ASSESSING READINESS TO CHANGE AND IDENTIFYING RISK

FACTORS LEADING TO AN ALCOHOL-RELATED INJURY

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For my family and friends who supported me through these efforts

and

to Him who made all of this possible

ASSESSING READINESS TO CHANGE AND IDENTIFYING RISK FACTORS LEADING TO AN ALCOHOL-RELATED INJURY

by

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Alcohol use is a leading risk factor in injuries and accounts for nearly half of all patients in the emergency room. Brief interventions are conducted in the ER setting to target patients who are seeking medical attention and who screen positive for alcohol misuse. It is believed that providing treatment in alternative

settings will more effectively reach patients with alcohol problems, thereby decreasing their risk of future injury. From May 2003 to May 2005, approximately 1,500 trauma patients at an urban hospital participated in a study to assess risk factors associated with alcohol-related injuries. The primary aim of this study was to assess factors associated with readiness to change for patients seeking medical attention due to an alcohol-related injury. Multivariate analysis demonstrated that older patients, patients with increased causal attribution, and patients reporting increased recent alcohol-related problems were significantly more likely to be ready to make a change in their alcohol use. Also of interest in the study were factors associated with acute intoxication and drinking beyond normal limits, patient's perception of the relationship between their alcohol use and subsequent injury, and ethnic influences on these variables. It was found that acutely intoxicated patients were more likely to not be employed for wages, have an intentional injury, and to have experienced more alcohol-related problems in the past 12 months compared to patients who drank beyond normal limits. It was further found that Hispanics, patients reporting having been a little bit, somewhat, and very affected by alcohol at the time they were injured, and patients reporting increased recent alcohol-related problems were significantly more likely to have increased causal attribution. Having an intentional injury and screening positive by either drinking beyond normal limits or on an alcohol questionnaire were negatively associated with causal attribution. Hispanics significantly differed

from Whites and Blacks on causal attribution. These findings show that accounting for certain risk factors may facilitate treatment for alcohol problems by improved understanding of the patient's readiness to change.

TABLE OF CONTENTS

PRIOR PUBLICATIONS

Ladd, G., Field, C., & Caetano, R. (2006). *Motivation to change drinking among white, black, and hispanic patients admitted for an alcohol related injury.* Research Society on Alcoholism. Poster at the 29th Annual RSA Scientific Meeting.

LIST OF TABLES

LIST OF APPENDICES

LIST OF ABBREVIATIONS

AIDS	Acquired Immune Deficiency Syndrome
AMI	Adaptation of Motivational Interviewing
AUDIT	Alcohol Use Disorders Identification Test
BAC	Blood Alcohol Concentration
BAI	Brief Alcohol Intervention
BI	Brief Intervention
CBT	Cognitive Behavioral Coping Skills Therapy
CDC	Centers for Disease Control and Prevention
DBNL	Drinking Beyond Normal Limits
DSM	Diagnostic and Statistical Manual of Mental Disorders
ED	Emergency Department
ER	Emergency Room
HIV	Human Immunodeficiency Virus
MET	Motivational Enhancement Therapy
MI	Motivational Interviewing
NIAAA	National Institute on Alcohol Abuse and Alcoholism
TM	Teachable Moment
TSF	Twelve-Step Facilitation Therapy
TTM	Transtheoretical Model
WOO	Window Of Opportunity

CHAPTER 1: INTRODUCTION

Section I: Scope of the Problem

Chronic drinking[1] nationwide has doubled from 1995 to 2002 (Centers for Disease Control and Prevention, 2003b). Chronic drinking peaked at 5.9% in 2002 compared to 2.8% in 1995. Centers for Disease Control and Prevention (CDC) (2003b) reports that nationwide statistics of adults reporting chronic drinking increased from 5.1% in 2001 to 5.9% in 2002. Likewise, binge drinking[2] spiked nationwide to 16.1% in 2002 after a 10-year decline where it reached as low as 14.1% in 1995 (CDC, 2003a). Using the Alcohol Use Disorders Identification Test (AUDIT) as a screener for potential alcohol problems, the National Institute on Alcohol Abuse and Alcoholism (NIAAA) reports that 19.4% of people in the community (N = 19,700) scored in the hazardous range (scores 8-19) and 6.7% scored in the harmful range (score >20) in 2003 (Dupre, Aseltine, Wallenstein, & Jacobs, 2004/2005). This represents a second year increase of those in the hazardous range. In 2001, 14.4% (N = 2,556) scored in the hazardous range. Those who scored in the harmful range stayed roughly constant from 2002 (N = 12,042, 6.8%) and an increase from 2001 (6.4%).

According to the NIAAA (2005d), adults reporting chronic drinking in

[1] CDC (2003b) defines chronic drinking as an average of two or more drinks per day, males who report an average of more than two drinks per day, or females who report an average of more than one drink per day. All respondents were 18 years of age or older.
[2] CDC (2005a) defines binge drinking as having four or more drinks on one occasion for females and as having five or more drinks on one occasion for males.

Texas decreased from 7.3% to 5.9% from 2002 to 2003. Men continue to report more chronic drinking than women. However, men did report less heavy drinking as seen by a decline from 10.4% to 7.2% over the same time period. Women reported more heavy drinking from 2002 (4.3%) to 2003 (4.8%). Overall, however, heavy drinking has decreased over this 15-year time span. For instance, in 1987, total adults reporting heavy drinking was 10.0%, men reported 12.1%, and women reported 8.0%.

Health Consequences of Alcohol Use

Chronic and binge drinking increases one's risk for health problems. Alcohol use potentiates the risk for cardiovascular disease (CVD), which is the leading source of death in the United States (American Heart Association [AHA], 2005; Lucas, Brown, Wassef, & Giles, 2005; National Institute of Health [NIH], 2005b; Room, Babor, & Rehm, 2005). CVD accounted for 28.5% of all deaths in the United States in 2002, which is nearly 700,000 deaths (CDC, 2005b). The most common form of CVD is coronary heart disease (CHD), which affects approximately 13 million Americans (AHA, 2005; Lucas et al., 2005; Room, et al., 2005). A primary risk factor for CHD is a pattern of irregular heavy drinking (Room, et al., 2005). In addition to CVD, alcohol is linked to many other medical conditions including diabetes, liver disease, gastrointestinal disease, and certain types of cancer (AHA, 2005; D'Onofrio & Degutis, 2002; NIAAA, 2003; NIH,

2005a; Room, et al., 2005). Room and colleagues (2005) argue that alcohol accounts for 4% of the global burden of disease and that alcohol leads to as much death and disability globally as tobacco and hypertension. Globally, alcohol accounts for 25% of liver cancer, 18% of epilepsy, 32% of cirrhosis of the liver, 18% of poisonings, and 24% of homicides (Room, et al., 2005). Approximately 100,000 lives are lost per year due to alcohol use (NIAAA, 2003).

Risk of Self-Injury Due to Alcohol Use

People who consume alcohol not only put their health at risk, they also put themselves in greater danger for injury. In fact, alcohol is the leading risk factor for injuries in the United States (CDC, n.d.; Healthy People 2010, n.d.; United States Fire Administration [USFA]/National Fire Data Center, 2003). Roughly 3 in 10 people in the United States will be involved in an alcohol-related crash in their lifetime (CDC, n.d.). Nearly half of adult patients treated in emergency settings for injuries are positive for alcohol use (USFA/National Fire Data Center, 2003). Nearly 50% of those who are severely injured and 22% of those who are minimally injured present at the emergency department (ED) positive for alcohol use (D'Onofrio & Degutis, 2002, 2004/2005). Of the estimated 110 million patients who visit the ED annually, 24% to 31% who are treated screen positive for alcohol problems (D'Onofrio & Degutis, 2002, 2004/2005). In a study involving burn patients and general surgery patients, alcohol consumption was

found to be the primary risk factor leading to injury, along with driving and violence-related risk behaviors (Field & O'Keefe, 2004). In a study involving 201 patients admitted to a single Level 1 trauma center, 48.2% had a history of acute and/or chronic alcohol use (Field, Claassen, & O'Keefe, 2001). Over 75% of patients in the study were involved in one or more high-risk driving practices, 40% engaged in one or more violence-related behaviors, and 19% reported suicidal ideation in the last year (Field, et al., 2001). Cherpitel, Bond, et al. (2003) found that a moderate but robust association exists of a positive blood alcohol concentration (BAC) and self-report with admission to the ER with the injury.

Risk of Lethal Injury Due to Alcohol Use

An increased risk for alcohol-related injury also leads to increased risk for alcohol-related injury resulting in death. The NIAAA (2005b) reports that 30.5% of all traffic crash fatalities occurring in 2002 were alcohol-related. Unintentional injury death rates made up the largest portion of all injuries in 1995 at 61% (CDC, 1997). Of the 1,151,281 years of potential life lost due to traffic crashes in 2002, 39.4% were alcohol-related for males and 25.6% were alcohol-related for women (NIAAA, 2005c). Of those who died in traffic crash fatalities in 2002, 34.7% were intoxicated drivers and 31.0% were intoxicated passengers (NIAAA, 2005a). The number of intoxicated drivers who died in traffic crashes peaked at 50.7% in

1986, so the current percentage of 34.7% represents a decline (NIAAA, 2005a). Schermer, Apodaca, Albrecht, Lu, and Demarest (2001) found that intoxicated passengers were just as likely as intoxicated drivers to be cited for motor vehicle crashes and driving under the influence (DUI), which points to the intoxicated passenger's future likelihood to have a lethal injury as well.

Financial Burden of Alcohol Use and Associated Injury

Negative consequences of alcohol use just described including loss of life and traffic crashes represent an economic burden on society. According to the National Safety Council, alcohol-related motor vehicle crashes cost the nation $26.9 billion in 1998 (CDC, n.d.). The NIAAA (2004) projected the financial impact of alcohol abuse in 1998 to be as follows (in millions): health care expenditures (i.e., treating and preventing alcohol use disorders, medical care) $26,338, lost productivity (i.e., due to alcohol-related illness or crimes) $134, 206, and other social impacts (i.e., motor vehicle crashes, crime, and social welfare administration) $24,093, for a total sum of $184,636. This represents a cost increase of 19.8% from 1992 when the total was estimated to be $148,021 (NIAAA, 2004).

Alcohol and Illicit Drug Use

Several studies show that illicit drug use is increasing among young

adults. In an analysis of illicit drug use by college students, Mohler-Kuo, Lee, and Wechsler (2003) gathered data from 119 American colleges and universities in the Harvard School of Public Health College Alcohol Study. They found that marijuana use increased during the time span of 1993 to 2001. Specifically, current marijuana use (defined as use in the past 30 days) increased from 13% to 19%, marijuana use in the past year increased from 23% to 30%, and marijuana lifetime use increased from 41% to 47%. Use of other drugs, including cocaine, heroin, LSD, PCP, and tranquilizers, increased as well. Respondents reporting having used other illicit drugs in the past 30 days increased from 4% to 7% and having used other drugs in their lifetime increased from 11% to 14% from 1993 to 2001. Nearly all of marijuana and other illicit drug users used another substance. Specifically, more than 98% either smoked, binge drank, and/or were users of another illicit drug in addition to marijuana use.

Alcohol and illegal substances are used more frequently and at younger ages (Johnson and Gerstein, 1998). For those born between 1971 and 1975, it is projected that by age 21, 55% will consume alcohol regularly, 51% will have used marijuana, 13% will have used cocaine, and 11% will have used hallucinogens. Comparatively, of 21-year-olds who were born between 1951 and 1955, 42% consumed alcohol regularly, 40% used marijuana, 6% used cocaine, and 13% used hallucinogens.

Studies also show that use of alcohol and illicit drugs are associated. In a

national report submitted by the Substance Abuse and Mental Health Services Administration (SAMHSA) in 2005, it was found that among admissions of people aged 21 or over where alcohol was the primary substance of abuse, 43% of those reported a secondary substance of abuse. These patients were almost twice as likely to enter treatment and to enter treatment at a younger age (*mean* = 37 years old) compared to patients who reported alcohol only problems (*mean* = 40 years old). Ethnic differences were also observed. Whites and Hispanics were more likely to be admitted for alcohol only problems while Blacks were more likely to be admitted for alcohol plus secondary drug problems (SAMHSA, 2005).

In a review of five major surveys, O'Malley and Johnston (2002) found that 40% of college students engaged in heavy drinking (defined as having consumed five or more alcoholic beverages in a row in the past two weeks). This sample also reported having smoked cigarettes (30%), marijuana use (20% or less), and cocaine use (less than 2%) in the last 30 days. O'Malley and Johnston did not find that increased alcohol use led to increased use of drugs.

In summary, although use of alcohol use does not necessarily predict use of other substances, use of illicit drugs is increasing nationwide and many users of illicit drugs have a history of heavy alcohol use. Efforts to decrease alcohol use should consider treatment for drug use as well, when appropriate.

