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Predictors of moderated drinking in a primarily alcohol dependent sample of men who have sex with men

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Abstract

Understanding for whom moderated drinking is a viable, achievable, and sustainable goal among those with a range of alcohol use disorders (AUD) remains an important public health question. Despite common acceptance as severe risk factors, there is little empirical evidence to conclude whether co-occurring mental health disorders or drug dependence contribute to an individual's inability to successfully moderate his drinking. Utilizing secondary data analysis, the purpose of this study was to identify predictors of moderation among both treatment seeking and non-treatment seeking, primarily alcohol dependent, problem drinking men who have sex with men (MSM), with an emphasis on the high risk factors psychiatric comorbidity and drug dependence. Problem drinkers (N=187) were assessed, provided feedback about their drinking, given the option to receive brief AUD treatment or change their drinking on their own, and then followed for 15 months. Findings revealed that neither psychiatric comorbidity or drug dependence predicted ability to achieve moderation when controlling for alcohol dependence severity. Those who were younger, more highly educated, and had more mild alcohol dependence were more likely to achieve moderated drinking. Impact of treatment on predictors is explored. Limitations of this study and arenas for future research are discussed.

Keywords

moderation; controlled drinking; co-occurring mental health disorders; alcohol; drug dependence; problem drinkers; alcohol use disorder treatment

Moderated drinking, also known as asymptomatic drinking, controlled drinking, or reduced risk drinking, among individuals with alcohol use disorders (AUDs) has been the subject of much study both within and outside of treatment over the last fifty years (e.g., Armor, Polich, & Stambul, 1978; Davies, 1962; Rosenberg, 1993; Saladin & Santa Ana, 2004; L. C. Sobell, Ellingstad, & Sobell, 2000; Walters, 2000). While operational definitions vary, moderation is considered to be a return from out of control or harmful drinking to within

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safe or safer drinking guidelines (Saladin & Santa Ana, 2004). Understanding for whom moderation is a viable, achievable, and sustainable goal remains an important public health question.

For decades, moderation as a goal among individuals with AUD has been met with controversy (Ambrogne, 2002; Marlatt, Larimer, Baer, & Quigley, 1993), particularly in the United States (Cox, Rosenberg, Hodgins, Macartney, & Maurer, 2004) where the disease model is the dominant perspective of addiction. Despite this controversy, there is recognition of a place for harm reduction and in some cases controlled drinking along a continuum of AUD (el-Guebaly, 2005; Gastfriend, Garbutt, Pettinati, & Forman, 2007). Research generally indicates that moderation is not only possible for a subset of individuals with AUDs, it occurs both within (Saladin & Santa Ana, 2004; Walters, 2000) and outside (L. C. Sobell, et al., 2000) the context of treatment.

While there are no established clinical algorithms for determining for whom moderation is a viable and safe option, there are some widely accepted guidelines for which risk factors may preclude the ability to moderate (Hodgins, 2005; Maisto, Clifford, Stout, & Davis, 2007). Two of the most common risk factors that designate individuals with AUDs as “high risk” and thus unlikely to moderate drinking (i.e., abstinence is recommended) are: (1) a co-occurring mental health disorder, such as depression, and (2) other drug dependence. Difficulty moderating or abstaining in the context of additional mental health disorders is thought to be the result of an overwhelming desire to self-medicate the intolerable negative symptoms of the disorders themselves (Khantzian, 1999), potentially leading to excessive drinking. Additionally, co-morbid other drug use or dependence may intensify craving for alcohol, for example in the case of nicotine dependence (Harrison, Desai, & McKee, 2008; McKee, Falba, O’Malley, Sindelar, & O’Connor, 2007). Other drug use may be closely connected to simultaneous patterns of drinking (Barrett, Darredeau, & Pihl, 2006), and/or interfere with a person’s ability to achieve long term abstinence (Carroll, Rounsaville, & Bryant, 1993).

Despite their common acceptance as severe risk factors, particularly in the abstinence based literature (e.g., Ciraulo, Piechniczek-Buczek, & Iscan, 2003; Pettinati, Pierce, Belden, & Meyers, 1999), there is little empirical evidence to conclude whether co-occurring mental health disorders or drug dependence contribute to an individual’s ability or inability to successfully moderate his drinking. Ample research on predictors of moderation (e.g., Heather & Robertson, 1981; Miller & Munoz, 2005; Rosenberg, 1993) almost entirely excludes participants with these disorders. This is true across study type, regardless of receipt of treatment (L. C. Sobell, et al., 2000). This may be the result of rigid exclusion criteria to increase the rigor of scientific methods (e.g., Carbonari & DiClemente, 2000; Koerke, 2006; Maisto, et al., 2007); however, many studies completely omit mentioning screening for these conditions (e.g., Adamson, Heather, Morton, & Raistrick, 2010; Adamson & Sellman, 2001; Cunningham, 1999; Heather & Dawe, 2005; Humphreys, Moos, & Finney, 1995).

Problem drinking men who have sex with men (MSM) are a particularly important group to consider in terms of identifying feasibility of moderation and its predictors. Although MSM have lower rates of alcohol dependence than the general population, compared to their heterosexual counterparts they are: more likely to experience problems at lower levels of alcohol consumption and more likely to use illicit drugs (Bux, 1996; Mackesy-Amiti, Fendrich, & Johnson, 2009; National Institute on Alcohol Abuse and Alcoholism, 2005). While aggregate evidence suggests there is no elevated risk compared to heterosexual men for developing alcohol problems or alcohol abuse (Bux, 1996, p. 286), MSM are less likely to accept abstinence as a treatment goal (Bux, 1996), thus limiting their willingness to

engage in treatment programs the majority of which are abstinence-based in the United States (Rosenberg & Davis, 1994). This suggests that MSM may require specialized treatments that allow for goal choice to include moderation. Additional risky behaviors and characteristics of some MSM have also been identified as associated with continued problematic drinking and other drug use among subsets of MSM (Harawa et al., 2008). These include temperamental characteristics that are thought to be risk factors for the general population (Kinney, 2006) but may be particularly problematic for MSM given their social milieu, such as tendency for sensation seeking, risky sexual behaviors, difficulty with impulse control, and internalized homophobia (Harawa, et al., 2008; Kalichman, Heckman, & Kelly, 1996; Leigh & Stall, 1993), the last of which could be influenced by level of participation in the gay community.

