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Predictive utility of alcohol use disorder symptoms across race/ethnicity

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Abstract

Research has shown differences in alcohol use and problems across race/ethnicity. This study examines whether there are differential effects of alcohol use disorder (AUD) symptoms on drinking outcomes across race/ethnicity. Data from 1483 patients admitted to a hospital for treatment of an injury were utilized (19% Black, 45% non-Latino White, and 36% Latino). AUD symptoms and race/ethnicity reported at baseline and their interaction were the predictor variables. Drinking patterns and associated problems measured at the 6- and 12-month follow-up were the outcome variables of interest. Linear regression was the analytic method employed. Endorsement of “spending a great deal of time to obtain, use, or recover from effects of drinking,” “craving,” “failure to fulfill major role obligations,” and “alcohol use in physically hazardous situations” at baseline was associated with greater levels of subsequent alcohol use and alcohol-related problems at both 6- and 12-month follow-ups, regardless of race/ethnicity. Endorsement of “important social, occupational, or recreational activities given up because of drinking” was differentially associated with greater alcohol-related problems at both 6- and 12-month follow-ups dependent on race/ethnicity. Follow-up analyses indicated that this symptom was a significant predictor of alcohol problems among Latino and Black participants, but not non-Latino White participants. Brief interventions targeting these AUD symptoms could increase the effectiveness of brief motivational interventions among different racial/ethnic groups.

Keywords

Race/ethnicity; Alcohol use; Alcohol problems; Injury; Brief interventions

1. Introduction

Alcohol consumption differs across racial/ethnic groups. While White individuals are more likely to receive a diagnosis of alcohol dependence in their lifetime (Hasin, Stinson, Ogburn, & Grant, 2007), specific racial/ethnic minority groups are more likely to present with

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alcohol use disorder (AUD) diagnoses. For example, compared to other racial/ethnic groups, Latinos have a higher prevalence of heavy drinking (Chartier & Caetano, 2010), defined as five or more standard drinks per day for men and four or more drinks per day for women (National Institute on Alcohol Abuse and Alcoholism, 2005). When compared to White women, Black women are more likely to report heavy drinking episodes (Blazer & Wo, 2009), and Black and Latina women are at greater risk for abuse and dependence (Grant et al., 2012). When compared with non-Latino White men, Latino and Black men report higher percentage of abstinence from alcohol (Galvan & Caetano, 2003); however, among those who do drink, Latino and Black men report higher frequency of heavy drinking and higher number of drinks consumed by month than White men (Galvan & Caetano, 2003). While White persons are more likely to receive a diagnosis of alcohol dependence in their lifetime (Hasin et al., 2007), Latino and Black individuals are more likely to experience recurrent or persistent alcohol dependence (Dawson et al., 2005; Grant et al., 2012). Among individuals with AUD, Latinos experience more severe alcohol problems compared to White and Black persons (Schmidt, Ye, Greenfield, & Bond, 2007). Additionally, Black and Latino individuals are at higher risk of developing alcohol-related health problems and suffer more social/interpersonal problems associated with alcohol consumption when compared to White persons (Chartier & Caetano, 2010; Hilton, 2006; Mulia, Ye, Greenfield, & Zeng, 2009). For example, Latinos have higher rates of driving under the influence (DUI; Galvan & Caetano, 2003) and ever being arrested for DUI (Caetano & Clark, 2000; Caetano & McGrath, 2005). Despite this, racial/ethnic minorities with AUD are less likely to utilize formal alcohol treatment services compared to Whites with AUD (Chartier & Caetano, 2011; Schmidt et al., 2007).

The American College of Surgeons requires Level 1 trauma centers to provide brief intervention to all injured patients identified with alcohol problems (American College of Surgeons, 1993). Brief interventions in medical settings reduce typical drinks per week and maximum drinks per occasion (Bernstein, Boudreaux, & Aseltine, 2010); more importantly, brief interventions also reduce deaths and non-fatal injuries (Dinh-Zarr, Goss, Heitman, Roberts, & DiGiuseppi, 2004). Since potential racial/ethnic differences in benefits of brief interventions were not previously known, we conducted the first randomized clinical trial that was sufficiently powered to determine the differential effect of brief intervention across race/ethnicity among injured patients in a Level 1 urban trauma center (Field, Caetano, Harris, Frankowski, & Roudsari, 2010). We found that Latino patients were more likely to benefit from a brief intervention than non-Latino patients, regardless of the severity of alcohol problems. Specifically, Latino patients were more likely to reduce their average amount of alcohol consumed per week compared to White and Black patients at 12 months post-intervention and were more likely to reduce percentage days of heavy drinking than Whites and Blacks at 6 and 12 months post-intervention (Field et al., 2010).

In a follow-up to that study (Field & Caetano, 2010), we found that, regardless of race/ethnicity, patients with alcohol dependence were more likely to benefit from a brief intervention. These patients reduced the average drinks per week at 6 and 12 months post-intervention and reduced the maximum amount of drinks consumed in one day by more than twice the amount reported by non-dependent patients at 6 months post-intervention. Patients with alcohol dependence also reported a decrease in the occurrence of alcohol related

problems at 12 months post-intervention. In addition, patients with alcohol dependence at baseline were less likely to meet criteria for this diagnosis at six months post-intervention (Field & Caetano, 2010).

