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Prospective Changes in Alcohol Use Among Hazardous Drinkers in the Absence of Treatment

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Abstract

Gaining a better understanding of the natural course of hazardous alcohol consumption could inform the development of brief interventions to encourage self-change. In the current study, hazardous drinkers (based on Alcohol Use Disorders Identification Test score) were recruited using advertisements to participate in a 2-year multi-wave prospective study. Participants ($N = 206$) provided self-reports every six months during the study, including reports of daily alcohol consumption. The current investigation focuses on self-initiated change in participants' frequency of heavy drinking days (i.e., $\geq 5/4$ drinks per day for men/women), as predicted by a number of demographic (e.g., age) and psychosocial (e.g., guilt-proneness) variables. Latent growth curve models of the change in percent heavy drinking days over the 2-year period provided an excellent fit to the observed data and indicated a significant decline in percent heavy drinking days over time. Reductions in heavy drinking frequency were predicted by younger age and higher guilt-proneness. The identification of these predictors of reductions in heavy drinking frequency provides information to guide future work investigating self-change among hazardous drinkers.

Keywords

self-change; hazardous alcohol consumption; heavy drinking; shame; guilt

Public and academic discourse about alcohol consumption tends to focus on the extreme ends of the spectrum – namely, the health benefits of moderate use and the often devastating consequences of severe alcohol dependence. In contrast, relatively less regard is paid to hazardous drinking patterns (with or without associated alcohol dependence), despite the variety of potential consequences that can result from hazardous alcohol consumption. Such consequences can include medical concerns (e.g., liver disease, injuries, various cancers), relationship difficulties, and even death (Centers for Disease Control, 2011). In response to recommendations by the Institute of Medicine (1990) to better accommodate the treatment needs of individuals with varying levels of alcohol problem severity, there has been increasing attention in recent years to hazardous drinking patterns (e.g., Kazemi, Sun, Nies, Dmochowski, & Walford, 2011; Krenke, Maisto, Funderburk, & Drayer, 2011; Mertens, Weisner, Ray, Fireman, & Walsh, 2005; Zamboanga et al., 2009).

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Compelling evidence indicates that hazardous drinkers frequently reduce their drinking without formal help (L. C. Sobell, Cunningham, & Sobell, 1996), and several excellent reviews offer insight concerning self-change among individuals with alcohol and other substance use problems (Carballo et al., 2007; Finfgeld, 1997; Klingemann, Sobell, & Sobell, 2010; Rumpf, Bischof, & John, 2007; Smart, 2007; L. C. Sobell, Ellingstad, & Sobell, 2000; Watson & Sher, 1998). One consistent finding is that self-change is most common among people with less severe levels of alcohol problems, whereas individuals with more severe problems are more likely to enter treatment (Dawson et al., 2005; Smart, 2007). A variety of factors other than problem severity likely contribute to self-initiated reductions in alcohol consumption. For example, prior treatment has been shown to be a strong positive predictor of subsequent use of outpatient services and self-help groups (Freyer et al., 2007). Also, a limited body of research has indicated that women who are hazardous drinkers may be less likely to reduce their drinking to safe levels as compared to men (Booth, Curran, & Han, 2004), and that triggers of self-initiated recovery from alcohol dependence may differ by gender (Bischof, Rumpf, Hapke, Meyer, & John, 2000). Although much useful information can be gleaned from prior research, clinically meaningful decreases in alcohol consumption without formal treatment remain largely unexplained (see L. C. Sobell, 2007).

One potentially fruitful area for investigation is whether shame and/or guilt influence self-change in alcohol consumption among hazardous drinkers. Some research suggests that cognitive appraisals are an important catalyst for change (L. C. Sobell, Sobell, Toneatto, & Leo, 1993). In this regard, it seems likely that self-evaluations may motivate self-change as well. For instance, research has demonstrated that shame and guilt tend to arise in response to cognitive evaluations of one's behavior (Tracy & Robins, 2006). When the evaluation focuses on the *self*, shame tends to arise, whereas when the *situation* is the center of evaluation, guilt is the more likely emotional outcome. The action tendencies associated with shame include hiding or avoiding, whereas the action tendencies associated with guilt tend to be more positive, such as making amends or doing things differently (Tangney, Miller, Flicker, & Barlow, 1996). For example, if negative consequences ensue from one's alcohol use, a guilt-prone person might be likely to think, "I need to quit drinking so much." In contrast, a shame-prone person might be more likely to think, "I'm such a jerk." Individuals who have a guilt-prone style may be inclined to see their hazardous alcohol use as something in their control, and cognitive appraisals eliciting guilt may result in efforts to reduce their consumption. In comparison, individuals who are shame-prone are more likely to feel stuck, hopeless, and unable to change. Thus, shame and guilt may be relevant to changes in alcohol use, but we are unaware of research that has focused on the emotional outcomes of cognitive appraisals in relation to self-change.

