tests) associated with the sexual risk variables

<table>
<thead>
<tr>
<th>IVR Method</th>
<th>TLFB Method</th>
<th>Mean</th>
<th>SD</th>
<th>Mean</th>
<th>SD</th>
<th>t(df)</th>
<th>pvalue</th>
<th>Pearson r</th>
<th>pvalue</th>
<th>ICC</th>
<th>pvalue</th>
</tr>
</thead>
<tbody>
<tr>
<td>Frequency of Sexual Incidents (SI)</td>
<td>7.08</td>
<td>8.8</td>
<td>11.9</td>
<td>21.2</td>
<td>.921</td>
<td>.82</td>
<td>.36</td>
<td>0.52</td>
<td>.001</td>
<td>0.51</td>
<td>.001</td>
</tr>
<tr>
<td>Frequency of Unprotected Anal Intercourse (UAI)</td>
<td>2.08</td>
<td>4.4</td>
<td>2.7</td>
<td>9.6</td>
<td>2.11</td>
<td>82</td>
<td>.03</td>
<td>0.56</td>
<td>.001</td>
<td>0.54</td>
<td>.001</td>
</tr>
<tr>
<td>Frequency of Unprotected Receptive Anal Intercourse (URAI)</td>
<td>1.11</td>
<td>3.2</td>
<td>1.9</td>
<td>6.8</td>
<td>3.53</td>
<td>82</td>
<td>.001</td>
<td>0.51</td>
<td>.001</td>
<td>0.45</td>
<td>.001</td>
</tr>
<tr>
<td>Frequency of Unprotected Insertive Anal Intercourse (UIAI)</td>
<td>.99</td>
<td>1.9</td>
<td>.81</td>
<td>4.1</td>
<td>.075</td>
<td>82</td>
<td>.94</td>
<td>0.59</td>
<td>.001</td>
<td>0.58</td>
<td>.001</td>
</tr>
</tbody>
</table>

Note: The following variables required logarithmic transformations: SI, UAI, URAI, and UIAI; T-tests were conducted using paired sample t-tests; ICC refers to Intraclass Correlation Coefficient
Table 9: Ninety-five percent limits of agreement associated with the sexual risk variable

<table>
<thead>
<tr>
<th>Limits of Agreement</th>
<th>Mean</th>
<th>SD</th>
<th>Lower 95% LA</th>
<th>Upper 95% LA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Frequency of Sexual Incidents (SI)</td>
<td>-4.84</td>
<td>20.53</td>
<td>-45.1</td>
<td>35.3</td>
</tr>
<tr>
<td>Frequency of Unprotected Anal Intercourse (UAI)</td>
<td>-.65</td>
<td>8.29</td>
<td>-16.9</td>
<td>15.6</td>
</tr>
<tr>
<td>Frequency of Unprotected Receptive Anal Intercourse (URAI)</td>
<td>.18</td>
<td>3.48</td>
<td>-6.64</td>
<td>7.01</td>
</tr>
<tr>
<td>Frequency of Unprotected Insertive Anal Intercourse (UIAI)</td>
<td>-.82</td>
<td>5.98</td>
<td>10.9</td>
<td>-12.5</td>
</tr>
</tbody>
</table>
Table 10: TLFB-IVR descriptive statistics (means, stds, correlations, t-tests) associated with the sexual risk on days in which

<table>
<thead>
<tr>
<th></th>
<th>IVR Method</th>
<th>TLFB Method</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean</td>
<td>SD</td>
</tr>
<tr>
<td>Frequency of UAI on drinking days (UAIAU)</td>
<td>1.58</td>
<td>3.81</td>
</tr>
<tr>
<td>Frequency of URAI on drinking days (URAIAU)</td>
<td>.76</td>
<td>1.63</td>
</tr>
<tr>
<td>Frequency of UIAI on drinking days (UIAIAU)</td>
<td>.82</td>
<td>2.69</td>
</tr>
</tbody>
</table>

Note: The following variables required logarithmic transformations: TLFB-IVR variables for UAIAU, URAIAU, and UIAIAU; *denotes Intraclass Correlation Coefficient (ICC); t-tests were conducted using paired-sample t-tests
Table 11: Ninety-five percent limits of agreement associated with the risky sex on days in which drinking occurs variables.

<table>
<thead>
<tr>
<th>Limits of Agreement</th>
<th>Mean</th>
<th>SD</th>
<th>Lower 95% LA</th>
<th>Upper 95% LA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Frequency of UAI on drinking days</td>
<td>-.08</td>
<td>4.91</td>
<td>-9.71</td>
<td>9.54</td>
</tr>
<tr>
<td>Frequency of URAI on drinking days</td>
<td>.21</td>
<td>2.41</td>
<td>-4.51</td>
<td>4.93</td>
</tr>
<tr>
<td>Frequency of UIAI on drinking days</td>
<td>-.33</td>
<td>6.01</td>
<td>-12.11</td>
<td>11.45</td>
</tr>
</tbody>
</table>
Table 12: Descriptive statistics (means, sds, correlations, t-test) associated with the alcohol use variables by data collection method and IVR.