In the original study, the benefits of brief intervention among Latinos were independent of the severity of alcohol problems (Field et al., 2010). Likewise, the benefits of brief motivational interventions among patients with alcohol dependence were independent of race/ethnicity (Field & Caetano, 2010). However, the potential interaction between race/ethnicity and alcohol dependence on drinking outcomes was not fully examined. Under DSM-IV, the diagnostic criteria for abuse and dependence were distinct (American Psychiatric Association, 1994). Under DSM-5, anyone meeting any two of the 11 criteria during the same 12-month period may receive a diagnosis of AUD (American Psychiatric Association, 2013). As such, any single symptom has equal influence on a diagnosis of AUD, making it extremely practical to examine the influence of AUD symptoms individually. Therefore, understanding the interaction between race/ethnicity and symptoms of alcohol dependence may further elucidate our prior findings and increase our understanding of how to improve brief interventions or, if necessary, culturally tailor interventions. Specifically, understanding their interaction may bring to light the differential importance of specific symptoms of AUD on alcohol outcomes for a particular racial/ethnic group. Such findings could potentially inform tailoring or adaptation of brief alcohol interventions. Some previous research has examined the predictive utility of DSM-IV alcohol use disorder symptoms on later alcohol use disorder diagnosis and alcohol use problems, (De Bruijn, Van Den Brink, De Graaf, & Vollebergh, 2005; Schuckit, Smith, & Landi, 2000; Schuckit et al., 2001; Schuckit et al., 2005). However, no published study to our knowledge has examined whether the predictive utility of AUD symptoms differ by race/ethnicity.

Herein, we studied the potential interaction of DSM-5 AUD symptoms on drinking outcomes by race/ethnicity. We examined differences across racial/ethnic groups in symptoms of AUD, drinking patterns, and alcohol problems. In addition, we examined AUD symptoms measured at baseline, race/ethnicity, and their interaction, as predictors of alcohol use patterns and alcohol related problems at 6- and 12-month follow-up. We hypothesized that at least some symptoms of AUD measured at baseline would differentially predict drinking patterns and alcohol related problems at 6- and 12-month follow-up by race/ethnicity at 6- and 12-month follow-ups.

2. Material and methods

2.1. Participants

This study employed data from the baseline, 6-month follow-up, and 12-month follow-up assessments of a randomized clinical trial examining the efficacy of brief motivational intervention (BMI) against treatment as usual (TAU; Field et al., 2010). The sample included male and female injured patients who self-identified as Black, non-Latino White, or Latino. Patients who did not self-identify with any of these racial/ethnic groups were not screened. Injury was defined as an intentional or unintentional event caused by an external factor, even if a medical condition was a factor. Patients were included in this study if they

(1) were at least 18 years of age, (2) spoke English or Spanish, (3) had an identifiable residence, (4) were not under arrest or in police custody at the time of admission or during their hospital stay, (5) were judged by the trauma care or research staff to not be actively suicidal or psychotic, (6) were not victims of sexual assault, and (7) had no medical condition that precluded a face-to-face interview. Patients who were intoxicated at the time of their injury or presented with a Glasgow Coma Scale (GCS) ≤ 14 were monitored by research staff for inclusion in the study. Subjects with a GCS ≤ 14 that did not resolve prior to discharge were not eligible for screening or enrollment. To participate in the study individuals had to demonstrate orientation to person, place, and time. The total sample in this study was 1483 patients.

2.2. Procedures

Patients who presented in a level 1 trauma center or the emergency department with an alcohol-related injury were screened for eligibility. They were approached in person by study clinicians while receiving medical care in these settings. Full study procedures have been reported in the original RCT and screening model (Field, Caetano, & Pezzia, 2009; Field et al., 2010). Screening for alcohol problems included (1) clinical indication of acute intoxication, or alcohol use, or positive blood alcohol concentration (BAC); (2) self-reported drinking 6 h prior to injury; (3) at-risk drinking (women: four or more drinks in women per day and 7 or more drinks per week; men: five or more drinks per day and 14 or more drinks per week) per the National Institute on Alcohol Abuse and Alcoholism (2005) guidelines; or (4) positive on one or more items of the instrument “**C**utting down, **A**nnoyance by criticism, **G**uilty feeling, and **E**ye-openers” (CAGE; Ewing, 1984; Kitchens, 1994). A sequential screening, including four steps, was designed to minimize the impact on medical care (Field et al., 2009). For example, if patients screened positive on the first criteria subsequent criteria were not assessed. During the time that the RCT was implemented, 9860 injury admissions were processed; from them, 6390 (65%) patients were eligible; 5742 were screened; and 2368 had a positive screen in one of the four criteria mentioned above and consequently were invited to participate in the study. Once eligible patients screened positive, they were recruited between Thursday and Monday from 9 am to 6 pm, over a 2-year period. A total of 875 patients screened and deemed eligible did not participate in the study because of discharge prior to consent, declined to participate, or had an incomplete survey.