Given the potential negative health consequences of heavy alcohol use (Centers for Disease Control, 2011), it is important to develop ways to encourage hazardous drinkers to reduce their alcohol consumption. Gaining greater understanding of self-change could lead to the development of guidelines to help individuals who are seeking to initiate, maximize, and sustain changes in hazardous drinking patterns. Specifically, better characterization of the course of hazardous alcohol use over time could facilitate development of brief interventions to encourage self-change (Hester, 2003; L. C. Sobell et al., 2002) as well as help identify individuals who are in need of more intensive treatment.

In the current study, we were interested in characterizing the natural (i.e., in the absence of treatment) course of alcohol consumption among hazardous drinkers over a two-year period. In particular, we were interested in the degree to which hazardous drinkers reduced their frequency of heavy drinking and whether there were specific characteristics that distinguished those who made changes in their frequency of heavy drinking as compared to

those who continued their heavy drinking at a relatively stable rate. We used the existing self-change literature to guide our selection of predictor variables, but because there is limited information about factors that contribute to self-change, our analyses were largely exploratory. Variables that were of interest included demographic factors (i.e., age, gender, marital status), past self-help meetings and past treatment, objective and perceived problem severity, shame- and guilt-proneness, and intention to change alcohol consumption. It was our goal to characterize gradations of change, rather than discrete transitions related to diagnostic categories or abstinence. In order to have a meaningful metric of change, we chose our primary outcome variable to be consistent with National Institute on Alcohol Abuse and Alcoholism (NIAAA) guidelines for heavy or hazardous drinking (i.e., 5 or more drinks on a given day for men, 4 or more drinks on a given day for women; NIAAA, 2005).

Method

Recruitment and Study Eligibility

Participants responded to newspaper and radio advertisements in Buffalo, NY, recruiting “moderate to heavy drinkers” for a study of alcohol attitudes. In order to limit the study sample to hazardous drinkers, inclusion criteria included “hazardous and harmful alcohol use” based on Babor and colleagues’ (2001, p. 19) recommended screening cutoffs as measured by the Alcohol Use Disorders Identification Test (AUDIT; Saunders, Aasland, Babor, de la Fuente, & Grant, 1993). Specifically, in order to be eligible to enroll in the study, participants were required to have an AUDIT score of 8 or above for men 65 and under, 7 or above for men over 65, and 7 or above for women. Participants were not seeking treatment and were not recruited based on a desire to change their alcohol use. Additional criteria for enrollment were that participants had to be over 18 years of age and not in alcohol or drug treatment (including self-help meetings) in the past year. Interested individuals were excluded from participation if they demonstrated evidence of severe cognitive impairment (score below 23 on the Mini-Mental State Examination [MMSE]; Folstein, Folstein, & McHugh, 1975) or symptoms of an active psychotic disorder or current mood disorder with psychotic features (based on the Psychotic Disorders Module of the Mini International Neuropsychiatric Interview [M.I.N.I.]; Sheehan et al., 1998).

General Procedures

Respondents completed a preliminary screening by phone ($n = 495$). Individuals who were over 18, scored sufficiently high on the AUDIT, and reported no past year treatment ($n = 340$) were invited for an in-person screening at the Research Institute. A total of 263 interested individuals completed the in-person screening, which included reassessment of the phone eligibility criteria, plus evaluation for evidence of cognitive impairment and psychotic symptoms. Twenty-two participants were excluded based on reassessment of telephone eligibility criteria, two were referred for treatment (and thus excluded), one was excluded for cognitive impairment, twelve were excluded due to psychotic symptoms, and two were excluded for evidence of both cognitive impairment and psychotic symptoms. Excluded individuals ($n = 39$) were paid \$20 for participating in the 30-minute screening appointment. Eligible individuals ($n = 224$) remained at the Research Institute and were reimbursed \$50 for participation in the baseline assessment, which lasted approximately 2 additional hours. Sixteen individuals were later determined to be invalid (most often based on subsequent discovery of information that would have disqualified participant, including inconsistent reporting, clinical judgment by the research staff concerning participants’ ability to understand or cooperate with the study tasks, or provision of treatment referral after collection of baseline data), and were excluded from subsequent data analyses. Final enrollment included valid data for 208 participants. At subsequent waves of data collection (i.e., 6-months, 12-months, 18-months, and 24-months), study materials were mailed to

participants; participants were reimbursed \$50 for each returned packet, plus a \$50 bonus for completing all five assessment waves.

Of the 208 participants who provided baseline data there were some missing data at each wave of assessment. One hundred forty one participants completed all assessment waves. Patterns of missing follow-up data were as follows: completed only the baseline assessment ($n = 23$), completed only the 6-month follow-up ($n = 10$); completed only the 6- and 12-month follow-ups ($n = 5$); and completed only the 6-, 12-, and 18-month follow-ups ($n = 4$). Twenty three participants had other patterns of participation (i.e., missing one or more follow-ups and later returning to the study). In most cases when participants returned to the study after a missed follow-up, help-seeking information was obtained back to the most recent assessment (which reduced the amount of missing data for the help-seeking variables). Two participants (<1%) were missing data on three of the baseline covariate predictors described below and these two individuals were removed from the analyses. Other missing data (not related to attrition), such as missing timeline data at one follow-up wave, applied to 5 participants.