A previous study called Informed Choices for Men (IC4M, Morgenstern et al., 2007) examined the efficacy of brief interventions for MSM with AUD and HIV risk. Highly strategized recruitment efforts yielded a group of MSM with multiple high risk factors that might otherwise preclude moderate drinking. A majority of the sample was alcohol dependent (88%) and a large proportion (45%) also qualified for other drug dependence (Morgenstern, et al., 2007). Furthermore, 45% reported psychiatric symptoms two standard deviations above the mean on the Brief Symptom Inventory's (BSI) Global Severity Index (GSI, Derogatis, 1993), indicating substantial psychiatric co-morbidity. Almost a third (29.9%) qualified for both high psychiatric distress and an other drug use dependence diagnosis. All participants were assessed and provided feedback about their drinking and other high risk behaviors. Participants could then elect to receive brief AUD treatment or change their drinking on their own. The 45% who elected to receive treatment were then randomly assigned to one of two treatments, each of which lasted 12 weeks: four sessions of Motivational Interviewing (MI) alone or 12 sessions of combined MI plus coping skills training adapted from modified behavioral self control therapy (MI + CBT). All three groups were then followed for 15 months. Results revealed that all groups significantly reduced their drinking to clinically substantial levels within group. Both treatments yielded significantly lower drinks per day than the group that elected to receive no treatment during the posttreatment phase. While those who received MI alone reduced their drinking at a significantly faster rate than those who received MI + CBT during treatment, one year posttreatment outcomes were equivalent between the two treatment groups.

The purpose of this analysis was to identify predictors of moderation among both treatment seeking and non-treatment seeking problem drinking MSM, with an emphasis on the high risk factors psychiatric comorbidity and other drug dependence. To our knowledge, this is the first study to examine these factors as predictors of moderation, which included abstinence, in a problem drinking sample. In addition to these primary predictors, relationships between ability to moderate and other potential risk factors unique to MSM, as listed above, were explored. The authors hypothesized that the presence of a co-morbid mental health disorder, an additional other drug disorder, or the factors listed above unique to MSM would interfere with an individual's ability to moderate his drinking.

Method

A complete discussion of the IC4M study methods are reported elsewhere (Morgenstern, et al., 2007) and reviewed here briefly.

Study Participants

Screening—Recruitment included both passive and active strategies, such as online advertising and community based, in-person outreach. Procedures were designed to sample for problem drinking MSM who were at risk for HIV transmission and in the early stages of

readiness to change their drinking, as measured by the University of Rhode Island Change Assessment (URICA, McConaughy, DiClemente, Prochaska, & Velicer, 1989; McConaughy, Prochaska, & Velicer, 1983). Potential participants interested in the study called into the main project phone line and participated in a brief screening interview.

Eligibility criteria—Formal selection criteria for participants included: (a) a self-reported negative HIV status, (b) having been sexually active with men within the last 3 months, (c) meeting criteria for an alcohol abuse or dependence diagnosis in the previous year (according to the *Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition*, DSM-IV, American Psychiatric Association, 1994), (d) reporting drinking in the last 30 days, (e) having no evidence of thought disorder or cognitive impairment, and (f) being available to participate in the study over the next 15 months (Morgenstern, et al., 2007). Individuals who met criteria for other drug dependence that was more severe than his AUD diagnosis; reported injection drug or crack cocaine use during the last 6 months; or reported currently participating in substance abuse treatment were excluded.

Sample description—One hundred ninety-eight HIV-negative MSM were recruited for the study. Eight of these participants did not have sufficient drinking data for the purposes of these analyses and were excluded. Due to our focus on moderation, we excluded three additional participants who achieved and sustained abstinence from the first month to study end. The final sample size consisted of 187 MSM. While many participants were abstinent for a month or two during the study follow-up period, only 12.3% achieved three consecutive months of abstinence at any one point in the study. In order to have a more conservative estimate of predictors of moderation versus moderation plus periods of abstinence, all analyses were run with the 187 men and again excluding the 23 participants who established three or more consecutive months of abstinent. The findings were equivalent. These results combined with the fact that participants reported having a goal for moderation caused authors to surmise that episodic abstinence in this case may be a part of moderation rather than indicative of an attempt at abstinence that resulted in relapse. Therefore results reported below regarding moderation include those who established abstinence and are yielded from models including all 187 men. This group was descriptively equivalent to the original sample (Morgenstern, et al., 2007), and it is summarized below and in Table 1.

Almost identical to the original sample of 198 men (Morgenstern, et al., 2007), mean age of this sample was 36.2 years; 39.6% were non-Hispanic White, 28.9% were non-Hispanic Black, and 23.5% were Hispanic. The typical participant had completed some college, and median income range was between \$20,000 to \$50,000. A large proportion of participants (40.6%) was employed full time, and almost a fifth (19.3%) was unemployed and looking for work. Eighty-eight percent of the sample satisfied criteria for an alcohol dependence diagnosis, 11% satisfied criteria for alcohol abuse, and 3 individuals did not qualify for either. Sixteen percent had received formal treatment for alcohol in the past, and the mean drinks per drinking day at baseline was 10.4 standard drinks. Almost half (45.0%) of participants satisfied criteria for other drug dependence (Morgenstern et al., 2007). Other baseline characteristics not previously reported but used in the current analysis are presented in Table 1.