Section II: The Need for Alcohol Interventions

As discussed, alcohol use is a primary risk factor for major chronic diseases and traffic fatalities. Researchers in public health are concerned with modifying this at-risk behavior in order to decrease medical risk for the individual and to increase safety for the public. Currently, only 1.5 million of the 16 million Americans who meet the diagnostic criteria for abuse or dependence seek and receive treatment (NIAAA, 2003). Offering alternative settings for treatment interventions would help capture a number of these people who would not normally seek treatment. Due to the propensity of those who consume alcohol to be more likely to injure themselves, offering alcohol interventions in medical settings would be advantageous. In the medical emergency setting, 27% (5.5 million people) of injured adult patients screen positive for alcohol use and could be offered alcohol interventions (Gentilello, Ebel, Wickizer, Salkever, & Rivara, 2005).

Studies have revealed that between 45% and 50% of patients admitted to a trauma center screen positive for alcohol use, with the mean BAC of such patients being 187 mg/dl, which is twice the legal level for driving in most states (Dill, Wells-Parker, & Soderstrom, 2004; Gentilello, et al., 1999). Screening trauma patients who may have a negative BAC with alcohol questionnaires results in as many as 44% patients who screen positive for chronic alcohol abuse (Gentilello, et al., 1999).

The need for interventions has yielded different treatment strategies to target and curb the problem behavior. Traditional strategies relied on expert-recipient exchanges; more recent approaches utilize an understanding of where the client is currently and how to promote change. A model that serves as the underpinning for more recent approaches is the transtheoretical model.

Section III: The Transtheoretical Model

As discussed, alcohol use represents a major problem for the alcohol user as well as for society. Many brief interventions that attempt to modify alcohol use rely on an understanding of the transtheoretical model (DiClemente & Velasquez, 2002). The transtheoretical model (TTM) outlines the sequence of steps, known as stages of change, which an individual progresses through in order to successfully change behavior. The name "trans" comes from the model's integration of interventions across different theories which rely on the realization that behavioral change unfolds into a series of stages (Prochaska, Redding, & Evers, 1997). Arkowitz (2002) posits that integration of ideas across theories helps move psychology forward rather than creating unnecessary divisive schools of thought which do not aid the client's success in changing. Considered "enormously popular with practitioners and researchers in the addictions field," (Morgenstern, 2002, p.504) the TTM is applicable to any intentional change in behavior, whether it is initiation, modification or cessation of behavior

(Prochaska, DiClemente, & Norcross, 1992; Miller, 2001). Stages of change consist of precontemplation, contemplation, preparation, action, and maintenance, and they are described below (DiClemente & Velasquez, 2002; Prochaska, et al., 1992, 1997).

Precontemplation

The client is either unaware of a need to change or unwilling to make a change for at least six months. It is believed that brief interventions are particularly useful in helping the client get "unstuck" from this stage (Arkowitz, 2002).

Contemplation

The client is willing to make a change in the next six months but has not yet made a commitment to take action.

Preparation

The client plans and commits to a behavioral change in the next month but does not yet implement it.

Action

The client implements the plan and makes sufficient changes either in his

behavior, experiences, or environment as to reduce risk. Change in behavior has been less than six months.

Maintenance

The client has maintained change in behavior lasting at least six months and have increased confidence in their ability to maintain their behavioral change and decreased temptation to relapse.

The progression from one stage to the next is not linear, and people often regress to earlier stages before taking action forward once more[3]. For instance, precontemplators may regress to the contemplation stage as they fear failure in making a successful change (Arkowitz, 2002). Prochaska and colleagues (1992) found that it takes an average of three to four attempts to quit smoking before it is achieved successfully. In addition, relapse is the rule rather than the exception with addictions (Prochaska, et al., 1992). When regression occurs, the clinician should elicit the client's own arguments for change, utilizing tools such as weighing the pros and cons of maintaining the status quo.

Internal motivation for change has been found more effective in yielding sustained change than providing external incentives for change (Curry, Wagner, & Grothaus, 1990). The level of internal motivation is the key differential between each stage of the TTM. DiClemente (1999) defines motivation as "the

causes, considerations, reasons, and intentions that move individuals to perform certain behaviors or sets of behaviors" (p.209). DiClemente holds that this is true regardless of whether one considers behavior through a perspective of "contingencies, driven by unconscious motives, or directed by self-regulation" (1999, p.209). Increasing motivation to change is important not only for the person who is trying to change his alcohol use for the first time but also for someone recovering from a relapse. Lack of motivation hinders entering and continuing treatment as well as short and long-term outcomes of treatment (DiClemente, 1999). For instance, 31% of subjects (N = 308) in a 2.5 year smoking cessation study failed to make any change and another 23% regressed to an earlier stage (DiClemente, 1999).

In addition, Miller and Rollnick (2002) point out that changing people's behavior is dependent upon their motivation for change. Motivation for change stems from the discrepancy between a person's values and his activities. The more discrepant those two are, motivation for change will increase to restore consistency (Miller, 1983). Motivational interviewing builds upon this understanding of change (Miller, 1983). It utilizes dissonance between what a person holds important and his current behavior in order to increase the patient's motivation to make a change in his alcohol use.

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[3] Regression is usually limited to one stage change (see Etter & Sutton, 2002).

Critique of The Transtheoretical Model

Recently, the TTM has come under scrutiny for its assumptions and delineation of stages of change (Herzog, 2005). Critics point out that the model assumes that the decision-making process is conscious and stable. People are often influenced to reduce or quit a behavior based on unconscious or situational motivators that are not accounted for in the TTM (Etter, 2005; Etter & Sutton, 2002; West, 2005). Weighing the pros and cons of a behavior is difficult, West posits, when the behavior is reinforced by rewards not in the conscious awareness of the person. Further, people often quit suddenly and without any prior planning or preparation (Etter & Sutton, 2002; West, 2005). Segan, Borland, and Greenwood (2002) found that the model's assumption that as one progresses forward, situational confidence increases and temptation to relapse decreases was not upheld in their study (N = 193).

The demarcation of stages in the stage of change model also has come under investigation by researchers. One researcher reports that boundaries between stages are "simply arbitrary lines in the sand" and are "not genuine stages" (West, 2005, p. 100) as continuous variables of time and intention are arbitrarily categorized. Etter and Sutton (2002) posit that there is a "lack of standardization" (p.1171) in defining stages of change which challenges the potential to empirically measure the efficacy of the TTM (see Segan, et al., 2002). In addition, the stages themselves contain a mixture of variables related to stage

of change which create heterogeneity of patients subsumed in a stage (Etter, 2005; Etter & Sutton, 2002). Etter and Sutton describe their frustration in properly classifying participants in their assessment of stage of change:

> The inclusion of quit attempts in the preparation stage had a large impact on the distribution of smokers by stage, since 18-24% of smokers who had decided to quit in the next 30 days were downgraded to contemplation because they had not made a quit attempt in the previous year. As a result, the contemplation stage is a heterogeneous category which includes smokers who intent to quit in the next 6 months and may or may not have made a quit attempt, and smokers who intent to quit in the next 30 days but have not made a quit attempt. Because intention to quit and past quit attempts are conceptually distinct variables, the current definition of contemplation is not satisfactory. (p. 1178)

No current model of behavior change including the TTM is completely sufficient in explaining motivation to change. Motivation is a "complex subject" (Segan, et al., 2002, p. 419) which has yet to be fully de-constructed in terms of its component parts. In response to arbitrary cutoff points, DiClemente (2005) counters that operationalizing any psychological construct is difficult and while demarcation can be done several ways, the value of studying the phenomenon should not be overlooked. Despite the model's critics, the TTM has been shown to have predictive validity of the stages in that behavior change is associated with more progressed stages of the model (Hodgins, 2005). The TTM provides a

valuable conceptualization for how change occurs for many people, and it should be understood and applied from this perspective. Understanding the limits of the TTM allows for better application of its usefulness where it is appropriate.

Section IV: What is Motivational Interviewing?

The stages of change presented in the TTM and the client's motivation for change are applied in motivational interviewing (MI) (Field, Hungerford, & Dunn, 2005; Miller, 1983). Since introduced by William Miller in 1983, MI has gained popularity in the United States and abroad (Dunn, Deroo, & Rivara, 2001; Moyer, Finney, Swearingen, & Vergun, 2002). A new approach to treating problem behaviors, MI is defined as "a client-centered, directive method for enhancing intrinsic motivation to change by exploring and resolving ambivalence" (Miller & Rollnick, 2002, p.25). MI is a therapeutic method that recognizes that patients may feel ambivalence about the problem behaviors while still seeking treatment (Field, et al., 2005). While often considered an obstacle to change in traditional treatment approaches, MI conceptualizes ambivalence as a necessary first step towards making change. Ambivalence reveals that the patient recognizes discrepancy between his values and actions (Miller & Rollnick, 2002). Motivation to change, or lack thereof, is conceptualized as an interpersonal characteristic rather than as a personality trait (Arkowitz, 2002; Miller, 1983). MI is structured in a way to encourage dialogue about the ambivalence so that the

client works through the reasons for and against making a change. It is hoped that the client will reason through his contrasting desires and make the decision for change. The clinician draws upon Rogerian techniques of creating a warm and empathic environment in which the client is respected regardless of where he is in the change process (Moyer & Finney, 2004/2005). Clinician's use of empathy plays an important part in this process as it builds rapport and has been found to decrease future alcohol consumption (Field, et al., 2005).

The clinician helps promote thinking about the consequences of drinking versus not drinking and helps the client consider the discrepancy between what he is doing and what his values/goals are. However, the clinician does not give strong advice leading to change (Fleming & Manwell, 1999). In fact, the client is the one who presents the arguments for change based on the discrepancy he realizes between his actions and what he values (Miller & Rollnick, 2002). In order to effectively resolve ambivalence, the clinician must accept and tolerate that the possibility exists that no change will occur, since the client may not be sufficiently motivated to abstain or reduce alcohol use and may not choose to curb his at-risk behavior. The underlying belief in MI is that the client, if allowed to continue through the change process, will choose what is best for herself (Moyers & Waldorf, 2003).

The decision to have the client decide on his own to change is based upon self-perception theory. Self-perception theory posits that people are motivated to

act in ways that are in accordance with how they perceive themselves. For example, once a person with an alcohol problem decides to change his drinking, he is motivated to alter his consumption of alcohol to fit this new schema of himself. This theory is contrasted against other orientations where the decision to change is drilled into the client. Such orientations employ more persuasive, confrontational approaches where resistance towards recognizing the problem or towards treatment are seen as client characteristics (Field, et al., 2005; Miller, 1983; Miller & Rollnick, 2002). Clients are presumed to lack the necessary skills for change, and the counselor directs clients on what to do (Miller & Rollnick, 2002). Some of the underlying assumptions of these programs have been that "A tough approach is always best, " "This person *ought* to change," and "If he or she does not decide to change, the consultation has failed" (Emmons & Rollnick, 2001). Such assumptions, however, tend to elicit resistance and discourage motivation for change (Field, et al., 2005; Rollnick, 2001). Rather than pointing blame to the patient, MI shifts the focus onto the relationship, as guided by the clinician, to elicit change (Emmons & Rollnick, 2001; Rollnick, 2001). Unlike these more persuasive approaches, MI recognizes that resistance signals that something important within the client has been drawn out and should be respected (Arkowitz, 2002). Rather than attempting to thwart the opposition, the clinician views resistance as useful information, which is a more appropriate response (Arkowitz, 2002). In addition, MI rests on the belief that the client is the expert

and is best served by making his own arguments for change (Field, et al., 2005; Miller & Rollnick, 2002). To carry out this belief, the clinician takes a back seat to pointing out the need for change and lets the client make the arguments for it. This allows the client to become "unstuck" from his position because he is not forced to defend his position of "no-change" and can move toward change instead (Miller & Rollnick, 2002).

Collaboration between the clinician and client are needed to promote the spirit of MI (Rollnick, 2001; Rollnick & Miller, 1995). Miller and Rollnick (1995) assert that the spirit of MI is violated when the clinician does the majority of the talking in the session, acts punitively towards the client, argues with the client that a change is needed, offers advice without permission, or acting as an expert, leaves the client in a passive role. The spirit of MI includes eliciting (versus coercing or persuading) from the client motivation to change. Rather than utilizing external controls, MI emphasizes the client's freedom of choice. Utilizing the client's internal motivation for change is a more effective style of promoting and ensuring long-term change (Curry, et al., 1990). These standards set MI apart from more aggressive styles of counseling patients with alcohol problems.