<table>
<thead>
<tr>
<th>Variable</th>
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<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
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</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>IVR Method</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Mean</td>
<td>SD</td>
<td></td>
<td>Mean</td>
<td>SD</td>
<td></td>
<td>t(df)</td>
<td>pvalue</td>
<td>Pearson r</td>
<td>pvalue</td>
</tr>
<tr>
<td>Percent Heavy Drinking Days</td>
<td></td>
<td>28.29</td>
<td>20.97</td>
<td></td>
<td>29.03</td>
<td>27.68</td>
<td></td>
<td>.062(42)</td>
<td>.95</td>
<td>.61</td>
<td>.001</td>
</tr>
<tr>
<td>Mean Drinks per Drinking Day</td>
<td></td>
<td>6.06</td>
<td>2.33</td>
<td></td>
<td>5.52</td>
<td>2.74</td>
<td></td>
<td>1.59(42)</td>
<td>.12</td>
<td>.33</td>
<td>.05</td>
</tr>
<tr>
<td>Percent Days Abstinent</td>
<td></td>
<td>36.21</td>
<td>25.15</td>
<td></td>
<td>33.16</td>
<td>32.35</td>
<td></td>
<td>1.06(42)</td>
<td>.31</td>
<td>.83</td>
<td>.001</td>
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</tbody>
</table>

High IVR compliance group (N = 40)

<table>
<thead>
<tr>
<th>Variable</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>IVR Method</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>Mean</td>
<td>SD</td>
<td></td>
<td>Mean</td>
<td>SD</td>
<td></td>
<td>t(df)</td>
<td>pvalue</td>
<td>Pearson r</td>
<td>pvalue</td>
</tr>
<tr>
<td>Percent Heavy Drinking Days</td>
<td></td>
<td>24.36</td>
<td>21.15</td>
<td></td>
<td>15.65</td>
<td>20.1</td>
<td></td>
<td>3.25(38)</td>
<td>.001</td>
<td>.58</td>
<td>.001</td>
</tr>
<tr>
<td>Mean Drinks per Drinking Day</td>
<td></td>
<td>5.17</td>
<td>2.34</td>
<td></td>
<td>4.22</td>
<td>1.99</td>
<td></td>
<td>3.46(38)</td>
<td>.001</td>
<td>.65</td>
<td>.001</td>
</tr>
<tr>
<td>Percent Days Abstinent</td>
<td></td>
<td>31.47</td>
<td>25.08</td>
<td></td>
<td>29.57</td>
<td>26.22</td>
<td></td>
<td>1.12(38)</td>
<td>.27</td>
<td>.91</td>
<td>.001</td>
</tr>
</tbody>
</table>

Note: The following variables required logarithmic transformations: TLFB-IVR variables for PHDD, MDDD and PDA; *denotes Intraclass Correlation Coefficient (ICC); t-tests were conducted using paired-sample t-tests
Table 13: Ninety-five percent limits of agreement associated with the alcohol use variables by IVR compliance group.

<table>
<thead>
<tr>
<th>Low IVR compliance group (N = 44)</th>
<th></th>
<th></th>
<th></th>
<th>Upper 95% LA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Limits of Agreement</td>
<td>Mean</td>
<td>SD</td>
<td>Lower 95% LA</td>
<td>LA</td>
</tr>
<tr>
<td>Mean Drinks per Drinking Day</td>
<td>.54</td>
<td>3.04</td>
<td>-5.41</td>
<td>6.49</td>
</tr>
<tr>
<td>Percent Heavy Drinking Days</td>
<td>-.74</td>
<td>22.2</td>
<td>-44.3</td>
<td>42.4</td>
</tr>
<tr>
<td>Percent Days Abstinent</td>
<td>3.04</td>
<td>18.24</td>
<td>-32.7</td>
<td>38.79</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>High IVR compliance group (N = 40)</th>
<th></th>
<th></th>
<th></th>
<th>Upper 95% LA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Limits of Agreement</td>
<td>Mean</td>
<td>SD</td>
<td>Lower 95% LA</td>
<td>LA</td>
</tr>
<tr>
<td>Mean Drinks per Drinking Day</td>
<td>.95</td>
<td>2.01</td>
<td>-2.98</td>
<td>4.89</td>
</tr>
<tr>
<td>Percent Heavy Drinking Days</td>
<td>8.71</td>
<td>19.1</td>
<td>-28.73</td>
<td>46.15</td>
</tr>
<tr>
<td>Percent Days Abstinent</td>
<td>1.91</td>
<td>11.23</td>
<td>-20.1</td>
<td>23.92</td>
</tr>
</tbody>
</table>
Table 14 Descriptive statistics (means, sds, correlations, t-test) associated with the sexual risk variables.