Measures

Baseline characteristics—Age, education, employment status, income, and relationship status (self reported in a relationship or not) were obtained from participants through a structured interview procedure.

Alcohol use disorders, severity, and chronicity—Criteria for alcohol use disorders were measured by the substance abuse module of the Composite International Diagnostic Interview (CIDI-SAM, World Health Organization, 1990). The CIDI-SAM has demonstrated adequate reliability and validity (Compton, Cottler, Dorsey, Spitznagel, & Mager, 1996). Two variables were created for the purposes of this analysis from this measure. The first was a dichotomous variable indicating whether or not the participant qualified for current alcohol dependence. The second was a continuous variable, indicating the number of criteria satisfied for alcohol dependence.

Severity of alcohol dependence: Severity of alcohol dependence was measured using the Alcohol Dependence Scale (ADS, Skinner & Allen, 1982). The ADS is a 25 item self report measure of various symptoms and intensity of alcohol dependence. It has demonstrated strong reliability and validity across studies and populations (Kahler, Strong, Hayaki, Ramsey, & Brown, 2003; Skinner & Horn, 1984). Low severity of alcohol dependence, including an absence of withdrawal symptoms, is one of the few consistent predictors of moderation success (Hasin, Paykin, Meydan, & Grant, 2000; Rosenberg, 1993).

Chronicity of drinking: Chronicity of drinking was measured by asking participants “Since the age of 18, how many months have you had three or more days per week where you felt buzzed, high, or intoxicated?” Instructions clarified that in addition to this feeling, they should include the number of months they had five or more drinks in a single day. Number of months reported was then transformed into a continuous variable indicating the number of years individuals had been drinking to effect.

Past treatment for alcohol use disorders: Participants were asked if they had been treated for alcohol abuse in the last three months. Responses were coded as a dichotomous variable.

Other drug use and dependence—Several markers for other drug use were explored as potential predictors of a participant’s ability to moderate his drinking.

Any other drug usage: Participants reported in a structured interview format whether they had used particular drugs in the six months prior to the baseline assessment other than alcohol. Answers to these questions were aggregated to create a dichotomous variable indicating whether a participant had used any other drugs in the six months prior to baseline.

Number of other drugs used: A continuous variable indicating the number of other drugs a participant used in the last six months was calculated.

Other drug dependence: Criteria for other drug use disorders were measured by the CIDI-SAM. Two dichotomous variables were created to indicate whether a participant was dependent on hard or soft drugs in the year prior to baseline. Soft drugs were defined as marijuana or inhalants. Hard drugs included cocaine, opiates, benzodiazepenes, and other drugs. Because of the potentially unique role of nicotine to interfere with reduction in drinking (Harrison, et al., 2008; McKee, et al., 2007), we were interested in understanding the potential influence of smoking. Nicotine dependence was not specifically recorded during data collection; however, there were three variables related to smoking behavior: ever smoked, number of years smoked, and number of days smoked in the 90 days prior to baseline. These were collected using the Form 90 (Miller & Del Boca, 1994), which has demonstrated strong reliability and validity (Tonigan, Miller, & Brown, 1997).

Maximum number of criteria of other drug dependence: Criteria for other drug use disorders were measured by the CIDI-SAM. While many participants met criteria for other

drug dependence in addition to alcohol dependence, a continuous variable indicating the number of other drug dependence criteria met was calculated for the other drug on which the participant was most dependent. Nicotine dependence was not included in this calculation.

Psychological factors

Self efficacy to resist the urge to drink heavily: The Situational Confidence Questionnaire (SCQ-39, Annis & Graham, 1988) was used to assess participants' confidence to resist the urge to drink heavily. For each item in this 39 item scale, participants rate their level of confidence on a six point scale, from zero (not at all confident) to one hundred percent (very confident). For the purposes of this analysis, the response to each item was then summed to produce a total score. Cronbach's alpha for this scale for this study was .964.

Brief Symptom Inventory: The Global Severity Index (GSI), subscale of the Brief Symptom Inventory (BSI, Derogatis, 1993), is a 53 item Likert-type rating scale that measures the degree to which a participant experiences psychiatric symptoms or distress and has demonstrated good reliability. The GSI was used as a raw score that was calculated by summing the scores of all of the items.

Millon Clinical Multiaxial Inventory III (MCMI-III): The MCMI-III (Millon, Millon, & Davis, 1997) is a widely used measure of personality and axis I psychiatric disorders, and it is considered consonant with DSM-IV diagnostic criteria. Subscales indicate the presence and severity of a disorder or specific trait. Overall the construct validity has been demonstrated to be strong (Schoenberg, Dorr, Morgan, & Burke, 2004; Woolley, 2004), and the subscales have demonstrated high reliability (Blais et al., 2003). Predecessors of the MCMI-III have also demonstrated reliability among drug users (Craig & Weinberg, 1992). The MCMI-III was used here only in aggregate form.

Past mental health treatment: Participants were asked about their mental health treatment history, both inpatient and outpatient. From these questions, a dichotomous variable was created to indicate whether a participant ever had mental health treatment.

Risk factors for problem drinking and AUDs—Two additional groups of risk factors that might predict continued problematic drinking were identified: risk factors for developing alcohol dependence and risk factors that may be unique to MSM. Risk factors for developing alcohol dependence included: family history of alcohol or other drug abuse or dependence (Rosenberg, 1993), impulse control, non-sexual sensation seeking, and sexual sensation seeking. Potential risk factors unique to MSM were internalized homophobia and participation in the gay community.