The clinician must be adept at leading the client through the change process and consolidating the client's commitment for change. The clinician must avoid getting ahead of the client (Field, et al., 2005). If the client becomes

resistance, the clinician is instructed to "roll with resistance" (Miller & Rollnick, 2002). This means that resistance should not be directly opposed; that is, the clinician should respond differently to the client and avoid arguing for change. The goal of MI, after all, is to increase motivation for change rather than to force compliance. Miller and Rollnick (2002) state, "*It is the client who should be voicing the arguments for change*" (p.22) and "responsibility for change is left with the client – which, by the way, is where we believe it *must* lie" (p. 34). The clinician must attend to certain factors that the client discusses which best help the client progress through the change process (Hettema, Steele, & Miller, 2005).

Throughout the interview, the clinician selectively reinforces aspects that elicit "change talk." Change talk focuses on four key aspects of change: disadvantages of status quo, advantages of change, optimism for change, and intention to change (Miller & Rollnick, 2002). The clinician elicits the client's ambivalence regarding his problem behavior. The element of the client's decision for change is enhanced by the clinician's directive approach. The clinician, however, must be adept at not moving ahead of the client towards change or else resistance may result (Emmons & Rollnick, 2001).

Section V: Efficacy of Motivational Interviewing Compared to Other Treatment Modalities

How effective is motivational interviewing (MI) compared to other types

of treatment? Because MI involves usually only one session, it has been difficult to easily assess its efficacy in comparison to other treatment approaches. There are two ways that the efficacy of MI can be evaluated. First, one may assess MI in its typical brief duration against the longer-term interventions. Research has shown that MI is competitive as it has yielded a similar improvement of 50% for clients in two sessions compared to psychotherapy's eight sessions (Burke, Arkowitz, & Menchola, 2003). Second, one may assess efficacy of MI projected to a longer treatment style, similar in length as other treatment modalities. Doing this also can support efficacy of MI over other approaches. In comparison to CBT, adaptations of MI (AMIs) produced similar results but were 180 minutes shorter, suggesting that longer AMI interventions may generate effect sizes that match effect sizes generally reported by other psychotherapies (Burke, et al., 2003).

Project MATCH

An in-depth comparison of Motivational Enhancement Therapy (MET), an intervention based upon MI, to other treatment modalities was conducted in a nationwide study named Project MATCH (Project MATCH Research Group, 1997). Treatment approaches of Cognitive Behavioral Coping Skills Therapy (CBT), Motivational Enhancement Therapy (MET) and Twelve-Step Facilitation Therapy (TSF) were contrasted. The first sample (n = 952; 72% male), called

"outpatient," was recruited from the community and from outpatient treatment facilities. The second sample (*n* = 774; 80% male), called "aftercare," was recruited after discharge from inpatient hospital stay or intensive day hospital treatment. The same randomization procedure to treatment approaches was used for both patient groups. All participants were diagnosed with alcohol abuse or alcohol dependence by DSM-III-R criteria, engaged in active drinking during the three months prior to entering study, alcohol use was the predominant drug of abuse, and they were at least 18 years of age. The inclusion criteria was modified for the aftercare group in the following ways: the active drinking must have occurred during the three months prior to entering the inpatient or day treatment facility, the treatment stay must have been at least seven days in length (not simply detoxification), and they were referred by staff at their treatment facility for aftercare treatment.

The treatment approaches of CBT, MET, and TSF were conducted for 12 weeks (PMRG, 1997). CBT and TSF were conducted weekly, and MET consisted of four sessions, occurring at weeks 1, 2, 6, and 12. Follow up assessments were conducted at 3, 6, 9, 12 and 15 months after the first therapy session. Data for all five follow up sessions was collected for at least 90% of participants in both groups. Difference in dose or compliance between treatments was small indicating that all comparison of outcome between treatment types is appropriate.

Compared to baseline, where aftercare participants were abstinent approximately 20% of the days per month, aftercare participants were abstinent more than 90% of the time at one month into the study. Assessment at month 15 showed only a slight decrease in abstinence. Baseline abstinence for outpatient participants was slightly higher which increased to 80% of the day at post-treatment. A similar decrease in abstinence at month 15 was shown for this group, too (PMRG, 1997).

Comparison between treatment approaches for the aftercare condition showed no significant main effects. When adjusted for the 10 matching attributes to adjust for all matching effects, a significant effect was found by time effect. Participants in the TSF condition showed slightly fewer drinking days as time progressed in the study. This effect was not deemed clinically significant by the researchers, however (PMRG, 1997).

Comparison between treatment approaches for the outpatient condition showed no significant main effects, either. However, after adjusting for matching attributes were added, a significant effect was found by time effect. Participants in the CBT condition showed slightly fewer drinking days as well as less intense drinking days as time progressed in the study. This effect was not deemed clinically significant by the researchers, however.

Project MATCH researchers found that except for dispositional factors of psychopathology and motivation, matching client attributes to treatment did not

enhance outcome (PMRG, 1997). Participants in the outpatient group who revealed low motivation had better outcomes when in the MET condition, but this was a reversal from the beginning of therapy when outpatient participants with low motivation performed better in the CBT condition. In summary, this major study found that individually delivered psychosocial treatments seem to produce good outcomes, despite their theoretical approach.

There were two important findings from Project MATCH. The first is that the three approaches were equally effective despite the difference in number of sessions (MET consisted of four sessions whereas CBT and TSF consisted of 12 each). This had the corollary finding that MET was more cost-effective. Secondly, MET was more effective for angry and less motivated clients.

Financial Efficacy of Brief Interventions Compared to Other Interventions

A cost-analysis was conducted of Project MATCH to consider its financial efficacy in addition to its treatment efficacy. Holder et al. (2000) found support for the efficacy of Motivational Enhancement Therapy (MET) over two other modalities in Project MATCH. Project MATCH was a three-year study comparing the effectiveness of three modalities: a four-session Motivational Enhancement Therapy (MET), a 12-session Cognitive-Behavioral Therapy (CBT), and a 12-session Twelve-Step Facilitation (TSF) (PMRG, 1997). Participants (N = 279) were randomly assigned to one of the three conditions.

Medical care costs were surveyed for each of the participants for three years following treatment. Inpatient, outpatient and total medical care costs were analyzed. Since emergency room use was low for this sample, it was not analyzed separately but included with the outpatient costs. Medicare care costs comprise only hospital costs and do not include lost income, etc. Pre-treatment analysis was comprised only of inpatient costs as this cost was the largest factor and outpatient costs were unreliable. Results show a decline in average per-patient cost in the post-initiation of treatment period. The overall monthly means for pre- and post-treatment were $653 vs. $186 for CBT, $913 vs. $328 for MET, and $827 vs. $176 for TSF (Holder, et al., 2000).

Holder and colleagues (2000) found that total medical care costs decreased from pre- to post-treatment overall for Motivational Enhancement Therapy, Cognitive-Behavioral Therapy, and Twelve-Step Facilitation. Relative to the other two modalities, MET represented the most overall cost-savings intervention. When patients have low levels of alcohol dependence, MET was again found to represent the most cost-savings intervention compared to CBT and TSF. For patients who were evaluated as having low network support for drinking, assignment to the MET condition represented a cost savings of $1,457 over CBT (Holder, et al., 2000). In summary, Holder and colleagues reported that MET was overall superior for patients with good prognostic characteristics due to MET's use of the person's inherent strengths and reasoning skills to promote

ambivalence and change.

The results of Project MATCH provided the impetus for the growth of brief interventions targeted to people who are seeking medical treatment for health problems (i.e., injuries) which are secondary to their alcohol problems (i.e., not seeking treatment for alcohol problems). Analysis of MET's cost effectiveness further enhanced the incentive for health providers and researchers to implement and study this intervention. For this reason, brief interventions (BIs) will be studied as they include MI principles but often add supplementary techniques (i.e., educational materials).

Section VI: Brief Interventions Targeted to Array of Health Problems

With their rise in popularity, BIs have been used to treat a diverse array of health problems. Results of BIs with people in treatment centers have been promising. Carroll, Libby, Sheehan, and Hyland (2001) surveyed 60 participants entering a substance abuse treatment center. They found that participants who received BIs during the initial evaluation were significantly more likely (59% in experimental condition vs. 29% in control condition) to attend at least one additional treatment session. Participants who received the intervention were also more likely (30% in experimental condition vs. 17% in control condition) to attend three or more sessions than those who did not receive the BI, but this difference was not significant. Researchers have applied BIs to other addictions

such as smoking and illicit drug use and to less-studied populations such as adolescents (see Barnett, et al., 2002, 2004; Colby, et al., 2005; Monti, et al., 1999; O'Leary-Tevyaw & Monti, 2004).

BIs have been applied outside the addiction population as well. Reducing the risk of HIV/AIDS transmission, smoking cessation, weight loss, and increasing compliance with managing one's diabetes are other areas where BIs have been utilized (Resnicow, et al., 2002). Initially, motivational interviewing was crafted with the treatment-seeking alcohol user in mind (Resnicow, et al., 2002; see Miller, 1983).

Efficacy of Brief Interventions Targeted to Array of Health Problems

Brief interventions have shown variably strong efficacy in treating diverse health problems, especially for alcohol use and weight reduction. Hettema et al. (2005) reviewed 72 BI studies for health problems ranging from alcohol, smoking, HIV, drugs, gambling, to diet and exercise. They found that BIs have been well tested and show promise in treating most addictions. BIs have been shown to double the rate of change talk and cut in half the rate of resistance when compared to more confrontational type approaches. The clinician's use of empathy decreases the likelihood that the client will become defensive and feel compelled to defend his health problem. BIs have been shown to help decrease client defensiveness and contribute to the likelihood that he will change in the

future. For behavioral change to occur, however, these researchers found that the level (i.e., mild, moderate, strong) of commitment most strongly predicted behavior change rather than frequency of commitment (i.e., number of times the client stated he would change).

In a systematic review, Dunn et al. (2001) reviewed the efficacy of brief behavioral interventions, all of which were based on the principles and techniques of MI. These researchers studied the efficacy of BIs in decreasing substance abuse and smoking. Due to the heterogeneity of the trials, a meta-analysis was not conducted. Of the 26 trials, 18 (69%) resulted in at least one significant effect size. Except for one of these trials (e.g., Project MATCH), the effects were in favor of BIs. The effect sizes in 10 of the 15 substance abuse trials ranged from 0.30 to 0.95, showing significance and in favor of BIs. One of two smoking studies had a significant effect size of 0.23. The smallest effect size occurred in a smoking cessation study, where the effect size of 0.23 occurred for percent of smokers abstinent in the past 24 hours. Two of four HIV risk reduction studies had significant effect sizes ranging from 0.46 to 0.64. The largest effect sizes in all the trials were found in the trials of weight reduction. Three of the five weight reduction trials had significant effect sizes ranging from 0.36 to 2.17.

A final review of BIs across health problems includes the meta-analysis conducted by Burke et al. (2003). They included in their analyses 30 studies involving adaptation of motivational interviews (AMIs), which involved MI plus

personalized feedback to the patient regarding his individual results from tests compared to national norms. The spirit of MI is maintained, however, by adopting a non-confrontational style. They found that AMIs were not helpful in treating smoking or HIV-risk behaviors; however, AMIs showed a 56% reduction in client drinking in which clients reduced their drinking from about 36 to 16 standard drinks per week.

Section VII: Brief Interventions Targeted to Injured Patients in Medical Settings

More recently, researchers have studied the usefulness of BIs in settings outside of substance abuse treatment centers. In particular, researchers are curious whether BIs are efficacious in helping people who screen positive for alcohol use but are not seeking treatment. This often occurs in hospital emergency rooms due to the increased risk of alcohol use leading to an alcohol-related injury. BIs are well-suited to the unique demands of the hospital due to their brevity and are clearly more effective than no treatment (Heather, 1995). One prospective study concluded that injured patients with a history of hazardous alcohol use should be targeted for BIs between one and four months following injury for optimal results in reducing hazardous drinking (Dunn, et al., 2003).

Efficacy of Brief Interventions Targeted to Injured Patients in Medical Settings

Since many patients in the medical setting have been injured as a result of their alcohol use, the efficacy of BIs in this unique setting has become a "hot topic" of research. BIs have been shown to decrease future occurrence of drinking and driving, alcohol-related injuries, and alcohol-related problems in patients treated in an emergency room (ER) who screened positive for alcohol use (Dill, et al., 2004; Monti, et al., 1999). BIs also have been demonstrated to prevent morbidity and mortality, decrease consumption as well as binge drinking episodes, reduce future ER visits, decrease inpatient stay, and increase referrals for follow-ups and/or treatment (Dill, et al., 2004; D'Onofrio & Degutis, 2002). Of the 39 studies reviewed which took place in the emergency department (ED), 32 showed a significant decrease in alcohol consumption after a brief intervention (D'Onofrio & Degutis, 2002). Project ASSERT, which provided comprehensive referral services in an ED setting, followed 169 patients who scored in the hazardous or harmful range of alcohol problems (i.e., score of 8 or greater on the AUDIT) for two months following a BI. Patients self-reported a significant reduction in the following areas: frequency of alcohol use (56%), number of drinks per day (33%), and frequency of drinking six or more drinks on one occasion (64%) (Bernstein, Bernstein, & Levinson, 1997).

