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An Experimental Test of the Effects of Social Conflict on Posttraumatic Stress Symptoms and Alcohol Craving

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An Experimental Test of the Effects of Social Conflict on Posttraumatic Stress Symptoms
and Alcohol Craving

A dissertation submitted in partial fulfillment
of the requirements for the degree of
Doctor of Philosophy in Psychology

by

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Abstract

While substantial efforts have been devoted to understanding links between posttraumatic stress disorder (PTSD) and hazardous alcohol use, relatively little research has examined possible third factor variables that may maintain this comorbidity. Social conflict is common among people suffering from posttraumatic stress symptoms (PTSS), hazardous alcohol use, and the combination of these two conditions, and is thought to maintain both PTSS and hazardous alcohol use. Fortunately, social conflict is malleable, but there is little evidence to date examining social conflict as a common maintaining factor. The current study investigated the effect of social conflict on state PTSS, alcohol craving, and alcohol approach bias in an effort to isolate one portion of a complex constellation of difficulties. A total of 46 participants with a history of trauma exposure and current hazardous alcohol use completed a laboratory-based assessment of posttraumatic stress symptom reactions, alcohol craving, and alcohol approach bias in response to social conflict, as manipulated via the script-driven imagery procedure. Results demonstrated that social conflict, compared to a neutral social script, elicited an increase in state PTSS symptoms, but not in alcohol craving, or alcohol approach bias. Sex was not demonstrated to have a moderating effect on social conflict as it relates to PTSS, alcohol craving, or alcohol approach bias. These findings highlight the role of social conflict in eliciting state PTSS; however, contrary to hypotheses social conflict did not elicit alcohol craving or approach bias. Possible reasons for these findings as well as limitations and future directions are discussed.

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Dedication

This dissertation is dedicated all of my family and friends who have supported me throughout this process. Thank you to Libby, Mark, and Kim who welcomed us in to their family and made Arkansas home. Thank you to Beth, Craig, Caroline, and Thomas for your love and support over the last 6 years. To my amazing parents and sister who have loved me and supported me through many years of school, I wouldn't be where I am without you! Thank you to my very patient husband for your unwavering love and support. Thank you to my faculty mentor, lab mates, and my cohort who have encouraged me and facilitated my growth as a professional. Without each of you, this would never have been possible. This dissertation is dedicated to all of you.

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An Experimental Test of the Effects of Social Conflict on Posttraumatic Stress Symptoms and Alcohol Craving

Posttraumatic stress disorder (PTSD) and hazardous alcohol use are commonly comorbid (Back, Jackson, Sonne, & Brady, 2005; Jacobsen, Southwick, & Kosten, 2001; Stewart, 1996), and result in more severe impairment and poorer treatment outcomes relative to the presence of either problem alone (Back et al., 2000; Hien, Nunes, Levin, & Fraser, 2000; Kranzler, Del Boca, Rounsaville, 1996; Najavits, Weiss, & Shaw, 1997; Triffleman, Carroll, & Kelloog, 1999). Moreover, efficacy of treatments for comorbid PTSD/alcohol use disorders (AUDs) is limited, with treatment outcomes comparable across active and control conditions (Hien et al., 2009; Zlonick, Johnson, & Najavits, 2009). These findings emphasize the need to continue to examine possible maintaining factors in order to enhance treatment for comorbid PTSD/AUDs.

Definitions of Posttraumatic Stress Disorder (PTSD) and Hazardous Alcohol Use

PTSD is a chronic and disabling condition comprised of a specified set of symptoms that often occur following a range of traumatic events (Kessler, 2000; Kessler, Sonnega, Bromet, Hughes, & Nelson, 1995). While most posttraumatic stress symptoms (PTSS) naturally remit among the majority of people exposed to a traumatic event, a significant minority of traumatic event-exposed people continue to suffer from these symptoms (Gilboa-Schechtman & Foa, 2001). Four symptom types characterize PTSD: (1) intrusion symptoms (e.g., intrusive thoughts, nightmares); (2) avoidance of trauma cues (i.e., avoiding thoughts and reminders of the event); (3) negative cognitions or mood (e.g., detachment, restricted affect, distorted blame); and (4) change in arousal or reactivity (e.g., problems sleeping and concentrating, irritability; American Psychiatric Association [APA], 2013). Diagnoses of PTSD also require the presence of symptoms for at least one month following traumatization (APA, 2013). Importantly, taxometric

research suggests PTSS are continuous in nature, rather than dichotomous, discrete categories, with PTSD being at the upper end of the continuum (Rusico, Rusico, & Keane, 2002). Research has demonstrated that functional impairment and comorbid conditions can occur even for those who have experienced a traumatic event, but do not meet full criteria for PTSD (Cukor, Wyka, Jayasinghe, & Difede, 2010; Marshall et al., 2001).

Alcohol use problems have been defined in a multitude of ways. Until recently, alcohol use disorders (AUDs) included both alcohol abuse and dependence, which also are disabling and often-unremitting problems (Hasin, Stinson, Ogburn, & Grant, 2007; National Institute on Alcohol Abuse and Alcoholism [NIAAA], 2013; Samokhvalov, Popova, Room, Ramos, & Rehm, 2010). Alcohol abuse has been defined as use that results in psychosocial impairment and is only diagnosed in the absence of alcohol dependence (APA, 2000; Hanson, 1999).

Dependence was diagnosed when alcohol was used in a maladaptive manner, and the alcohol use pattern reached a level at which the individual clearly demonstrated difficulty exerting control over drinking (NIAAA, 2013). In DSM-5, alcohol use disorder is a single diagnosis, with specifiers to denote the level of use (e.g., mild, moderate, severe; APA, 2013). Here, hazardous drinking describes a use pattern that increases risk of harm for the user and/or others (Babor, Longabaugh, Zweben, & Fuller, 1994). The current study focused on the broader hazardous alcohol use construct because of its documented public health significance, even in the absence of AUDs (Babor, Higgins-Biddle, Saunders, & Monteiro, 2001).

PTSD/Hazardous Alcohol Use Comorbidity

People diagnosed with alcohol dependence are at least two times as likely to meet criteria for PTSD (Kessler et al., 1997). Specifically, among those diagnosed with an AUD, the rates of diagnosed PTSD range from 30% to 50% (Brown et al., 1995). Additionally, approximately 28%

of women and 52% of men diagnosed with PTSD also meet criteria for an AUD (Kessler et al., 1995; Pietrzak, Goldstein, Southwick, & Grant, 2011). People suffering from comorbid PTSD/AUDs report lower educational attainment, having less income, poorer occupational functioning, poorer physical health, are more likely to be unemployed, and report higher levels of alcohol craving (Drapkin et al., 2011; Najavits et al., 1997; Ouimette et al., 1999). Additionally, they often have been exposed to more traumatic events and report more severe PTSD and general symptoms of anxiety compared to people with only one of these disorders (Bonin et al., 2000; Drapkin et al., 2011; Mills, Teeson, Ross, & Peters, 2006; Ouimette, Goodwin, & Brown, 2006; Rash, Coffee, Baschnagel, Drobles, & Saladin, 2008; Saladin, Brady, Dansky, & Kilpatrick, 1995).

Individuals receiving inpatient treatment for SUDs who were also diagnosed with PTSD endorsed longer histories of problematic substance use, were more likely to endorse a history of suicide attempts and thoughts of suicide (Bonin et al., 2000), and were more likely to meet criteria for an additional mood or anxiety disorder (Read, Brown, & Kahler, 2004). Specifically, within a nationally representative sample, comorbid PTSD/AUD was associated with an approximate 6-fold increase in endorsing a prior suicide attempt compared to each disorder alone (Rojas, Bujarski, Babson, Dutton, & Feldner, 2014). Moreover, hazardous alcohol use is strongly correlated with PTSS, making the study of alcohol use beyond diagnosable AUDs important (McDevitt-Murphy et al., 2010). Given the common co-occurrence of these problems, there has been substantial investigation of the relation between hazardous alcohol use and PTSS.

Impact on Treatment

Comorbid PTSD/AUDs have been linked to worse treatment outcomes when compared to the presence of only one diagnosis (Brown & Wolfe, 1994; Najavits, Weiss, & Shaw, 1999;

Ouimette, Brown, & Najavits, 1998; Ouimette, Finner, & Moos, 1999). Moreover, PTSD impedes treatment of alcohol use problems (Brown, Stout, & Mueller, 1999; Najavits, 2004; Norman, Tate, Anderson, & Brown, 2007; Ouimette, Ahrens, Moos, & Finney, 1997; Ouimette et al., 1999; Read et al., 2004). In fact, research has shown that PTSD symptoms can worsen with abstinence from alcohol (Brady, Killeen, Saladin, Dansky, & Becker, 1994; Kofoed, Friedman, & Peck, 1993), making the treatment of alcohol use problems particularly difficult in the presence of PTSD. Similarly, the presence of an alcohol use problem negatively impacts PTSD treatment (Boudewyns, Woods, Hyer, & Albrecht, 1991; Riggs & Foa, 2008).

Recognizing the difficulty in treating comorbid PTSD/AUDs, scholars have attempted to develop specific treatments for this constellation of problems (Abueg & Fairbank, 1992; Najavits, 2004; Najavits, Weiss, & Liese, 1996; Triffleman, 2000). Unfortunately, these targeted treatments often do not outperform active comparison conditions through follow-up assessments (Abueg & Fairbank, 1992; Hien et al., 2009; Triffleman, 2000; Zlonick et al., 2009). Accordingly, scholars have suggested that other aspects of the clinical presentation of people with comorbid PTSD/hazardous alcohol use need to be considered as treatment targets, including social functioning (Cohen & Hien, 2006). Indeed, to continue to improve treatments for comorbid PTSD/hazardous alcohol use, we need to better understand characteristics of the comorbidity that make this population more severe and harder to treat (Bonin et al., 2000).

Social Conflict as a Maintenance Factor for both PTSS and Hazardous Alcohol Use

It has been posited that psychiatric comorbidity may be due, at least in part, to factors that potentiate the maintenance of more than one disorder (Teesson & Proudfoot, 2003). Social conflict has been defined in many ways, some of which encompass a wide range of phenomena (Pruitt, 1998). Here, it is defined as perceived stress or discord in a relationship that may be

occasional, periodic, or consistent, and due to either the presence or absence of a behavior (Tilden, Nelson, & May, 1990). Importantly, social conflict has been linked to the maintenance of both PTSS and AUDs.

Social conflict can lead to stress that contributes to psychopathology (Lapore, 1992; Manuck, Kaplan, Muldoon, Adams, & Clarkson, 1991; Rook et al., 2012) or makes recovery from a disorder like PTSD more difficult (Masland & Hooley, 2015; Whisman & Baucom, 2012). Researchers have hypothesized that among individuals with PTSD, perceived ineffective communication with a partner may be interpreted as a threat, resulting in increased PTSS (Fredman et al., 2016). Indeed, elevated levels of social conflict often characterize relationships involving a person with PTSD (Dutton et al., 2014; Galovski & Lyons, 2004; Monson, Taft, & Fredman, 2009; Monson et al., 2012), subthreshold PTSD (Jakupcak et al., 2007) and hazardous alcohol use (Kachadourian et al., 2012; Taft et al., 2010). For example, men with PTSD report greater conflict with their partners than men not diagnosed with PTSD (Glen et al., 2002). Similarly, distal (e.g., alcohol problem severity, beliefs about alcohol) and proximal (e.g., alcohol use, relationship adjustment) effects of drinking in men with an AUD have been linked to elevated social conflict (Kachadourian, Taft, O'Farrell, Doron-LaMarca, & Murphy, 2012; O'Farrell & Murphy, 1995). In fact, social conflict is a predictor of relapse among hazardous drinkers (Marlatt & Gordon, 1980).

Evidence further suggests that hazardous drinkers with PTSD, compared to those with either PTSD or hazardous drinking levels alone, report more interpersonal problems (Najavits et al., 1998) and are less likely to live with a partner (Drapkin et al., 2011). Results from a recent study suggest that people with either PTSD or alcohol dependence report more social conflict, fewer family members that can be relied on for support, and greater apprehension about relying

on others compared to people without mental health problems (Dutton, Adams, Bujarski, Badour, & Feldner, 2014). Moreover, people with comorbid PTSD/alcohol dependence endorse significantly less support from their family and greater apprehension about enlisting social support than those with a single diagnosis (Dutton et al., 2014).

While the interplay among social conflict, PTSS severity, and hazardous alcohol use is undoubtedly complex and bi-directionally related across time (Taft et al., 2007), it is important to isolate and understand the nature of these relations. Social conflict is thought to maintain PTSS even beyond the ameliorative effects of social support (Joseph, Williams, & Yule, 1997; Rook & Pietromonaco, 1987). Specifically, social conflict increases environmental stress (Lapore, 1992; Manuck, Kaplan, Muldoon, Adams, & Clarkson, 1991; Rook, Luong, Sorkin, Newsom, & Krause, 2012) and is thought to negatively impact appraisals of a traumatic event (Joseph, Williams, & Yule, 1997). As a result, PTSS can be exacerbated and maintained by social conflict. Consistent with this perspective, among people experiencing elevated PTSS and anxiety, the presence of social conflict predicts symptomology above and beyond the absence of social support (Nayback-Beebe & Yoder, 2011).