Study procedures were approved by the University at Buffalo Social and Behavioral Sciences Institutional Review Board and all participants provided informed consent. Participants were asked whether they were alcohol free at the time of the telephone screening and breath alcohol assessment was conducted at the beginning of the in-person screening interview. Participants who reported or registered positive alcohol levels were rescheduled (only one eligible participant was rescheduled for this reason). As part of the informed consent process, participants were given a general description of the purpose of the study (i.e., to learn more about alcohol use and beliefs about alcohol problems). Although treatment participation was assessed at all waves of the study, participants were not told that help-seeking events were of particular interest as an outcome. Participants remained eligible for study participation (and associated remuneration) regardless of reports at any given time about receipt of formal or informal help related to their drinking.

Participant Characteristics

Participants' average age when entering the study was 36.1 ($SD = 12.4$) and 52.4% of participants were men. The sample was racially diverse: 68.4% of participants were White/Caucasian; 26.7% were Black/African American; and 4.9% were Asian, Middle Eastern, Native American or "other" race. Seven participants (3.4%) reported Hispanic or Latino ethnicity (4 White/Caucasian; 1 Black/African American; 2 other race). Participants' reported marital status was as follows: 51.9% of participants were single or never married; 21.6% were married; 6.7% were cohabiting; and 19.5% were separated, widowed, or divorced. Approximately sixty percent of participants were employed full (37.4%) or part time (22.8%). Most participants had completed high school (90.7%), with many having completed education beyond high school (62.7%). Twenty-two percent of participants had completed a bachelor's degree or above.

Of the 206 participants in the current analyses, 138 (67.0%) did not report a history of any prior help seeking related to an alcohol problem (help seeking included inpatient or outpatient alcohol treatment, professional help from a counselor, physician, or emergency department, and self-help meetings including internet groups), and 176 (85.4%) did not report a history of prior alcohol-related inpatient or outpatient treatment. Of those who had been in treatment, 5 had been in inpatient treatment, 17 had been in outpatient treatment, and 8 had been in both inpatient and outpatient treatment. Aside from prior inpatient or outpatient alcohol treatment, 37 participants (18.0%) had attended AA or other self-help groups in the past related to their drinking, 16 participants (7.8%) had received help from a mental health counselor, 16 participants (7.8%) had received help from a primary care

physician, 12 participants (5.8%) had sought help in an emergency department, and 10 (4.9%) had received detoxification services. Treatment history data were incomplete for 8 participants; when missing, prior treatment (or self-help) was coded to indicate no past treatment (to be consistent with the majority of participants).¹ Per eligibility requirements, any treatment or self-help meetings took place at least 1 year before entering the study; for most participants, the most recent treatment episode or self-help meeting was several years prior to study enrollment.

Measures

Although most measures (described below) were administered at all assessment waves (i.e., baseline, 6-months, 12-months, 18-months, and 24-months), the longitudinal variable of interest was alcohol consumption (i.e., percent heavy drinking days). Other variables were used as baseline covariates (i.e., demographic factors, prior treatment and attendance at self-help meetings, actual and perceived problem severity, shame, guilt, and intention to change). Diagnosis was used to characterize the sample, and post-baseline help-seeking behaviors were used to determine whether to retain participants' data in the analyses (see Exclusion of Data for Treatment Seekers).

Diagnostic assessment—During the baseline assessment, participants completed the Alcohol Abuse and Dependence and Substance Abuse and Dependence sections of the Computerized Diagnostic Interview Schedule for DSM-IV (CDIS; Robins et al., 2000; Robins et al., 1988). Half of participants (50.0%) met criteria for an Alcohol Use Disorder (AUD) as indicated by the Diagnostic and Statistical Manual of Mental Disorders, Version IV (DSM-IV; American Psychiatric Association, 1994); 11 participants met criteria for Alcohol Abuse only, and 92 met criteria for Alcohol Dependence (of these 92, 42 met both abuse and dependence criteria). The remaining 103 participants did not meet criteria for abuse or dependence. Preliminary analyses demonstrated that having an alcohol or other substance abuse or dependence diagnosis was unrelated to change in heavy drinking over time.

Alcohol consumption—The Timeline Follow-back (TLFB; L. C. Sobell & Sobell, 1992, 1996) was used to obtain participants' daily drinking information (based on standard drink equivalents). At the baseline appointment, the TLFB was administered as an interview covering the six months prior to recruitment. At subsequent assessments, participants provided daily drinking information for the time since the last assessment (approximately 6 months prior) using calendars filled out at home and returned by mail. Calendars were filled out retrospectively when the 6-month follow-up was due, not as daily self-monitoring. The TLFB has been used in numerous settings to collect information about daily alcohol use and it has been used successfully in other studies to collect alcohol use data via mailed surveys (L. C. Sobell et al., 2002). TLFB data were used to compute a summary variable indicative of percent heavy drinking days (i.e., 5 drinks per day for men, 4 drinks per day for women).

Help seeking—At each assessment, participants were asked a series of detailed questions about their history of alcohol-related services including detoxification, treatment (i.e., inpatient, outpatient), and self-help groups. A representative question was “Not counting detox, have you ever been in inpatient treatment to help you stop or reduce your drinking?”