More evidence exists regarding efficacy of BIs. A meta-analysis analyzed a similar population, i.e., non-treatment seeking patients in the medical community, and found efficacy at 6 and 12 month follow ups. Bertholet,

Daeppen, Wietlisbach, Fleming, and Burnand (2005) analyzed 24 studies (19 trials for a total of 5,639 patients) of brief alcohol interventions (BAIs) for patients seeking primary health care but not seeking help for alcohol-related problems. They excluded studies which collected patients from advertisements or from referrals for alcohol problems. Studies involving patients from hospital wards or emergency departments were also excluded. Instead, eligible studies were face-to-face initial sessions that focused on alcohol consumption, and the intervention was defined as either "brief intervention" or "motivational intervention" or reported the use of feedback or advice to reduce alcohol use. Some studies had repeated interventions while others did not. Each trial was evaluated and scored for trial quality on components including randomization, blinding in assessment of outcomes, and attrition during follow-up. Due to the heterogeneity of the studies, only the outcome of alcohol consumption was assessed across studies.

To assess long-term behavioral change, Bertholet and colleagues (2005) analyzed 10 randomized studies that involved follow-ups at 6 and 12 months. Without adjusting for dropout, the net change was five drinks per week based on follow up observations for the overall pooled effect size. When compared to controls, the experimental group's decrease of five drinks per week corresponds to an additional relative mean reduction of 15% in alcohol consumption. Overall, for both men and women, BAIs were effective in reducing alcohol use at 6 and 12

months.

An important point is that these BAIs were not complex or time-consuming for primary care providers. Bertholet and colleagues (2005) report, "The typical effective BAI takes no more than 15 minutes, is accompanied by written material, and offers an opportunity for the patient to schedule a follow-up" (p.994). For the one study that included follow up data for 36 and 48 months, the BAI was still effective in decreasing alcohol consumption at those later time periods. This meta-analysis shows that BIs can be effective in reducing alcohol use for at least one year even in patients who are not seeking help with their alcohol problems.

Bertholet and colleagues (2005) point out that the subject pool represents a "primary care" population, i.e., not actively seeking help with their alcohol misuse and is therefore treated by a primary care doctor rather than a specialist (Moyer, et al., 2002). Some argue that in this type of population, contrary to people actively searching for help with their alcohol use, people have less severe alcohol problems and lower motivation for assistance. The second group, defined as "specialist," (Moyer, et al., 2002) receives longer therapy, therapy is more structured, and delivered by an expert (versus in "primary care" interventions). Further, some studies included more than one session. Researchers tend to group studies involving "brief interventions" together despite that they may range from one to four sessions with a patient. Better delineation is needed in the term "brief

intervention" as that may inappropriately pool results of similarly named but heterogeneous studies (Buhringer, 2002; Drummond, 2002; Heather, 1995; Miller & Rollnick, 2002).

Section VIII: Efficacy of Brief Interventions for All Levels of Alcohol Users

Alcohol studies provide support for efficacy of BIs for all types of alcohol users, from at-risk to harmful users. Bazargan-Hejazi et al. (2005) found that injured patients at an urban ED were less likely (64%) to have a score greater than 7 on the AUDIT (e.g., score above 8 indicates hazardous or harmful drinking levels) three months following the BI compared to the control group (80%). This was only true, however, for patients (n = 24) initially scoring in the 7 to 18 range (e.g., hazardous range) on the AUDIT. Patients (n = 47) with initial AUDIT scores in the 19 to 40 range (e.g., harmful range) did not significantly decrease their AUDIT scores compared to patients in the control group (n = 53) who scored in the same range on the AUDIT. This study points to the efficacious nature of BIs for moderate users, and due to the prevalence of injury among mild to moderate drinkers, the efficacy of BIs for this group is helpful in curbing alcohol use leading to a medical problem or injury. For instance, it was found that mild to moderate drinkers represent 83% of the total group of alcohol users, most likely to be injured, and most likely to present to trauma centers (Field, et al., 2005; Gentilello, et al., 1999).

BI's efficacy for treating hazardous levels of drinking is also supported. Wilk, Jensen, and Havighurst (1997) reviewed 12 BI studies involving heavy alcohol drinkers and found that BIs were useful in curbing alcohol use. Interventions were defined as less than one hour long, motivational counseling sessions that included feedback and education regarding harm of heavy drinking and advice to moderate drinking to low-risk, problem-free levels of alcohol consumption. Some studies had repeat interventions while others did not. Wilk and colleagues found that heavy drinkers who received a BI were twice as likely as heavy drinkers who did not receive the intervention to reduce their drinking at 6 and 12 months. Another study of 120 heavy-drinking injured male patients who were admitted to a trauma hospital showed that a brief intervention was effective in significantly decreasing alcohol consumption six months later (Antti-Poika, Karaharju, Roine, & Salaspuro, 1988).

Taking the analysis of BIs in primary care one step further, Ballesteros, Duffy, Querejeta, Arinoa, and Gonzalez-Pinto (2004) conducted a meta-analysis to review the efficacy of BIs. Reviewing 12 studies, they found that BIs significantly reduced drinking in hazardous drinkers compared to minimal interventions and usual care. This finding reinforces the argument that even for nontreatment seeking patients who are injured, BIs decrease future risk of injury and represent a cost savings based on fewer readmissions.

Taken altogether, these studies show that BIs are helpful for people with

mild, moderate, and harmful levels of alcohol use.

Section IX: Potential Cost Savings with Implementation of Brief Interventions

So far BIs have been discussed in terms of efficacy in treating people with addictions, particularly people who have been injured and are not seeking alcohol-related interventions. The financial aspect of implementing BIs will be considered next. In a review of the literature, Gentilello et al., (2005) analyzed whether any cost savings could be found by providing brief alcohol interventions in trauma centers to patients who were injured. They found the following:

> An estimated 27% of all injured adult patients are candidates for a brief alcohol intervention. The net cost savings of the intervention was $89 per patient screened, or $330 for each patient offered an intervention. The benefit in reduced health expenditures resulted in savings of $3.81 for every $1.00 spent on screening and intervention. This finding was robust to various assumptions regarding probability of accepting an intervention, cost of screening and intervention, and risk of injury recidivism. Monte Carlo simulations found that offering a brief intervention would save health care costs in 91.5% of simulated runs. If interventions were routinely offered to eligible injured adult patients nationwide, the potential net savings could approach $1.82 billion annually (p.541).

This finding of Gentilello and colleagues supports the conclusion that BIs provide a cost benefit ratio advantageous to medical settings. At a time when medical costs are increasing and hospitals must try to contain costs, BIs offer a solution to decreasing costs by minimizing costs in the current visit and decreasing the likelihood of the patient re-injuring herself and returning for medical attention. The potential net savings of $1.82 billion annually across the United States is an astonishing finding.

In a major study of injured patients at a medical setting, Project TrEAT (Trial for Early Alcohol Treatment) was analyzed in terms of its cost-benefit ratio (Fleming, et al., 2002). Participants who received the BI spent fewer days in the hospital and fewer emergency department visits. Although three people died in the treatment group, seven deaths were reported in the control group. The treatment intervention, estimated to cost $205 per patient, was said to save $712 in medical costs, $102 in legal costs, and $7,171 in motor vehicle accident costs for each patient, with a net benefit–cost ratio of 39 to 1 (Fleming, et al., 2002). Fleming and colleagues (2002) suggest a $43,000 reduction in future health care costs for every $10,000 invested in early intervention. BIs were shown to be efficacious in curbing alcohol use as well as providing generous cost-savings for the medical and legal communities and for patients.

Another study argues for the cost-effectiveness of BIs by presenting evidence for the substantial cost of not treating people with substance abuse need.

Rockett, Putnam, Jia, Chang, and Smith (2005) analyzed patients with unmet need (n = 415) against patients without substance abuse treatment need (n = 1,073). They found that the former group was 1.8 times more likely to be admitted to the hospital during their current ED visit (81%) and 1.5 times more likely to have reported making at least one ED visit in the past 12 months (46%). ED patients with unmet substance abuse treatment were found to cost an estimated $777 million, or $1,568 per patient, in extra ED and hospitalization charges annually.

Section X: Central Issues of Study

So far, the need for treatment has been explored as well as treatment's efficacy in terms of curbing alcohol use and related injuries as well as its financial savings for society and the medical community. Considered next will be three central issues of this study. The first central issue of study is that patients screen positive for alcohol use based upon different criteria. Do these different criteria screen for different types of alcohol users? If so, how are these groups different and what are the risk factors for each? Second, some study participants are more likely to recognize the role that alcohol played in their current injury. What factors lead to this increased insight, known as causal attribution? Third, some study participants appear more willing and ready to make a change to their alcohol consumption. Motivation to change is a vital component to treatment effectiveness. What factors are associated with readiness to change?

Differences Among Injured Patients who Screen Positive for Alcohol Use

Until recently, most research on treating alcohol use has focused on patients at treatment centers. Due to the propensity of people with alcohol problems to injure themselves, alcohol interventions at the emergency room are worthwhile. These patients, however, represent a different type of patient to treat with alcohol interventions as they are seeking medical help for the injury rather than help for their alcohol use. Within this non-seeking treatment group, differences in receptiveness to alcohol-intervention emerge. Studies have shown that patients are increasingly more amenable to alcohol interventions after recently experiencing a life-threatening injury (Field, et al., 2005; Gentilello, et al., 1999). In particular, an argument has been made that this temporal association creates a "teachable moment" in which patients are more capable of insight into the negative effects of their alcohol use (Apodaca & Schermer, 2002; Gentilello, et al., 2005; Longabaugh, et al., 1995, 2001). Such patients are likely to be amenable to changing the pattern of their alcohol use. Teachable moments better relate to patients who screen positive for alcohol use based upon their having consumed alcohol prior to their injury. They are likely to perceive the association between their alcohol consumption and the resultant injury based on the close interval of those two events (co)occurring. Such insight can foster motivation for change and yield a reduction in negative alcohol-related

consequences.

Longabaugh and colleagues (2001) contrast teachable moments from windows of opportunity. "Window of opportunity" pertains to patients who have a pattern of heavy drinking and may have screened positive for alcohol use based upon the CAGE or frequency of use, rather than screening positive due to recent consumption of alcohol prior to the injury (i.e., positive BAC). Because their injury is not so obviously a result of their alcohol use, patients presenting with "windows of opportunity" may be difficult to engage in treatment. These patients may question the appropriateness of an alcohol-related intervention.

These two patient groups have different rates for screening positive for alcohol use. One review of studies found that while 7.4% of injured patients in the emergency department (ED) screened positive for alcohol use by having a BAC equal to or greater than 100 mg/dL, a further 19.6% of injured patients in the ED screened positive for alcohol use based upon a positive substance abuse screening questionnaire rather than their BAC, which was negative (Gentilello, et al., 2005). Gentilello and colleagues (1999) argue that screening trauma patients by use of questionnaires can garner as many as 44% of patients positive for chronic alcohol abuse. These findings shows that only including currently intoxicated injured patients into a study for brief interventions grossly neglects a sample of patients whose drinking level may be hazardous, although they were not drinking prior to the injury. Further comparison of these two patient groups is

warranted and future research should take into account whether the patient is drinking at the time of injury and presents with a “teachable moment,” or is not drinking at the time of the event and presents with a “window of opportunity” (Dill, et al., 2004; Longabaugh, et al., 2001).

The difference in amenability between these two patient groups to an alcohol-intervention in the emergency room was studied by Longabaugh and colleagues (2001). They studied 539 patients 12 months after inclusion into the study. Inclusion was based upon having scored positive on one of the three criteria: tested breath alcohol positive (BAC $\geq$0.003 mg/dl) while in the emergency department (ED), received a score of eight or greater on the Alcohol Use Disorders Identification Test (AUDIT) thereby receiving a hazardous or harmful drinking score, and/or self-reported that they ingested alcohol within six hours prior to the injury. None of the patients had a prior diagnosis of alcohol abuse or dependence. The average age of the participants was 27 years (*SD* = 9), 78% were male, 72% were white, 77% were single, and 72% were employed. This population sample is representative of the population that utilizes the southern New England hospital ED.

Patients were randomly assigned to one of three conditions: standard care (SC), brief intervention (BI), or brief intervention with a booster session (BIB). The BI consisted of motivational enhancement treatment (MET) with MI principles. BIB consisted of MET with a booster session 7-10 days following. A

referral list for alcohol treatment services was given to any participant, regardless of condition assignment, who was thought to need it or who asked for one.