Stress resulting from social conflict (Lapore, 1992; Manuck, Kaplan, Muldoon, Adams, & Clarkson, 1991; Rook et al., 2012) likely maintains hazardous alcohol use (as documented by Marlatt and Gordon [1980]), at least in part, by increasing alcohol craving (Fox, Bergquist, Hong, & Sinha, 2007). This is likely to be particularly problematic for people with elevated levels of PTSS. It is widely recognized that people with PTSD are particularly likely to drink to dampen stress responses and reduce negative affect (Dixon, Leen-Feldner, Ham, Feldner, & Lewis, 2009; Sharkansky, Brief, Pierce, Meehan, & Mannix, 1999; Smith, Feldner, & Badour, 2011; Stewart, 1996; Waldrop, Back, Verduin, & Brady, 2007). Various drug-conditioning

models hypothesize that when alcohol is repeatedly used in response to negative emotions, the negative affective state can become a conditioned stimulus that elicits conditioned drug responses, including craving (e.g., Bouton, 2000; Siegel, 1989; Stewart, de Wit, & Eikelboom, 1984). Moreover, social exchange theory suggests alcohol use problems can lead to negative family interactions, which prompt alcohol use to cope with said interactions, resulting in a bidirectional cycle of social conflict and drinking to cope (Marshall, 2003). Taken together, there is both theoretical and empirical support for predicting that social conflict will increase PTSD and alcohol craving. However, this expected pattern of results is not likely to be identical for men and women.

Sex Likely Impacts the Effects of Social Conflict

Women and men react to social conflict in different ways. Social conflict more strongly and reliably elicits psychological and physiological responses among women compared to men (Ewart, 1991; Kiecolt-Glaser, Malarkey, Cacioppo, & Glaser, 1994). For example, women evidence greater increases in depression, hostility, and systolic blood pressure in response to social conflict than men (Mayne et al., 1997). Moreover, women are more likely to both suffer from persistent posttraumatic stress symptoms (Tolin & Foa, 2006) and drink to reduce negative affect (Norberg, Norton, Oliver, & Zvolensky, 2010). In contrast, men with PTSD are approximately twice as likely to meet criteria for an AUD than women with PTSD (Feldner et al., 2009; Kessler, Sonnega, Bromet, Hughes, & Nelson, 1995). Moreover, Kaysen and Colleagues (2013) found that PTSD symptoms increase urges to drink and sex moderates links between coping motives and alcohol use among alcohol dependent people with PTSD. Taken together, women are relatively more apt to respond to social conflict with elevated stress and negative affect and, given evidence of elevated motives for drinking to reduce negative affect

among women, experience relatively greater posttraumatic stress symptom reactions and alcohol craving in response to social conflict.

There is increasing recognition that treatments for PTSD and hazardous alcohol use can be enhanced by improving social functioning (Charuvastra & Cloitre, 2008; Monson et al., 2009; Moos, 2007; Schumm, Monson, O'Farrell, Gustin, & Chard, 2015). Based on evidence that social support is the biggest predictor of recovery from traumatization (Brewin, Andrews, & Valentine, 2000), and is shown to positively correlate to treatment response (Price, Gros, Strachan, Ruggerio, & Acierno, 2013), efficacious treatments for PTSD have been developed that enlist the resources of significant others in treatment (Monson et al., 2012). Similarly, enlisting social support has been highlighted as a key process in treatments for alcohol use problems (Moos, 2007). Despite evidence indicating hazardous drinkers with PTSD experience particularly impaired social functioning, no research to date has examined the effects of social conflict on either PTSS or alcohol-related processes within this particularly vulnerable population.

Synthesis

Elevated levels of social conflict characterize the lives of hazardous drinkers who are experiencing PTSS following a traumatic event. Although research indicates social conflict may maintain both PTSS and hazardous alcohol use, there has not been an experimental test of the effects of social conflict on co-occurring PTSS and alcohol craving. Such a test would establish social conflict as a promising target for treatments of comorbid PTSD/hazardous alcohol use. Accordingly, the current study aims to conduct a controlled laboratory-based test of the effects of social conflict on 1) posttraumatic stress symptom reactions, 2) alcohol craving, and 3) alcohol approach bias. Moreover, the study will examine if the effects of social conflict differ for women

and men.

Current Study

The literature reviewed above highlights the importance of beginning to systematically study the possible maintaining factors for comorbid PTSS and hazardous alcohol use. As such, employing a laboratory model to test the effects of social conflict on PTSS, alcohol craving, and alcohol approach bias was an ideal step toward advancing our ability to treat comorbid PTSD/hazardous alcohol use (David & Montgomery, 2011; Smith, Feldner, & Badour, 2011), allowing for the isolation of the effects of factors implicated in the maintenance of psychopathology (McNally, 1994; Olatunji, Leen-Feldner, Feldner, & Forsyth 2007; Zvolensky, Lejuez, Stuart, & Curtin, 2001).

The current study sought to examine the effects of social conflict in terms of both posttraumatic stress symptom reactions and alcohol craving among people who endorse hazardous alcohol use and a history of a DSM-5 defined traumatic event. As such, the current study has six separate hypotheses under two separate aims of the study. The first aim of this study is to understand the effects of social conflict on PTSS and alcohol craving. There are two specific hypotheses within this first aim. Posttraumatic stress symptom reactions, as indexed via change in self-reported posttraumatic stress symptoms (hypothesis 1), were predicted to be greater in response to the social conflict script than the social neutral script. Similarly, alcohol craving, as indexed via change in self-reported cravings (hypothesis 2) were predicted to be greater in response to the social conflict script than the social neutral script. Finally, alcohol approach bias, measured using the Approach Avoidance Task (Wiers, Rinck, Dictus, & van den Wildenberg, 2009) were predicted to be greater in response to the social conflict script than the social neutral script. The second aim of this study was to understand how participant sex impacts

reactions to social conflict in terms of posttraumatic stress symptom, alcohol craving, and alcohol approach bias. The hypotheses within this second aim were as follows: sex would interact with social conflict such that women would evidence greater posttraumatic stress symptom reactions (hypothesis 1.a), alcohol craving (hypothesis 2.a), and alcohol approach bias (hypothesis 3.a) than men across all dependent variables described in aim 1.

Method

Participants

Overall, 62 adults over the age of 21, who reported experiencing a DSM-5 (APA, 2013) defined traumatic event and hazardous alcohol use were enrolled. A DSM-5 traumatic event includes any stressful or traumatic even in which the person endorsed threatened or actual serious injury, threatened or actual death, sexual violence, or repeated exposure to a trauma due to a job. The exposure to the traumatic even can range from experiencing it directly to learning about it happening to someone close (APA, 2013). Consistent with previous studies (e.g., McDevitt-Murphy et al., 2010), hazardous drinking was defined as a score of at least 8 on the Alcohol Use Disorders Identification Test (AUDIT) for men and at least 7 on the AUDIT for women (Babor et al., 2001). People scoring 20 or higher on the AUDIT were excluded, as this level of alcohol use problems warrants a clinical referral (Babor et al., 2001), and therefore was deemed problematic for the proposed laboratory study. Participants were also excluded if they were younger than 21, as well as for endorsing current suicidal intent, mania, or psychosis. Eligible participants were randomly assigned, stratified by sex, to receive either a neutral script followed by a social neutral script, or a neutral script followed by a social conflict script. Sixteen of these participants either screened out, or voluntarily did not complete part II of the study (the laboratory portion of the study). In total, data from 46 participants were included in the study.

See Figure 1 for a graphical representation of study enrollment, and Table 1 for a more detailed representation of participant demographic information.

Measures

Demographics. Basic demographic information was collected from participants via a paper and pencil demographics questionnaire, including information related to age, sex, race, ethnicity, education, marital status, occupation, and annual income.

Posttraumatic stress symptom severity. The Clinician-Administered PTSD Scale for DSM-5 (CAPS-5; Weathers et al., 2013) was used to assess traumatic event exposure. While there are no current published studies examining the reliability and validity of the CAPS-5, the original CAPS (Blake et al., 1995) has excellent psychometric properties, and the updated version continues to be considered a gold standard in PTSD assessment (Weathers et al., 2001). The CAPS-5 was also used to measure time since traumatic event exposures, frequency and severity of PTSS, and related impairment and distress.

Alcohol use level. Taxometric research also suggests hazardous alcohol use can usefully be studied in the absence of an AUD (Slade, Grove, & Teesson, 2009; Walters, Diamond, & Magaletta, 2010). The AUDIT (Babor et al., 2001) is a 10-item, well-established and psychometrically sound measure that is widely used to measure frequency and amount of alcohol use as well as problems resulting from use. Participants rated their problems on a scale of 0 – 4 for each problem (e.g., *Have you or someone else been injured as a result of your drinking?*). The measure was used to index hazardous drinking, defined as a score of at least 8 for men and 7 for women (Babor et al., 2001), and to index the exclusion criterion of scores of 20 or greater. Also, expired air samples were analyzed (Alcosensor FST, Intoximeter) to ensure participants were not intoxicated during the study as indicated by a reading of .00 on the breathalyzer.

Comorbid conditions. The Mini International Neuropsychiatric Interview (MINI; Sheehan et al., 1998) was used to identify current and lifetime DSM-IV Axis I diagnoses, including AUDs. Additionally, this instrument was used to identify current suicidal intent, mania, and psychosis. The MINI has excellent psychometric properties (Sheehan et al., 1997).

Perceived social support. The Medical Outcome Study Social Support Survey (MOSSS; Sherbourne & Stewart, 1991) is a 20-item measure that was used to index different domains of baseline social support including emotional/information support (e.g., *Someone you can count on to listen to you when you need to talk*), tangible support (e.g., *Someone to take you to the doctor if you needed it*), affectionate support (e.g., *Someone to love and make you feel wanted*), positive social interactions (e.g., *Someone to get together with for relaxation*), and a total support index). The MOSSS asks individuals to rate their perceived social support on a 5-point Likert-type scale (*1 = none of the time; 3 = some of the time; 5 = all of the time*). The MOSSS has demonstrated good psychometrics when used in samples with mental health issues (Gjesfjeld, Green, & Kim, 2008; Kilbourne, McCarthy, Post, Welsh, & Blow, 2007) with alpha levels consistently greater than .95.

State affect. The state version of the Positive and Negative Affect Schedule (PANAS; Watson, Clark, & Tellegen, 1988) is a 20-item measure that was used to measure baseline affective states. Participants were asked to rate their feelings and emotions *right now* (e.g., excited, upset, alert, irritable) on a 5-point Likert scale (*1 = very slightly or not at all; 3 = moderately; 5 = extremely*). The 10-item positive and negative affect subscales have good internal consistency and discriminant and convergent validity (Watson et al., 1988). The current study demonstrated a high level of internal consistency as well, with a Cronbach's alpha of .84 for the Positive Affect scale and .87 for Negative Affect scale.

Posttraumatic stress symptom reactions. Posttraumatic stress symptom reactions were measured with the Responses to Script-Driven Imagery questionnaire (RSDI; Hopper, Frewen, Sack, Lanius, & van der Kolk, 2007). The RSDI has adequate psychometric properties for measuring symptom reactions to script-driven imagery procedures (Hopper et al., 2007). The RSDI is an 11-item measure that asks participants to rate their experience following the script driven imagery procedure on a 7-point, Likert-type scale (e.g., *Did you avoid thoughts about the event?*). Of note, the wording of select questions of the RSDI was modified slightly to help clarify for participants that they should be rating current symptoms related to the traumatic event, rather than related to the event in the script driven imagery procedure (e.g., “Did you feel as though the *traumatic* event was reoccurring, like you were reliving it?”).

Alcohol craving. Alcohol craving was measured using self-reported visual analog scale ratings (from 0-100) of alcohol craving using a sliding scale on the computer (Coffey, 2010; Kozlowski, Pillitteri, Sweeny, Whitfield, & Graham, 1996). Although there is inconsistency in how craving is conceptualized (Rohsenow & Monti, 1999; Tiffany, 1999), the measure we adopted allows for examining of current self-reported craving or want for alcohol (Coffey et al., 2010; Kaysen et al., 2013), which is consistent with the hypothesized impact of social conflict on state alcohol craving, thereby allowing us to address our primary aim.

Alcohol approach bias. The alcohol-related Approach Avoidance Task (Weirs, Rinck, Dictus, & van den Wildenberg, 2009) measures alcohol approach bias by presenting individuals with pictures from multiple categories: alcohol, other appetitive pictures matched for color and shape (e.g., soft drinks), and general positive and general negative pictures from the International Affective Picture System (IAPS; Lang, Bradley, & Culbreth, 2001). Movement assignments are counterbalanced such that participants are instructed to either push landscape pictures away from

them and pull portrait pictures towards them or vice versa. Approach bias is measured by the difference between pushing and pulling median reaction times for both script presentation (neutral vs. conflict; between-subjects) and picture type (within-subject) with a positive difference score indicative of an approach bias (Fleming & Bartholow, 2013; Weirs et al., 2009). This task correlates with sensitivity to alcohol (Fleming & Bartholow, 2013), working memory capacity (Sharbanee et al., 2013), and genetic risk for alcohol use problems among heavy drinkers (Weirs et al., 2009), suggesting adequate convergent validity.

Design Overview

A 2 (condition: neutral/social neutral scripts, neutral/social conflict scripts) by 2 (sex: female, male) by 5 (repeated self-report of craving: baseline, pre- and post-1st and 2nd script-driven imagery procedure) or 2 [Responses to Script Driven Imagery questionnaire (Hopper et al., 2007): post-1st and 2nd script driven imagery procedure] or 3 [Alcohol Approach Avoidance Task (Weirs et al., 2009): baseline, post-1st and 2nd script driven imagery procedure] mixed factorial design was employed. Individual participants attended one laboratory session (part II), with the option to complete a portion of the questionnaire battery (part I) online prior to their appointment in the laboratory. Screening measures were used to determine eligibility and a baseline assessment was used to measure factors related to the primary hypotheses. Random assignment (stratified by sex) was used to assign participants to condition, followed by a script-driven imagery procedure presenting idiographic neutral and social scripts, with one of two conditions including a social conflict script. Primary dependent variable measures were completed at baseline (with the exception of the RSDI) and after each script presentation.