|                      | Low IVR compliance group (N = 44) |                       |                       |                       |                       |                       |                         |                         |                         |
|----------------------|-----------------------------------|------------------------|------------------------|------------------------|------------------------|------------------------|--------------------------|--------------------------|
|                      | IVR                               | TLFB                   | Variable               | Mean  | SD    | Mean  | SD    | t(df) | pvalue | Pearson r | pvalue | ICC       | pvalue                 |
| Frequency of SI      | 4.62  | 5.61  | 12.95  | 27.2  | -1.45(42) | .15  | 0.31  | .06   | 0.26   | .04     |        |           |                        |
| Frequency of UAI     | 1.41  | 4.15  | 2.07   | 7.89  | 1.32(42)  | .19  | 0.33  | .04   | 0.31   | .03     |        |           |                        |
| Frequency of URAI    | .52   | 1.13  | .21    | .65   | 2.08(42)  | .04  | 0.23  | .15   | 0.17   | .13     |        |           |                        |
| Frequency of UIAI    | .88   | 3.12  | 1.87   | 7.67  | .31(42)   | .76  | 0.45  | .01   | 0.43   | .001    |        |           |                        |

|                      | High IVR compliance group (N = 40) |                       |                       |                       |                       |                       |                         |                         |                         |
|----------------------|-----------------------------------|------------------------|------------------------|------------------------|------------------------|------------------------|--------------------------|--------------------------|
|                      | IVR                               | TLFB                   | Variable               | Mean  | SD    | Mean  | SD    | t(df) | pvalue | Pearson r | pvalue | ICC       | pvalue                 |
| Frequency of SI      | 9.32  | 10.5  | 11.1   | 14.1  | .52(38)   | .61  | 0.73  | .001  | 0.71   | .001    |        |           |                        |
| Frequency of UAI     | 2.71  | 4.53  | 3.32   | 10.9  | 1.66(38)  | .11  | 0.67  | .001  | 0.65   | .001    |        |           |                        |
| Frequency of URAI    | 1.41  | 2.27  | 1.36   | 5.65  | 2.85(38)  | .001 | 0.57  | .001  | 0.51   | .001    |        |           |                        |
| Frequency of UIAI    | 1.31  | 3.17  | 1.95   | 5.89  | -.224(38) | .82  | 0.69  | .001  | 0.69   | .001    |        |           |                        |

Note: The following variables required logarithmic transformations: TLFB-IVR variables for SI, UIAI, URAIAU, and UIAIUAU; *denotes Intraclass Correlation Coefficient (ICC); t-tests were conducted using paired-sample t-tests.
Table 15: Ninety-five percent limits of agreement associated with the sexual risk variables by IVR compliance group.

<table>
<thead>
<tr>
<th>Limits of Agreement</th>
<th>Low IVR compliance group (N = 44)</th>
<th>High IVR compliance group (N = 40)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean (SD)</td>
<td>Lower 95% LA</td>
</tr>
<tr>
<td>Frequency of SI</td>
<td>-8.32 (27.3)</td>
<td>-61.83</td>
</tr>
<tr>
<td>Frequency of UAI</td>
<td>-0.68 (6.52)</td>
<td>-13.45</td>
</tr>
<tr>
<td>Frequency of URAI</td>
<td>0.33 (1.12)</td>
<td>-2.53</td>
</tr>
<tr>
<td>Frequency of UIAI</td>
<td>-1.01 (6.44)</td>
<td>-13.63</td>
</tr>
</tbody>
</table>
Table 16: Descriptive statistics (means, sds, correlations, t-test) associated with the sexual risk days in which alcohol use occurred variables by data collection method and IVR compliance group.

<table>
<thead>
<tr>
<th></th>
<th>Low IVR compliance group (N = 44)</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Limits of Agreement</td>
<td>Mean</td>
<td>SD</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Frequency of SI</td>
<td>-8.32</td>
<td>27.3</td>
<td>-61.83</td>
</tr>
<tr>
<td>Frequency of UAI</td>
<td>-0.68</td>
<td>6.52</td>
<td>-13.45</td>
</tr>
<tr>
<td>Frequency of URAI</td>
<td>0.33</td>
<td>1.12</td>
<td>-2.53</td>
</tr>
<tr>
<td>Frequency of UIAI</td>
<td>-1.01</td>
<td>6.44</td>
<td>-13.63</td>
</tr>
<tr>
<td></td>
<td>High IVR compliance group (N = 40)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Limits of Agreement</td>
<td>Mean</td>
<td>SD</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Frequency of SI</td>
<td>-1.68</td>
<td>10.77</td>
<td>-22.79</td>
</tr>
<tr>
<td>Frequency of UAI</td>
<td>-0.61</td>
<td>9.69</td>
<td>-19.61</td>
</tr>
<tr>
<td>Frequency of URAI</td>
<td>0.05</td>
<td>4.71</td>
<td>-9.18</td>
</tr>
<tr>
<td>Frequency of UIAI</td>
<td>-0.66</td>
<td>5.61</td>
<td>-11.65</td>
</tr>
</tbody>
</table>

Note: The following variables required logarithmic transformations: TLFB-IVR variables for UAIAU, URAIAU, and UIAIAU; *denotes Intraclass Correlation Coefficient (ICC); t-tests were conducted using paired-sample t-tests.
Table 17: Ninety-five percent limits of agreement associated with the sexual risk on days in which alcohol use occurred variables.