Planned comparisons revealed that BI alone was not significantly better than SC. BIB participants had significantly fewer DrINC consequences that did SC. BIB patients averaged 8.78 negative consequences, BI 9.94, and SC 11.02. Analyzing subscales on DrINC, BIB was significantly better than SC on intrapersonal consequences, interpersonal consequences, social responsibility and impulse control. No difference existed between these two treatment conditions for physical consequences. BI was significantly better than SC on intrapersonal consequences only. Regarding the association between alcohol use and injuries, BIB had significantly fewer alcohol-related injuries than SC. Participants in the BIB condition reduced their alcohol-related injuries by 36% compared to 6% for controls. BI was not significantly different from SC. Regardless of treatment condition, all participants significantly reduced their alcohol-related injuries and medically treated injuries in the year following their inclusion into the study. All participants significantly reduced their number of heavy drinking days (defined as at least six drinks) regardless of assigned condition at 12 months follow up from 71% to 59%. Having drunk alcohol in the six hours prior to their injury did not play a significant factor in reducing alcohol-related negative consequences in the 12 months following. This study shows that providing BIs increases the likelihood of decreased alcohol use in the future and consequent injuries.

In a study which followed patients (N = 762) for three years, Gentilello and colleagues (1999) found that BIs were effective in decreasing future alcohol consumption compared to controls and particularly effective for patients with mild to moderate alcohol problems. A BI was defined as one single motivational interview conducted by a psychologist. The interview consisted of personalized feedback including comparison of the patient's drinking quantity and frequency compared to national norms.

The difference between the two groups was highlighted at the 12 month follow up as both groups decreased in their alcohol use at the 6 month follow up. At the 12 month follow up, however, the patients who received the intervention decreased alcohol consumption by 21.8 drinks per week compared to a decrease of 6.7 drinks per week for controls. This suggests that controls increased their drinking back to their baseline level while those who received the intervention continued to decrease their alcohol consumption. Another significant difference was detected at the 12 month follow up. Patients with mild to moderate alcohol use who received the intervention had 21.6 fewer drinks per week compared to those who did not receive the intervention who increased their drinks per week by 2.3. This shows that the BI was particularly effective for the majority of drinkers, particularly those who were mild to moderate problem drinkers. At the three year follow up, patients who received the intervention had a 48% reduction in inpatient hospital readmissions for treatment of a new injury compared to controls.

Differences within injured patients who screen positive for alcohol use need to be further explored in terms of risk factors associated for the two groups.

The Role of Causal Attributions in Predicting Readiness to Change

Causal attribution refers to the injured patient's acknowledgment of the role that alcohol played in his current injury. This insight is important because research shows that the two events are frequently associated. Cherpitel, Ye et al., (2003) found that patients with positive BAC were more than half as likely to be admitted to the ER with an injury when compared to patients with negative BAC. This finding was true after controlling for age, gender, and drinking five or more drinks on occasion at least monthly. It was also found that Hispanic patients in the ER were more likely to meet criteria for alcohol dependence or harmful drinking or abuse during the 12 months leading up to the hospital visit than other Hispanics living in the same metropolitan city (Cherpitel, Bond, et al., 2003). In other studies of alcohol-related injuries, injured ER patients were more likely to report heavy drinking, being drunk, social consequence s of drinking and alcohol dependence experiences compared to non-injured ER patients (Cherpitel, 1995, 1999). In a study comparing regional effects on primary care and emergency care utilization, Cherpitel (1999) found that patients in the South were more likely than patients in the West to seek ER services for both injuries and illness due to consequences of their drinking.

The effectiveness of BIs may be influenced not just by whether a patient is a hazardous user, but also by the patient's recognition of the causal relationship between his alcohol use and his injury. Many injured patients report drinking prior to the injury, feeling drunk at the time of the injury, and attribute a causal relationship between their drinking and the injury (Cherpitel, 1996, 1998; Cherpitel, Bond, et al., 2003). Stout (2003) compared drinking patterns in regards to stressful situations to better understand the nature of causal attributions. He found that patients who drank alcohol which resulted in stressful events, were more likely to gradually increase their drinking leading up to the event, then a decrease after the event. Patients did not change their drinking pattern when the stressful event was not related to their alcohol use, however. This substantiates the claim that perceived causal attribution of the stressful event to alcohol use influences subsequent decline in consumption (Cherpitel, Bond, et al., 2003). In particular, causation is influenced by the following factors: the quantity of alcohol consumed, temporal association between drinking and injury, perceived drunkenness and typical drinking patterns.

The degree to which the injured patient recognizes the role that alcohol played in her injury, may affect her receptivity to treatment (Cherpitel, Ye et al., 2003). If she perceives no causal attribution between her alcohol use and her subsequent injury, then she may be less motivated, i.e., be in the precontemplative or contemplative stage, to change her alcohol use. Patients' perception of

causality is mediated by individual and social factors (Cherpitel, Ye et al., 2003). Individual factors include degree of tolerance and capability of insight. For instance, the patient might be too intoxicated immediately following the injury to be able to consider the role that his alcohol use played in his injury. Social factors which influence perception of causality include the role that alcohol plays in one's culture. For instance, cultures that consume alcohol infrequently but excessively are more likely to have deleterious effects of alcohol use (Cherpitel, Ye et al., 2003).

Cherpitel, Ye, and colleagues (2003) conducted a meta-analysis of 13 studies of ER patients (N = 6,370) who were injured and had consumed alcohol within six hours prior to their injury. These 13 studies consisted of 23 ERs across eight countries; due to small numbers of patients at certain ERs, meta-analysis was conducted across studies rather than across ERs. They found that causal attribution was positively predicted by three factors: BAC at the time of the ER admission, amount of alcohol consumed within 6 hours prior to the injury, and feeling intoxicated at the time of the injury (even when amount of alcohol consumed was controlled for). Because of its collection of data internationally, researchers analyzed the social influence, if any, on outcome. They found that injured patients from "wet" societies, that is, cultures which regularly imbibe alcohol and do not have the same stigma attached to alcohol use as dry societies do, were more likely to attribute causality between alcohol and injury. Cherpitel,

Ye, and colleagues (2003) hypothesize that patients from wet societies feel less stigma with this admission compared to patients from dry societies who may be more motivated to deny or hide that their injury was due to alcohol use.

Factors Predicting Readiness to Change

Researchers have studied what makes an injured person move from one stage in the transtheoretical model to the next. Readiness to change is significantly more likely to occur for patients who have experienced a number of negative consequences of alcohol use (Apodaca & Schermer, 2003; Longabaugh, et al., 1995). In a study at a Level 1 trauma center, 50 patients were recruited who presented with a positive BAC (*mean* = 197 mg/dL at admission) (Apodaca & Schermer, 2003). Patients had a mean age of 33, were more likely male (88%), Hispanic or Native American (43% each), employed (61%), and single (68%). Patients completed five measures: the Alcohol Use Disorder Identification Test (AUDIT), which detects hazardous or harmful alcohol use, the Drinker Inventory of Consequences (DrINc), which assesses lifetime experiences stemming from alcohol use, a three-item questionnaire assessing frequency and quantity of alcohol use, Readiness to Change Questionnaire, which assesses which stage the client is currently in (e.g., precontemplation, action), and finally, asked one question concerning the client's perception that alcohol played a role in his injury, along a seven-point Likert scale. Most patients fell either within the

contemplation stage (41%) or the action stage (43%) and the remaining were in the precontemplation stage (16%). Apodaca and Schermer noted, however, that a brief intervention was appropriate as many patients (57%) reported either being in the precontemplation or contemplation stage of change.

Results of this study show that experiencing negative consequences was a positive predictor of readiness to change, more so than variables of age, gender, total AUDIT score, or perception of the role that alcohol played in their injury. A total of 84% of patients reported either wanting to reduce or quit drinking altogether. Interestingly, this study did not find that the level to which the patient recognized his injury as alcohol-related significantly related to his motivation to change.

Longabaugh and colleagues (1995) found supporting evidence that negative experiences increase the patient's readiness to change. In particular, they found that injury itself is a predictor for change. Their sample group consisted of 24 patients presenting with minor injuries at an emergency department (ED) who tested positive on a saliva alcohol test (SAT). Predispositional variables such as risk-taking and environmental conditions supporting risk-taking behavior were not found to relate to readiness to change. However, aversiveness of the injury and awareness of the role that alcohol played in causing the injury significantly increased the likelihood that the patient was motivated to change his drinking. Negative consequences associated to drinking

prior to the injury strengthened the association of injury aversiveness and alcohol involvement with readiness to change.

Anticipating negative consequences is also effective in yielding behavior change. Barnett and colleagues (2002) considered adolescents' stage of change to predict behavior change. In a study of 334 adolescents presenting positive for alcohol in an emergency department (ED), 254 of them were identified as being either in the precontemplative or preparatory stages of change. Compared to patients in the precontemplative stage, patients in the preparatory stage were more likely to be younger, live at home, consume less alcohol, and have penalties for breaking family rules about drinking. Regarding severity of the event, patients in the preparatory stage of change were more likely to be severely injured and more likely to be admitted to the hospital rather than released following ED treatment. Regarding consequences of the event, patients in the preparatory stage were more likely to be very frightened compared to patients in the precontemplative stage.

In a secondary analysis, Barnett and colleagues (2002) considered another adolescent patient group. These injured adolescents scored in the action or maintenance stages of change. They tended to have lower alcohol consumption at baseline compared to patients in earlier stages of change. These patients also differentiated themselves from patients in earlier stages of change by having penalties for breaking family rules about drinking. Regarding severity of the event, patients in the action or maintenance stage had more severe injuries at

baseline. Regarding consequences of the event, patients in the action or maintenance stage anticipated a greater number of negative consequences at the time of the ED visit. These patients were also more likely to consume less alcohol.

Overall, of the 254 adolescents followed in the study, 25% progressed to the action stage following the injury that brought them to the ED (Barnett, et al., 2002). Characteristics that led to an increase in readiness to change were as follows: younger age, lower drinking, having penalties for breaking family drinking rules, injury severity, and number of anticipated consequences such as getting in trouble with parents. In a corollary finding, the World Health Organization (2004) reported that anticipation of repercussion for drinking and driving was more effective in decreasing the behavior than the actual repercussion.

In another study of predicting readiness to change, Mello et al. (2005) provided a brief intervention at an emergency department to patients (N = 539) injured in motor vehicle crashes (MVC). Follow up at 12 months was conducted to assess subsequent alcohol-related injuries. They found that compared to injured patients involved in a MVC who received standard care (n = 46), MVC injured patients who received a brief intervention plus booster session (n = 34) had one-third fewer alcohol-related injuries. This treatment effect was only found for patients who were injured from MVC; patients presenting with injuries from

non-MVC did not show a treatment effect. This study shows that cause of injury (motor vehicle crash) may moderate the effectiveness of a brief intervention as well as the patient's readiness to change. See Table 1 for a summary of factors predicting readiness to change.

Insert Table 1 here

Section XI: Discussion Relating to Present Study's Hypotheses

The above discussion of central issues of the present study leads to analysis of the contribution this study makes to existing research. Taking each hypothesis in turn, a critique of current research and how this study expounds upon the literature by its research design and focus will occur.

Hypothesis 1: Determine the risk factors that are highly associated with patients who are acutely intoxicated versus those who drink beyond normal limits.

This study expounds upon several previous studies by its screening method. Many prior studies used the sole criteria of currently elevated alcohol level. In Longabaugh and colleagues' study (1995), injured patients screened positive by a saliva alcohol test (SAT). Apodaca and Schermer (2003) screened injured patients as positive for alcohol problems via their BAC at the time of

admission. Barnett and colleagues (2002) screened injured patients positive for alcohol problems by their BAC or by patients' self-report of drinking alcohol prior to their injury. Monti and colleagues (1999) screened injured patients as positive for alcohol problems by either their self-report of alcohol use prior to the injury or positive BAC. These studies have emphasized chemical evidence of alcohol use for inclusion.

Not all alcohol problems can be identified by elevated alcohol levels, however. For instance, injured patients who consume mild to moderate amounts of alcohol may present with alcohol problems due to the frequency, rather than the quantity, of use. In Gentilello and colleagues' study (1999), patients screened positive by BAC, gamma glutamyl transpeptidase level as well as their score (1 or more) on short Michigan Alcoholism Screening Test (SMAST). Longabaugh and colleagues (2001) targeted only hazardous or harmful level drinkers for their study which they screened for by the patients' meeting one of the following criteria: tested breath alcohol positive at the ED, self-report of alcohol use within the six hours prior to their injury, or score of 8 or greater on the AUDIT. Bazargan-Hejasi and colleagues (2005) differ from all the rest in that no physiological instruments were used in their screening process. Instead, they used only the CAGE questionnaire as a means of identifying people with alcohol problems.