Procedure

Participants were recruited with the help of flyers placed around campus and the

community, as well as advertisements published in the daily email news flyer published by the University, and played on the campus radio station. Interested individuals were invited to contact the principal investigator for more information. Initially, individuals interested in enrolling in the study were screened over the phone as a preliminary screen for determining eligibility. Those who met initial screen-in criteria were invited to the lab to complete a more detailed screening process, including the MINI and the CAPS-5 to determine whether or not they met inclusion/exclusion criteria. Potentially eligible individuals first provided written informed consent, which included a detailed study description. They then completed the baseline assessment described above. Ineligible participants were compensated \$10 and debriefed.

Random assignment (stratified by participant sex) was used to assign participants to one of two conditions. The neutral/social neutral script condition consisted of administering one individualized neutral script followed by an individualized neutral social script. The neutral/social conflict script condition consisted of administering an individualized neutral script, followed by an individualized social conflict script. Individualized 60-sec scripts were developed based on published procedures (e.g., Pitman et al., 1987; Weinstein, Lingford-Hughes, Martinez-Raga, & Marshall, 1998). Participants worked with the experimenter to develop one neutral script (e.g., mundane every-day activity), one neutral social script (e.g., mundane social interaction), and a social conflict script (e.g., argument with a friend). Script topics did not involve alcohol use or the identified DSM-5 defined criterion A traumatic event to avoid possibly confounding the social conflict manipulation with alcohol or trauma-related imagery. To develop the scripts, all participants (1) provided a brief written account of the neutral and both types of social situations and (2) completed a checklist of bodily sensations relevant to each situation (e.g., racing heart, sweating palms). The written accounts and bodily sensations

endorsed were incorporated into the scripts to maximize reactivity to the scripts via inclusion of both stimulus and response propositions (e.g., Lang et al., 1980). This information was then compiled into 3 60-sec digital audio recordings that were employed to elicit neutral, neutral social, and social conflict imagery.

Recorded scripts were then played to participants in the experimental room in the Intervention Sciences Laboratory (ISL). This room contained a chair, computer for script playback, and equipment for self-report measure administration. Once seated in the experimental room, participants completed a 5-min relaxation period. Depending on random assignment, participants were presented with a neutral script followed by either the neutral social script or the social conflict script. Participants completed pre-script craving ratings, followed by presentation of the initial neutral script. Each 60-sec script was preceded by a 30-sec baseline period and followed by a 30-sec rehearsal period when participants were asked to imagine each script-driven image as vividly as possible. Participants then completed the RSDI, craving ratings, and AAT. After a 5-min relaxation period, pre-script self-report craving ratings were completed. Participants were then presented with the second script (the content of which depended on condition assignment as describe above). Then, participants completed the RSDI, self-report craving ratings, and AAT one final time. Upon completion of the imagery procedure participants were fully debriefed and compensated \$55.

Data Analytic Strategy

Prior to conducting the proposed analyses, descriptive statistics were obtained for all variables of interest and relevant assumption tests were conducted. A series of analyses including chi-squared analyses and one-way ANOVAs were used to test condition equivalence in regards to baseline characteristics to validate the efficacy of random assignment. This included a

comparison of demographic (e.g., age, race, income) as well as other relevant factors (e.g., social support, posttraumatic stress symptoms, and alcohol use symptoms) characteristics. Zero-order correlations were assessed for all primary variables of interest (i.e., posttraumatic stress symptoms, alcohol use symptoms, and baseline social support).

A series of mixed-factorial analyses of variance (ANOVAs) were conducted to test the hypothesis that social conflict would be associated with 1) increased state posttraumatic stress symptoms, 2) increased state alcohol craving, and 3) increased alcohol approach bias when compared to the social neutral group. Three separate three-way ANOVAs were conducted to test for condition by sex interactions. This approach yielded 3 separate 2 (condition) by 2 (sex) by 5 (repeated craving ratings) or by 2 (RSDI measurements) or by 3 (AAT measurements) repeated measures ANOVAs. Post-hoc probing of interactions was completed as recommended (Holmbeck, 2002).

Results

Table 1 includes descriptive data for the groups separated by script condition. One-way ANOVAs and chi-squared analyses supported the effectiveness of random assignment by demonstrating no significant group differences on variables of interest (i.e., AUDIT score, CAPS symptom severity, and baseline social support). As such, no additional variables were added as covariates into the proposed analyses. Table 2 outlines the zero-order correlations between all variables of interest. Of note, posttraumatic symptom severity was significantly negatively associated with perceived tangible social support ($r = -.32, p < .05$) and positive social interactions ($r = -.35, p < .05$).

The data was analyzed for missing data and outliers prior to examining the main analyses (i.e., mixed-factorial ANOVAs) to test the primary hypotheses. Four participants endorsed

extreme scores that had a studentized residuals with an absolute value greater than 3 (Laerd Statistics, 2015). These data were excluded for the analyses in which the outlier existed (i.e., outliers on the AAT outcome variable were excluded only on the AAT ANOVA) to reduce the skewness of the dependent variable, as well as increase the power of the analysis (Myers, Well, & Lorch, 2010).

Prior to testing hypothesis 1, assumption tests revealed that there was homogeneity of variances, as assessed by Leven's test of homogeneity of variance ($p > .05$) as well as homogeneity of covariances, as assessed by Box's test of equality of covariance matrices ($p = .07$). Given that there are only two levels of the within-subject factor, the assumption of sphericity is automatically met. Consistent with hypothesis 1, there was a significant interaction between experimental condition (social neutral script vs. social conflict script) and time on state PTSS [$F(1, 36) = 14.54, p = .001, \text{partial } \eta^2 = .28$]. Follow up simple main effects test revealed a statistically significant difference in state PTSS between experimental groups following the presentation of the experimental script (i.e., social conflict or social neutral scripts) [$F(1, 37) = 3.8, p = .05, \eta^2 = .09$], with the social conflict group reporting greater state PTSS ($M = 27.47, SD = 2.75$) than the social neutral group ($M = 20.47, SD = 2.75$); however, there was not a significant difference following the neutral script [$F(1, 40) = 1.09, p = .30, \eta^2 = .02$]. Similarly, the social neutral group did not demonstrated a significant change in state PTSS across time (i.e., from the neutral script to the experimental script) [$F(1, 18) = .62, p = .43$]; however, those who received the social conflict script second did demonstrate a significant increase in reported state PTSS from the neutral script ($M = 17.42, SD = 2.57$) to the conflict script ($M = 27.47, SD = 2.75$), [$F(1, 18) = 19.64, p < .001$]. See Figure 2 for a graphical representation.

Assumption testing related to hypothesis 2 revealed homogeneity of variances, as

assessed by Leven's test of homogeneity of variance ($p > .05$); however, the homogeneity of covariances assumption, as assessed by Box's test of equality of covariance matrices ($p = .00$) and the sphericity assumption, as assessed by Mauchly's Test of Sphericity ($p = .01$) were violated. As a result, the interaction term was not interpreted and all statistics reported are Greenhouse-Geisser values. Contrary to the hypothesis, there was not a significant group by time interaction on reported craving [$F(2.96, 76.98) = 0.12, p = .94, \eta^2 = .005$]. In addition, there was a non-significant main effect of time (craving) [$F(2.96, 76.98) = 2.17, p = .09, \eta^2 = .07$] and group [$F(1, 26) = 0.92, p = .34, \eta^2 = .034$]. See Figure 3 for a graphical representation.

Assumption test related to hypothesis 3 revealed homogeneity of variances, as assessed by Leven's test of homogeneity of variance ($p > .05$), the homogeneity of covariances assumption was met, as assessed by Box's test of equality of covariance matrices ($p = .42$), and the sphericity assumption was not violated ($p = .08$), as assessed by Mauchly's Test of Sphericity. There was a non-significant interaction between time and alcohol approach bias [$F(2, 82) = 1.55, p = .21, \eta^2 = .037$]. Similarly, there were no main effects of approach bias [$F(2, 82) = 1.03, p = .36, \eta^2 = .025$] or group [$F(1, 41) = 1.80, p = .18, \eta^2 = .042$]. See Figure 4 for a graphical representation.

Sex

Three-way mixed ANOVAs were used to address aim 2 of the study and examine the impact of sex on the three hypotheses. Initial assumption testing for hypothesis 1.a indicated homogeneity of variance for PTSS at script 2 (i.e., the experimental script; $p = .97$), but not at script 1 (i.e., the neutral script; $p = .005$). Given that there are only two levels of the within-subject factor, the assumption of sphericity is automatically met. Since there were violations of normality in some of the cells, as well as violations of homogeneity of variance ($p = .004$), a log

transformation was performed. While the transformation addressed the assumption violations, it did not alter the findings; therefore, for interpretation purposes, statistics from the non-transformed analyses are presented. When examining sex, experimental condition, and PTSS, there was not a significant three-way interaction [$F(1, 34) = .93, p = .34, \eta^2 = .027$]. The PTSS by experimental condition interaction remained significant [$F(1, 34) = 13.94, p = .001, \eta^2 = .291$]; however, the PTSS by sex interaction was not significant [$F(1, 34) = .58, p = .45, \eta^2 = .017$], nor was the sex by experimental condition interaction significant [$F(1, 34) = .004, p = .94, \eta^2 = .000$]. See Figures 5 and 6 for graphical representations.

The three-way interaction between sex, experimental condition, and craving (hypothesis 2.a) was assessed as well. Assumption tests revealed that the assumption of normality was not met in all cells, the assumption of equality of covariance was approaching significance ($p = .057$), and the assumption of sphericity was violated ($p = .01$). The homogeneity of variance assumption was met for all levels of assessment ($p = .39; p = .14; p = .32; p = .37; p = .49$). As a result, the craving ratings were transformed using a log transformation to determine if transformation would improve the outcomes. There were no significant changes in the findings when using the log transformations, so for interpretation purposes, the original analyses are reported with Greenhouse-Geisser values. The three-way interaction between sex, experimental condition, and craving was not significant [$F(2.89, 72.37) = .89, p = .44, \eta^2 = .03$]. Similarly, there was not a significant two-way interaction between sex and craving [$F(2.89, 72.37) = .16, p = .91, \eta^2 = .006$] or sex and group [$F(1, 25) = .12, p = .72, \eta^2 = .005$]. See Figures 7 and 8 for graphical representations.

When examining the three-way interaction between sex, experimental condition, and alcohol approach bias (hypothesis 3.a), the assumptions of equality of covariance ($p = .02$),

sphericity ($p = .00$), and normality were violated. The assumption of homogeneity of variance was met. As a result, a log transformation was performed on the data; however, the findings were not impacted by the transformation, and as such the non-transformed findings, with Greenhouse-Geisser values, are reported to aid in interpretability. The three-way interaction between sex, experimental condition, and alcohol approach bias was non-significant [$F(1.50, 61.74) = .15, p = .79, \eta^2 = .004$]. In addition, there was a non-significant interaction between alcohol approach bias and sex [$F(1.5, 61.74) = .57, p = .51, \eta^2 = .01$], as well as experimental condition and sex [$F(1, 41) = .34, p = .56, \eta^2 = .008$]. See Figures 9 and 10 for graphical representations.

Exploratory Analyses

Related to hypothesis 1, the Response to Script Driven Imagery (RSDI; Hopper et al., 2007) was used to assess state posttraumatic stress symptoms following the presentation of two idiographic scripts. The wording of the measure was altered slightly in the current study to emphasize to participants that they should rate symptoms related to the traumatic event assessed during the CAPS-5, rather than the event they heard in during the script driven imagery procedure (e.g., “Did you feel as through the *traumatic* event was reoccurring, like you were reliving it?”). In an effort to gain more confidence that the significant findings related to state PTSS were indeed elicited by social conflict, follow up analyses examining the pattern of results for anxiety ratings were examined as well. One participant was excluded from this analysis due to extreme responses on more than one data point. Assumption tests revealed that the equality of covariances was violated ($p = .009$), as was sphericity ($p = .004$). The assumption of homogeneity of variance was met for all five assessment points ($p = .25; p = .34; p = .99; p = .09; p = .32$). There was a significant two-way interaction between anxiety rating and experimental condition [$F(2.81, 81.65) = 3.65, p = .01, \eta^2 = .11$], Greenhouse-Geisser values

reported. Sig differences were at baseline [$F(1, 36) = 4.26, p = .04, \eta^2 = .10$], and approaching significance at pre-script 2 [$F(1, 33) = 3.94, p = .05, \eta^2 = .10$]. There was a significant decrease in anxiety scores for those in the social neutral group [$F(2.61, 39.23) = 3.19, p = .01, \eta^2 = .17$], and a significant increase in anxiety for those in the social conflict group [$F(2.19, 30.75) = 3.12, p = .05, \eta^2 = .18$]. See Figure 11 for a graphical representation.

One interesting pattern that emerged, was the trend for the control group to report increased levels of craving or alcohol approach bias following the social neutral script. It is important to note that this was not a significant finding, but rather a pattern of interest. These findings seem consistent with empirical support that suggests that some individuals crave alcohol to regulate positive affect as well as negative affect following the presentation of both a neutral script and alcohol cues (Nosen et al., 2012). As a result, exploratory analyses were performed to examine whether happiness ratings were significantly different for the experimental groups as a possible explanation for the increase in craving following the social neutral script presentation. The assumption of equality of covariance was violated ($p = .02$) and the assumptions of homogeneity of variance were violated for the baseline rating of happiness ($p = .02$) as well as the pre-script 1 rating ($p = .008$). The homogeneity of variance assumption was met for the remaining time points ($p = .41; p = .15; p = .18$) and sphericity assumption was met as well ($p = .17$). A log transformation did not fix these assumption violations. Prior to the transformation, the data was fairly normally distributed; however, there was incomplete data for approximately 10 participants. There was a significant two-way interaction between happiness ratings and experimental condition [$F(4, 136) = 3.89, p = .005, \eta^2 = .103$]. Simple main effects tests revealed that the experimental conditions did not significantly differ on happiness ratings at any of the five time point assessments. There was a statistically significant increase in happiness for the

social neutral group [$F(4, 72) = 3.05, p = .02, \eta^2 = .14$], and a significant decrease in happiness ratings for the conflict group [$F(2.51, 64) = .8.0, p < .001, \eta^2 = .334$], with Greenhouse-Geisser values reported. See Figure 12 for a graphical representation.