Research staff obtained written informed consent from eligible patients who screened positive and agreed to participate in the study. Research staff collected data via an in-person, 3040-min interview at baseline, and via telephone interview at the 6- and 12-month follow-up time points. Forty-seven percent of the Latino participants were interviewed in Spanish by bilingual staff. Participants were compensated for their time and effort at \$25 for the baseline interview and \$50 for each of the two follow-ups. Retention rates were 74.5% in BMI at 6-month follow-up and 62.5% at 12-month follow-up. For detailed study procedures see the original RCT and screening model (Field et al., 2009; Field et al., 2010).

2.3. Measures

2.3.1. Participant characteristics—Participant characteristics collected at baseline included age (1824, 2534, 3544, and 45+), gender (male/female), employment status (working part-time/working full-time/not working), marital status (single or never married; married or living with partner; separated, divorced or widowed), education (more than high school, high school diploma, some high school), type of injury (unintentional/intentional), and injury severity (moderate or severe). All of these characteristics were included as covariates in the analysis to observe the main effects that alcohol dependence symptoms and race/ethnicity have on alcohol use and alcohol problems independent of participant characteristics. Race/ethnicity was measured by patient's self-identification as non-Latino Black, non-Latino White, or Hispanic/Latino. From the total of Hispanic/Latino participants, 85% were Mexican or Mexican-American. When individuals endorsed more than one race/ethnicity, they were asked which group best described their race/ethnicity.

2.3.2. Symptoms of AUD—The Composite International Diagnostic Interview (CIDI; Andrews & Peters, 1998) was used to assess symptoms of AUD in the past 12 months. While based on DSM-IV, because the CIDI was developed for international use it incorporates items for diagnoses according to the International Classification of Diseases. Thus, it includes symptoms related to craving. To more accurately reflect symptoms of AUD according to the DSM-5, legal problems were excluded from the CIDI symptoms reported.

2.3.3. Drinking patterns—Quantity and frequency of alcohol consumption were assessed at, 6- and 12- month follow-up using a graduated frequency technique (Greenfield, 2000; Midanik, 1994). One standard drink was defined as 12 ounces of beer, 5 ounces of wine, or 1.5 ounces of hard liquor (Dawson, 2003). Four measures of alcohol use were considered (Field et al., 2010); average volume per week, percent days abstinent, percent days of heavy drinking, and maximum amount of drinks consumed in one day. "Average volume per week" was measured using the approach quantity/frequency of alcohol consumption by multiplying average quantity of drinks per occasion by frequency of drinking. "Percent days abstinent" was calculated by dividing the number of reported days on which alcohol was not consumed by the number of days during the assessment period (past six months). "Percent days of heavy drinking" was calculated by dividing the number of times on which five or more drinks were consumed by the number of days during the assessment period. "Maximum number of drinks in one day" was assessed by asking, "During the past six months, what was the largest number of drinks that you had in a single day?" The variables "volume per week" and "maximum amount consumed in one day" were highly skewed and thus were log transformed (Osborne, 2002).

2.3.4. Alcohol problems—Alcohol problems were measured at the 6- and 12-month follow-up periods using the Short Inventory of Problems (SIP; Miller, Tonigan, & Longabaugh, 1995). The SIP is a 15-item short version of the Drinker Inventory of Consequences that contains 45 items (DrInC; Miller et al., 1995). Both instruments are comprised of 5 subscales—physical, interpersonal, intrapersonal, impulse control, and social responsibility (Miller et al., 1995). The SIP has been recently validated among Latino and non-Latino populations and among Spanish Speaking and Non-Spanish speaking Latinos

(Marra, Field, Caetano, & von Sternberg, 2014). Six additional questions related to injuries were also retained from the original DrInC to be included in the assessment of alcohol problems, forming the SIP + 6 (Soderstrom et al., 2007). Participants endorsed a five-point Likert scale, ranging from “never” to “almost daily.” As such, each subscale provides a continuous measure as well as the measure of number and frequency of the consequences. Higher scores indicate greater frequency of consequences of drinking per subscale.

2.4. Data analysis plan

To test the hypothesis that symptoms of alcohol use disorder may influence alcohol use and problems more strongly in certain racial/ethnic groups, we examined the main effect of each symptom assessed at baseline on alcohol problems and drinking patterns at 6- and 12-month follow-ups and the interaction effect of each symptom with race/ethnicity on outcomes. Consistent with previous studies, age, gender, race/ethnicity, employment status, marital status, education, type of injury, injury severity and treatment group assignment were the control variables. Data analysis was performed using the software IBM SPSS Statistics Data Editor, version 20.

2.4.1. Bivariate association of drinking patterns, alcohol problems and AUD symptoms by racial/ethnic group—Chi square and analysis of variance (ANOVA) were used to examine group differences in participant characteristics measured at baseline. Chi square tests were conducted to examine differences in AUD symptoms measured at baseline across the three racial/ethnic groups. ANOVAs were also conducted to examine the differences in alcohol use and SIP + 6 measured at the 6- and 12-month follow-ups across racial/ethnic groups.