Family history of addiction: Evidence that family history of addiction may be a potential moderator of ability to moderate drinking is mixed (Rosenberg, 1993, p. 134), and it was included here to understand its influence in this sample of men. In order to assess the approximate level of genetic risk for alcohol dependence, participants were asked if they had relatives with an alcohol or drug problem. Primary relatives, parents or siblings, were scored with two points. All other relatives were considered secondary and scored with one point. Points were then summed to create a continuous score indicating level of genetic risk for alcohol dependence.

Impulse control and non-sexual sensation seeking: Two scales were used to capture a participant's tendencies towards impulsivity and non-sexual sensation seeking. Impulsiveness (Eysenck, Pearson, Easting, & Allsopp, 1985) was a 19 item scale used to measure general impulsivity and was adapted from the 19 item scale developed by Eysenck

and colleagues. The original scale was a series of closed questions to which a participant could answer yes or no. For the purpose of this study, the items were rephrased as statements, for which participants were able to answer on a 4-point Likert scale ranging from “Not at all like me” to “Very much like me.” Reliability of this scale for this study was moderate at Cronbach’s Coefficient alpha = .80.

The ten item non-sexual sensation seeking scales was also adapted from a scale developed by Eysenck and colleagues (Kalichman et al., 1994) and was developed specifically for use with MSM. It demonstrated moderate to strong reliability in previous studies (Kalichman & Rompa, 1995). It was scored identically to Impulsiveness— on a 4-point Likert scale indicating how much a statement was “like him.” Reliability of the non-sexual sensation seeking scale for this study was at Cronbach’s Coefficient alpha = .814.

Sexual sensation seeking: The nine item sexual sensation seeking scale (Kalichman, et al., 1994) was developed at the same time as the non-sexual sensation seeking scale specifically for use with MSM, and it also demonstrated moderate to strong reliability in previous studies (Kalichman & Rompa, 1995). Scoring was the same as for the impulsiveness and non-sexual sensation seeking scale. Reliability of this scale for this study was at Cronbach’s Coefficient alpha = .804.

Potential Risk Factors Unique to MSM—Because self-esteem and social stability have previously been identified in some studies as predicting moderation (Humphreys, et al., 1995), we included variables that related to these constructs that are unique to MSM. These are internalized homophobia and participation in the gay community. In addition, internalized homophobia has been associated with problem drinking (Kalichman, et al., 1996).

Internalized homophobia: Internalized homophobia was measured using the Internalized Homophobia Scale (Ross & Rosser, 1996), a valid 26 item scale that yielded four subscales each measuring a distinct dimension of internalized homophobia. For the purpose of this analysis, all items were summed to create one global score for each participant. Reliability was considered acceptable at Cronbach’s Coefficient alpha = .773.

Participation in the gay community: The Participation in the Gay Community (PGC) measure was used to identify a number of activities, organizations, or hobbies directly related to the queer/gay male community with which a participant was involved in the last 6 months (Mills et al., 2001). We used this behavioral count as a proxy for gay community involvement, with higher number of items endorsed indicating greater involvement. Participants could endorse up to 14 activities.

Drinking outcome: Achieved moderation—The Timeline Followback (TLFB, M. B. Sobell et al., 1980) was used to collect data on alcohol use during the 15 month study period. The TLFB is an interviewer assisted, calendar based method that utilizes specific techniques (e.g., memory cues) for participants to recall daily drinking (in standard drink equivalents). The TLFB has demonstrated reliability and validity for recall periods of up to one year (Fals-Stewart et al., 2000). For the present study, alcohol use data were collected for each day from 90 days prior to the date of the baseline assessment up to 15 months after baseline to obtain a continuous record of use across 18 months (Morgenstern et al., 2006). At each assessment, daily data were collected from the date of the previous assessment. Daily data was aggregated into monthly indicators of intensity and frequency of drinking. Baseline drinking was measured as a count of the number of drinking days across the pre-baseline 90-day period.

A primary indicator of moderation was created: NIAAA. Drinks per drinking day and number of standard drinks per week were the two criteria used in combination with one another to determine achieved moderation. In order to explore whether the impact of predictors differed across various levels of moderation, two additional indicators were created: Sanchez et al. and a problem drinking threshold. For each of the three indicators, dichotomous variables were created from TLFB data for each of the three months prior to study entry and for the 15 months during the study to indicate achieved moderation. All three indicators included abstinence and were used as dependent variables.

NIAAA: A proxy for the National Institute for Alcoholism and Alcohol Abuse (NIAAA) low risk drinking was created due to the limited structure of aggregate monthly data. NIAAA guidelines recommend that men drink no more than 14 standard drinks in a week and no more than 5 drinks in any one day (U.S. Department of Health & Human Services, 2005). Our proxy for moderation at this threshold was defined as having 56 or fewer standard drinks *and* no heavy drinking days (6 or more standard drinks) within a month.

Sanchez-Craig et al: Based on empirical evidence from three studies of moderation, Sanchez-Craig and colleagues (1995) proposed alternative guidelines for non-hazardous, moderate drinking. According to their proposed criteria, men also had an upper limit of 4 standard drinks per day, with no more than a total of 16 standard drinks per week. In the current analysis, a participant successfully moderated according to this criteria if he had no more than 4 drinks per day *and* had 64 or fewer standard drinks or under during a month.

Problem drinking threshold: Eligibility criteria for studies on problem drinkers often utilize a liberal threshold to indicate problem drinking that is well beyond the healthy guidelines proposed by NIAAA and Sanchez-Craig and colleagues (e.g., Hester & Delaney, 1997; Sanchez-Craig, et al., 1995; Sitharthan, Kavanagh, & Sayer, 1996), ranging from 112 to 136 drinks or more per month. Therefore an indicator of reduced drinking that was conceivably safer or less problematic but did not fit the widely published health guidelines was created. For this indicator, participants achieved moderation if they had fewer than 6 drinks on any drinking day and no more than 96 standard drinks per month (the equivalent of 24 drinks per week or less).