To confirm the null findings related to hypothesis 3, in the event that individuals were unclear what “craving” meant, a two-way ANOVA was also conducted on an additional self-reported measure of alcohol craving, in which participants were asked how much they wanted a drink at that time. Similar to the original craving analysis, the assumption of equality of covariances and sphericity were violated ($p < .001$). The assumption of homogeneity of variance was met for all time points ($p = .93; p = .63; p = .58; p = .98; p = .28$). A log transformation yielded the results non-significant for both the two-way interaction [$F(2.44, 31.78) = 0.98, p = 0.40, \eta^2 = 0.07$] as well as the main effects of time [$F(2.44, 31.78) = 1.67, p = 0.20, \eta^2 = 0.11$] and experimental condition [$F(1, 13) = 0.70, p = 0.41, \eta^2 = 0.05$], with Greenhouse-Geisser values reported. See Figure 13 for a graphical representation.

Finally, to statistically assess whether sample size may have resulted in being underpowered to find significant results, a post hoc power analysis was run using G*Power 3.1. When powered at .8, utilizing the exact partial eta squared values from the interactions listed above, a total of 44 participants would be needed to see a significant effect in the alcohol approach bias, and 240 participants would be needed to see the significant effect for the craving outcome. Given these analyses, it seems possible that the current study is underpowered to see significant results related to alcohol craving.

Discussion

Current literature has documented the frequency of co-occurring of hazardous alcohol use and PTSS following exposure to a traumatic event. To date, research has identified social

conflict as a factor that commonly co-occurs with alcohol use and PTSS, but has yet to experimentally test of the effects of social conflict on co-occurring PTSS and alcohol craving. Given the psychosocial impacts of PTSS and hazardous alcohol use, researchers have called for increase understanding of the mechanisms that may be maintaining this comorbidity, therefore identifying a possible target in treatment. Therefore, the current study aimed to address this gap in the literature by examining whether social conflict elicited an increase in 1) state posttraumatic stress symptoms 2) self-reported alcohol craving, and 3) alcohol approach bias.

Consistent with hypothesis 1, there was an interaction between PTSS and experimental condition such that those who received the social conflict script evidenced significantly greater levels of reported PTSS from their neutral script, and compared to those who received the social neutral script. Utilizing idiographic social conflict scripts in this context is a novel task; therefore, to confirm that the RSDI was indeed measuring PTSS, anxiety ratings were examined as well. Consistent with the PTSS findings, anxiety ratings significantly decreased for those in the social neutral condition and significantly increased for those in the social conflict condition, lending support to the finding that participants in the current study reported higher state PTSS following the social conflict script. Given that PTSS is associated with increased levels of social conflict, and the bidirectional nature of the relation between PTSS and social conflict following an increased time since the traumatic event, these findings seem to confirm one direction of this complex relationship. It has been hypothesized that intimate relationships with high levels of conflict can not only impede recovery from PTSS (Hooley, 2007; Masland & Hooley, 2015; Whisman & Baucom, 2012), but can also be perceived as a threat and exacerbate PTSS (Fredman et al., 2016). Within this context, the presentation of conflict via the script driven imagery procedure in the laboratory could potentially serve as a threatening stimuli for the

individual, thus eliciting an increase in PTSS. An alternative hypothesis is that the idiographic conflict scripts elicited an increase in PTSS symptoms via an increase in negative affect.

Contrary to hypothesis 2, social conflict did not differentially elicit self-reported alcohol craving across the five assessment time points. It is possible that participants were not familiar with the term craving, and as a result, may not have accurately recorded alcohol cravings; however, exploratory analyses revealed non-significant findings for questions asking participants how much they “wanted a drink”. Therefore, it is reasonable to infer that in this sample, self-reported craving did not significantly interact with script condition. It may be posited that given the small sample size, the current sample is underpowered to detect significant differences. Indeed, post hoc power analyses revealed that a sample of over 200 participants would be needed to detect a significant difference. In addition, given that this sample is trauma-exposed and endorsed hazardous alcohol use, they may be less symptomatic, allowing for fewer opportunities in which the learning process that typically takes place in the self-medication model to occur. Future research would benefit from replication of this study with a more symptomatic, larger sample that may be more likely to be experiencing difficulties related to PTSD, alcohol use, and conflict. The current sample can only be generalized to individuals who are engaging in hazardous alcohol use and have a history of trauma exposure. Given that a large majority of individuals who report for either AUD or PTSD treatment with comorbid difficulties meet criteria for both disorders (Brown et al., 1995; Kessler et al., 1997), it will be important to replicate this study in a sample diagnosed with both PTSD and an AUD.

Finally, in contrast to hypothesis 3, there was not a significant interaction between experimental condition and alcohol approach bias. While this is a relatively novel assessment of alcohol craving designed to assess automatic approach vs. avoidance to alcohol cues, it was

expected that those participants receiving the social conflict script would evidence greater alcohol approach bias compared to those who received the social neutral script. It is possible that the idiographic script presentation was not robust enough of a conflict manipulation to maintain an effect though the assessment of three dependent variables. Within this particular study design, the AAT was completed after the participant completed the RSDI and self-reported craving and affect measures. Future research may benefit from utilizing more potent conflict tasks (e.g., Taylor Aggression Paradigm; Taylor, 1967) and reducing the time between the task and the completion of the AAT. It is also possible that the current study was underpowered to detect significant findings.

Taken together, participants in the current study demonstrated increased PTSS in response to social conflict, but did not demonstrate significant alcohol craving or alcohol approach bias. Due to inclusion and exclusion criteria, it is possible that the current study participants had experienced enough of a reduction in PTSS symptoms (i.e., were not symptomatic enough), that their existing PTSS had not led to a significant increase in social conflict to result in drinking to dampen stress responses or reduce negative affect (Dixon, Leenfeldner, Ham, Feldner, & Lewis, 2009; Sharkansky, Brief, Pierce, Meehan, & Mannix, 1999; Smith, Feldner, & Badour, 2011; Stewart, 1996; Waldrop, Back, Verduin, & Brady, 2007). This might imply that the drug condition process that sometimes takes place and leads to avoidance of conflict with alcohol (Marshall, 2003), may not be present in the current sample. An alternative hypothesis is that the conflict manipulation may have been strong enough to elicit PTSS, but not strong enough to elicit alcohol craving or alcohol approach bias. Finally, it cannot be ruled out that this participants simply did not experience craving or alcohol approach bias in response to conflict or an increase in PTSS. However, given that other studies have demonstrated a

correlation between PTSS and self-reported craving (Saladin et al., 2003), and the current study found an association between social conflict and PTSS, it will be important to replicate these findings before concluding that social conflict does not elicit alcohol craving or approach bias.

Future studies utilizing a longitudinal design would allow researchers to perform cross lag analyses to look at the influence of PTSS, conflict, and alcohol craving or approach bias across time. This study design would be particularly salient to look at how the interaction of these difficulties change not only over time, but also time since trauma. Difficulty recovering from a traumatic event can often lead to symptoms that results in social isolation and conflict (Kaniasty & Norris, 2008), sometimes leaving individuals needing a method of coping with the ongoing stress of PTSS and family conflict. Indeed, a recent study by Fredman and colleagues (2016) found that PTSS at time one predicted dysfunctional communication at time 2 among a community sample of individuals who had recently experienced a motor vehicle accident, and that effortful avoidance specifically predicted greater conflict at time 2. Additionally, future research may benefit from examining these phenomena in a naturalistic setting among individuals who meet criteria for PTSD and AUD. Utilizing an assessment method like a smart phone app for tracking and administering real-time assessments during conflict or times when the individual is experiencing PTSD triggers or alcohol cravings would allow for a more naturalistic study. To extend this line of research into the treatment domain, researchers might consider measuring conflict or mutual aggression at multiple time points during a couples-based PTSD treatment like Cognitive Behavioral Conjoint Therapy for PTSD (Monson et al., 2012) to examine the change in and impact of conflict across treatment.

There are several important limitations to note in the current study. First, a slightly modified, self-report measure of state posttraumatic stress symptoms used (i.e., Response to

Script Driven Imagery; Hopper et al., 2007). Unique to this measure and experiment, it is possible that participants may have been rating symptoms elicited in regards to the social conflict script rather than the traumatic event. Steps were taken to prevent this confusion, including adding the word “traumatic” before the word “event” throughout the measure to help participants distinguish their ratings between the traumatic event assessed during the CAPS-5, and the events depicted in the script driven imagery procedure. Nevertheless, future studies should utilize additional methods (e.g., physiological measurements) to better understand potential state posttraumatic stress responses to social conflict. Similarly, the MINI used in this study was based on the DSM-IV criteria as the DSM-5 version had not been released at the time this study began. Future studies will benefit from utilizing all measures based on DSM-5 criteria.

Finally, the current study aimed to isolate one important aspect of the common PTSD and AUD comorbidity. It is likely that there are other processes at work related to both trauma exposure and substance use. For example, there was a high comorbidity of marijuana use in sample ($n = 26$; 56%), more so than any other substance. It is possible that participants are using marijuana (Bonn-Miller, Vujanovic, Feldner, Bernstein, & Zvolensky, 2007) or a combination of both marijuana and alcohol to cope with negative affect or PTSD symptoms. Future studies may benefit from accounting for participants’ substance of choice to cope with negative affect or PTSD symptoms. Furthermore, the literature supports the idea that individuals with substance use difficulties use substances to cope, but also for other reasons (e.g., regulate positive affect; Nosen et al., 2012). As a result, we may have captured an increase in craving as a result of neutral social scripts increasing positive affect. Analyses of the VAS happiness ratings following the social neutral scale seem to support this hypothesis. Future studies may benefit from a more thorough assessment of use motives and coping substance of choice to idiographically tailor the

experimental task and outcome variables.

These limitations notwithstanding, there are a few important findings that can be drawn from this novel laboratory study of the effects of social conflict on state posttraumatic stress symptoms, alcohol craving, and alcohol approach bias. There are significant domains of literature looking at co-morbid PTSD and alcohol use, as well as social conflict as it relates to PTSD and alcohol use independently. This is the first study to experimentally manipulate social conflict in the laboratory via idiographic script-driven imagery procedures to examine the impact of social conflict on state PTSS, alcohol craving, and alcohol approach bias. The methods used in the current study allowed for the experimental test the role of social conflict on PTSS and factors related to hazardous alcohol use. Although this specific test did not evaluate all factors and temporal patterning involved in the complex interplay among social conflict, PTSS, and hazardous alcohol use, it provided important experimental evidence supporting treatment development focused on reducing social conflict. This type of experimental evidence is crucial to the development of evidence-based psychosocial therapies generally (David & Montgomery, 2011), and developing treatments for comorbid PTSD and alcohol use problems specifically (Stewart, 1996). Moreover, this approach allowed for state-of-the-art assessment of constructs central to the psychopathology of interest (e.g., real-time assessment as opposed to sole reliance on retrospective self-report). So while this study may have lower external validity and not generalize beyond those with trauma exposure and hazardous alcohol use, it allowed for a prioritization of internal validity. Therefore, while considering the limitations of the current study, it can be concluded that social conflict may increase state posttraumatic stress symptoms, but additional studies are needed to confirm this finding and the lack of association between social conflict and alcohol craving or approach bias.

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Table 1

Demographics for Groups by Script Condition

Variable	Social Neutral Group (n = 24)		Social Conflict Group (n = 22)	
	M(SD) or % (n)	Range	M(SD) or %	Range
Age	27.75 (6.49)	21 – 41	26.50 (9.65)	21 - 64
Sex (Female)	50% (12)	-	54.5% (12)	-
Race				
Caucasian	79.2% (19)	-	90.9% (20)	-
African American	0	-	4.5% (1)	-
Native Hawaiian/Pacific Islander	0	-	0	-
Asian	12.5% (3)	-	0	-
American Indian/Alaska Native	0	-	0	-
Multi-racial	4.2% (1)	-	4.5% (1)	-
Other	4.2% (1)	-	0	-
Ethnicity (Non-Hispanic)	91.7% (22)	-	86.4% (19)	-
Income	19262.18 (16975.50)	0 - 55000	14361.11 (12307.10)	0 - 50000
Education				
Graduated High School	8.3% (2)	-	0	-
Some College	25% (6)	-	68.2% (15)	-
Graduated College	29.2% (7)	-	9.1% (2)	-
Some Graduate School	29.2% (7)	-	4.5% (1)	-
Completed Graduate School	8.3% (2)	-	18.2% (4)	-
Marital Status				
Married	12.5% (3)	-	13.6% (3)	-
Separated/Divorced/Widowed	8.4% (2)	-	0	-
Single	62.5% (15)	-	77.3% (17)	-
Cohabiting	16.7% (4)	-	9.1% (2)	-

Table 1

Demographics for Groups by Script Condition (Cont.)