<table>
<thead>
<tr>
<th>Limits of Agreement</th>
<th>Mean</th>
<th>SD</th>
<th>Lower 95% LA</th>
<th>Upper 95% LA</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Low IVR compliance group (N = 44)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Frequency of UAI on Drinking Days</td>
<td>-.35</td>
<td>3.37</td>
<td>-6.96</td>
<td>6.25</td>
</tr>
<tr>
<td>Frequency of URAI on Drinking Days</td>
<td>.18</td>
<td>.93</td>
<td>-1.64</td>
<td>2.01</td>
</tr>
<tr>
<td>Frequency of UIAI on Drinking Days</td>
<td>-.81</td>
<td>6.43</td>
<td>-13.41</td>
<td>11.79</td>
</tr>
<tr>
<td><strong>High IVR compliance group (N = 40)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Frequency of UAI on Drinking Days</td>
<td>.16</td>
<td>6.01</td>
<td>-11.61</td>
<td>11.94</td>
</tr>
<tr>
<td>Frequency of URAI on Drinking Days</td>
<td>.25</td>
<td>3.22</td>
<td>-6.06</td>
<td>6.56</td>
</tr>
<tr>
<td>Frequency of UIAI on Drinking Days</td>
<td>.09</td>
<td>5.63</td>
<td>-10.94</td>
<td>11.12</td>
</tr>
</tbody>
</table>
Table 18: Multiple linear regression analyses: Factors that influence discrepancy scores associated with mean drinks per drinking day (MDDD) across the TLFB and IVR data collection methods

<table>
<thead>
<tr>
<th>Variable</th>
<th>B</th>
<th>SES</th>
<th>β</th>
<th>R^2</th>
<th>F</th>
<th>df</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overall Model</td>
<td>.33</td>
<td></td>
<td></td>
<td></td>
<td>19.54</td>
<td>2, 82</td>
</tr>
<tr>
<td>MDDD on day of IVR call</td>
<td>1.12</td>
<td>.21</td>
<td>.51</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ADS composite score W/13</td>
<td>-.11</td>
<td>.04</td>
<td>-.23</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### Table 19: Correlation matrix: MDDD discrepancy score and potential predictors that influence IVR-TLFB correspondence

<table>
<thead>
<tr>
<th>Variables</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
<th>11</th>
<th>12</th>
<th>13</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Discrepancy MDDD</td>
<td>1</td>
<td>-.15</td>
<td>-.12</td>
<td>.51**</td>
<td>-.12</td>
<td>-.12</td>
<td>-.26*</td>
<td>.05</td>
<td>.14</td>
<td>.01</td>
<td>.09</td>
<td>-.08</td>
<td>.09</td>
</tr>
<tr>
<td>2. Average Daily Commitment IVR</td>
<td>1</td>
<td>-.18</td>
<td>-.35**</td>
<td>-.13</td>
<td>-.21*</td>
<td>-.08</td>
<td>-.37**</td>
<td>.37**</td>
<td>-.31**</td>
<td>.11</td>
<td>.03</td>
<td>.01</td>
<td></td>
</tr>
<tr>
<td>3. Negative Affect Composite IVR</td>
<td>1</td>
<td>.05</td>
<td>.13</td>
<td>.18</td>
<td>.07</td>
<td>.37**</td>
<td>-.05</td>
<td>.11</td>
<td>-.26*</td>
<td>.03</td>
<td>-.11</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. MDDD reported on day of IVR call</td>
<td>1</td>
<td>.05</td>
<td>.07</td>
<td>-.06</td>
<td>.04</td>
<td>-.01</td>
<td>.09</td>
<td>.13</td>
<td>-.13</td>
<td>.31**</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. SCS composite W/13</td>
<td>1</td>
<td>.13</td>
<td>.41**</td>
<td>.20</td>
<td>.04</td>
<td>.19</td>
<td>-.02</td>
<td>-.26*</td>
<td>.17</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. SIP composite W/13</td>
<td>1</td>
<td>.48**</td>
<td>.41**</td>
<td>-.26*</td>
<td>.34**</td>
<td>-.13</td>
<td>-.16</td>
<td>-.02</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7. ADS composite W/13</td>
<td>1</td>
<td>.37**</td>
<td>-.04</td>
<td>.57**</td>
<td>-.05</td>
<td>-.04</td>
<td>.07</td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>8. BDI composite W/13</td>
<td>1</td>
<td>-.23*</td>
<td>.32**</td>
<td>.01</td>
<td>.02</td>
<td>-.10</td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>9. STAI composite W/13</td>
<td>1</td>
<td>-.06</td>
<td>-.03</td>
<td>.01</td>
<td>.05</td>
<td></td>
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<td></td>
</tr>
<tr>
<td>10. OCDS composite W/13</td>
<td>1</td>
<td>.01</td>
<td>.01</td>
<td>.04</td>
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<td></td>
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<td></td>
</tr>
<tr>
<td>11. Age</td>
<td>1</td>
<td>.08</td>
<td>.19</td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>12. Race/Ethnicity</td>
<td>1</td>
<td>.26*</td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>13. HIV status</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
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<td></td>
</tr>
</tbody>
</table>

*p < .05, ** p < .01
Table 20: Correlation Matrix for PHDD discrepancy score and potential predictors that influence IVR-TLFB correspondence