¹All models were estimated with and without prior treatment coded as no past treatment among those with incomplete treatment history. The primary results were not changed by the inclusion (treatment history = 0) or exclusion (treatment history = missing) of treatment history from these eight individuals, thus we retained the eight participants as treatment history = 0 in order to include these participants in the sample.

(Inpatient treatment would include any alcohol-related treatment where you were required to stay at a hospital or treatment center overnight for the duration of treatment.)” Response options were “yes” or “no,” and in instances of a positive response, participants answered follow-up questions about number of times this type of service had been used and most recent time (month/year). Participants were also asked whether they had ever sought help related to their drinking from a list of possible sources (e.g., mental health counselor, emergency room or urgent care center, primary physician). For each source, participants were asked number of times help was sought and most recent time (month/year). Wording of questions at baseline referred to lifetime history; at the follow-up assessments, the questions referred to help sought within the past 6 months.

Problem severity—Alcohol-related problem severity was based on the total 25-item score from the Alcohol Dependence Scale (ADS; Skinner & Horn, 1984) as reported at the baseline assessment. The ADS measures dependence symptoms, such as symptoms of withdrawal, tolerance, drink-seeking behaviors, and failure to control alcohol use. Mean ADS score in this sample was 10.2 ($SD = 6.2$); internal consistency reliability was $\alpha = .83$. Based on ADS score, 95% of participants were in the lower 50th percentile for dependence symptoms, suggesting a low to moderate level of alcohol dependence (Skinner & Horn, 1984).

Perceived problem severity—Participants’ perceptions of alcohol-related problem severity were based on the perceived problem severity subscale of the Treatment Attitude Profile (TAP; Neff & Zule, 2000) as reported at the baseline assessment. For the purposes of this study, the wording of the measure was modified from the original to reflect treatment for alcohol problems, rather than drug problems. Internal consistency reliability for the 7-item perceived problem severity subscale in the current study was $\alpha = .85$.

Shame-proneness and guilt-proneness—The Test of Self-Conscious Affect, Version 3 (TOSCA-3; Tangney, Dearing, Wagner, & Gramzow, 2000) was used to measure participants’ propensity to experience shame and guilt (i.e., shame-proneness and guilt-proneness) at baseline assessment. The TOSCA-3 is a psychometrically sound instrument (see Tangney & Dearing, 2002) that uses 16 scenarios depicting situations that commonly elicit shame and/or guilt. Previous research has shown shame-proneness and guilt-proneness to be relatively stable traits; two-year test-retest correlations among adults were .65 to .71 for shame and .49 to .53 for guilt (Tangney & Dearing, 2002). Internal consistency reliability estimates in the current study were $\alpha = .72$ (shame-proneness) and $\alpha = .76$ (guilt-proneness). Because shame and guilt frequently arise concurrently (see Tangney & Dearing, 2002), it is important to account for collinearity (i.e., $r = .44$ in the current study) by including both scales in any analyses, allowing for interpretation of their unique effects.

Intent to change—Participants were asked the likelihood that they would change their drinking using a single item question: “What is the likelihood that you might significantly reduce the amount that you drink, without the help of treatment, in the next two years? When we say ‘significantly reduce,’ we mean a reduction in drinking that you would consider to be a meaningful change.” The response options ranged from 1 (*not at all likely*) to 4 (*very likely*). Intent to change for the current analyses was based on participants’ responses at the baseline assessment.

Data Analysis

Exclusion of Data for Treatment Seekers

Because we sought to examine the course of drinking in the absence of treatment, for participants who indicated any formal help-seeking attempts during the 24-months of data collection ($n = 29$, 14.1%), their data were eliminated from that point forward. Formal help was defined as inpatient or outpatient treatment for alcohol-related problems, formal alcohol detoxification, treatment from a mental health professional for alcohol-related problems, alcohol-related emergency room or primary care visits, and attendance at Alcoholics Anonymous or other self-help meetings focused on alcohol or other substance use. Using these criteria, data were excluded for 14 participants beginning with the 6-month assessment, 4 participants beginning with the 12-month assessment, 7 participants beginning with the 18-month assessment, and 4 participants at the 24-month assessment. Data prior to their help-seeking attempts were kept for these 29 participants in order to maximize the amount of data available for analysis; the overall model results, described below, are provided with help-seeking participants included in the model until the time of help seeking. Model results without help-seeking participants included at any time are summarized in footnotes and full model results are available from the authors.