The present study's broad inclusion criteria allows for divergent ways of

screening positive for alcohol. In particular, there are four criteria by which patients screened positive for alcohol use and therefore became eligible to participate in this study. The criteria consisted of the following: 1) any clinical indication of alcohol use (e.g., positive BAC, appears intoxicated, or friends/family report patient's alcohol use) 2) the patient's self-report of having drunk alcohol prior to the injury, 3) consuming alcohol in sufficient quantities as to quality for concern (e.g., more than 14 drinks/week or more than 4 drinks/occasion for men and more than 7 drinks/week or more than 3 drinks/occasion for women), or 4) answering "yes" to any item on the CAGE in the past 12 months (see Appendix A). These criteria selected for two types of patients: those who consumed alcohol prior to the injury (i.e., Criterion 1 and 2) and those who consume alcohol on a frequent basis more than what is considered at normal or safe levels but are not currently intoxicated at the time of their injury (i.e., Criterion 3 and 4). This allows a wider net to be cast and increases generalizability of the study results to include injured patients who consume alcohol prior to the injury as well as injured patients who have hazardous alcohol use patterns.

Hypothesis 2: Determine the risk factors associated with increased causal attribution.

The study of causal attributions considers patients who recognize the

degree to which alcohol plays a role in their current injury. This area of study has been neglected by many researchers who instead emphasize screens which detect physiological signs rather than considering the injured patient's history of alcohol use (Cherpitel, Ye et al., 2003). A reason physiological signs have been used more than chronicity is that temporal associations between alcohol consumption and injury lend themselves better to awareness of the association between alcohol use and injury, more so than chronicity of alcohol use and resultant injury. Patients who test negative on BACs may have a more difficult time recognizing the role that alcohol played in their injury when they may not have consumed alcohol prior to their injury.

Many of Cherpitel's studies have assessed causal attributions and shown that acute intoxication lends itself more readily to making causal attributions. This present study expounds upon her studies by providing a large-scale study (nearly 1,500 injured patients at an ED). Many of Cherpitel's studies have consisted of small sample sizes (see Cherpitel, Ye, et al., 2003). Also, due to the inclusion criteria of the present study, whether patients with a history of chronic drinking (versus consuming alcohol prior to the present injury) will be as likely to attribute causality will be explored.

This study also takes on Apodaca and Schermer's study (2003) which failed to find that patient's perception of the role that alcohol played in the injury predicted readiness to change. Their study consisted of 50 injured patients and

this study, which collected data from nearly 1,500 injured patients, may find significance if there is any to be found.

Hypothesis 3: Determine the factors associated with increased readiness to change.

As discussed earlier, people are more likely to change their alcohol use after they have experienced negative consequences of their alcohol use. The present study contributes by expounding upon previous research. In particular, it builds upon Apodaca and Schermer's (2003) study of 50 injured patients in several ways. Apodaca and Schermer acknowledge that their small sample size only targeted roughly 5% of the population to that site's trauma center. This present study's sample size is more than 1,500 patients and targeted approximately 14% of the population of the hospital's trauma center during the two-year collection phase (May 12, 2003 through May 23, 2005). Apodaca and Schermer's sample included an overrepresentation of Native Americans (43%) and an underrepresentation of white non-Hispanics (12%), which limits its findings to the general population. The present study included white non-Hispanic, Hispanic, and Blacks in roughly equal proportion (Native Americans were screened out).

Longabaugh and colleagues (1995) found that aversiveness of the injury and awareness of the role that alcohol played in causing the injury significantly

increased the likelihood that the patient was motivated to change his drinking. Negative consequences associated to drinking prior to the injury strengthened the association of injury aversiveness and alcohol involvement with readiness to change. The present study provides a more thorough analysis of these issues than does Longabaugh and colleagues' study in several ways. First, their sample consisted of 24 injured patients while this one exceeds 1,500. They did not control for the effect of race while the present one included only Blacks, Hispanics, and Whites and controlled for possible racial influences. Their sample consisted of only six women. This is hardly enough to consider reasonable to generalize their findings to the entire population. The present study consists of 267 women (17.6%) which allows for better external validity of the results. This present study also considered a wider range of inclusion criteria allowing people to screen positive for alcohol use which netted a wider pool of people with alcohol problems. This allows the opportunity to better capture and assess more factors that may contribute to patient's readiness to change his alcohol use.

The present study contributes findings above and beyond Barnett and colleagues' (2002) study by having a larger sample group of injured patients (over 1500 versus 334) and focusing on readiness for change in adults rather than adolescents. The present study's inclusion criteria selected for patients who screened positive by positive BAC, similar to Barnett's inclusion criteria, but also by a history of hazardous drinking (as determined by NIAAA standards or CAGE

questionnaire). Barnett's inclusion criteria consisted only of positive BAC and self-report. This does not select for injured patients who are not currently intoxicated but may have problems with alcohol not detected by Barnett's screening methods.

This study also adds to existing research by considering the severity of the patient's injury. As Mello and colleagues (2005) found, patients who were injured by motor vehicle crashes were less likely to have future alcohol-related injuries compared to patients in the control group. Readiness to change as predicted by injury severity will be assessed in the present study.

Section XII: The Influence of Ethnicity in Readiness to Change

In addition to the three central issues explored in this study, this project also makes a major contribution in the area of ethnicity. It address the question: To what degree, if any, does ethnicity influence how patients screen positive, make causal attributions, and readiness to change? Little research has been conducted to this point assessing the role that ethnicity plays in these areas. And there is a great need for this understanding in order for BIs to be efficacious for a diverse population. For instance, CDC (1997) provides data showing that minorities have a disproportionate injury mortality rate compared to Whites relative to their rate for heavy drinking. While the current prevalence rate nationwide for heavy drinking is 4.8%, Whites make up the largest portion of the

total prevalence (5.2%), followed by Hispanics (3.7%) and then Blacks (2.8%) (CDC, 2005c). Injury mortality rates, however, do not fall in the same pattern. For ages 15-34, unintentional injury death rates were roughly similar (34.9 per 100,000) for the three groups for 1994 to 1995 despite their different rates for alcohol use (CDC, 1997). A primary risk for injury is alcohol use. Yet for ages 15 to 34, Whites do not injure themselves more often than Blacks and Hispanics. Injury mortality rates do not reflect the alcohol-use pattern which signifies the huge need for treating alcohol-related problems for minorities.

Hettema et al. (2005) found that efficacy of BIs differed across ethnicities. They were surprised to find that Native Americans responded favorably to BIs. They posited that the principles of BIs, including providing a warm, supportive, nonjudgmental atmosphere fit well with Native American culture. They did not find similar results, however, with other minorities, including Blacks and Hispanics. A review of BI studies with minorities would offer advancement of knowledge about the applicability of this intervention type across a wider domain.

At-risk behavior is already documented in literature regarding potential for alcohol-related injuries for different ethnicities. Caetano and Clark (2000) report that lifetime arrest rates for driving under the influence of alcohol are 13% for White men and 19% for Hispanic men. Self-reported rates of driving a car after having drunk enough “to be in trouble if stopped by the police” were 22% for Whites and 21% for Hispanics.

In a study spanning eight countries, the World Health Organization (WHO) (1996) studied the efficacy of BIs in over 1500 subjects (1260 men, 299 women) who were identified as heavy drinkers in primary care settings. These participants did not have a history of alcohol dependence but were selected on the basis of frequency and/or intensity of consumption of alcohol. They were randomly assigned to one of three conditions: a control group or one of two intervention groups: a simple advice group or a group receiving brief counseling. WHO found that at follow up nine months later, males in the two intervention groups reported 17% lower average daily alcohol use compared to males in the control group. Additionally, men in the two intervention groups reported 10% more reductions in the intensity of their drinking compared to men in the control group. Women reported significant reductions regardless of intervention type. This study points to the efficacy of BIs for heavy drinkers as well as its efficacy across cultures.

Based on these findings, the following hypothesis will be assessed:

Hypothesis 4: Examine ethnic differences in reasons for screening positive, making causal attributions, and readiness to change.

Whites, Blacks, and Hispanics may differ on these and other variables for a number of reasons. First, research on efficacy of treatment has primarily centered on trials of Whites. Blacks and Hispanics may have unique needs that are not adequately addressed in traditional treatment. Consequently, they may

respond less favorably to traditional treatment. This may yield either higher drop out rates or increased rates of relapse following completion of treatment for minorities. Finally, sociodemographic factors influence readiness to change. For instance, cultural norms influence drinking patterns. Research points to the relatively higher rate of binge drinking for Hispanics. This may account for increased injuries in this population.

Section XIII: Conclusion

This project analyzes 1) risk factors for patients who have problems with alcohol use differentiated by whether their alcohol use immediately precipitated the injury or whether their alcohol consumption exceeds normal levels 2) the level of awareness he has of the association between his alcohol use and current injury 3) the factors contributing to the patient's readiness to change his alcohol use and 4) the influence of ethnicity on these preceding factors. These four issues are relevant to the stage of change the patient is in. For instance, the patient's keen awareness of association of alcohol and injury may be correlated to greater commitment toward change, also known as the contemplation stage. As already discussed, for instance, Longabaugh and colleagues (1995) found that patients who recognize the role that alcohol played in their injury were more likely to be ready to change their alcohol consumption. It may be possible to better understand the client's readiness to change stage by having these three questions

answered regarding an injured patient. Increased understanding of readiness to change can lead to more success between the therapist and patient in building rapport and eliciting change talk from the injured patient. The patient's dissonance between his values and his present behavior will increase leading to motivation for change. Changing his alcohol use will decrease the risk of future alcohol-related injuries. While a chain of events must be played out in this treatment scenario, it all begins with recognizing the injured patient's stage of change and meeting her where she is in the current time.

CHAPTER 2: METHODOLOGY

Specific Aims

Nearly 100,000 people die every year due to alcohol use (NIAAA, 2003). In the United States, reports of chronic alcohol use have doubled since 1995 (CDC, 2003b). Alcohol use has consequences for the physical health of the user and for society. For the individual who consumes alcohol, he is at increased risk for cardiovascular disease (CVD), particularly coronary heart disease (CHD), liver disease, diabetes, and cancer (AHA, 2005; D'Onofrio & Degutis, 2002; Lucas, et al., 2005; NIAAA, 2003; NIH, 2005a; Room, et al., 2005). Also, the alcohol user is more likely to injure himself, based upon findings that alcohol is the leading risk factor for injuries (Apodaca & Schermer, 2003; Dill, et al., 2004; Gentilello, et al., 1999, 2005). Approximately nearly 7.6 million visits annually to the ED are alcohol-related (Bazargan-Hejazi, et al., 2005). Social concern is raised by the potential risk to others that alcohol users present, for instance while driving intoxicated, and also by the financial burden this places upon society. The NIAAA (2004) estimates that society pays $184,636 million for the financial impact of alcohol use.

Interventions that target alcohol users in nontraditional settings such as hospital emergency departments may help limit future alcohol use and associated injuries. Certain interventions, such as motivational interviewing (MI), use the principles of the transtheoretical model (TTM) to understand and treat alcohol

users based on their stage of change. Project MATCH found that MET was as effective as traditional and longer treatment approaches, which resulted in the growth of brief interventions (BIs) conducted in medical settings (PMRG, 1997). BIs have been shown effective in decreasing future alcohol use, along with associated injuries, amongst injured patients who sought medical attention for the injury, secondary to their alcohol use (Bertholet, et al., 2005; D'Onofrio and Degutis, 2002).

The present study assesses risk factors associated with screening criteria, causal attribution, and readiness for change amongst injured patients at a level one trauma center located in an urban setting. In addition, a major contribution of this study is analyzing the influence that ethnicity has on these three factors. Analysis will address the following four hypotheses.

Hypothesis 1: Determine the risk factors that are highly associated with patients who are acutely intoxicated versus those who drink beyond normal limits.

Longabaugh and colleagues (2001) differentiate injured patients who screen positive for alcohol use. They recognize that patients who screen positive for alcohol use based on recent alcohol use are often more amenable to interventions based on temporal association of alcohol use and subsequent injury. Longabaugh identifies these injured patients as having "teachable moments" where alcohol interventions can have beneficial consequences for these patients.

Patients who screen positive for alcohol use on the basis of hazardous drinking patterns rather than recency of alcohol use to injury are considered to be less amenable to alcohol interventions because of the decreased temporal association. Longabaugh identifies this group as having “windows of opportunity” where alcohol interventions may have less, but still meaningful, beneficial consequences on these injured patients' alcohol use subsequent to the intervention.