Variable	Social Neutral Group (n = 24)		Social Neutral Group (n = 24)	
	M(SD) or % (n)	Range	M(SD) or % (n)	Range
AUDIT Score	11.25 (4.64)	4 – 24	10.00 (4.59)	-
CAPS Score	21.69 (11.23)	3 – 38	17.10 (9.25)	2 – 42
Emotional Information Support	4.14 (.88)	2.38 – 5	3.38 (1.26)	1 – 5
Tangible Support	3.61 (1.2)	1 – 5	3.91 (1.07)	1.25 – 5
Affectionate Support	4.07 (1.15)	1.33 - 5	4.03 (1.07)	1 – 5
Positive Social Interaction	4.21 (1.12)	1 – 5	4.06 (.94)	1.67 – 5
Overall Support Index	4.00 (.95)	1.84 – 5	3.93 (1.03)	1.89 – 5

Table 2

Correlations Among Dependent Variables and Inclusion Variables

	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
1.	.09	.06	.14	.03	.16	.12	.04	.08	.17	.31	.18	.09	.07	-.04	-.34*	-.03
2.	-	-.01	-.32*	-.09	-.35*	.91**	.14	.06	-.03	.01	-.02	.13	.16	-.03	-.01	.22
3.	-	-	.62**	.82**	.56**	.87**	-.04	-.30	-.10	-.13	-.20	-.32	-.31	-.35*	.12	-.10
4.	-	-	-	.76**	.73**	.92**	-.43**	-.30	.05	-.12	-.19	-.33	-.20	-.01	.15	-.16
5.	-	-	-	-	.71**	.80**	-.16	-.26	-.02	-.05	-.09	-.23	-.24	-.22	.16	-.08
6.	-	-	-	-	-	-	-.01	-.01	.16	.09	-.07	-.01	-.10	-.15	-.07	-.34*
7.	-	-	-	-	-	-	-.19	-.26	-.01	-.09	-.19	-.30	-.27	-.24	.14	-.18
8.	-	-	-	-	-	-	-	.55*	.28	.35	.29	.50**	.31	-.14	-.08	.03
9.	-	-	-	-	-	-	-	-	.21	.33	.25	.36	.51**	-.07	-.06	-.02
10.	-	-	-	-	-	-	-	-	-	.86**	.78**	.79**	.74**	.16	-.06	-.38*
11.	-	-	-	-	-	-	-	-	-	-	.87**	.89**	.75**	-.13	-.17	-.22
12.	-	-	-	-	-	-	-	-	-	-	-	.81**	.86**	-.15	-.10	-.06
13.	-	-	-	-	-	-	-	-	-	-	-	-	.81**	-.13	-.05	-.02
14.	-	-	-	-	-	-	-	-	-	-	-	-	-	-.19	-.01	-.10
15.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-.06	-.01
16.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-.01

Note: $N = 44$. 1 = Alcohol Use Disorders Identification Test; 2 = Posttraumatic Stress Symptoms; 3 = Emotional Support; 4 = Tangible Support; 5 = Affection; 6 = Positive Social Interaction; 7 = Total Social Support; 8 = Response to Script Driven Imagery- Neutral; 9 = Response to Script Driven Imagery- Experimental; 10 = Baseline Craving; 11 = Pre-Script 1; 12 = Post-Script 1; 13 = Pre-Script 2; 14 = Post-Script 2; 15 = Approach Avoidance Task-Baseline; 16 = Approach Avoidance Task-Neutral; 17 = Approach Avoidance Task-Experimental.

* $p < .05$ and ** $p < .01$.

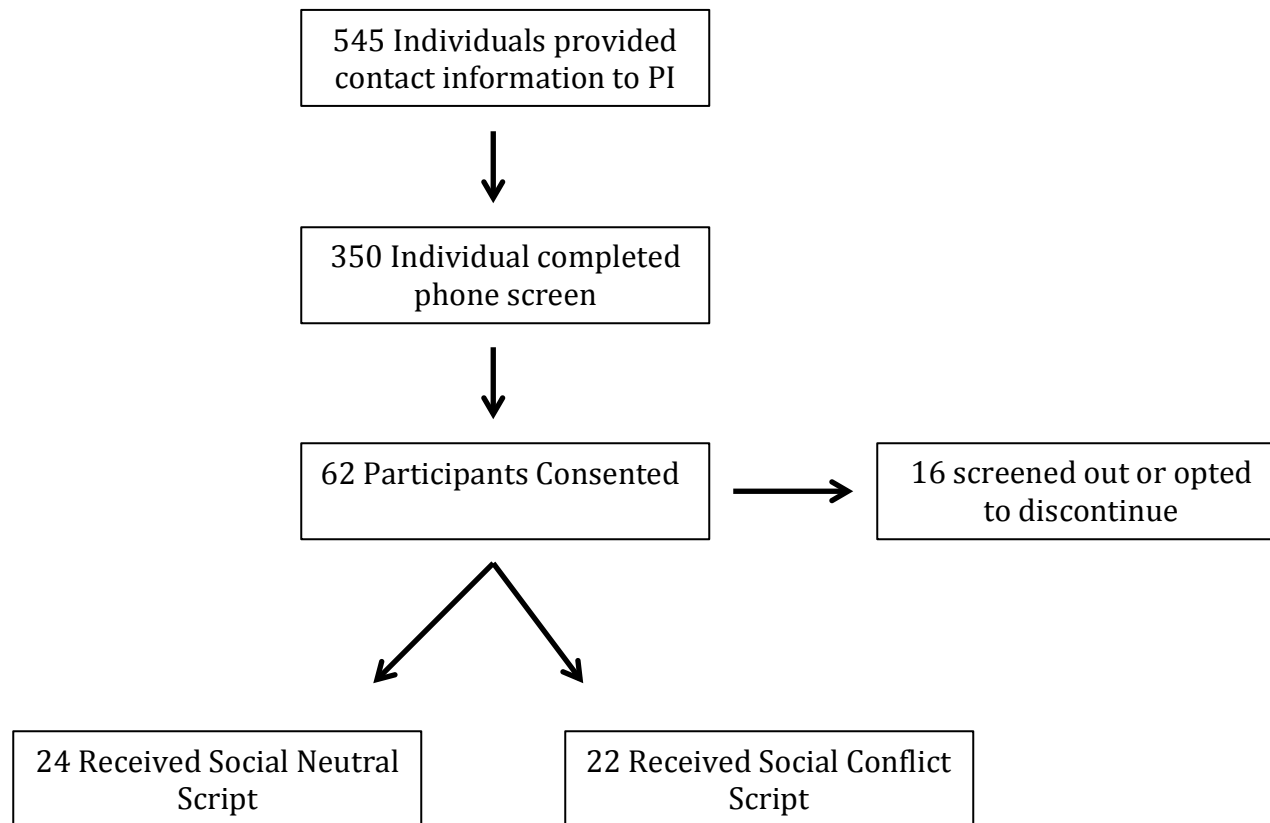


Figure 1. Study recruitment and enrollment flow chart.

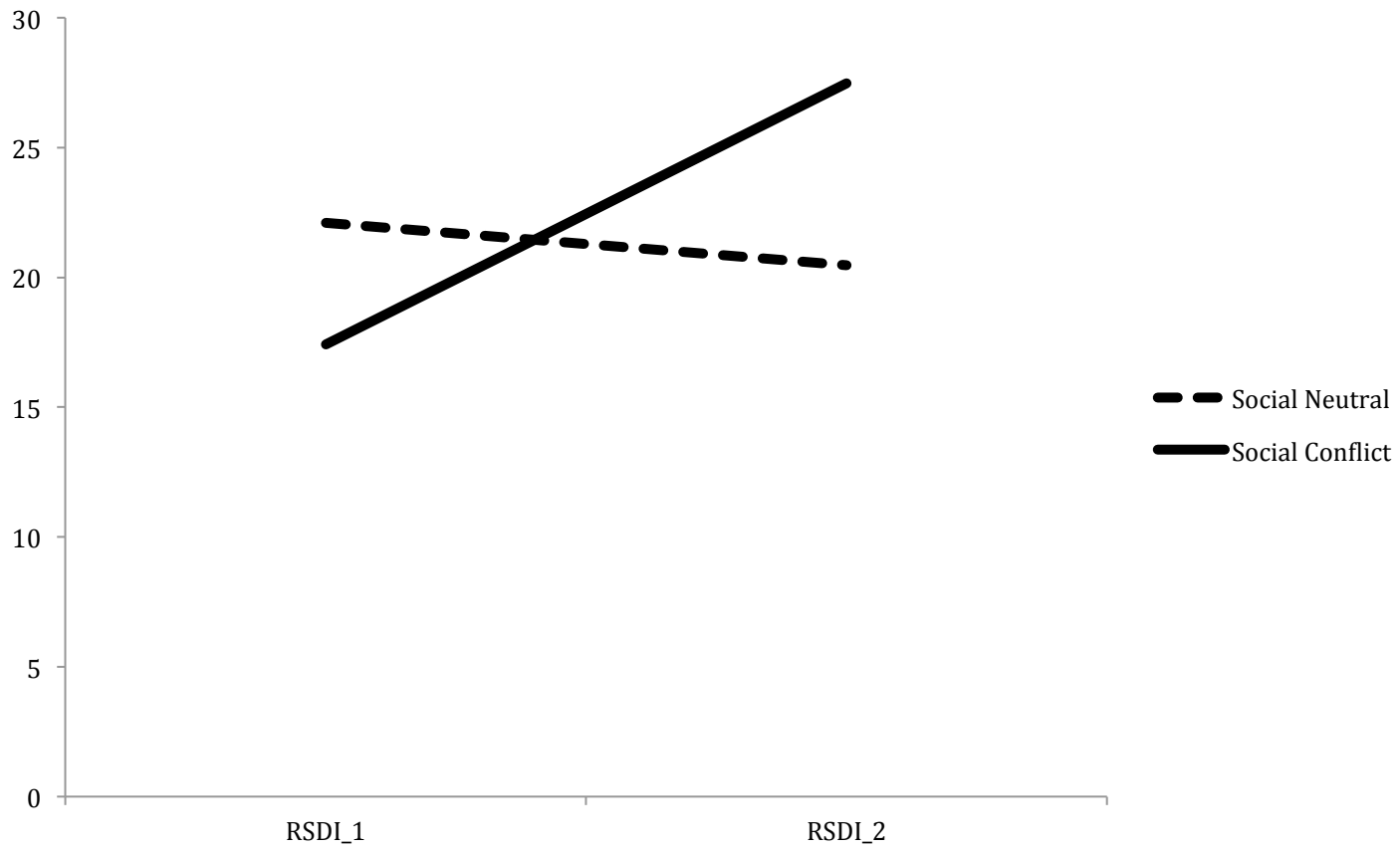


Figure 2. Changes in posttraumatic stress symptoms measured by the Response to Script Driven Imagery Questionnaire. RSDI: Response to Script Driven Imagery.

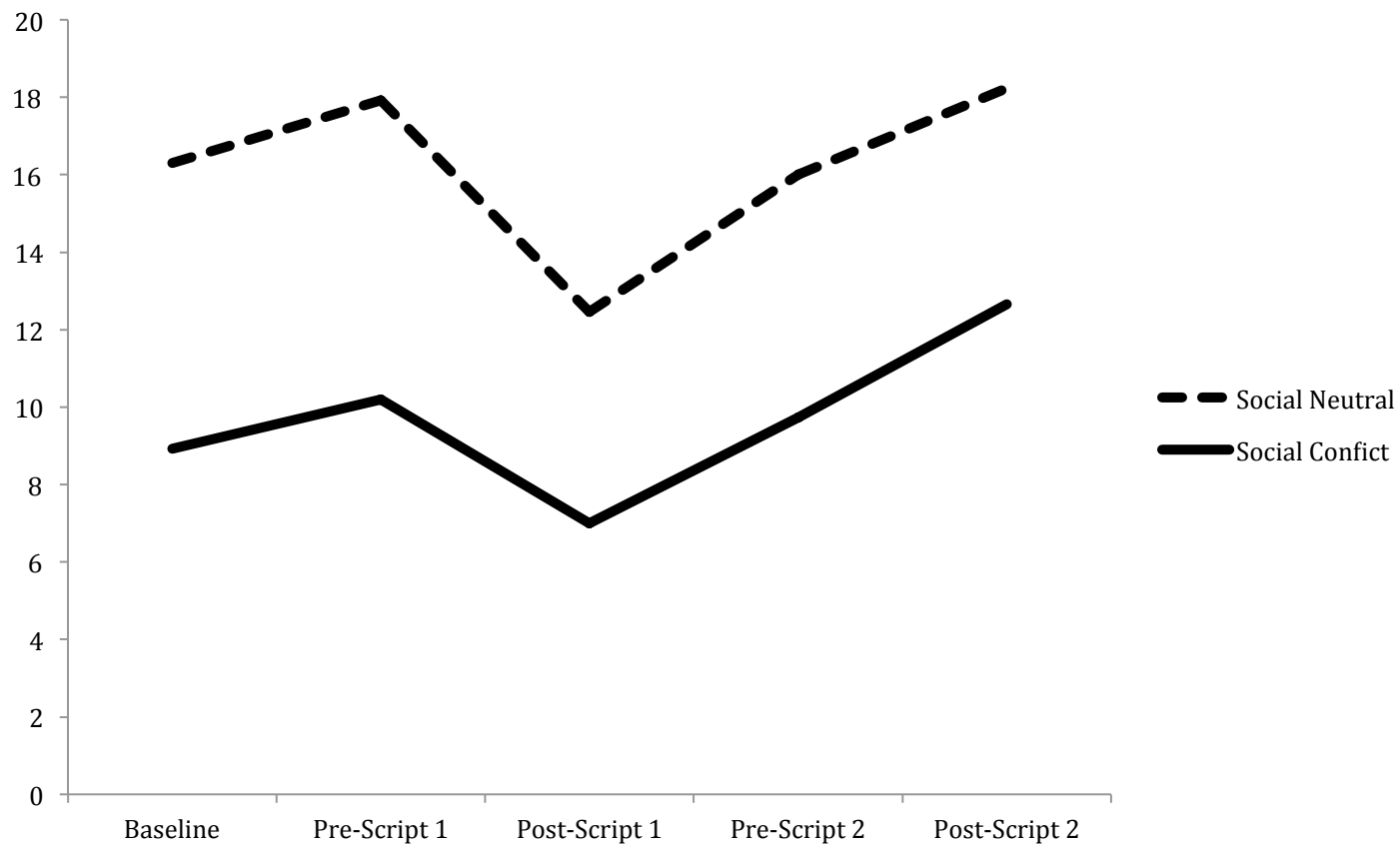


Figure 3. Changes in self-reported craving measured by a Visual Analog Scale.