We conducted analyses to assess for baseline differences between participants who sought help during the study ($n=29$) and those who did not ($n = 151$) or who were missing data on the help-seeking variables ($n = 26$; individuals with missing help-seeking data were assumed not to have sought help). Help seekers and non help seekers were not statistically different on any of the demographic measures (including age, years of education, gender, income, marital status, and ethnicity), but were significantly different on several baseline measures used in the current analyses. Individuals who did not seek help, in comparison to those who did seek help, reported significantly fewer alcohol dependence symptoms on the ADS ($t(178) = -4.33$, $p < 0.001$; non help-seeking Mean (SD) = 9.37 (5.53); help-seeking Mean (SD) = 14.55 (7.60)), lower perceived drinking severity ($t(178) = -5.02$, $p < 0.001$; non help-seeking Mean (SD) = 2.16 (0.75); help-seeking Mean (SD) = 2.93 (0.81)), and less intention to change their drinking behavior ($t(178) = -2.60$, $p = 0.01$; non help-seeking Mean (SD) = 2.54 (0.77); help-seeking Mean (SD) = 2.94 (0.63)). Those who did not seek help were not significantly different from those who did seek help on prior treatment attendance, shame-proneness, guilt-proneness, or percent heavy drinking days at baseline.

Data Analytic Plan

Analyses were conducted to test a series of latent growth curve models using Mplus version 6.1 (Muthén & Muthén, 2010). These latent growth curve models were used to estimate the inter- and intra-individual change in percent heavy drinking days over time. The parameters derived from a latent growth model provide information about a construct's average level (mean intercept) and average change over time (mean slope), as well as the individual variance around the intercept and slope. First, an unconditional model of percent heavy drinking days was estimated without covariates using a systematic process of model testing whereby an intercept-only model was compared to increasingly complex functional forms (e.g., linear slope, linear and quadratic slope, nonlinear slope). Second, the conditional model incorporated demographic factors (age, gender, marital status), prior attendance at self-help meetings and other prior treatment history (inpatient or outpatient alcohol-related treatment), problem severity (actual and perceived), propensity to experience shame and guilt, and intention to change as covariate predictors of the latent growth factors.

All models were estimated using maximum likelihood estimation. Maximum likelihood provides the estimated variance-covariance matrix for the available data and is a preferred

method for estimation when some data are missing, assuming the data are missing at random (Schafer & Graham, 2002). Attrition analyses revealed no significant differences on any baseline study variables between those with missing data and those with complete data. Likewise, all model results presented below were consistent whether including or excluding those with incomplete data. Model fit of all models was evaluated using χ^2 values, the Root Mean Square Error of Approximation (RMSEA; Browne & Cudeck, 1993), and the Comparative Fit Index (CFI; Bentler, 1990). Models with non-significant χ^2 , RMSEA less than 0.06, and CFI greater than 0.95 were considered a good fit to the observed data (Hu & Bentler, 1999).

Results

Descriptive statistics (means, standard deviations, percentages) and correlations for percent heavy drinking days and all covariates are provided in Table 1. At all assessment points (baseline through 24 months), more frequent heavy drinking was significantly associated with being older, being married, having prior self-help or other treatment (except baseline heavy drinking with past treatment), higher levels of alcohol dependence (as measured by the ADS), and lower self-reported shame.

Latent Growth Models

Unconditional Model—The unconditional latent growth model of percent heavy drinking days over time during the two years following the baseline assessment provided an excellent fit to the data ($\chi^2 (6) = 10.01, p = 0.12$, RMSEA = 0.057, CFI = 0.99). The average intercept was 0.58 ($SE = 0.02$) with a significant average reduction in percent heavy drinking days over time (linear slope: $\beta = -0.58$, $B (SE) = -0.06 (0.10)$, $p < 0.001$) and a significant acceleration in the rate of change over time (quadratic slope: $\beta = 0.24$, $B (SE) = 0.01 (0.003)$, $p = 0.04$).² The variances of all three growth factors were significant, indicating significant individual variability around the average intercept (Variance (SE) = 0.05 (0.007), $p < 0.001$), linear slope (Variance (SE) = 0.01, (0.004), $p < 0.001$), and quadratic slope (Variance (SE) = 0.001 (0.0001), $p = 0.004$).

Conditional Model—The unconditional latent growth curve model described above was then re-estimated with the covariates incorporated as predictors of the growth factors. This conditional model also provided an excellent fit to the observed data ($\chi^2 (26) = 33.56, p = 0.15$, RMSEA = 0.037 (90% CI: 0.00, 0.070), CFI = 0.99). Overall, the covariates explained 30.1% of the variance in the intercept, 19.0% of the variance in the linear slope, and 14.4% of the variance in the quadratic slope.³ The intercept was significantly associated with age ($\beta = 0.19$, $B (SE) = 0.003 (0.001)$, $p = 0.01$), history of self-help group attendance ($\beta = 0.16$, $B (SE) = 0.001 (0.0001)$, $p = 0.02$), and alcohol dependence severity ($\beta = 0.31$, $B (SE) = 0.01 (0.003)$, $p < 0.001$). Age predicted the linear slope ($\beta = -0.33$, $B (SE) = -0.003 (0.001)$, $p = 0.01$), and both age and guilt-proneness were each predictors of the quadratic slope (age:

²The unconditional model without help-seekers included in the model ($n = 177$) also provided an excellent fit to the observed data ($\chi^2 (6) = 9.81, p = 0.13$, RMSEA = 0.060 (90% CI: 0.00, 0.124), CFI = 0.99). The average intercept was 0.57 ($SE = 0.02$) with a significant average reduction in percent heavy drinking days over time (linear slope: $\beta = -0.54$, $B (SE) = -0.06 (0.10)$, $p < 0.001$) and a significant acceleration in the rate of change over time (quadratic slope: $\beta = 0.23$, $B (SE) = 0.01 (0.003)$, $p = 0.04$).