Receipt of AUD treatment within the study—Two dummy variables were created to determine the effects of MI alone and MI + CBT on moderation. Due to the fact that over the long term, equivalent results were found for MI alone and MI + CBT in the original study, we also created a dichotomous variable that indicated whether or not a participant received any AUD treatment within the study, regardless of assigned condition. All three of these variables were utilized as part of the post-hoc analysis.

Procedures

After obtaining informed consent, eligible participants were scheduled for an intake assessment, during which they completed a battery of measures. All interviewers had extensive experience assessing clients with AUDs. All received intensive training in administering the measures and close supervision by a doctoral level psychologist. After the initial assessment, participants were provided feedback about their drinking and other health behaviors. Participants were then given the option to receive treatment for AUD and HIV prevention or to change their drinking on their own. Eighty-nine participants elected to receive treatment over the course of 12 weeks, and they were randomly assigned to two possible treatments: (a) 4 sessions of MI alone or (b) 12 weekly sessions of MI plus an adapted version of behavioral self control therapy (MI + CBT). Treatment addressed both alcohol use and HIV risk behaviors, and MI + CBT specifically taught moderation

techniques, such as pacing and counting drinks. One hundred nine participants elected not to receive treatment. Groups were found to be equivalent on all demographics, baseline drinking, and other drug indicators (Morgenstern, et al., 2007).

Participants were recruited between 2000 and 2002 and then followed for 15 months (Morgenstern, et al., 2007). All participants received in-person follow-up, structured interviews with a research staff member at 6 weeks and 3 (end of treatment), 9, and 15 months post-baseline. Follow-up retention rates were high at all time points ranging from 86.4% to 96% (Morgenstern, et al., 2007). Assessments lasted anywhere from one to two hours, depending on the particular time point (J. Morgenstern, personal communication, September 19, 2011).

Analytic Plan

Generalized estimating equations (GEE, Liang and Zeger, 1986) were used to analyze the non-normal, longitudinal data for each of the primary dependent variables indicating moderation. GEE is a data analytic technique appropriate for a longitudinal panel design because it is a powerful test that corrects for correlated observations (Stokes et al., 2000). For this analysis, a binomial distribution with logit link function was specified, which provided good model fit for all the dependent variables. In addition, an exchangeable working correlation matrix was specified (Stokes et al., 2000). All analyses were conducted using SAS statistical software program (SAS Institute Inc, 1997).

Predictors of moderation were grouped into five domains for the initial phase of model building: demographics (age, education, employment, income, and relationship status); drinking severity (alcohol dependence diagnosis, number of criteria satisfied for alcohol dependence, ADS sum score, chronicity of drinking, and past AUD treatment); other drug use and dependence (any other drug usage, number of other drugs used, ever smoked in life, number of years smoked, number of days smoked in the 90 days prior to baseline, dependence on soft or hard drugs, maximum number of other drug dependence criteria satisfied); psychological factors (self-efficacy, GSI, past mental health treatment); known risk factors for development of alcohol dependence (family history of addiction, impulsivity, sexual and non-sexual sensation seeking); and predictors unique to the MSM community (internalized homophobia and participation in the gay community). A model predicting moderation was created for each domain.

The first step of model building within each domain was to test for correlational relationships among the potential predictor variables. Then each of the variables was tested as a sole predictor of moderation, without controlling for other predictors. Those attributes found to be marginally significant contributors ($p < .10$) were kept and entered into the domain model. If two highly correlated variables were both significant predictors of moderation, the one with the highest significance in predicting moderation was chosen to enter in the domain model in order to avoid multicollinearity. Once all the significant predictor variables were identified in each domain, they were then entered into the final model along with time. All predictors found to be significant at $p < .05$ in the final model were retained.

All models were originally constructed using the NIAAA definition of moderation as the primary dependent variable. We then tested the final model using the Sanchez-Craig et al. and problem drinking threshold variables and found consistent findings across all three thresholds. Only parameters from the modeling of the NIAAA definition are reported here.

Results

Achieved Moderation across Three Thresholds

Figure 1 shows the proportion of the sample that achieved moderation according to the three *a priori* defined thresholds, all of which included abstinence. As expected, a larger proportion of participants achieved moderation at the problem drinking threshold than the other two thresholds, with fewer than half able to achieve any type of moderation across the 15 months. Utilizing the Sanchez-Craig threshold yielded a much smaller proportion of drinkers who achieved moderation, indicating that heavy drinking defined as 4 or fewer drinks in one day may be a key factor in inhibiting drinkers from achieving moderation. Time was not a significant predictor of moderation.

Predictors of Moderation by Domain

Demographics—Among demographics, age and education emerged as significant predictors, both alone and together in the domain model predicting moderation. Parameter estimates without covariates for each predictor are presented in Table 1. Those who were younger and more highly educated were more likely to achieve moderated drinking across the 15 months.

Alcohol use disorders, severity, and chronicity—Alcohol dependence diagnosis, number of criteria for alcohol dependence, ADS sum score, and chronicity of drinking were significantly correlated with one another, and all were significant as predictors of moderation when entered into the model alone. ADS sum score was chosen to be the marker for severity, as it had the highest significance and the greatest chance of survival in the model as a continuous variable. These results indicated that the lesser the severity, the lesser the chronicity and an absence of an alcohol dependence diagnosis increased the likelihood of achieving moderation. Past AUD treatment was not found to be significant ($p = .2801$).

Other drug use and dependence—Any other drug usage, number of other drugs used, ever smoked in life, lifetime number of years smoked, number of days smoked in the 90 days prior to baseline, dependence on soft drugs, dependence on hard drugs, and the maximum number of dependence criteria satisfied across any other drug were all highly correlated with one another. When entered into the model alone, only dependence on hard drugs emerged as marginally significant at the $p < .10$ level, indicating that those without dependence on hard drugs were more likely to achieve moderation. As such, dependence on hard drugs was entered into the final model.