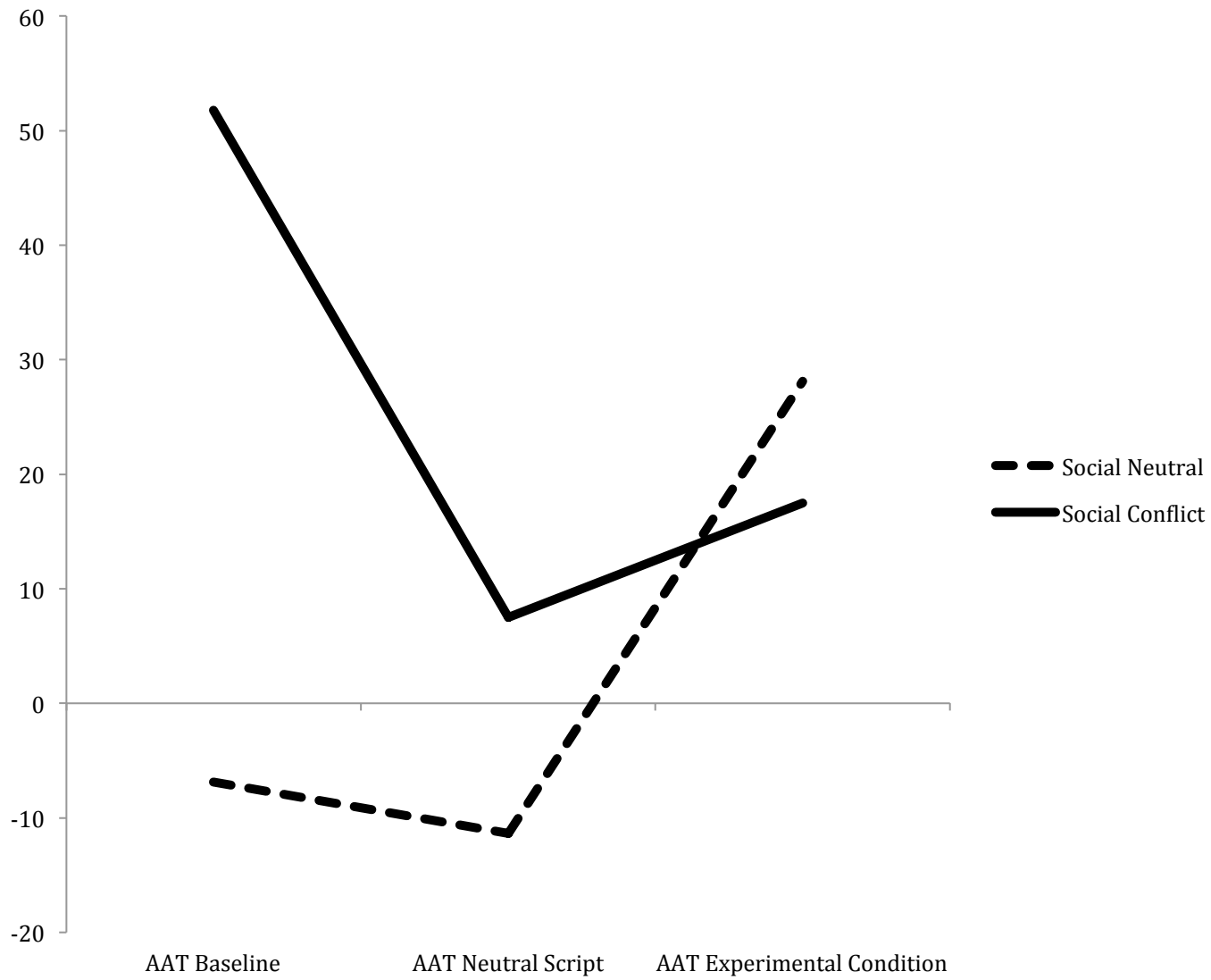


Figure 4. Changes in alcohol approach bias by the Approach Avoidance Task.

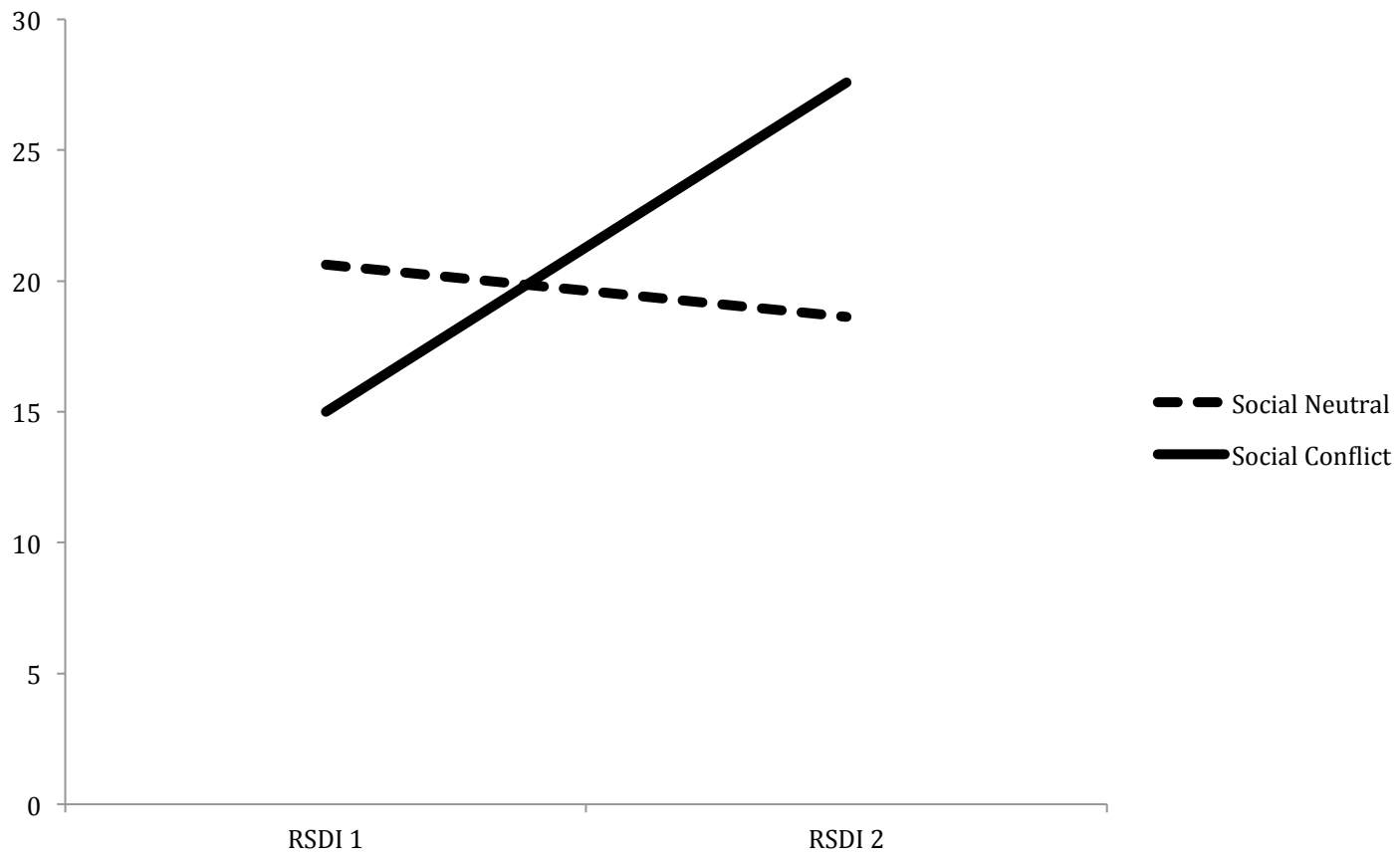


Figure 5. Changes in posttraumatic stress symptoms measured by the Response to Script Driven Imagery Questionnaire for females. RSDI: Response to Script Driven Imagery.

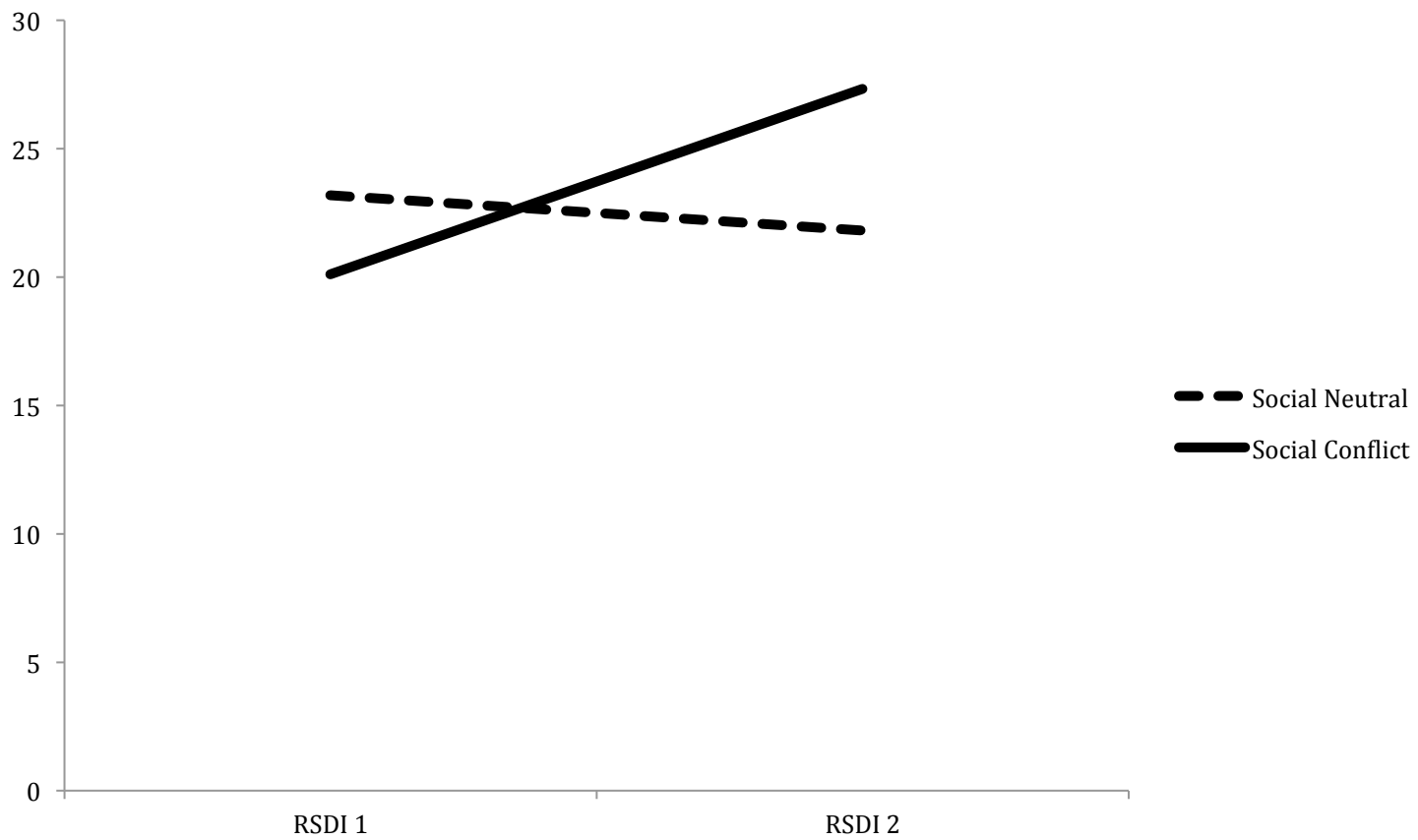


Figure 6. Changes in posttraumatic stress symptoms measured by the Response to Script Driven Imagery Questionnaire for males. RSDI: Response to Script Driven Imagery.