2.4.2. Multivariate association of AUD symptoms with drinking patterns and alcohol problems by race/ethnicity—Linear regressions were used to examine the associations of race/ethnicity, symptoms of AUD measured at baseline and their interaction with each measure of drinking patterns and alcohol problems measured at the 6- and 12-month follow-up. Each regression analysis consisted of a three-step model. Step 1 included demographics (age, gender, employment status, marital status, and education), type of injury, injury severity, and treatment group as control variables. Step 2 included a symptom of alcohol use disorder and race/ethnicity. Step 3 included the interaction of race/ethnicity and a symptom of AUD. Follow-up analyses were conducted when interaction terms were significant. Specifically, the main effect of each symptom was examined separately for each racial/ethnic group to understand the nature of the interaction effect. Since the variables “volume per week” and “maximum amount consumed in one day” were log transformed to conduct regression analyses, we back-transformed these variables in order to make results interpretable (see Table 3). The back-transformed regression coefficients represent approximately proportional differences (e.g., back-transformed value 1.1 represents a 10% increase per unit in the independent variable; Gelman & Hill, 2006).

3. Results

3.1. Participant characteristics

Participant characteristics are summarized separately for each racial/ethnic group in Table 1. Racial/ethnic differences were found on all participant characteristics examined. Latino participants were younger and more likely to be male. Black participants were more likely to be married. White participants were more likely to have greater than a high school education, work full time, have unintentional injuries and less likely to present with moderately severe injuries.

3.2. Bivariate association of symptoms of AUD with drinking patterns and alcohol problems across racial/ethnic groups

Table 2 shows the bivariate associations of alcohol use disorder symptoms at baseline across race/ethnicity and drinking patterns and alcohol problems at 6- and 12-month follow-up periods across race/ethnicity. Chi-square tests were conducted to examine differences in symptoms at baseline across race/ethnicity. Regarding symptoms of alcohol use disorder, statistically significant differences ($p < .05$) were found across racial/ethnic groups for all but one symptom. Latino participants were more likely than Black and White participants to endorse “withdrawal symptoms,” “unsuccessful cut down attempts,” “activities given up,” and “continue to drink despite physical or psychological problems.” Latino participants were less likely than White and Black participants to endorse “drinking more than intended.” Black participants were more likely than Latino and White participants to endorse “tolerance.” Latino participants were more likely than Black participants to endorse “alcohol use in physically hazardous situations” and “recurrent social or interpersonal problems exacerbated by alcohol.” White participants were more likely than black participants to endorse “alcohol use in physically hazardous situations.”

ANOVA tests were conducted to examine drinking patterns and alcohol-related problems at the 6- and 12-month follow-ups across race/ethnicity. Regarding drinking patterns, White participants had a higher “average of alcohol consumption per week” and “maximum amount consumed in 1 day” than Latino participants at 6- and 12-month follow-up. Latinos had a higher average of “percent days abstinent” and “percent days heavy drinking” than Black and White participants at 6 and 12 months. Regarding alcohol problems as measured by SIP + 6, Latinos had a higher score on “social responsibility” than Whites at 6 months. Similarly, Latinos had a higher score on “physical consequences” than Whites at 12 months. Latinos had a higher score on “injuries” than Black participants at 6 and 12 months.

3.3. Symptoms of AUD predicting drinking patterns across racial/ethnic groups

In regard to associations between symptoms and drinking patterns, Table 3 shows that the symptoms “great deal of time to obtain, use, or recover from effects of drinking,” “craving,” “failure to fulfill major role obligations,” and alcohol use in physically hazardous situations” were consistently associated with all four alcohol use measures ($p < .05$) at both 6- and 12-month follow-ups with the exception of “craving,” “failure to fulfill major role obligations,” and “alcohol use in physically hazardous situations” and “maximum amount consumed in one day at 12-month follow-up; “craving,” and “percent days heavy drink” at 6-month

follow-up; and “alcohol use in physically hazardous situations” (only symptoms with significant associations are shown). These associations indicate that, above and beyond demographics, treatment group, and race/ethnicity, individuals reporting spending a great deal of time obtaining, using or recovering from effects of alcohol consumption, craving, failure fulfill major role obligations, and using alcohol in physically hazardous situations were more likely to report higher alcohol volume per week, higher maximum amount consumed in one day, higher percent days of heavy drink, and lower percent days abstinent at 6- and 12-month follow-ups.

“Withdrawal symptoms” and “recurrent social or interpersonal problems exacerbated by alcohol” were significantly associated with some measures of alcohol use but not others and was less consistent across time. In addition, the interaction terms, “unsuccessful attempts to cut down $\times$ race/ethnicity” and “activities given up $\times$ race/ethnicity,” were significantly associated only with “volume per week” at 6-month follow-up. Since they did not show any consistency either across alcohol use patterns or across time, no further analysis was conducted for these associations.