Psychological factors—Self efficacy to resist heavy drinking, GSI score from the BSI, and receipt of any past mental health treatment were not correlated with one another. Self efficacy was the only variable in this domain that emerged as a significant predictor of moderation when entered into the model alone, indicating that higher self efficacy to resist heavy drinking predicted ability to moderate across the 15 months. Neither GSI score nor receipt of past mental health treatment significantly predicted moderation.

Risk factors for alcohol dependence—Only impulsivity and non-sexual sensation seeking were moderately and significantly correlated with one another. When each of the variables was entered alone into the model, only family history of addiction was predictive of moderation at the $p < .10$ level. This indicated that those with more family members with a history of alcohol or other drug abuse or dependence may be less likely to achieve moderation.

Risk factors potentially unique to MSM—Internalized homophobia and PGC were significantly correlated with one another and both were significant predictors of moderation when entered into the model alone. Greater internalized homophobia and less participation in the gay community predicted an inability to moderate. Due to its greater strength and significance, PGC was chosen to be placed in the final model.

Predictors of Moderation: Final Model

The final model is presented in Table 2. Age, education, and ADS score were the only significant predictors of moderation across the 15 months when controlling for all other predictors. Individuals who were younger, more highly educated (had some college education or graduate school), and scored below the mean on the ADS indicating lower severity of dependence were more likely to moderate at any of the *a priori* defined moderation thresholds.

Post Hoc Analyses

In order to further explore the impact of severity on drinking, baseline frequency of drinking (defined as the number of drinking days out of 90 prior to treatment) was added in as a covariate to the final model. Baseline drinking was found to be a significant predictor ($B = -0.0107$; $SE = 0.0033$; $p = 0.001$) of moderation. All other predictors remained significant.

Due to the lack of findings regarding psychological factors, we explored whether the presence of an axis I or II disorder, as measured by the MCMI-III, would predict moderation. Only 163 participants completed this questionnaire at the 3 month assessment. Two dichotomous variables were created, one for each axis, to indicate whether a participant met criteria for an axis I or axis II disorder respectively. About a quarter (23.7%) of participants had an axis I disorder, while just under a third (27.3%) had an axis II disorder. Having an axis I or II disorder did not predict moderation when entered into the model independently ($p = .5862$). These results suggest that presence or absence of a co-occurring disorder does not impact a participant's ability to achieve moderated drinking.

Because previous literature has found severity of alcohol use to be consistently predictive of moderation primarily in non-treatment or naturalistic studies (Saladin & Santa Ana, 2004), the relationship between the significant predictors of moderation in the context of receiving AUD treatment was examined. First, the two types of treatments were tested separately as predictors of moderation, and neither emerged as significant. Receipt of any treatment also was tested as a moderator of the three significant predictor variables: age, education, and ADS score. For this analysis, each variable was entered into the model independently and with an interaction term that multiplied the predictor by receipt of any treatment. No significant moderation effect of treatment was found. This would suggest that neither electing to have treatment or receipt of treatment among MSM has an impact on ability to achieve moderation at levels recommended as lower risk.

Discussion

This study aimed to identify predictors of moderation (including abstinence) for MSM at three different levels of moderation: NIAAA guidelines, Sanchez-Craig et al. guidelines, and a threshold for problem drinking. Several characteristics were significant predictors of moderation at the $p < .05$ level when entered into the model without additional covariates, including: age, education, alcohol dependence diagnosis, number of criteria satisfied for alcohol dependence, severity of alcohol dependence (ADS score), chronicity of drinking in years, self efficacy to resist heavy drinking, internalized homophobia, and participation in the gay community. The final model yielded three significant predictors of moderation: age,

education, and severity of alcohol dependence. Neither other drug dependence nor any mental health indicators significantly predicted moderation.

To our knowledge, this is the only study to explore psychiatric co-morbidity and drug dependence as predictors of achieved moderated drinking in a context of both treatment and non-treatment seeking individuals with alcohol dependence. Evidence from this study suggests that these factors do not impair the ability to moderate drinking. Predictors of successful moderation among MSM are the same regardless of defined level of moderation: younger age, higher education level, and lower severity of alcohol dependence as measured by the ADS. These findings are consistent with previous studies (Humphreys, et al., 1995; Rosenberg, 1993) of naturally recovered or less severe problem drinkers that indicate that younger age, higher education, and lower severity of alcohol dependence predict moderation.

Relationship between Moderation and Abstinence

Interestingly, while the proportion of individuals who achieved moderation slowly increased across the 15 months, the proportion of those who achieved abstinence increased at a more substantial rate. Due to the fact that the proportion of at-risk drinkers did not decrease dramatically (see Figure 2) and very few individuals sustained abstinence for more than three months at a time, this may indicate that an increasingly greater proportion of individuals who moderated also experimented with abstinence over time. There are a range of possible reasons for this. First, moderation may naturally include periodic abstinence. As drinking is controlled, abstinence may become preferable in some circumstances. Second, the increase in abstinence over time may also be an indicator that moderation is either too difficult to sustain or that moderation has somehow failed. Third, it may be also that participants' goals changed overtime from moderation to abstinence. In this case, it is possible that it is abstinence that has failed and individuals return to moderated drinking periodically. Further research is needed to understand the motivations surrounding the relationship between moderation and abstinence in more detail.

Co-occurring Mental Health Conditions

This analysis examined both psychiatric distress and presence of axis I and II disorders defined by the DSM-IV as predictors of moderation, and neither was found to have an impact on ability to moderate. Results are consistent with the few studies that have examined psychiatric distress in the context of problem drinkers (e.g., Walitzer & Connors, 2007); however, those studies explored the impact of psychiatric distress in populations that had low rates of alcohol dependence and unknown other drug use (Hodgins, 2005). Ability to moderate may not be determined by one's need to ameliorate negative affect. Further research is needed to determine the impact of specific co-occurring disorders in a variety of samples, in addition to determining whether the mental health disorders are primary or secondary to the substance dependence.