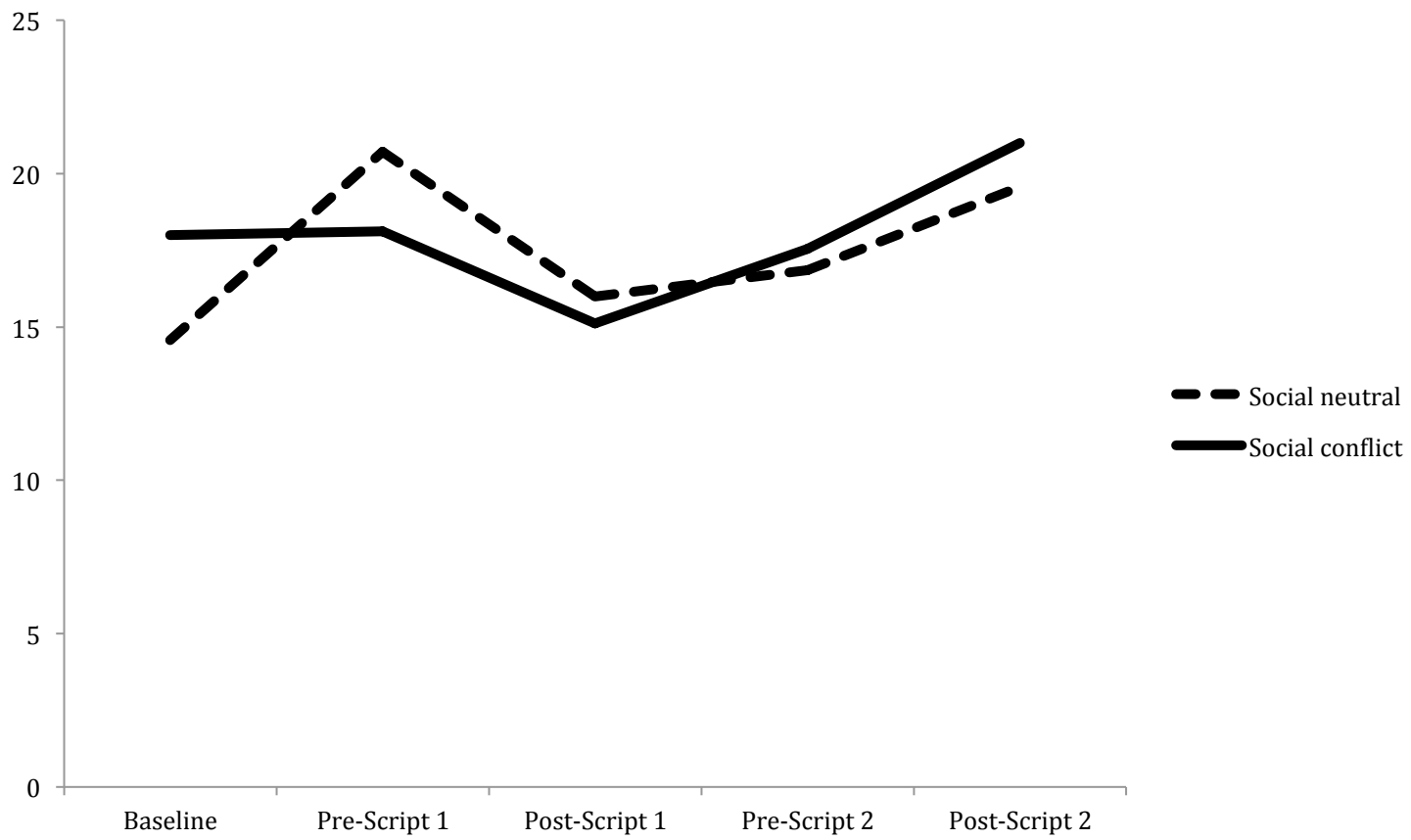


Figure 7. Changes in self-reported craving measured by a Visual Analog Scale for males.

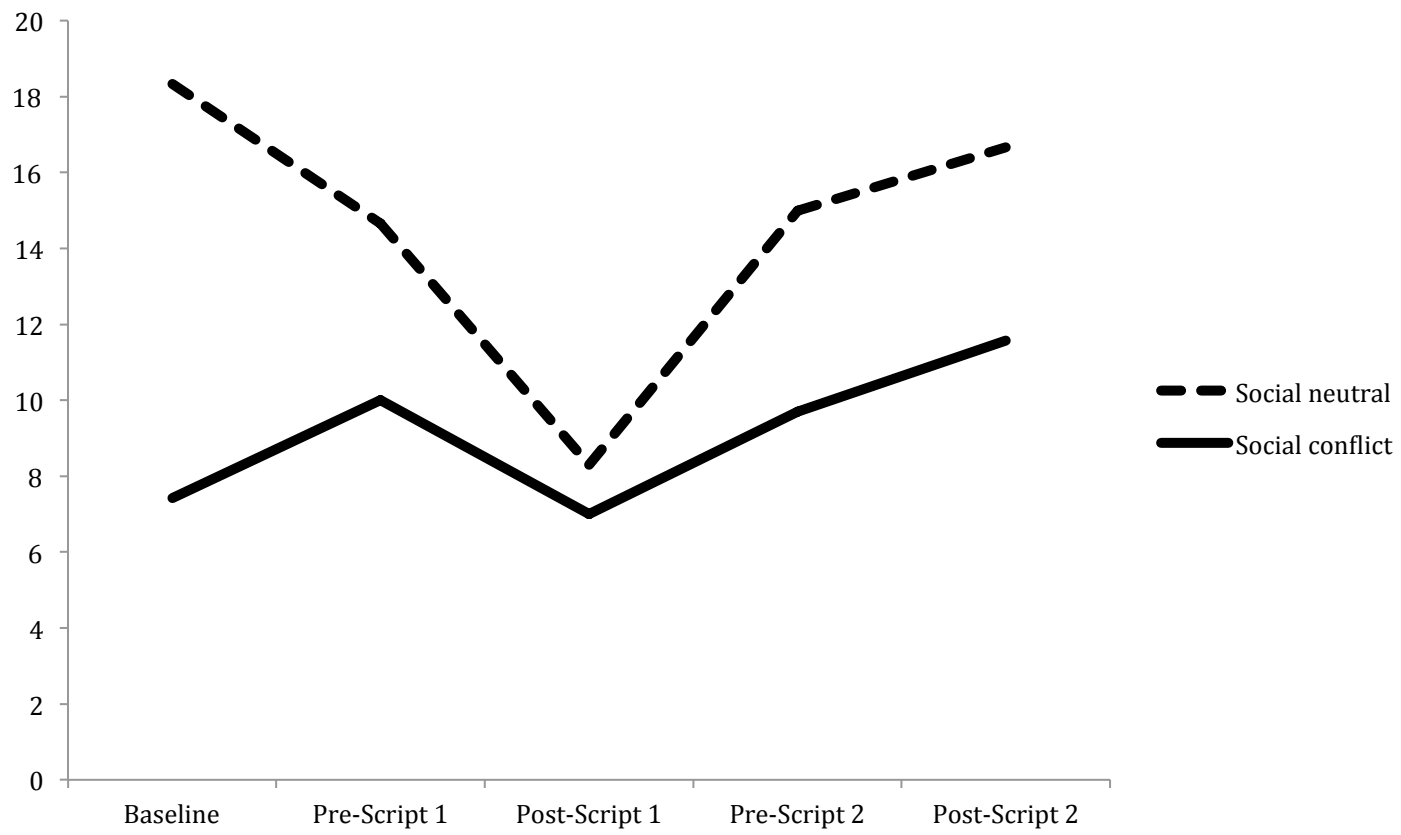


Figure 8. Changes in self-reported craving measured by a Visual Analog Scale for females.

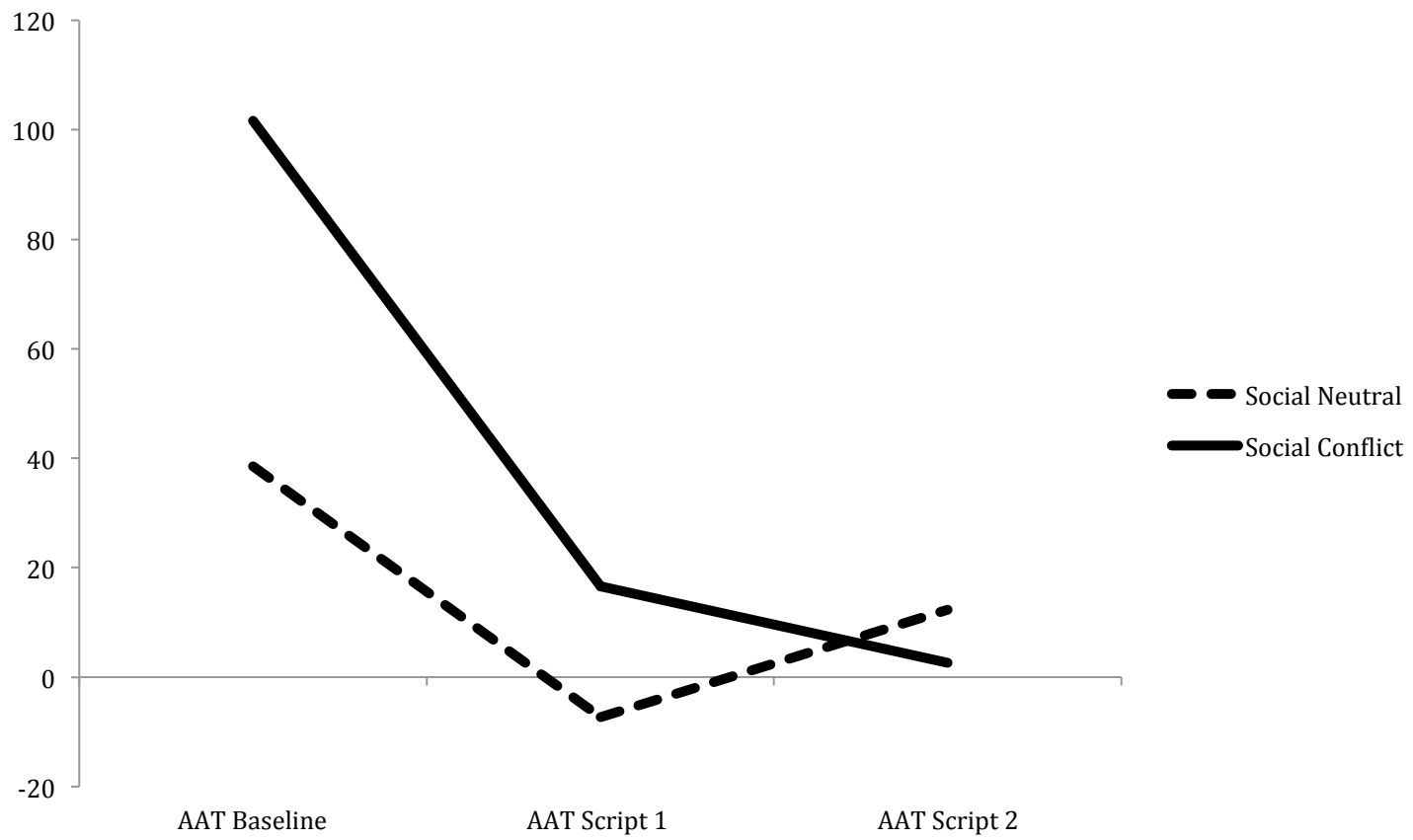


Figure 9. Changes in alcohol approach bias by the Approach Avoidance Task for males.

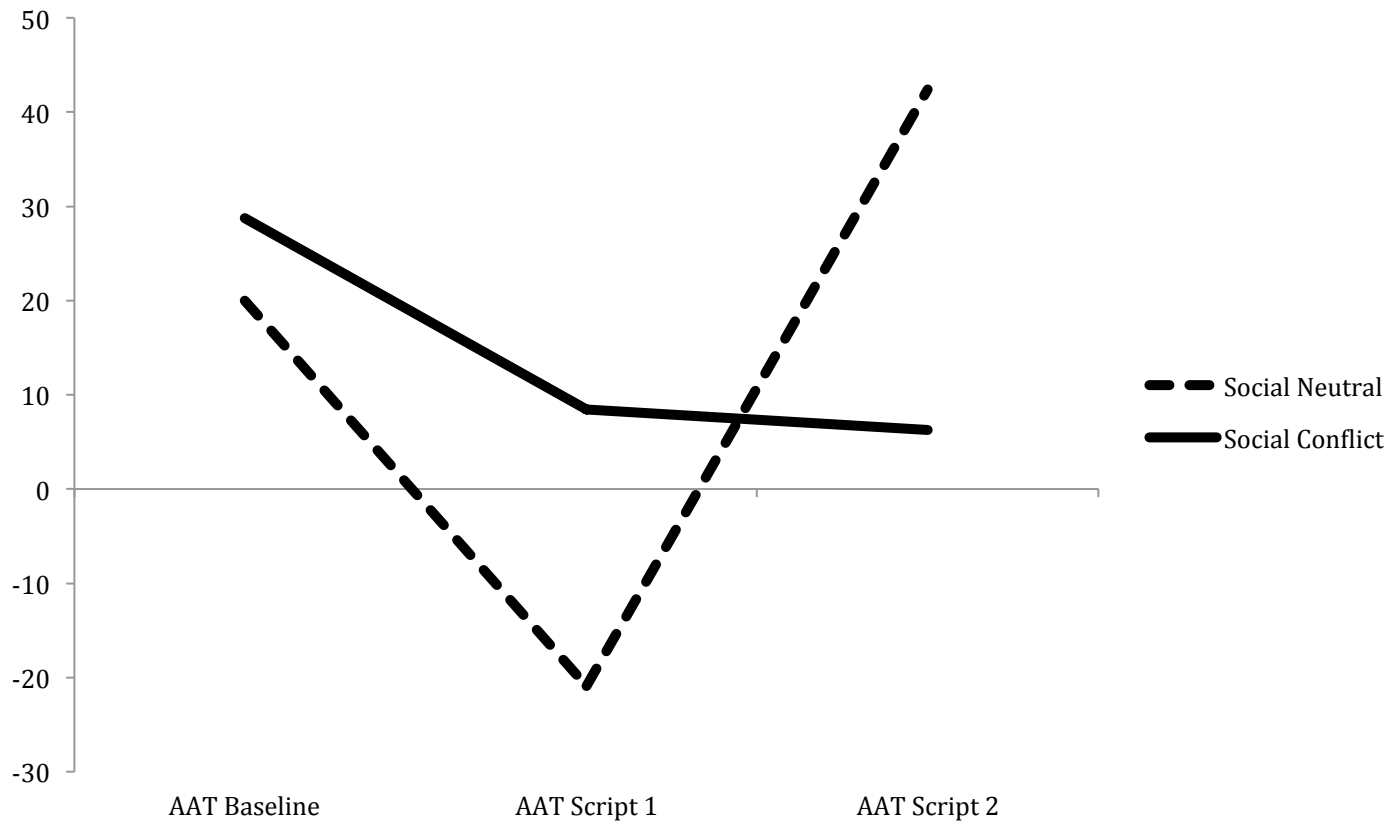


Figure 10. Changes in alcohol approach bias by the Approach Avoidance Task for females.