³The conditional model without help-seekers included in the model ($n = 177$) also provided an excellent fit to the observed data ($\chi^2 (26) = 32.80, p = 0.15$, RMSEA = 0.038 (90% CI: 0.00, 0.074), CFI = 0.99). Overall, the covariates explained 30.7% of the variance in the intercept, 23.7% of the variance in the linear slope, and 16.3% of the variance in the quadratic slope. Age significantly predicted the intercept ($\beta = .20$), linear slope ($\beta = -.35$), and quadratic slope ($\beta = .30$). Alcohol dependence severity and perceived severity significantly predicted in the intercept (ADS: $\beta = .33$; perceived severity: $\beta = .18$), whereas the association between history of self-help group attendance and intercept was no longer significant ($\beta = .14, p = .07$). Guilt was still associated with the quadratic slope ($\beta = -.24$).

$\beta = 0.28$, $B (SE) = 0.001 (0.0001)$, $p = 0.02$; guilt: $\beta = -0.26$, $B (SE) = -0.012 (0.006)$, $p = 0.049$).

To examine the covariate effects on linear and quadratic change over time we estimated additional latent growth curve models of percent heavy drinking days using high (greater than one standard deviation above the mean) and low (greater than one standard deviation below the mean) values of age and guilt-proneness as grouping variables in separate models.

⁴ This procedure is analogous to using simple slopes to examine an interaction effect at high and low levels of a moderator (Aiken & West, 1991). As seen in Figure 1a, relatively older individuals (i.e., those who were older than 48 years old, equivalent to one standard deviation above the mean age of 36) drank heavily more frequently at baseline and evinced less change in percent heavy drinking days over time, in comparison to relatively younger individuals (i.e., those who were 24 or younger). As seen in Figure 1b, individuals with lower guilt-proneness at baseline reported more frequent heavy drinking at baseline and only a slight change in percent heavy drinking days over time, in comparison to those with higher levels of guilt-proneness who reported less frequent heavy drinking at baseline and a greater decrease in frequent heavy drinking over time.

Additional analyses were conducted using a variety of baseline predictors (i.e., comorbid drug use diagnosis, psychiatric functioning, general health, social functioning, emotional well-being). These measures were not significantly associated with change in percent heavy drinking days over time. Furthermore, general health, social functioning, emotional well-being, as well as employment and marital status were tested as time-varying predictors, but these variables did not contribute to outcome in a meaningful way. Finally, *changes* in marital and employment status over the two years of the study were unrelated to changes in heavy drinking. These supplemental analyses did not result in substantial changes to our general findings (using the initially tested predictors as reported above) and did not enhance prediction of changes in heavy drinking in a meaningful way. We therefore do not present detailed results concerning these analyses.

Discussion

In the present study we sought to characterize the short-term course of heavy drinking among hazardous drinkers, as well as to explore predictors of changes in heavy drinking among individuals who did not seek any form of help for their drinking. Perhaps the most meaningful finding from the current analyses was the steady decrease in heavy drinking days over time among participants. This reduction in heavy drinking does not appear to be a random short-term fluctuation; instead, mean heavy drinking days declined steadily over the two-year period. More specifically, mean heavy drinking days were reduced from approximately 12 days per month to approximately 8 days per month over the 2-year period. This pattern of results is consistent with other studies showing decreases in alcohol consumption over time among hazardous drinkers (e.g., Booth et al., 2004; Delucchi, Matzger, & Weisner, 2004). Collectively, these studies provide hopeful evidence for self-initiated reductions of hazardous drinking patterns.

Results of our main analyses were consistent with prior research in demonstrating that lower levels of problem severity were associated with self-change in hazardous consumption. Furthermore, individuals who were eliminated from further analysis at the point of seeking help (during the study) demonstrated higher levels of baseline severity than individuals who did not receive help during the study. Both of these findings regarding severity reflect the

⁴Age and guilt-proneness were maintained as continuous in all conditional analyses reported above and were only categorized to examine the interactions in a multiple group analysis.

general idea that individuals with greater alcohol problems are more likely to enter treatment, whereas individuals at lower levels of severity are more likely to change without formal assistance (see Smart, 2007).

The fact that younger hazardous drinkers were more likely than older drinkers to reduce their alcohol consumption over the course of the study is consistent with the phenomenon of aging out (or maturing out) of hazardous alcohol use (e.g., Cunningham, Blomqvist, Koski-Jannes, & Cordingley, 2005; O'Malley, 2004). Although some research suggests that aging out may occur as a result of life changes (e.g., marriage, becoming a parent; Bachman et al., 2002; Cunningham et al., 2005) rather than by deliberate decisions regarding alcohol consumption, additional research is needed to investigate the degree to which purposeful self-change plays a role. With regard to older age, our findings suggest that older hazardous drinkers may be less likely than younger drinkers to change outside the context of treatment.