<table>
<thead>
<tr>
<th>Variables</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
<th>11</th>
<th>12</th>
<th>13</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Discrepancy PHDD</td>
<td>1</td>
<td>.05</td>
<td>-.25*</td>
<td>.37**</td>
<td>.02</td>
<td>.01</td>
<td>-.02</td>
<td>-.05</td>
<td>.01</td>
<td>.02</td>
<td>.15</td>
<td>-.19</td>
<td>.17</td>
</tr>
<tr>
<td>2. Average Daily Commitment IVR</td>
<td>1</td>
<td>-.18</td>
<td>-.36**</td>
<td>-.12</td>
<td>-.21*</td>
<td>-.08</td>
<td>-.37**</td>
<td>-.31**</td>
<td>.11</td>
<td>.03</td>
<td>.01</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Negative Affect Composite IVR</td>
<td>1</td>
<td>.05</td>
<td>.13</td>
<td>.18</td>
<td>.07</td>
<td>.36**</td>
<td>-.05</td>
<td>.11</td>
<td>-.26*</td>
<td>.03</td>
<td>-.11</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. MDDD reported on day of IVR call</td>
<td>1</td>
<td>.05</td>
<td>.07</td>
<td>-.06</td>
<td>.04</td>
<td>-.02</td>
<td>.11</td>
<td>.13</td>
<td>-.13</td>
<td>.29*</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>5. SCS composite W/13</td>
<td>1</td>
<td>.13</td>
<td>.39**</td>
<td>.21</td>
<td>.04</td>
<td>.19</td>
<td>-.02</td>
<td>-.26*</td>
<td>.17</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. SIP composite W/13</td>
<td>1</td>
<td>.41**</td>
<td>.42**</td>
<td>-.26*</td>
<td>.34**</td>
<td>-.13</td>
<td>-.16</td>
<td>.02</td>
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</tr>
<tr>
<td>7. ADS composite W/13</td>
<td>1</td>
<td>.37**</td>
<td>-.04</td>
<td>.57**</td>
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<td>.04</td>
<td>.07</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>8. BDI composite W/13</td>
<td>1</td>
<td>-.23*</td>
<td>.32**</td>
<td>.01</td>
<td>.02</td>
<td>-.11</td>
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<tr>
<td>9. STAI composite W/13</td>
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<td>-.05</td>
<td>-.03</td>
<td>.01</td>
<td>.04</td>
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</tr>
<tr>
<td>10. OCDS composite W/13</td>
<td>1</td>
<td>-.01</td>
<td>.01</td>
<td>.04</td>
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<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>11. Age</td>
<td>1</td>
<td>.08</td>
<td>.19</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>12. Race/Ethnicity</td>
<td>1</td>
<td>.26*</td>
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<td></td>
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<td></td>
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<td></td>
<td></td>
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<tr>
<td>13. HIV status</td>
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<td></td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>

*p < .05, ** p < .01
Table 21: Multiple Linear Regression Analyses: Factors that Influence Discrepancy Scores associated with percent heavy drinking days (PHDD) across the TLFB and IVR data collection methods

<table>
<thead>
<tr>
<th>Variable</th>
<th>B</th>
<th>SES</th>
<th>β</th>
<th>$R^2$</th>
<th>$F$</th>
<th>df</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overall Model</td>
<td>.19</td>
<td></td>
<td></td>
<td>10.68</td>
<td>2, 82</td>
<td></td>
</tr>
<tr>
<td>MDDD on day of IVR call</td>
<td>.07</td>
<td>.02</td>
<td>.38</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Negative Affect Composite Score</td>
<td>-.03</td>
<td>.01</td>
<td>-.27</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Table 22: Correlation matrix for PDA discrepancy scores and potential predictors that influence IVR-TLFB correspondence

<table>
<thead>
<tr>
<th>Variables</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
<th>11</th>
<th>12</th>
<th>13</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Discrepancy PDA</td>
<td>1</td>
<td>.04</td>
<td>-.06</td>
<td>.04</td>
<td>-.15</td>
<td>-.14</td>
<td>-.30**</td>
<td>-.23*</td>
<td>-.08</td>
<td>-.23*</td>
<td>.09</td>
<td>-.10</td>
<td>-.02</td>
</tr>
<tr>
<td>2. Average Daily Commitment IVR</td>
<td>1</td>
<td>-.18</td>
<td>-.35**</td>
<td>-.13</td>
<td>-.21*</td>
<td>-.08</td>
<td>-.37**</td>
<td>.37**</td>
<td>-.31**</td>
<td>.11</td>
<td>.03</td>
<td>.01</td>
<td></td>
</tr>
<tr>
<td>3. Negative Affect Composite IVR</td>
<td>1</td>
<td>.05</td>
<td>.13</td>
<td>.18</td>
<td>.07</td>
<td>.37**</td>
<td>-.05</td>
<td>.11</td>
<td>-.26*</td>
<td>.03</td>
<td>-.11</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. MDDD reported on day of IVR call</td>
<td>1</td>
<td>.05</td>
<td>.07</td>
<td>-.06</td>
<td>.04</td>
<td>-.01</td>
<td>.09</td>
<td>.13</td>
<td>-.13</td>
<td>.31**</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. SCS composite W/13</td>
<td>1</td>
<td>.13</td>
<td>.41**</td>
<td>.20</td>
<td>.04</td>
<td>.19</td>
<td>-.02</td>
<td>-.26*</td>
<td>.17</td>
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</tr>
<tr>
<td>6. SIP composite W/13</td>
<td>1</td>
<td>.48**</td>
<td>.41**</td>
<td>-.26*</td>
<td>.34**</td>
<td>-.13</td>
<td>-.16</td>
<td>-.02</td>
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<td></td>
</tr>
<tr>
<td>7. ADS composite W/13</td>
<td>1</td>
<td>.37**</td>
<td>.04</td>
<td>.57**</td>
<td>-.05</td>
<td>-.04</td>
<td>.07</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8. BDI composite W/13</td>
<td>1</td>
<td>-.23*</td>
<td>.32**</td>
<td>.01</td>
<td>.02</td>
<td>-.10</td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9. STAI composite W/13</td>
<td>1</td>
<td>- .06</td>
<td>-.03</td>
<td>.01</td>
<td>-.05</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10. OCDS composite W/13</td>
<td>1</td>
<td>-.01</td>
<td>.01</td>
<td>-.04</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>11. Age</td>
<td>1</td>
<td>.08</td>
<td>.19</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>12. Race/Ethnicity</td>
<td>1</td>
<td>.26*</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>13. HIV status</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* p < .05, ** p < .01
Table 23: Multiple linear regression analysis: Factors that influence discrepancy scores associated with percent days abstinent (PDA) across the TLFB and IVR data collection methods