3.4. Symptoms of alcohol use disorder predicting alcohol problems across racial/ethnic groups

Table 4 shows the regression analysis for alcohol problems as measured by the SIP + 6 subscales. Similar to the former analysis, Table 4 shows that the symptoms “great deal of time to obtain, use, or recover from effects of drinking,” “craving,” “failure to fulfill major role obligations,” and alcohol use in physically hazardous situations” were significantly associated with all alcohol problems (only symptoms and interaction terms with significant associations are shown). These results indicate that, regardless of race/ethnicity, participants reporting these symptoms were more likely to have higher severity of physical, interpersonal, intrapersonal, impulse control, social responsibility, and injuries problems related to alcohol use at 6- and 12-month follow-ups.

“Withdrawal symptoms” had a positive association with some alcohol problems (“intrapersonal,” “impulse control,” and “social responsibility”) but less consistent across time. Although some symptoms were significantly positively associated with alcohol problems (e.g., “tolerance”, “drinking more than intended”, etc.), no consistency was observed across subscales and follow-up time points.

Regarding the interaction terms, “important social, occupational, or recreational activities given up $\times$ race/ethnicity” was significantly associated with all subscales of the SIP + 6 at both six and 12 months. This suggests that the association between “activities given up” and each SIP +6 subscale varies across racial/ethnic groups. To better understand the nature of the significant interaction effects, Table 5 shows the regression results of SIP + 6 subscales on “activities given up” within each racial/ethnic group. The findings suggest that all SIP + 6 subscales were significantly associated with this symptom among Latino participants at 6- and 12-month follow-ups. Among Black participants, “activities given up” was significantly associated only with the interpersonal and social responsibility subscales of the SIP + 6 at 12-month follow-up. Among White participants, “activities given up” was not associated with any SIP + 6 subscale.

4. Discussion

To the best of our knowledge, no published study has examined the differential importance of individual symptoms of alcohol use disorder according to the DSM-5 on subsequent drinking patterns including alcohol use and problems across racial/ethnic groups. We hypothesized that certain symptoms of alcohol use disorder would have a stronger association with alcohol use and alcohol problems in certain racial/ethnic groups after controlling for other participant characteristics and treatment condition. The results from this study suggest that, regardless of race/ethnicity, individuals who spend a “great deal of time to obtain, use, or recover from effects of drinking,” report “craving,” “failure to fulfill major role obligations,” and “use alcohol in physically hazardous situations” have higher alcohol use patterns and more severe alcohol-related problems at both 6- and 12-month follow-ups. In addition, the effect of “important social, occupational, or recreational activities given up” on subsequent alcohol related problems at both 6- and 12-month follow-ups was significantly moderated by race/ethnicity. Follow-up analyses indicated that giving up important social, occupational, or recreational activities was positively associated with all alcohol problems subscales at 6- and 12-month follow-ups for Latino patients, and two alcohol problems subscales at 12-month follow-up for Black patients. In contrast, this symptom of alcohol dependence did not predict alcohol problems among White patients.

As such, one important implication of the current study is that these four AUD symptoms: “great deal of time spent to obtain, use or recover from the effects of alcohol,” “craving,” “failure to fulfill major role obligations,” and “alcohol use in physically hazardous situations” may be particularly important prognostic indicators of subsequent drinking and related problems. Practitioners who work with patients with AUD may consider that individuals who endorse these symptoms may be at greater risk for poor treatment outcomes based on the current findings. Thus, clinicians may consider that patients who spend a great deal of time in obtaining, using, or recovering from effects of alcohol use, experience craving, fail in fulfilling major role obligations, and/or use alcohol in physically hazardous situations may need more intensive intervention to help prevent or mitigate poorer outcomes. This information may be particularly useful in emergency department settings where screening and brief intervention might take place. Of particular note is that the lack of significant interaction effects for these symptoms and race/ethnicity means that these implications are applicable to Black, White, and Latino patients.

Another symptom, “activities given up,” evidences differential predictive utility dependent on race/ethnicity. This is true even after accounting for participant characteristics and treatment condition. Results indicate that Latino and Black patients endorsing “activities given up” may be particularly vulnerable to alcohol-related problems. Future research may want to examine the specific activities that are referenced when heavy drinkers endorse this symptom and what accounts for this differential relationship. For example, we know that Latino and Black problematic drinkers have more episodes of heavy drinking and are more likely to report persistence of AUD than White heavy drinkers. Thus, they may place more value on these “activities” and stay involved longer than White drinkers. As such, their alcohol related problems may be more lengthy and severe by the time they endorse this symptom.

This finding may also have implications for culturally relevant interventions for Black and Latino problem drinkers. Specifically, it suggests that Latino and Black individuals particularly benefit from interventions which emphasize on recovering and or improving social, occupational, or recreational activities that they report having given up or reduced because of alcohol use. Interventions that support reconnecting these patients with those activities they have given up because of alcohol use could be particularly useful in preventing future alcohol-related problems. These interventions may involve strengthening contact with members of social networks who support changes in drinking.