We were interested in exploring whether guilt- and shame-proneness had any bearing on reductions in heavy alcohol consumption. Guilt-proneness tends to be an adaptive trait (see Tangney & Dearing, 2002), and findings from the current study demonstrated that higher levels of guilt-proneness were associated with greater changes in heavy drinking over time. It seems plausible that feelings of guilt with regard to one's drinking serve as motivation for reductions in alcohol consumption; investigation of guilt specific to drinking behavior may prove a promising area for future research. Findings related to shame are a bit more puzzling. Prior research has consistently shown that shame is linked to a multitude of problematic behaviors (Tangney & Dearing, 2002), including alcohol-related problems (Dearing, Stuewig, & Tangney, 2005). However, although not a significant predictor in the overall model, in the bivariate correlations greater shame-proneness was associated with *fewer* heavy drinking days at baseline and was unrelated to baseline dependence severity and perceived severity. Because these findings run counter to previous research, shame-proneness among hazardous drinkers warrants additional study.

Limitations and Strengths

As in all research, there are limitations associated with the current investigation. Perhaps most important is that findings are based on the reports of hazardous drinkers who responded to advertisements seeking "moderate to heavy" drinkers. It is not known whether participants who reply to advertisements are representative of other individuals who consume alcohol at similar levels. It is possible that expressing interest in the study was indicative that participants were aware that their alcohol consumption was hazardous. Perhaps their interest in the study suggested a greater intention, as compared to others who consume at similar levels, to reduce alcohol consumption in the near future. Thus, we are unable to make definitive conclusions about whether rates of change in heavy drinking among our participants are fully representative of rates of change among hazardous drinkers more generally.

Importantly, we were particularly interested in understanding the rates of self-initiated change among hazardous drinkers over the two year period. This research question led to complicated decisions related to whether we should include or exclude individuals who reported seeking help during the two-year period. In order to maximize the amount of data available and provide the most externally valid analysis of self-change among non help seekers we decided to include help seekers in the growth models until they reported seeking help. In order to assess the degree to which this decision influenced the results we estimated all growth models with those who eventually sought help included until the time of help seeking (as reported in the Results section) and without help seekers included at all (as reported in the Footnotes 2 and 3). Results of the unconditional and conditional models were consistent regardless of whether we included or excluded help seekers in the models with

only one small exception. In the models without help seekers the association between prior history of self-help meeting attendance was no longer significantly associated with the intercept of percent heavy drinking days, although the standardized coefficients were similar ($\beta = .16$ with help seekers and $\beta = .14$ without help seekers). The loss of power by excluding individuals who sought help could explain this non-significant finding in the growth models.

Participation in a study involving collection of detailed information about alcohol consumption (in this case, reporting of daily drinking data over a two-year period) may lead participants to be more aware of their drinking. In the current study, steps were taken to minimize reactivity (e.g., interspersing measures of other constructs among the alcohol-related measures, not providing feedback or advice to participants concerning their drinking). Nonetheless, it remains possible that involvement in the study resulted in reduced alcohol consumption for some participants. Furthermore, regression to the mean may have been a factor.

Some researchers have argued that behavior change should not be characterized as true self-change if the individual has engaged in prior treatment (e.g., L. C. Sobell, 2007). Although we acknowledge that inclusion of participants with a past treatment history may not reflect the purest form of self-change, most of our participants (67.0%) did not have a history of any type of previous alcohol-specific intervention and for those who did, their treatment concluded at least one year prior to entering the study. For our participants who had a history of prior treatment, we acknowledge that their prior treatment experiences are likely to have influenced drinking behavior and self-change efforts. We propose that studying individuals with differing histories makes it more likely that these data are generalizable to the range of people who may attempt self-initiated changes in their drinking.

Because our data cover only a two-year time frame, the reported findings do not answer questions about whether change is sustained over time, but instead offer a snapshot of changes that may be transient. Furthermore, it is rarely possible to include all variables that may be relevant to the outcome of interest, and the current study is no exception. For example, it would be beneficial to investigate the role of family and social functioning (e.g., social pressure to change and social support for abstinence), as well as post-baseline alcohol-related consequences, on changes in alcohol use over time. Nonetheless, we were able to demonstrate robust prediction of the changes that occurred over the course of the 2-year study using only a small number of predictors.

The study had a number of strengths that will allow the current findings to make a meaningful contribution to the existing literature and will inform future work concerning self-change in hazardous alcohol consumption. The longitudinal nature of the research allowed for collection of data in close temporal proximity to changes in drinking and lessened recall bias that can occur with longer term retrospective reporting. Recruitment of hazardous drinkers allowed us to look at individuals who continued to drink at hazardous levels alongside those who self-initiated changes in alcohol consumption. Finally, the current study did not require self-acknowledgement of drinking status (e.g., problem drinker), other than being a “moderate to heavy drinker.” This allowed us to study change independent of self-insight or potentially stigmatizing self-identification as having an alcohol problem.