The criteria by which patients screened positive for alcohol use yielded two patient groups: those who consumed alcohol prior to the injury (i.e., positive BAC, self-report of prior alcohol use) and those who have a hazardous drinking pattern (i.e., consumed alcohol at a level that met or exceeded NIAAA cutoff scores, responded positively on the CAGE). Preliminary analyses of the data showed that most participants who screened positive for alcohol use based on clinical indication or self-report of alcohol use prior to injury (i.e., met Criterion 1 or 2) also met criteria for drinking beyond normal limits (DBNL) (i.e, met Criterion 3). The number of patients who met criteria 1 or 2 and did not DBNL was small (n = 95). These patients were excluded in the analysis of this hypothesis. Participants who screened positive for alcohol use based on the CAGE (e.g., Criteria 4) were also excluded in the analysis of this hypothesis for two reasons. First, the number of participants in this group was small (n = 65). Second, no comparable questions to the CAGE were found in the study questionnaire to determine whether participants who met Criteria 1 or 2 would

also have screened positive based on the CAGE. Comparable questions for NIAAA cut-off scores (i.e., Criteria 3) were found to determine whether participants who screened positive based on a clinical indication or self-report of alcohol use would also have screened positive for DBNL (e.g., Criteria 3), so this group was included. The two groups regressed in the model were acutely intoxicated patients and patients who DBNL. Risk factors that are associated with the two groups will be analyzed.

Hypothesis 2: Determine the risk factors associated with increased causal attribution.

Perception of injury relating to prior alcohol use has been shown to influence future alcohol consumption and associated injuries (Cherpitel, Ye, et al., 2003). Increased causal attribution of the role alcohol played in an injury increases the chance that change in alcohol use will occur. The more the patient identifies the relationship between his alcohol use and related injury, the more likely he is ready to change his alcohol use. The risk factors that increase causal attribution will be assessed.

Hypothesis 3: Determine the factors associated with increased readiness to change.

Readiness to change one's drinking pattern is based upon the

transtheoretical model which outlines steps leading to change behavior. It is hypothesized that patients are more willing to make changes to their alcohol use after experiencing an increased number of negative alcohol-related experiences. Risk factors that are associated with increased readiness to change will be examined.

Hypothesis 4: Examine ethnic differences in reasons for screening positive, making causal attributions, and readiness to change.

Due to a myriad of reasons, Whites, Blacks, and Hispanics differ in terms of their alcohol consumption patterns and alcohol-related injury rates. These reasons include cultural and demographic differences which influence important factors leading to behavior change. Risk factors associated with screening criteria, causal attribution, and readiness to change will be assessed in terms of how they are differ based on ethnicity.

Summary

In this study, approximately 1,500 patients who sought medical attention at a level one trauma department were studied who screened positive for alcohol use and who were injured according to certain criteria. Of the 1,496 participants, 670 (44.8%) patients were White, 538 (36%) were Hispanic, and 288 (19.3%) were Black. These patients were identified by trauma care staff in association

with study clinicians as screening positive for alcohol use by meeting at least one of four criteria. Patients had to meet one of four criteria: clinical indication of alcohol use (i.e., positive BAC), self-report of alcohol use, DBNL, or responding that an item on the CAGE had occurred in the past 12 months.

Consent to Participate and IRB Approval of Study

All participants signed a form recording their written consent to participate in the study. Then the study clinician verbally administered the questionnaire to patients who consented. All patients received compensation of $25. The research protocol was approved by a full review from the institutional review boards at University of Texas Southwestern Medical Center and University of Texas at Houston. No exemption was granted.

Methods and Sample

Trauma patients admitted to the Emergency Room and Trauma Center of Parkland Health and Hospital System for treatment of an injury were screened by trauma care staff according to e-codes associated with motor vehicle collisions involving driver, passenger or pedestrian, violence including gunshot wounds, stab wounds, other trauma related to assaults, and falls. Approximately 4,000 trauma activations occur annually at Parkland Hospital, and an additional 2,500 are seen in the ED for treatment of an injury. Patients underwent routine standard

care for their medical needs.

Patients who screened positive for alcohol use were approached by a member of the study staff to ensure that they met inclusion criteria, and if so, study clinicians obtained written, informed consent. Bilingual study clinicians consented patients who were Spanish-speaking only. Patients who agreed to participate completed an interview lasting 20 to 40 minutes.

Following the interview, patients were randomized to either standard care or brief intervention. Standard care involved a referral to drug and alcohol services. Caseworkers from drug and alcohol services provide information to patients regarding social services and treatment options that are available in the community. Referrals may consist of short-term detoxification, outpatient, inpatient, or residential treatment. Parkland Hospital does not provide treatment for alcohol abuse or dependence beyond appropriate referrals to existing agencies within the community. Caseworkers make referrals at their discretion dependent upon their knowledge of community resources. Caseworkers are not trained in brief interventions but rely on a traditional, personally derived approach that primarily targets alcohol dependent individuals. No additional contact between the patient and caseworker occurs.

Patients were enrolled into the study from May 12, 2003 through May 23, 2005. During this time, 5,731 trauma patients out of 11,419 trauma activations were screened for inclusion into the study at Parkland Memorial Hospital. Of

those, 2,369 (41.3%) screened positive, 1,543 (26.9%) agreed to participant, and 1,496 (26.9%) enrolled and completed the initial interview. The current study included all 1,496 participants who completed the initial interview.

Inclusion Criteria

Patients who presented for treatment of an injury to the ED or trauma center at Parkland Hospital were screened on a number of factors. The subject pool included three ethnic groups: Blacks, Hispanics, and Whites. Spanish-only speaking patients were interviewed by bilingual study clinicians. Patients were required to be 18 years of age or older to participate. Participants screened positive for either alcohol use prior to the injury, DBNL, or hazardous drinking. This was determined on the basis of any of the following four criteria. First, clinical indication of alcohol abuse at the time of injury or documentation of alcohol abuse/intoxication in the medical record. Second, patient's self-report of alcohol use prior to injury. Third, the typical alcohol intake as determined by NIAAA was exceeded. These standards and cutoff limits are based upon studies from the NIAAA that examined the relationship between alcohol use and health related problems. Fourth, the patient scored positive by responding that one of the four items on the CAGE occurred in the past 12 months. Admitted patients who were intoxicated were approached during their hospital stay after they were medically stable. Patients who met the age, ethnicity and any one or more of the

four criteria on the screen were consented, interviewed, and randomized to either the study intervention or standard care. In summary, the criteria for inclusion included 1) admission to the emergency or trauma department for treatment of an injury at Parkland Hospital 2) screening positive for alcohol use at the time of injury or alcohol problems 3) aged 18 or older and 4) either Black, Hispanic, or White.

Exclusion Criteria

Certain factors excluded injured patients from participating in the study. Patients younger than 18 years of age, and patients who did not identify themselves as Black, Hispanic, or White were ineligible to participate. Patients who were mentally retarded, suffered a traumatic brain injury, or received a Glasgow Coma Scale (GCS) score of less than 14 were excluded. Patients who were intoxicated at the time of admission to the emergency room or trauma care center were monitored and consented to participate once clinically appropriate. Patients who screened positive on a tox screen for drug use at the time of admission were monitored and consented when clinically appropriate. Patients who were not medically stable at the time of admission were followed through hospital admission and consented once they were medically stable.

Screening Procedures

Patients screened positive for alcohol use based on any one of the following criteria:

1. Clinical indication that patient consumed alcohol prior to his current injury (Criteria 1); or
2. The patient's self-report of alcohol use prior to injury (Criteria 2); or
3. The patient met or exceeded NIAAA cutoff scores for alcohol use (Criteria 3); or
4. The patient responded that at least one of the four items on the CAGE occurred in the past 12 months (Criteria 4).

Clinical indication includes a positive blood alcohol concentration (BAC). BAC is a standard medical procedure for treatment of injured patients for whom blood is already drawn (approximately 90% of injured patients). BAC at admission provides an objective evaluation of alcohol use prior to injury.

NIAAA alcohol use cutoff limits have been set by examining the relationship between alcohol use and health related problems. The NIAAA limits are stratified by gender. Women who consume more than 7 drinks per week or 3 drinks per occasion and men who consume more than 14 drinks more week or 4 drinks per occasion exceed the cutoff limits set by the NIAAA. Patients who met or exceeded these limits were considered to have screened positive for alcohol use by drinking beyond normal limits (DBNL) and were included in the study. The three questions used to assess alcohol problems were: 1) On average, how many

days do you drink per week? 2) On a typical day when you drink, how many drinks do you have? 3) What is the maximum number of drinks you have had on a single occasion in the last month?

The CAGE consists of four questions which assess whether in the past 12 months: 1) participants have tried to cut down on alcohol use 2) participants have been annoyed by people criticizing their drinking 3) participants have felt guilty about their alcohol use or 4) participants have ever consumed alcohol first thing in the morning. The CAGE has been shown to be both sensitive and specific for identifying persons who meet criteria for alcohol abuse and dependence.

Steps to Ensure Screening Procedures

The ED nursing staff performed screening of all injured patients in the ED in association with study staff. All trauma nurses who worked in the ED participated in a training seminar regarding screening and other study procedures. This training seminar was conducted by the Principal Investigator and covered the screening criteria and standardized procedures. This insured standardized screening of all injured patients by ED nursing staff. In addition, the Principal Investigator and Research Coordinator met with trauma nursing staff on a weekly basis to monitor ongoing adherence to screening protocol. Study personnel actively monitored admission and screening of injured patients by reviewing daily hospital census information, laboratory BAC results, and by communication with

hospital staff. ED census sheets were actively maintained by nursing staff and monitored on an hourly basis by study staff. ED nursing staff maintained the census of hospital admissions, which were reviewed by study personnel prior to each shift. Study staff coordinated their activities with ED nursing staff to ensure accurate and complete screening of eligible patients. Finally, screening and enrollment rates were maintained by study staff on a daily basis. These rates were reviewed on a weekly basis with the Principal Investigator. In addition, monthly reports were generated and reviewed by all investigators.

Recruitment of Participants

Participants who screened positive for alcohol use based on any one of four criteria were informed of the study and requirements for participation. Study clinicians were trained regarding the purpose and elements of informed consent. Written informed consent was documented and patients received a signed copy. Patients were consented, interviewed, and treated at Parkland Memorial Hospital. After signed informed consent was obtained, the interview was conducted. Spanish-only speaking participants were interviewed by bilingual study clinicians.

Measurement of Risk Factors and Dependent Variables

All statistical procedures were conducted using the Statistical Package for the Social Sciences (SPSS), version 14.

A primary outcome variable of interest is alcohol consumption. Alcohol consumption is assessed by the number of drinks consumed per week and the frequency of drinking five or more drinks at one occasion. A drink is defined as equal to one ounce of spirits, a four-ounce glass of wine, or a 12-ounce can of beer, each of which contains approximately 12 grams of absolute alcohol. An occasion is defined as alcohol consumption within a two-hour time span. Frequency and volume per occasion variables are calculated according to their representation in terms of drinking occasions and number of drinks per occasion. Participants were asked a question which assessed the frequency with which they consumed five or more alcoholic drinks on one occasion in the past 12 months.

Description of Variables

Sociodemographic Factors

Measurement of Age

This is a continuous variable with an average age of 33.15 (*SD* = 11.35) for the total sample. It was categorized in the following way: 18-24 (*n* = 438; 29%), 25-34 (*n* = 440; 29%), 35-44 (*n* = 342; 23%), and 45 plus (*n* = 274; 18%) for chi-square analyses. In the correlational analyses and multiple regressions, age was used in its original continuous format. Reference group was age 45 plus.

Measurement of Education

Levels of education were condensed due to small numbers of participants

in certain education brackets. The final education brackets were as follows: Some high school or less (*n* = 579; 39%), High school diploma or GED (*n* = 520; 35%), More than high school (*n* = 395; 26%). Reference group was More than high school.

Measurement of Gender

This is a categorical variable with the output of male (*n* = 1,234; 83%) or female (*n* = 262; 17%). Assignment was based on self-report. Reference group was female.

Measurement of Occupation

Occupation groupings were condensed due to small numbers of participants in certain brackets. The final two groups were patients who earn money in a part or full time job (*n* = 1,036; 69%) and those who do not (*n* = 459; 31%). These 459 patients represent homemakers, students, retirees, those unable to work, and others. Reference group was patients who are employed for wages.

Measurement of Race/Ethnicity

As part of the inclusion criteria, only Blacks (*n* = 288; 19%), Whites (*n* = 670; 45%), and Hispanics (*n* = 538; 36%) participated in the study. Assignment was based on self-report. Reference group was Whites.

Risk Factors Related to Alcohol Use

Measurement of Alcohol Abuse or Dependence Criteria

Items to evaluate alcohol use in the past 12 months were gathered from the Composite International Diagnostic Interview (CIDI). The items are generated by the World Health Organization (1997) to increase psychometric properties of alcohol intake measurements. The items classify alcohol use as either alcohol abuse (*n* = 267; 18%), dependence (*n* = 435; 29%) or neither (*n* = 691; 46%). Reference group was patients who met neither criteria.