These findings expand the prior knowledge regarding the predictive utility of the alcohol dependence/abuse symptoms defined by the Diagnostic and Statistical Manual of Mental Disorders (DSM-IV) and craving on diagnoses of alcohol dependence over time and abuse symptoms on alcohol-related problems (De Bruijn et al., 2005; Schuckit et al., 2000; Schuckit et al., 2001; and Schuckit et al., 2005). We found that two symptoms of alcohol abuse, “failure to fulfill major role obligations,” and “use alcohol in physically hazardous situations,” one symptom of alcohol dependence, “great deal of time to obtain, use, or recover from effects of drinking,” and “craving,” were significant predictors of subsequent drinking patterns and alcohol-related problems. All of these symptoms are comprised in the new version of this manual, DSM-5. Additionally, these results may provide some insight into the results of our prior research (Field & Caetano, 2010; Field et al., 2010) in which we found that although a brief motivational intervention reduced subsequent alcohol use among heavy drinkers, it did not reduce subsequent alcohol-related problems. To further impact drinking outcomes, future intervention studies may benefit from including components that target particular symptoms of alcohol use disorder. For example, greater emphasis could be given to identification of personal values or commitments and associated activities that do not involve alcohol. Likewise, identifying and utilizing helping relationships to reduce exposure to or engagement in drinking related activities have the potential to increase self-efficacy to abstain from alcohol use, and provide practical strategies for reducing subsequent alcohol intake and related problems.

There are limitations to the current study. Participants with alcohol problems in other medical settings may not evidence similar patterns of association between symptoms and subsequent use and problems. In addition, the intervention is opportunistic and the participants included in the study are not seeking treatment for their alcohol use or associated problems. Future research is needed to examine the importance of dependence symptoms on alcohol use and problems among individuals who do not present to hospitals or receive alcohol treatment. Although the current study represents a diverse sample of individuals receiving treatment for alcohol use, some racial/ethnic groups were not represented (e.g., Asian/Asian American, American Native persons). Also, Mexican and Mexican Americans were overrepresented in the Latino group, which may limit the conclusions to this particular subgroup of Latinos. In addition, this is a secondary data analysis and while the parent study was sufficiently powered to examine racial/ethnic differences and patients were randomized to the two treatment conditions by race, the study was not designed to specifically examine the relationship between symptoms of alcohol use disorder and subsequent alcohol use or alcohol problems. However, we have attempted to mitigate misinterpretation or over interpretation of the findings by focusing on consistently

observed relationships. Finally, while we used DSM-5 symptoms of AUD the CIDI version used in the current study was not designed or tested to diagnosis AUD according to the DSM-5. Because it has been tested and used internationally, it did include items pertaining to craving which were used to reflect DSM-5 criteria.

5. Conclusions

In summary, the current study contributes to our understanding of the associations between symptoms of alcohol dependence and subsequent alcohol outcomes, and their variations across racial/ethnic groups. Alcohol use disorder symptoms “great deal of time in obtaining, using, or recovering from effects of alcohol,” “craving,” “failure to fulfill major role obligations,” and “alcohol use in physically hazardous situations” were associated with higher levels of alcohol use and higher frequency of problems associated with alcohol regardless of race/ethnicity. Giving up or reducing important activities is predictive of subsequent alcohol problems among Latino and Black patients, but not non-Latino White patients. Interventions targeting those symptoms of alcohol use disorder could increase the effectiveness of an intervention. Current findings also have implications for tailoring alcohol use interventions for racial/ethnic minority communities.

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Table 1

Participants' characteristics by race/ethnicity.

Age category %	Latinos (N=529)		Blacks (N=287)		Whites (N=667)	
	N	(%)	N	(%)	N	(%)
1824	204	(38.6)	52	(18.1) ^a	176	(26.4) ^{a,b}
2534	198	(37.4)	62	(21.6) ^a	174	(26.1) ^a
3544	88	(16.6)	85	(29.6) ^a	171	(25.6) ^a
45 +	39	(7.4)	88	(30.7) ^a	146	(21.9) ^{a,b}
Gender (male)	468	(88.5)	231	(80.5) ^a	523	(78.4) ^a
Marital status						
Single, never married	252	(47.6)	136	(47.4)	283	(42.4)
Married or living in a like-married relationship	175	(33.1)	68	(43.7) ^a	177	(26.5) ^a
Separated, divorced, widowed or married not living with spouse	101	(18.9)	83	(28.9) ^a	205	(30.7) ^a
Education						
More than high school	68	(12.9)	61	(21.3) ^a	263	(39.4) ^{a,b}
High school diploma	119	(22.5)	151	(52.6) ^a	248	(37.2) ^{a,b}
Some high school	342	(64.7)	75	(26.1) ^a	156	(23.4) ^a
Employment status						
Working part-time	69	(13.0)	50	(17.4) ^a	377	(56.5) ^{a,b}
Working full-time	338	(63.9)	104	(36.2)	89	(13.3)
Injuries						
Unintentional	386	(73.0)	196	(68.3)	589	(88.3) ^{a,b}
Moderate	427	(80.7)	245	(85.4)	471	(70.6) ^{a,b}

Note: Significance level was at $p < .05$.^a Significantly different from Latino participants.^b Significantly different from Black participants.