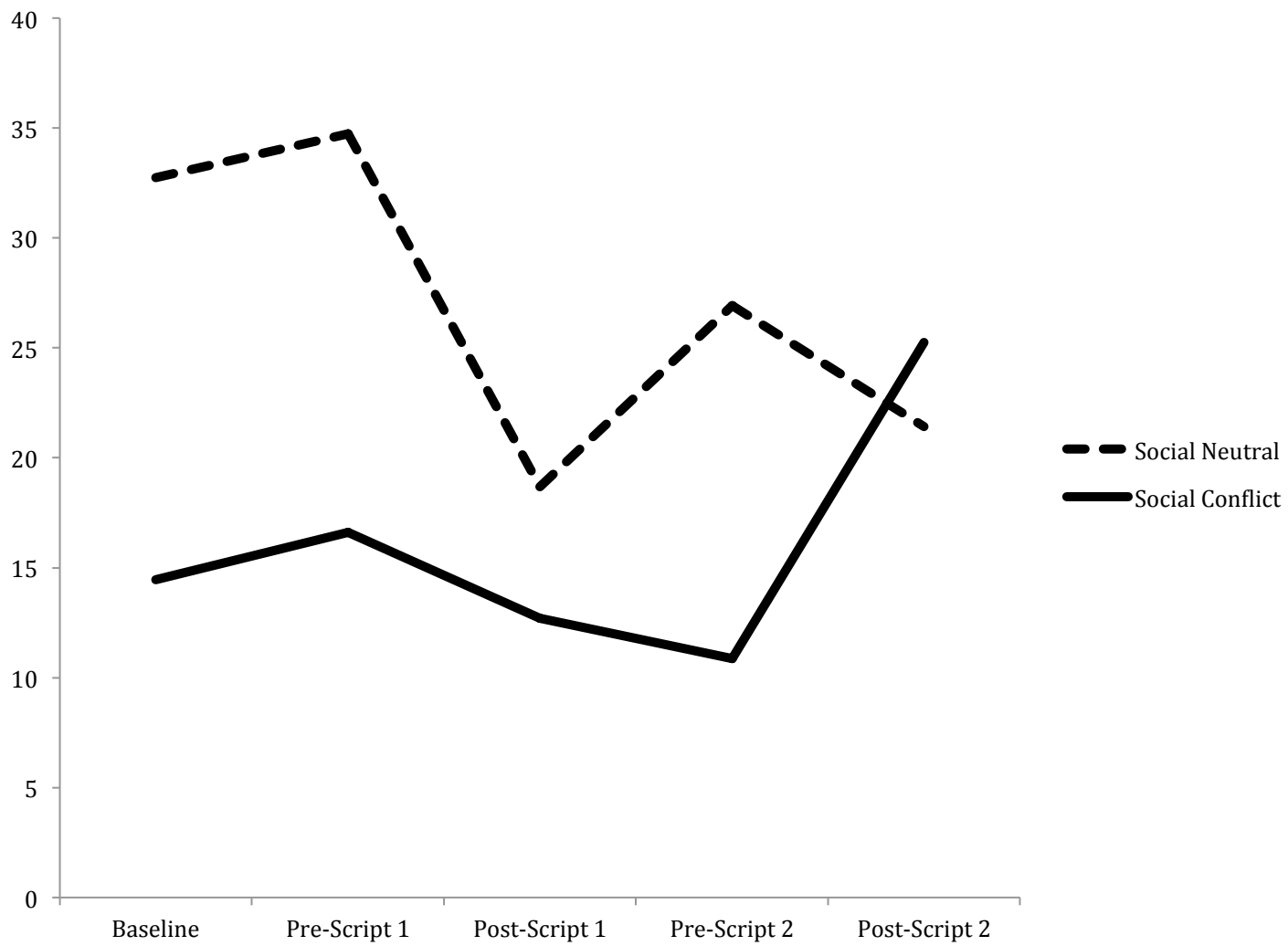


Figure 11. Changes in self-reported anxiety measured by a Visual Analog Scale.

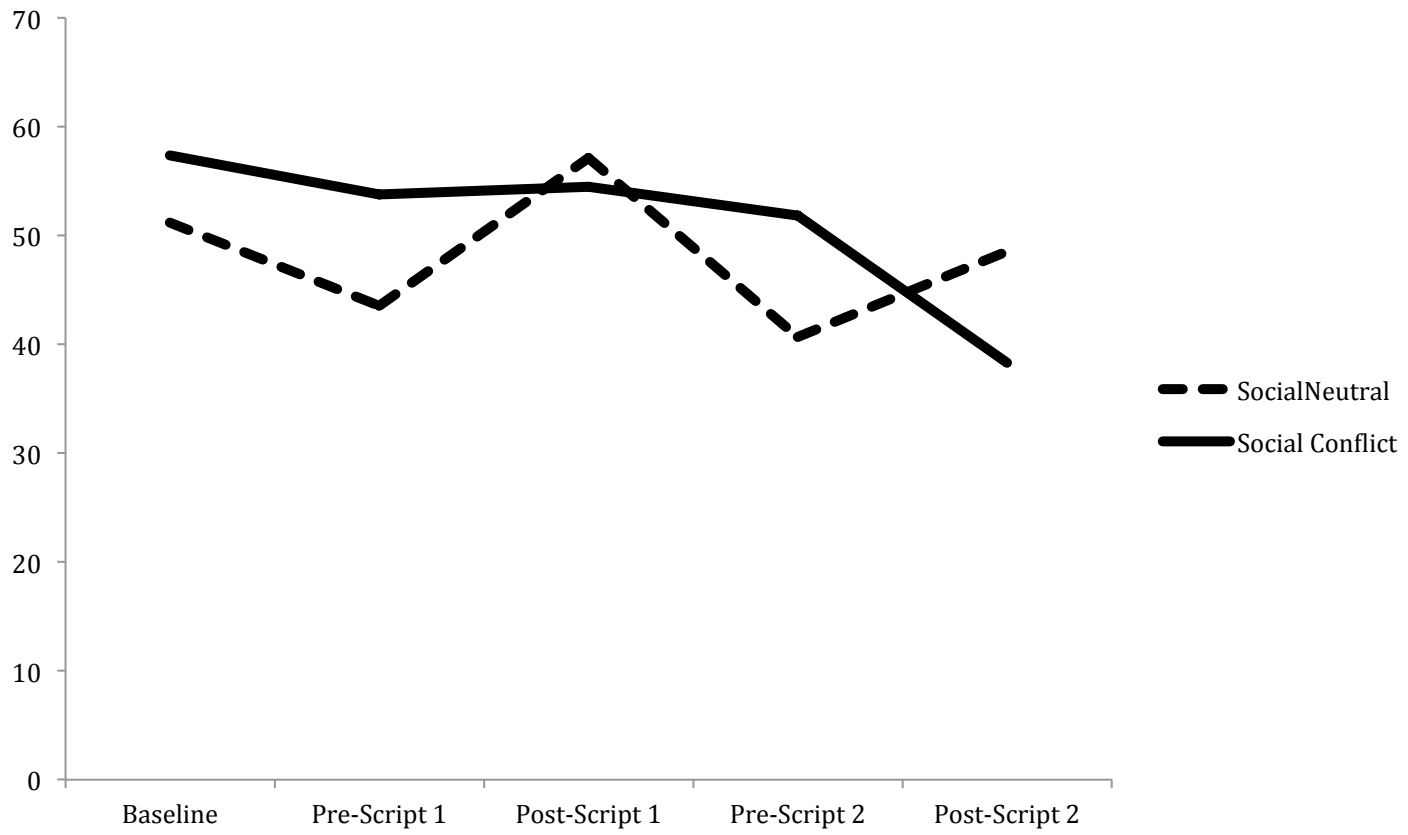


Figure 12. Changes in self-reported happiness measured by a Visual Analog Scale.

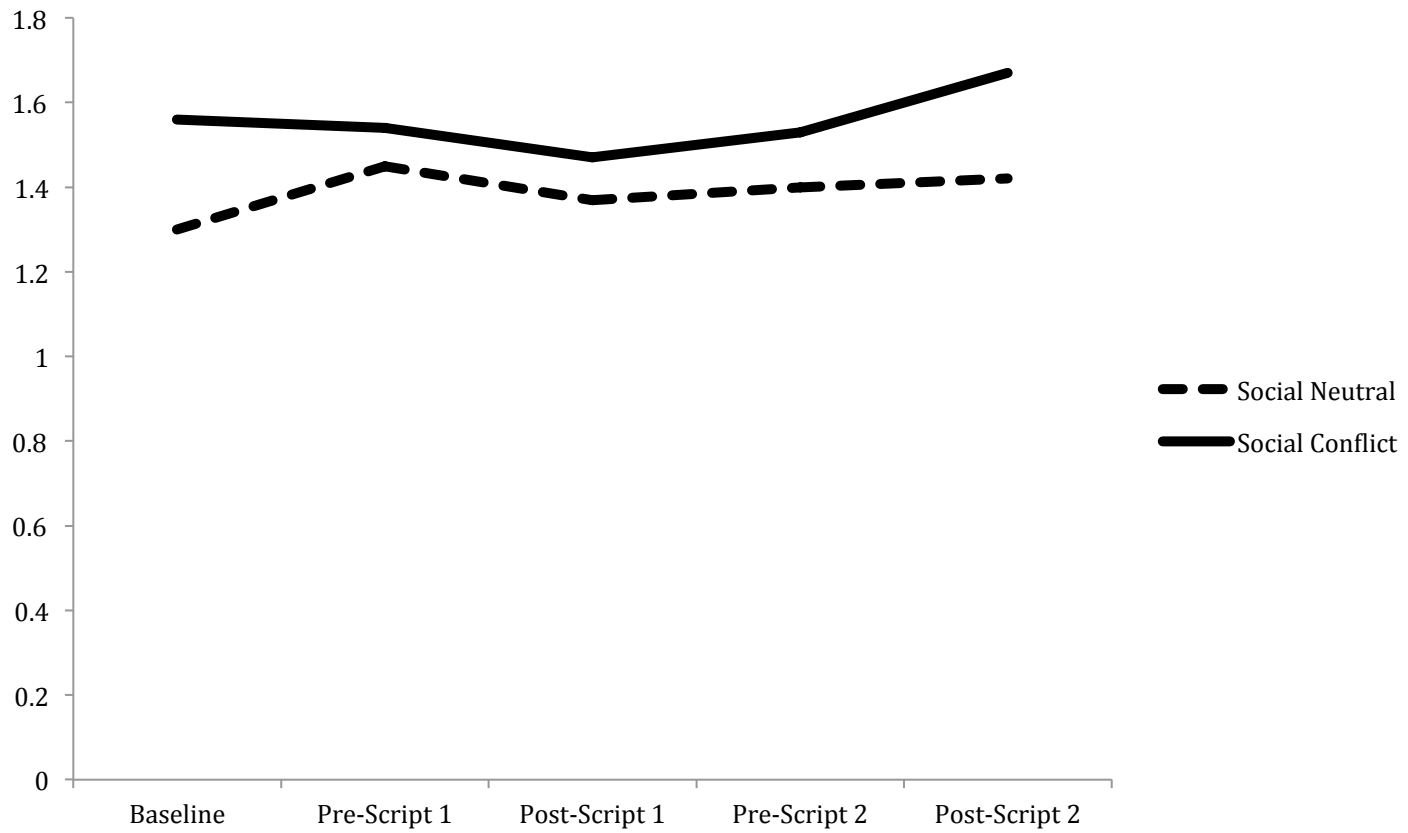


Figure 13. Changes in self-reported “want” to drink measured by a Visual Analog Scale.

Appendix

Institutional Review Board Approval Letter



UNIVERSITY OF
ARKANSAS

Office of Research Compliance
Institutional Review Board

August 6, 2013

MEMORANDUM

TO: Courtney Dutton
Matthew Feldner

FROM: Ro Windwalker
IRB Coordinator

RE: New Protocol Approval

IRB Protocol #: 13-07-027

Protocol Title: *Test of Effects of Social Conflict on Posttraumatic Stress Symptoms and Alcohol Craving*

Review Type: EXEMPT EXPEDITED FULL IRB

Approved Project Period: Start Date: 08/05/2013 Expiration Date: 08/04/2014

Your protocol has been approved by the IRB. Protocols are approved for a maximum period of one year. If you wish to continue the project past the approved project period (see above), you must submit a request, using the form *Continuing Review for IRB Approved Projects*, prior to the expiration date. This form is available from the IRB Coordinator or on the Research Compliance website (<http://vpred.uark.edu/210.php>). As a courtesy, you will be sent a reminder two months in advance of that date. However, failure to receive a reminder does not negate your obligation to make the request in sufficient time for review and approval. Federal regulations prohibit retroactive approval of continuation. Failure to receive approval to continue the project prior to the expiration date will result in Termination of the protocol approval. The IRB Coordinator can give you guidance on submission times.

This protocol has been approved for 100 participants. If you wish to make *any* modifications in the approved protocol, including enrolling more than this number, you must seek approval *prior to* implementing those changes. All modifications should be requested in writing (email is acceptable) and must provide sufficient detail to assess the impact of the change.

If you have questions or need any assistance from the IRB, please contact me at 210 Administration Building, 5-2208, or irb@uark.edu.

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