<table>
<thead>
<tr>
<th>Variable</th>
<th>B</th>
<th>SES</th>
<th>β</th>
<th>R^2</th>
<th>F</th>
<th>df</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overall Model</td>
<td></td>
<td></td>
<td></td>
<td>.08</td>
<td>7.78</td>
<td>1, 82</td>
</tr>
<tr>
<td>ADS composite score week 13</td>
<td>.</td>
<td>.007</td>
<td>.003</td>
<td>-.296</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Table 24: Correlation Matrix for UAI discrepancy scores and potential predictors that influence IVR-TLFB correspondence

<table>
<thead>
<tr>
<th>Variables</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
<th>11</th>
<th>12</th>
<th>13</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Discrepancy PHDD</td>
<td>1</td>
<td>.03</td>
<td>.12</td>
<td>.16</td>
<td>-.08</td>
<td>.13</td>
<td>-.05</td>
<td>-.06</td>
<td>.08</td>
<td>-.05</td>
<td>.11</td>
<td>.10</td>
<td>.13</td>
</tr>
<tr>
<td>2. Average Daily Commitment IVR</td>
<td>1</td>
<td>-.18</td>
<td>-.36**</td>
<td>-.12</td>
<td>-.21*</td>
<td>-.08</td>
<td>.37**</td>
<td>-.37**</td>
<td>-.31**</td>
<td>.11</td>
<td>.03</td>
<td>.01</td>
<td></td>
</tr>
<tr>
<td>3. Negative Affect Composite IVR</td>
<td>1</td>
<td>.05</td>
<td>.13</td>
<td>.18</td>
<td>.07</td>
<td>.36**</td>
<td>-.05</td>
<td>.11</td>
<td>-.26*</td>
<td>.03</td>
<td>-.11</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. MDDD reported on day of IVR call</td>
<td>1</td>
<td>.05</td>
<td>.07</td>
<td>-.06</td>
<td>.04</td>
<td>-.02</td>
<td>.11</td>
<td>.13</td>
<td>-.13</td>
<td>.29*</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. SCS composite W/13</td>
<td>1</td>
<td>.13</td>
<td>.39**</td>
<td>.21</td>
<td>.04</td>
<td>.19</td>
<td>-.02</td>
<td>-.26*</td>
<td>.17</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. SIP composite W/13</td>
<td>1</td>
<td>.41**</td>
<td>.42**</td>
<td>-.26*</td>
<td>.34**</td>
<td>-.13</td>
<td>-.16</td>
<td>-.02</td>
<td></td>
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</tr>
<tr>
<td>7. ADS composite W/13</td>
<td>1</td>
<td>.37**</td>
<td>-.04</td>
<td>.57**</td>
<td>-.05</td>
<td>-.04</td>
<td>.07</td>
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</tr>
<tr>
<td>8. BDI composite W/13</td>
<td>1</td>
<td>-.23*</td>
<td>.32**</td>
<td>.01</td>
<td>.02</td>
<td>-.11</td>
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<td></td>
</tr>
<tr>
<td>9. STAI composite W/13</td>
<td>1</td>
<td>-.05</td>
<td>-.03</td>
<td>.01</td>
<td>.04</td>
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<td></td>
</tr>
<tr>
<td>10. OCDS composite W/13</td>
<td>1</td>
<td>-.01</td>
<td>.01</td>
<td>-.04</td>
<td></td>
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<td></td>
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<tr>
<td>11. Age</td>
<td>1</td>
<td></td>
<td>.08</td>
<td>.19</td>
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<td></td>
</tr>
<tr>
<td>12. Race/Ethnicity</td>
<td>1</td>
<td></td>
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<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>13. HIV status</td>
<td>1</td>
<td></td>
<td></td>
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<td></td>
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<td></td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>

* p < .05, ** p < .01
Table 25: Multilevel model predicting the within day-to-day likelihood of unprotected anal intercourse on days when alcohol use (i.e., number of standard drinks) occurred.