Drug Use and Dependence

Hard drug dependence predicted an inability to moderate drinking at a marginally significant level; however, when entered into the final model and controlling for other variables other drug dependence did not feature prominently in predicting ability to moderate drinking over 15 months for MSM. Out of more than 60 articles examining predictors of stable moderated drinking, only two studies examined the impact of co-occurring other drug use (Dawson et al., 2005; Hester & Delaney, 1997). The findings of the present study are consistent with the results of those two studies. Hester and Delaney (1997) examined the efficacy of a computer-based version of behavioral self control therapy with 40 non-alcoholic heavy drinkers. Among this group, 40% had reported using a drug other than nicotine and/or

alcohol in the past three months, of which cannabis and cocaine were the most common. While baseline group comparisons revealed that those who reported using other drugs had a higher frequency of drinking compared to those who reported no other drug use, there was no difference in the two groups' ability to moderate their drinking at one-year posttreatment. Furthermore, investigators discovered that most individuals' other drug use decreased along with alcohol use. As reported earlier (Morgenstern, et al., 2007), other drug use also decreased with alcohol use for the current sample.

The second study utilized data from the National Epidemiologic Survey on Alcohol and Related Conditions (NESARC). Dawson and colleagues (2005) implemented a retrospective study of individuals with prior to past year alcohol dependence and explored their past year recovery status, which ranged from abstinence to still dependent. Just under half (47.5%) of their sample reported any use of illicit drugs and 74% reported ever using tobacco. Results revealed that dependent use of illicit drugs did not significantly impact ability or inability to moderate drinking; however, those who used illicit drugs and were not dependent were significantly more likely to moderate their alcohol use than establish abstinence. The authors suggested belief in one's ability to moderate drinking may be more possible in the absence of other drug dependence.

These studies, in conjunction with the present study, suggest illicit or other drug use when considered with other predictors of moderation does not inhibit a problem drinker's ability to moderate his or her drinking. In addition, at least two studies thus far suggest that alcohol and other drug use decrease concurrently. This is the only study that has examined other drug dependence along with other drug use. While other drug dependence does not appear to impact ability to moderate when controlling for other factors, it is important to again note that those individuals whose dependence on other drugs was more severe than their alcohol dependence were excluded. Thus, in this instance it may be the ADS score, which indicated severity of alcohol dependence, overlapped with aspects of severity of other drug dependence, rendering the variable representing other drug dependence insignificant. Research is needed to: 1) further determine the impact of drug dependence specifically on moderation, and 2) examine what extent this may be true across distinct populations of problem drinkers.

Age and Education

Findings suggest that older age and having received less education (e.g., no college) may be markers of increased vulnerability for problem drinkers who wish to moderate. These attributes have been found to predict moderation in other studies focusing on lower risk problem drinking samples than the one used in this study— both in treatment and natural recovery contexts (Rosenberg, 1993). More advanced age may have a relationship to a longer chronicity of drinking or more entrenched habits and therefore greater difficulty altering drinking patterns. Having less education may relate to being employed in professions that are likely to be associated with heavy drinking (e.g., blue collar workers, Bacharach, Bamberger, Sonnenstuhl, & Vashdi, 2004) or it may prevent individuals from having greater access to information or skills to moderate drinking on their own (Substance Abuse and Mental Health Services Administration, 1996).

Alcohol Dependence Severity

Results from this study demonstrate that single most important factor that predicts successful moderation is having a lower severity of alcohol dependence. This was true regardless of receipt of treatment. This is counter to the findings of previous studies on less severely alcohol dependent samples who received behavioral self control therapy and moderation oriented cue exposure and predictors of moderation (Walters, 2000). Despite the

fact that the mean ADS score for this sample indicated a low level of alcohol dependence, those who scored above the mean were far less likely to achieve moderation, even in the context of treatment. It is important to note that, among this sample of MSM who had a goal of moderation, few were able to do it. More than 50% of the sample remained heavy drinkers at the problem drinking threshold. It may be that due to their social milieu (Bux, 1996), MSM who are alcohol dependent are more vulnerable than other populations, and as such, treatments may not counter the impact of alcohol dependence severity adequately for this population. It is also possible, if not likely, that previous studies that found no impact for severity of alcohol dependence did not utilize a sample with sufficient variability of dependence criteria.

Factors Unique to MSM

While only significant when entered into the model without other covariates, this study found that increased stress of internalized homophobia and lower participation in the gay community impeded participants' ability to moderate. Though the social milieu of the gay and bisexual community may present specific challenges for its members to achieve abstinence and/or moderation (Bux, 1996), greater participation in the gay community appeared to help individuals moderate their drinking. This may indicate that type of interaction with the gay community either facilitates or inhibits moderation. It also may be that community participation is closely connected to internalized homophobia. Greater participation in the gay community may ameliorate internalized homophobia, as increased exposure to peers may normalize and destigmatize the experience of being homosexual. Internalized homophobia is clearly a stressor that can cause negative affect that may need to be medicated by drinking—similar to other mental health disorders. In order to better understand their influence, these characteristics should be included in further investigations of moderation as related to the mental health and well being of lesbian, gay, bisexual individuals.

Role of Treatment in Moderation

The absence of a treatment effect on moderation, either directly or indirectly was surprising, particularly given findings on moderation based treatments that were similar to this treatment (Miller, Leckman, Delaney, & Tinkom, 1992; Miller & Munoz, 2005; Walters, 2000). Behavioral self control therapy is the moderation-based treatment with the most empirical evidence. Still, even in the context of specific moderation based skills, treatment had no impact on ability to moderate at any of the thresholds tested. The original study reported significant reductions in drinking as a result of treatment; however, these reductions, while clinically substantial, were not enough to move the majority of participants into ranges of safer drinking.