An additional strength of the current study is that we did not place arbitrary constraints on improvement (e.g., “full recovery,” abstinence) but instead looked at reduction in heavy drinking days. Heavy drinking days have been identified as the standard for hazardous use (National Institute on Alcohol Abuse and Alcoholism, 2005), thus providing a specific and useful metric. Similarly, we did not limit our sample to individuals with alcohol use

disorders, rather, we included any individuals who were identified as having a hazardous drinking pattern (and may or may not have been dependent). This allowed for better characterization of an understudied population of hazardous drinkers—those with unsafe consumption patterns, but who are not severely dependent.

Future Directions and Conclusions

Our findings indicate that individuals who are lower in guilt-proneness may have a more difficult time reducing their alcohol consumption. Thus when working in clinical settings, it might be beneficial to have a sense of clients' propensity to experience guilt. Although there are a variety of indicators that clinicians can watch for when clients are experiencing shame (see Dearing & Tangney, 2011; Tangney & Dearing, 2002), indicators of guilt are more difficult to identify (Keltner & Buswell, 1996). Based on amassed research concerning behaviors associated with guilt-proneness (Tangney & Dearing, 2002), it is likely that guilt-proneness could be assessed based on clients' verbal indicators of such behaviors, such as expressions of regret, remorse, empathy for victims of one's wrongdoing, and the desire to make amends. The absence of such indicators could be cause for concern in terms of recovery.

There have been increasing efforts to identify hazardous drinking patterns among patients in primary care and emergency room settings (e.g., Cherpitel, 1995; Krenke et al., 2011; Mertens et al., 2005) and among college students (e.g., Kazemi et al., 2011; Zamboanga et al., 2009). In the context of these types of screenings, it would be beneficial to be able to identify those individuals who would be good candidates for brief interventions, such as guided self-change strategies (M. B. Sobell & Sobell, 2005) or self-directed behavioral self-control training (Hester, 2003). For example, our results suggest that individuals with lower levels of severity and younger people may have better success reducing drinking outside the context of treatment. Hazardous drinkers who do not show promise for successful self-change could be encouraged to consider more formal treatment options. Although methodologically complicated, future research should include systematic comparison of drinking outcomes of individuals who receive treatment with those who change on their own. A few studies have attempted this approach (e.g., Weisner, Matzger, & Kaskutas, 2003), but more research is needed to form a sound basis to substantiate or refute the assumption that the best course of action for hazardous drinkers is formal treatment.

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Figure 1a.

Figure 1b.

Figure 1.

Figure 1a. Change in percent heavy drinking days by age groups (“older” age = at least one standard deviation above the mean on age, $n = 37$; “younger” = one standard deviation below the mean or younger on age, $n = 45$).

Figure 1b. Change in percent heavy drinking days by guilt groups (“high guilt” = at least one standard deviation above the mean on the TOSCA Guilt scale, $n = 54$; “low guilt” = one standard deviation below the mean or lower on TOSCA Guilt scale, $n = 37$).

Table 1

Correlations and Descriptive Statistics for Study Variables

Variables	1	2	3	4	5	6	7	8	9	10	11	12	13	14	Mean (SD)/%
1. PHD 0-mo.	1.00														0.39 (0.29)
2. PHD 6-mo.	.76*	1.00													0.33 (0.26)
3. PHD 12-mo.	.73*	.80*	1.00												0.30 (0.28)
4. PHD 18-mo.	.64*	.64*	.79*	1.00											0.28 (0.26)
5. PHD 24-mo.	.67*	.76*	.80*	.81*	1.00										0.26 (0.27)
6. Age	.29*	.20*	.24*	.24*	.27*	1.00									36.1 (12.4)
7. Gender (1=male)	.07	.16*	.18*	.18*	.24*	.13	1.00								52.4% male
8. Married (1=yes)	.19*	.27*	.28*	.31*	.29*	.28*	.08	1.00							21.6%
9. Past self-help	.16*	.32*	.35*	.33*	.36*	.20*	.09	.08	1.00						14.6%
10. Past treatment	.13	.19*	.24*	.25*	.17*	.15*	.18*	-.03	.30*	1.00					18.0%
11. ADS	.30*	.29*	.19*	.24*	.20*	-.04	-.07	-.09	.10	.20*	1.00				10.2 (6.24)
12. Perceive severe	.29*	.31*	.18*	.15	.16*	.32*	.02	.08	.21*	.32*	.39*	1.00			2.28 (0.83)
13. Shame	-.19*	-.20*	-.17*	-.2*	-.21*	-.05	-.19*	-.10	-.03	-.09	.04	.06	1.00		2.71 (0.60)
14. Guilt	-.15*	-.16*	-.10	-.12	-.21*	.17*	-.21*	.01	.12	-.04	-.16*	.05	.44*	1.00	3.91 (0.54)
15. Intention	-.03	-.02	-.12	-.11	-.15	-.01	-.07	-.10	.05	.10	.26*	.26*	.02	.04	2.65 (0.97)

Note.

* $p < 0.05$; PHD = Percent heavy drinking days; past self-help includes AA and other self-help groups (including internet groups) related to drinking; past treatment includes formal inpatient or outpatient alcohol-related treatment; ADS = Alcohol Dependence Scale.