<table>
<thead>
<tr>
<th>B</th>
<th>S.E.</th>
<th>t(df)</th>
<th>p-value</th>
<th>OR</th>
<th>95% CI</th>
<th>OR</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fixed Effects</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intercept</td>
<td>.25</td>
<td>4.45(69)</td>
<td>.0001</td>
<td>.33</td>
<td>.20, .54</td>
<td>.33</td>
</tr>
<tr>
<td>Daily Alcohol Use</td>
<td>.03</td>
<td>1.08(483)</td>
<td>.27</td>
<td>.97</td>
<td>.92, 1.025</td>
<td>.97</td>
</tr>
<tr>
<td>Subject Mean Alcohol Use</td>
<td>.04</td>
<td>1.03(69)</td>
<td>.30</td>
<td>1.04</td>
<td>.96, 1.14</td>
<td>1.04</td>
</tr>
</tbody>
</table>

Random Effects (variance)             | df      | Chi-square* |
Unprotected anal intercourse           | 69      | 223.52      |

Note. OR = odds ratio; CI = confidence interval; *p < .001
Table 26: Multilevel model predicting the within day-to-day likelihood of unprotected anal intercourse when alcohol use occurred within the past 24-hours by HIV status.

<table>
<thead>
<tr>
<th>Fixed Effects</th>
<th>B</th>
<th>S.E.</th>
<th>t(df)</th>
<th>p-value</th>
<th>OR</th>
<th>95% CI OR</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intercept</td>
<td>-1.19</td>
<td>.29</td>
<td>4.03(68)</td>
<td>.0001</td>
<td>.30</td>
<td>.17, .55</td>
</tr>
<tr>
<td>Daily alcohol use</td>
<td>-.02</td>
<td>.04</td>
<td>.62(481)</td>
<td>.54</td>
<td>.97</td>
<td>.89, 1.06</td>
</tr>
<tr>
<td>HIV status</td>
<td>.39</td>
<td>.05</td>
<td>.61(68)</td>
<td>.54</td>
<td>1.47</td>
<td>.45, 4.02</td>
</tr>
<tr>
<td>Mean subject alcohol use</td>
<td>.04</td>
<td>.05</td>
<td>.89(68)</td>
<td>.34</td>
<td>1.04</td>
<td>.95, 1.13</td>
</tr>
<tr>
<td>Alcohol use X HIV status</td>
<td>-.003</td>
<td>.06</td>
<td>.06(481)</td>
<td>.95</td>
<td>.99</td>
<td>.89, 1.11</td>
</tr>
</tbody>
</table>

Random Effects (variance)  | df    | Chi-square* |
Unprotected anal intercourse | 68    | 222.54      |

Note. OR = odds ratio; CI = confidence interval; *p < .001
Table 27: Multilevel model predicting the within day-to-day likelihood of unprotected anal intercourse on days when any use of alcohol occurred (i.e., dichotomized alcohol use measure).

<table>
<thead>
<tr>
<th></th>
<th>B</th>
<th>S.E.</th>
<th>t(df)</th>
<th>p-value</th>
<th>OR</th>
<th>95% CI OR</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Fixed Effects</strong></td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intercept</td>
<td>-1.11</td>
<td>.25</td>
<td>4.50(69)</td>
<td>.0001</td>
<td>.33</td>
<td>.20, .54</td>
</tr>
<tr>
<td>Any daily alcohol use</td>
<td>.82</td>
<td>.42</td>
<td>1.97(483)</td>
<td>.048</td>
<td>2.29</td>
<td>1.01, 5.2</td>
</tr>
<tr>
<td>Any mean level alcohol use</td>
<td>.37</td>
<td>.87</td>
<td>.43(69)</td>
<td>.67</td>
<td>1.45</td>
<td>.26, 8.23</td>
</tr>
<tr>
<td><strong>Random Effects (variance)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Unprotected anal intercourse</td>
<td>70</td>
<td></td>
<td></td>
<td></td>
<td>224.38</td>
<td></td>
</tr>
</tbody>
</table>

*Note. OR = odds ratio; CI = confidence interval; *p < .001
Table 28: Multilevel model predicting the within day-to-day likelihood of unprotected anal intercourse on days when any alcohol use occurred by HIV status.

<table>
<thead>
<tr>
<th></th>
<th>B</th>
<th>S.E.</th>
<th>t(df)</th>
<th>p-value</th>
<th>OR</th>
<th>95% CI OR</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fixed Effects</td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intercept</td>
<td>-1.22</td>
<td>.31</td>
<td>4.06(68)</td>
<td>.0001</td>
<td>.29</td>
<td>.16, .54</td>
</tr>
<tr>
<td>Any mean level alcohol use</td>
<td>.35</td>
<td>.87</td>
<td>.41(68)</td>
<td>.69</td>
<td>1.42</td>
<td>.25, 8.1</td>
</tr>
<tr>
<td>Any daily alcohol use</td>
<td>.98</td>
<td>.49</td>
<td>1.97(481)</td>
<td>.049</td>
<td>2.66</td>
<td>1.004, 7.05</td>
</tr>
<tr>
<td>HIV status</td>
<td>.39</td>
<td>.52</td>
<td>.76(68)</td>
<td>.45</td>
<td>1.48</td>
<td>.53, 4.19</td>
</tr>
<tr>
<td>Alcohol Use X HIV Status</td>
<td>-.65</td>
<td>.77</td>
<td>.85(481)</td>
<td>.39</td>
<td>.52</td>
<td>.12, 2.36</td>
</tr>
</tbody>
</table>

| Random Effects (variance)      | df  | Chi-square* |
| Unprotected anal intercourse   | 68  | 222.44      |
Appendix B: Figures