Table 2
Bivariate association of alcohol use, alcohol problems and AUD by racial/ethnic group.

Symptoms at baseline	Latinos (N=529)		Blacks (N=287)		Whites (N=667)	
	N	(%)	N	(%)	N	(%)
Drinking more than intended	210	(39.7)	135	(47.0) ^a	358	(53.7) ^a
Unsuccessful cut down attempts	395	(74.7)	185	(64.5) ^a	364	(54.6) ^a
Great deal of time spent because of alcohol	113	(21.4)	74	(25.8)	144	(21.6)
Craving	113	(21.4)	57	(19.9)	158	(23.7)
Failure to fulfill major role obligations	96	(18.2)	39	(13.6)	96	(14.4)
Recurrent social or interpersonal problems	82	(15.5)	36	(12.5) ^a	96	(14.4)
Activities given up	129	(24.4)	46	(16.0) ^a	110	(16.5) ^a
Alcohol use in physically hazardous situations	114	(21.6)	37	(12.9) ^a	171	(25.6) ^b
Continue to drink despite problems	152	(28.7)	69	(24.0) ^a	188	(28.2) ^a
Tolerance	211	(39.9)	131	(45.6) ^a	213	(31.9) ^{a,b}
Withdrawal symptoms	158	(29.9)	75	(26.1) ^a	172	(25.8) ^a
	Mean	(SD)	Mean	(SD)	Mean	(SD)
Alcohol use at 6-month follow-up						
Volume per week	0.108	(2.30)	0.51	(2.39)	0.81	(2.17) ^a
Maximum amount in 1 day	1.299	(1.44)	1.24	(1.31)	1.66	(1.24)
Percent days abstinent	0.841	(0.25)	0.73	(0.31) ^a	0.74	(0.30) ^a
Percent days heavy drink	0.585	(0.35)	0.41	(0.42) ^a	0.5	(0.44) ^a
Alcohol use at 12-month follow-up						
Volume per week	0.207	(2.34)	0.97	(2.13)	1.06	(2.10) ^a
Maximum amount in 1 day	1.353	(1.42)	1.54	(1.13)	1.71	(1.16)
Percent days abstinent	0.838	(0.24)	0.69	(0.33) ^a	0.71	(0.30) ^a
Percent days heavy drink	0.62	(0.43)	0.42	(0.43) ^a	0.43	(0.43) ^a
SIP subscale at 6-month follow-up						
Physical	1.097	(2.53)	0.95	(2.01)	0.84	(2.12)

Symptoms at baseline	Latinos (N=529)		Blacks (N=287)		Whites (N=667)	
	N	(%)	N	(%)	N	(%)
Interpersonal	0.949	(2.55)	0.51	(1.55)	0.65	(2.03)
Intrapersonal	1.403	(2.92)	1.12	(2.46)	1.1	(2.58)
Impulse control	1.005	(2.01)	0.66	(1.52)	0.83	(1.67)
Social Responsibility	1.301	(2.79)	0.93	(2.24)	0.89	(2.27) ^a
Injuries	1.22	(2.36)	0.64	(1.04) ^a	0.94	(1.57)
SIP subscale at 12-month follow-up						
Physical	0.768	(1.93)	0.8	(1.89)	1.18	(2.56) ^a
Interpersonal	0.702	(2.22)	0.65	(1.80)	0.75	(2.27)
Intrapersonal	1.017	(2.23)	1.1	(2.24)	1.26	(2.85)
Impulse control	0.912	(1.74)	0.69	(1.55)	0.96	(1.84)
Social Responsibility	1.088	(2.53)	0.92	(2.24)	1.05	(2.46)
Injuries	1.006	(1.89)	0.6	(1.04) ^a	0.99	(1.61)

Note: SIP = Short Inventory of Problems. Significance level was at $p < .05$.

^a Significantly different from Latino participants.

^b Significantly different from black participants.

AUD symptoms predicting drinking patterns across racial/ethnic groups.

	Alcohol volume			Max amount consumed			% days abstinent			% days heavy drinking						
	6 months		12 months	6 months		12 months	6 months		12 months	6 months		12 months				
	$e^{(B)}$	p	$e^{(B)}$	p	$e^{(B)}$	p	$e^{(B)}$	p	$e^{(B)}$	p	$e^{(B)}$	p				
Great deal of time	1.72	.002	2.01	.000	1.30	.010	1.36	.005	−.106	.001	−.145	.000	.097	.006	.181	.000
Great deal of time × ethnicity	0.88	.525	1.44	.108	0.96	.743	1.23	.110	.007	.939	−.096	.326	−.016	.875	.132	.255
Craving	1.91	.000	1.70	.005	1.40	.001	1.22	.069	−.130	.000	−.122	.000	.062	.083	.088	.020
Craving × ethnicity	0.74	.141	0.79	.277	0.87	.225	0.86	.215	−.112	.001	−.159	.000	−.079	.438	−.043	.705
Failure to fulfill major role obligations	1.68	.014	1.68	.024	1.34	.017	1.29	.051	−.076	.014	−.085	.012	.086	.015	.103	.007
Role obligations × ethnicity	0.72	.158	0.87	.592	0.79	.080	0.91	.504	.114	.160	.078	.405	−.006	.950	.097	.366
Alcohol use in hazardous situations	1.54	.013	1.47	.040	1.29	.012	1.20	.083	−.076	.013	−.077	.022	.109	.002	.060	.109
Hazardous situations × ethnicity	0.86	.444	1.94	.195	0.90	.348	0.91	.422	.012	.888	−.044	.637	104	.288	.127	.235