Clinical Implications

These findings suggest that clinicians should be aware of age, education, and severity of alcohol dependence when working with individuals who are choosing between moderation and abstinence as a treatment goal. As discussed in previous studies (Miller, et al., 1992), moderation and abstinence may not be stable across time – which may or may not include relapse or a return to out of control drinking. With this in mind, clinicians can educate their clients about the potential outcomes and the various patterns they may take. This may be useful in predetermining thresholds with the client about when to try for moderation or initiate abstinence. Attention to self-efficacy to resist heavy drinking and family history of addiction may also help in the decision-making process, though these are unlikely to predict moderation outcome. Finally, among MSM specifically, clinicians need to pay special attention to internalized homophobia and participation in the gay community. Severely high

internalized homophobia or social isolation from the gay community may put a client at particular risk for inability to moderate.

Limitations

These findings rely exclusively on self-report of drinking and drug use. Prior reviews have concluded that in treatment studies the addition of biological measures or collateral reports do not add substantially to self-report of drinking outcomes (Babor, Steinberg, Anton, & Del Boca, 2000). Factors associated with enhancing the validity of self-report were employed in this study, such as including only participants who had no legal system involvement. Findings comparing non-treatment seeking MSM and those who received treatment are based on quasi-experimental methods and thus are inherently limited. Finally, these analyses are limited by their inability to identify what contextual factors over time may impact variable ability to moderate. Further research is needed to identify and understand the potentially dynamic patterns of problem drinkers who may move from moderation to abstinence and back again over time.

Conclusion

MSM is a problem drinking population that can be considered uniquely vulnerable. Both for this population and for problem drinkers at large, clinicians must be aware of the unique risks of alcohol dependence severity and its ability to impede successful moderation. This further underscores the need for screening of both treatment and non-treatment seeking problem drinkers for symptoms of alcohol dependence in order to enhance prevention and facilitate brief intervention and additional treatment if needed. Clinicians and health care providers must also be mindful of the dynamic aspects of recovery over time, whether the goal is abstinence or moderation. Future research on other populations with co-occurring mental health disorders, other drug dependence, and a higher severity of alcohol dependence is needed to further understand the factors that predict moderation.

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Figure 1.

Proportion achieved moderation and/or abstinence by three definitions of moderation. Each of the definitions includes individuals who achieved abstinence that month. Actual moderation proportion of individuals moderating their active drinking is the difference between abstinence and the respective lines. For those who received treatment, treatment ended at month four.

Figure 2.
Proportion achieved moderation at NIAAA defined level, abstinence, or remained an at-risk drinker (drank more than NIAAA level).

Table 1

Baseline independent predictors of achieving NIAAA moderation by domain (N=187)

Variables by Domain	<i>M</i> (SD) or %	<i>B</i>	<i>SE</i>	<i>P</i>
Demographics				
Age (years)	36.2 (9.4)	-.0361	.0120	<.01
Education ^a	50.3	.2767	.1027	<.01
Employment ^b	40.6			
Income ^c	63.2			
Relationship status ^d	30.4			
Alcohol Use Disorders, Severity and Chronicity				
Alcohol dependence diagnosis	88.0	-.9108	.3364	<.01
Number of criteria satisfied for alcohol dependence	4.86 (1.80)	-.1470	.0600	=.01
Alcohol Dependence Scale score	11.92 (6.54)	-.0621	.0168	<.001
Chronicity of drinking in years ^e	9.71 (7.04)	-.0437	.0199	<.03
Past alcohol use disorder treatment	16.0			
Other Drug Use and Dependence				
Used any drugs in the past six months	67.7			
Number of drugs used in past six months	1.37 (1.4)			
Ever smoked tobacco	77.8			
Number of years smoked tobacco, lifetime	1.1 (1.4)			
Number of days smoked in the last 90 days prior to study entry	33.0 (40.7)			
Dependent on marijuana or inhalants	35.0			
Dependent on hard drugs ^f	22.0	-.4890	.2815	<.10
Maximum number of criteria satisfied for drug dependence	2.34 (2.2)			
Psychological Factors				
Self efficacy to resist heavy drinking	112.3 (41.1)	.0083	.0026	=.001
Brief Symptom Inventory, Global Index	63.7 (14.1)			
Ever had past mental health treatment	38.1			
Risk Factors for Developing Alcohol Dependence				
Family history	3.3 (3.7)	-.0483	.0284	<.10
Impulse control	41.1 (8.3)			
Nonsexual sensation seeking	20.9 (6.0)			
Sexual sensation seeking	22.1 (5.4)			
Risk Factors Potentially Unique to MSM				
Internalized homophobia	73.5 (11.3)	-.0205	.0098	<.05
Participation in gay community	6.6 (2.9)	.0579	.0243	<.05

^aPercent represents proportion who received a bachelor's degree or higher.^bPercent represents proportion who were full time employed.^cPercent represents proportion who earned under \$30,000 annually.^dPercent represents proportion who are in a relationship currently.

^e Mean number of years since age 18 that a participant has had 3 or more days per week drinking to effect or had 5 or more drinks.

^f Hard drugs included opiates, cocaine, benzodiazepenes, and other drugs.

Table 2

Baseline predictors of moderation: Final model

Predictors	B	SE	IRR	95% Confidence Interval for the IRR	P
Age	−0.0441	0.0123	0.957	0.934–0.980	< .001
Education	0.3164	0.1082	1.37	1.11–1.70	< .01
Alcohol Dependence Scale Score	−0.0576	0.0173	0.940	0.912–0.976	< .001