Figure 1: A schematic diagram of the Babor and Del Boca (1992) question-answering model that was revised to reflect response correspondence.
Figure 2: Plot of 95% limits of agreement associated with the mean drinks per drinking day discrepancy (i.e., TLFB value – IVR value) variable.
Figure 3: Plot of 95% limits of agreement associated with percent days abstinent discrepancy (i.e., TLFB value – IVR value) variable.
Figure 4: Plot of 95% limits of agreement associated with the percent heavy drinking day discrepancy (i.e., TLFB value – IVR value) variable.
Note: The darker circles represent greater frequencies of discrepancy scores

*Figure 5:* Plot of 95% limits of agreement associated with the frequency of sexual incidents discrepancy (i.e., TLFB value – IVR value) variable.
Note: The darker circles represent greater frequencies of discrepancy scores.

**Figure 6**: Plot of 95% limits of agreement associated with the unprotected anal intercourse between discrepancy (i.e., TLFB value – IVR value) variable.
Note: The darker circles represent greater frequencies of discrepancy scores

*Figure 7: Plot of 95% limits of agreement associated with the frequency of unprotected receptive anal intercourse discrepancy (i.e., TLFB value – IVR value) variable.*
Figure 8: Plot of 95% limits of agreement associated with the frequency of unprotected insertive anal intercourse discrepancy (i.e., TLFB value – IVR value) variable.

Note: The darker circles represent greater frequencies of discrepancy scores
Note: The darker circles represent greater frequencies of discrepancy scores.

*Figure 9: Plot of 95% limits of agreement associated with the frequency of unprotected anal intercourse on days in which drinking occurred discrepancy (i.e., TLFB value – IVR value) variable.*
Figure 10: Plot of 95% limits of agreement associated with the frequency of unprotected receptive anal intercourse on days in which drinking occurred discrepancy (i.e., TLFB value – IVR value) variable.

Note: The darker circles represent greater frequencies of discrepancy scores.
Figure 11: Plot of 95% limits of agreement associated with the frequency of unprotected insertive anal intercourse on days in which drinking occurred discrepancy (i.e., TLFB value – IVR value) variable.

Note: The darker circles represent greater frequencies of discrepancy scores.
APPENDIX C:

Autobiographical Sketch of Brett Thomas Hagman

The author of the current dissertation, Brett Thomas Hagman, graduated with his Bachelor’s degree from the University of North Carolina-Wilmington (UNCW) in 2001 with a double major in Psychology and Philosophy and Religion with a distinction in Religious Studies. During his tenure as an undergraduate at UNCW, he worked closely with Nora E. Noel, Ph.D. in an alcohol research laboratory for two years and examined the effects of social norms on college student drinking behavior.

In 2001, Mr. Hagman entered a graduate program in Clinical Psychology at the University of North Carolina-Wilmington (UNCW) which is a specialized program in substance abuse treatment. He completed his Masters degree in 2004 under the direction of Sally J. MacKain, Ph.D., and his Master’s thesis examined the implications of coping and high-risk situations for substance abuse relapse during the first few months following substance abuse treatment. He completed his clinical internship at Coastal Horizons Outpatient Substance Abuse Services in Wilmington, NC.

After completion of his Masters degree, Mr. Hagman entered a Ph.D. program in Public Health in 2004 at the University of Medicine and Dentistry of New Jersey, Department of Health Education and Behavioral Sciences. He has been working under the direction of Patrick R. Clifford, Ph.D. for the past five years. Mr. Hagman’s research interests have focused on the accuracy of self-reports for alcohol and other drug use, and mechanisms that underlie treatment protocols for individuals with alcohol use disorders. His career objectives are to pursue an academic job at a university with a focus on teaching and research.
APPENDIX D CURRICULUM VITA

Brett Hagman’s Curriculum Vita

Education

University of North Carolina at Wilmington
Majors: Psychology and Philosophy/Religion (Religion Distinction)
Degree: B.A., Graduated Magna Cum Laude 5/01

University of North Carolina at Wilmington
Major: Clinical Psychology; Specialization in Substance Abuse Treatment
Master Thesis Title: The implications of coping and high-risk situations during a critical
time period for substance abuse relapse
Degree: M.A. 5/04

University of Medicine and Dentistry of New Jersey, School of Public Health
Major: Behavioral Sciences
Current Status: Ph.D. Candidate
Dissertation Title: Alcohol use and risky sexual behavior among problem drinking men
who have sex with men: A comparison of two data collection methods.
Degree: Ph.D. 10/09

Professional Positions

Intake Coordinator, Coastal Horizons Outpatient Substance Abuse Services, Wilmington,

Psychologist Intern, Coastal Horizons Outpatient Substance Abuse Services, Wilmington,

Research Associate, Columbia University Addiction Services and Psychotherapy
InterventionResearch, New York, NY. 2007 to present

Peer-Reviewed Publications

interventions: Testing the feasibility of a purported mechanism of action. Journal of
American College Health, 56 (3), 293-298.

Hagman, B. T. Clifford, P.R., Noel, N.E., Davis, C.M. & Cramond, A.J. (2007). The
utility of collateral informants in substance use research involving college students.
Addictive Behaviors, 32(10), 2317-2323.