Note: This table includes only dependence symptoms that had consistently significant relationships with alcohol use variables. Significance level was at $p < .05$. Significant associations are in bold. For “alcohol volume per week” and “maximum amount of alcohol consumed” (log transformed variables) the results presented are interpreted as proportional differences, where 1.72 corresponds to 72% increase of alcohol use when the patients reported “spending a great deal of time because of alcohol use.”

Table 4

AUD symptoms predicting alcohol-related problems across racial/ethnic groups.

	SIP Physical			SIP Interpersonal			SIP Intrapersonal					
	6 months		12 months	6 months		12 months	6 months		12 months			
	beta	p	beta	p	beta	p	beta	p	beta	p		
Activities given up	.052	.141	.051	.171	.045	.203	.051	.175	.055	.124	.056	.134
Activities given up × ethnicity	−4.161	.000	−.356	.000	−4.163	.000	−4.144	.000	−4.740	.000	−4.646	.000
Great deal of time	.261	.000	.268	.000	.234	.000	.259	.000	.299	.000	.308	.000
Great deal of time × ethnicity	.014	.884	.222	.051	.008	.938	.304	.088	.119	.229	.257	.025
Craving	.240	.000	.275	.000	.217	.000	.235	.000	.309	.000	.299	.000
Craving × ethnicity	−.033	.739	.060	.584	−.010	.922	.123	.275	−.048	.629	.089	.425
Failure to fulfill major role obligations	.278	.000	.215	.000	.294	.000	.282	.000	.272	.000	.204	.000
Role obligations × ethnicity	−.092	.305	.120	.258	−.077	.389	.125	.233	.003	.978	.033	.757
Alcohol use in hazardous situations	.217	.000	.233	.000	.203	.000	.183	.000	.248	.000	.192	.000
Hazardous situations × ethnicity	−.058	.555	.124	.234	−.050	.610	.100	.350	−.177	.070	−.030	.777
SIP Social Responsibility												
Activities given up	.046	.198	.051	.175	.053	.139	.051	.175	.038	.289	.043	.258
Activities given up × ethnicity	−3.768	.000	−4.381	.000	−4.528	.000	−4.926	.000	−4.021	.000	−4.140	.000
Great deal of time	.220	.000	.336	.000	.269	.000	.269	.000	.166	.000	.209	.000
Great deal of time × ethnicity	.005	.960	.190	.093	−.082	.403	.143	.216	−.128	.217	−.023	.844
Craving	.211	.000	.270	.000	.235	.000	.241	.000	.172	.000	.241	.000
Craving × ethnicity	.006	.956	−.037	.739	−.155	.120	−.046	.687	−.101	.337	−.046	.687
Failure to fulfill major role obligations	.273	.000	.296	.000	.286	.000	.258	.000	.175	.000	.209	.000
Role obligations × ethnicity	.010	.910	.116	.272	−.073	.414	−.031	.771	−.134	.156	.003	.974
Alcohol use in hazardous situations	.214	.000	.273	.000	.228	.000	.203	.000	.232	.000	.237	.000
Hazardous situations × ethnicity	−.071	.472	.009	.930	−.169	.083	−.035	.742	−.144	.153	−.079	.459
SIP Injuries												

Note: SIP = Short Inventory of Problems. This table includes only the dependence symptoms and corresponding interaction terms that had significant relationships with Short Inventory of Problems variables. Significance level was at $p < .05$. Significant associations are in bold.

Table 5

Follow-up analyses of significant interactions.

	Latino				Black				White			
	6 months		12 months		6 months		12 months		6 months		12 months	
	Beta	p	Beta	p	Beta	p	Beta	p	Beta	p	Beta	p
Alcohol problem												
Physical	.307	.000	.320	.000	.157	.069	.151	.084	.057	.235	.048	.343
Interpersonal	.304	.000	.273	.000	.087	.306	.253	.003	.046	.345	.045	.385
Intrapersonal	.369	.000	.408	.000	.118	.168	.162	.062	.058	.232	.052	.303
Impulse control	.295	.000	.340	.000	.078	.366	.096	.272	.048	.329	.051	.328
Social Responsibility	.344	.000	.344	.000	.085	.324	.173	.047	.058	.234	.046	.364
Injuries	.299	.000	.256	.001	.073	.392	.152	.085	.042	.393	.047	.365

Note: Significance level was at $p < .05$. Significant associations are in bold.