Measurement of Drug Use

Participants responded to this categorical variable with either a "yes" (*n* = 682; 46%) or "no" (*n* = 812; 54%) in response to whether they had used any illicit drug (i.e., marijuana, cocaine) or prescriptive drug (i.e., sedatives, tranquilizers) on their own in the past 12 months. "On your own" signified use of a drug or prescription that was either not prescribed to them, used in amounts not indicated, or for longer than was indicated on the prescription in the past 12 months. Reference group was participants who denied drug use in the past 12 months.

Measurement of Extent to which Affected by Alcohol

This risk factor was assessed by the following item:

When you were injured, how much were you affected by alcohol?

Possible responses are not at all (*n* = 346; 23%), a little affected (*n* = 227; 15%), somewhat affected (*n* = 146; 10%), and very affected (*n* = 147; 10%). Due to the large number of missing responses on this item (*n* = 301), data was filled in by reviewing another item assessing alcohol use prior to the current injury. The item

is as follows:

Before you were injured, did you drink any alcoholic beverages including Malt Liquor, Regular Beer, Wine Cooler, Wine, Fortified Wine, or Hard Liquor — even one drink?

Patients who denied have consumed alcohol prior to their current injury and who were missing a score on the item assessing the extent to which they were affected by alcohol at the time of their injury were assigned their own group (n = 601). This group was labeled "Did not report alcohol use prior to injury" and was the reference group.

Measurement of Injury Type

Injury type was determined as either "Intentional" (n = 317; 21%) or "Unintentional" (n = 1,179; 79%) based on codes assigned by the International Classification of Diseases (ICD-9) (World Health Organization, 1992). Study clinicians obtained ICD-9 data from medical records and coded these answers into categories. "Intentional" injuries include assault, gun shot wound, shot gun wound, and stab wounds. "Unintentional" injuries include injuries caused by ATVs, animals, motorcycles, falls, airplane, electricity, machine, motor vehicle collision, motor vehicle and person collision, skating, bicycle, boat, burn, sport, and other. Reference group was unintentional injuries.

Measurement of Previous Alcohol-Related Injuries

This categorical variable was gleaned from items gathered from the Injury

Behavior Checklist (IBS) (see Longabaugh, 2001). Items assessed the number of injuries participants had sustained since their 18th birthday and whether they had consumed alcohol before any prior injury. Five hundred and nineteen patients (35%) responded "yes" and 975 (65%) responded "no" to alcohol use before any prior injury.

Measurement of Prior Treatment for Alcohol

Patients were asked whether they had received prior treatment for alcohol. Five hundred and eighty-eight (39%) patients responded "yes" and 906 (61%) responded "no." Reference group was patients who responded "no."

Measurement of Recent Alcohol-Related Problems

Alcohol-related problems were measured using the Short Inventory of Problems (SIP) (Miller et. al., 1995) plus six additional questions relating to injury. The SIP is a 15-item, short version drawn from a larger instrument called the Drinker Inventory of Consequences (DrInC) (Miller, et al., 1995), which contains 50 items. The six extra questions were also drawn from the DrInC (Miller, et al., 1995). This instrument gives a total score of problems and six problem subscales: Physical, Interpersonal, Intrapersonal, Impulse Control, Social Responsibility, and Injury (plus 6) (Miller, et al., 1995). The alcohol problem data referred to the 12 months prior to the date of enrollment into the study. On this continuous item, higher scores indicate more alcohol-related problems. The average number of alcohol-related problems in the past twelve months was 8.2

(*SD* = 11.5). See Appendix B for SIP Plus 6 items.

Measurement of Weekly Alcohol Use

The continuous risk factor "Weekly Alcohol Volume" was calculated using the basic quantity/frequency approach (Dawson, 2003) by multiplying usual quantity of drinks per occasion by frequency of drinking and then by 0.6, which is the typical amount of ethanol found in one standard drink. One standard drink was considered 12 ounces of beer, 5 ounces of wine, or 1.5 ounces of hard liquor (Dawson, 2003). The average number of alcoholic drinks consumed per week was 9.5 (*SD* = 14.2).

Measurement of Dependent Variables

Measurement of Causal Attribution

Patient's causal attribution was assessed by the patient's response to the following question: "On a scale of 0-10, how much do you think your injury was related to your use of alcohol?". Responses ranged from 0 to 10 with higher scores indicating increased insight of the role that alcohol played in the patient's current injury. See Appendix C for item assessing causal attribution.

In hypothesis 2 where causal attribution is the dependent variable, the variable is analyzed in its original continuous form. For bivariate analyses in hypotheses 2 and 3 and as a risk factor in hypothesis 3, the causal attribution score was categorized based on the frequency distribution. Most participants scored as

having no causal attribution (score of ‘0’ or ‘0.5’) (*n* = 952; 64%). The second most frequently assigned score was absolute causal attribution (score of ‘10’) (*n* = 126; 8%). Based on the distribution of scores one through nine, this spread was divided into two groups where scores of one to four were identified as “limited causal attribution” (*n* = 186; 12%) and scores of five to nine were identified as “moderate causal attribution” (*n* = 213; 14%).

Accounting for Missing Responses to Causal Attribution Item

Due to the large number of missing responses (*n* = 196) to the causal attribution item, a review of other items was conducted to fill in the missing information where possible. A helpful item assessed patients’ responses to whether they consumed alcohol prior to their current injury was conducted. The item is as follows:

> *Before you were injured, did you drink any alcoholic beverages including Malt Liquor, Regular Beer, Wine Cooler, Wine, Fortified Wine, or Hard Liquor — even one drink?*

Patients who denied having consumed alcohol prior to their current injury and were missing a causal attribution score were assigned a causal attribution score of ‘0’ (*n* = 179). Patients who had denied having consumed alcohol prior to their current injury and had denied any causal attribution between their alcohol use and current injury were assigned a causal attribution score of ‘0.5’ to

differentiate them from the previous group.

Measurement of Screening Criteria

Patients screened positive into the study for alcohol use problems based on one of four criteria: clinical indication of alcohol use prior to injury (i.e., positive BAC) (*n* = 589; 39%) (Criteria 1), self-report of alcohol use prior to injury (*n* = 366; 25%) (Criteria 2), exceeding normal levels of alcohol use based on NIAAA cutoff scores (*n* = 476; 32%) (Criteria 3), responding positively to one of the four items on the CAGE questionnaire (*n* = 65; 4%) which assesses drinking problems experienced in the past 12 months (Criteria 4). See Appendix D for screening criteria.

Measurement of Stage of Change

Upon completion of the interview, the study clinician determined the participant's readiness to change his alcohol use based on the theoretical understanding of stages of change outlined in the Transtheoretical model. Clinicians judged readiness to change based on a scale from one to ten. Scores one to two identified precontemplation stage, scores three to five identified contemplation stage, scores six to eight identified preparation stage, and scores nine to ten identified action stage. The distribution of the stages of change was as follows: Precontemplation (*n* = 287; 19%), Contemplation (*n* = 936; 63%),

Preparation (*n* = 125; 8%), and Action (*n* = 27; 2%). The variable is a continuous one.

Log Transformations Required

For hypotheses 2 and 3, log transformations were required for two risk factors that did not have normal distributions. The risk factors were weekly alcohol volume and recent alcohol-related problems patients. Using SPSS, log transformations were conducted, along with adding a small constant to the data so that no score equaled zero, which would have resulted in missing values after the log transformation. An integer of 0.1 was added to weekly alcohol volume variable, and an integer of 1.0 was added to recent alcohol-related problems variable. Transformation of these two variables was successful in normalizing their distributions.

Dummy Variables Created for Multiple Regressions

Dummy variables were created to assist in the regression analyses for hypotheses 2 and 3. They were as follows: Less than high school, High school diploma or GED, Hispanic, Black, Screening criteria 2, Screening criteria 3 and 4, Not affected by alcohol prior to injury, A little affected by alcohol prior to injury, Somewhat affected by alcohol prior to injury, and Very affected by alcohol at the time of their injury.

Measurement of Terms

Measurement of Acute Intoxication in Hypothesis 1

In the preliminary analysis, it was found that nearly all patients who screened positive for acute intoxication (n = 860) also DBNL. Only 95 acutely intoxicated patients did not show evidence of DBNL. DBNL was determined for acutely intoxicated patients by assessing whether their alcohol consumption exceeded NIAAA cutoff standards on an item assessing the frequency with which patients consumed five or more alcoholic drinks at one time. According to the NIAAA, normal levels of alcohol use are exceeded when females consume more than three alcoholic drinks on one occasion (or more than 7 per week) and when males consume more than 4 alcoholic drinks on one occasion (or more than 14 per week).

Consumption of Five or More Alcoholic Beverages At One Time

During the past 12 months, how often did you have five or more drinks of any kind of alcoholic beverage at one time (that is, any combination of cans of beer, glasses of wine, or drinks containing liquor of any kind)?

The possible responses were “Every day,” “Nearly every day, “3 or 4 times a week, “Once or twice a week, “Two or three times a month, “About once a month,” 6-11 times a year,” “1-5 times a year,” and “Never.”

To review scores against the NIAAA criteria for DBNL, patients’

responses were subdivided by gender and reviewed. Patients whose scores exceeded NIAAA cutoff scores were considered to drink beyond normal levels (DBNL).

The option of "Never" (score = 9) was not included on the initial surveys due to a technical oversight. Due to this, scores, ranging from one to eight, were not considered necessarily valid since patients were not given the option of responding that they never consumed more than five alcoholic drinks. Instead, their response on this item was determined to be "Never" based on their response to this item:

Now think of all kinds of alcoholic beverages combined, that is, any combination of beer, wine, or liquor. During the <u>past 12 months</u>, what was the largest number of drinks that you had in a single day?

If patients reported that their largest number of drinks in a single day in the past 12 months was less than five, then they were assigned a score of "Never" on the item assessing the frequency with which they consume five or more alcoholic drinks at one time. Patients who indicated that they have consumed five or more alcoholic drinks at one time at least once in the past 12 months were considered to DBNL.

It was found that only 95 out of 955 acutely intoxicated patients did not DBNL. Due to the small number, these 95 patients were not included in the analysis for this hypothesis.

Cross-check of Frequency of Alcohol Use

All 95 patients who were assigned "Never" on the item assessing frequency of consuming five or more alcoholic drinks at one time were verified on two other items to ensure validity. These patient's responses were verified against two other items that were similar to NIAAA cutoff scores. However, it was found that the item evaluating frequency of five or more alcoholic beverages at one time in the past 12 months successfully differentiated the groups. The two items used to verify differentiation of groups are discussed below.

Now think of all kinds of alcoholic beverages combined, that is, any combination of beer, wine, or liquor. During the past 12 months, what was the largest number of drinks that you had in a single day?

This continuous variable allowed for patients to report the maximum number of alcoholic drinks they had consumed in one day in the past 12 months. In reviewing patients' responses to this item, responses were stratified by gender and then assessed for whether patients' responses exceeded DBNL or not. Scores that met or exceeded the NIAAA cut off standards were designated as patients who DBNL.

In the past 12 months, when you drank alcohol including beer, wine or liquor, how many drinks did you usually have per day?

This continuous variable allowed for patients to report the average

number of alcoholic drinks they consume on the days that they consume alcohol, in the past 12 months. In reviewing patients' responses to this item, responses were stratified by gender and then assessed for whether patients' responses exceeded DBNL or not. Scores that met or exceeded the NIAAA cut off standards were designated as patients who DBNL.

In summary, 95 out of 995 acutely intoxicated patients were not included in the analysis for this hypothesis after determining that they did not exceed NIAAA normal levels of alcohol consumption. Only those acutely intoxicated patients who exceeded NIAAA standards were included in the analysis for this hypothesis.

Measurement of Drinking Beyond Normal Limits

The NIAAA cut off scores for normal levels of alcohol use are stratified by gender. Males are considered to exceed normal levels of alcohol use when they consume more than four alcoholic beverages on one occasion or more than 14 beverages per week. Women are considered to exceed normal levels of alcohol use when they consume more than three alcoholic drinks on one occasion or more than 7 drinks per week.

Data Analysis

The following is a description of the hypotheses and data analysis. The data analysis is based on the conceptual understanding that alcohol use and other factors considered in this study have a multicausal origin. Prior to running main analyses, preliminary analyses were run to assess the sample distribution, determine relationships between the risk factors and the DV, and between the risk factors themselves.

Hypothesis 1: Determine the risk factors that are highly associated with patients who are acutely intoxicated versus those who drink beyond normal limits.

Eleven risk factors were analyzed to determine which risk factors are highly associated with acute intoxication and DBNL. The risk factors were gender, age, education, occupation, race/ethnicity, drug use, injury type, alcohol abuse/dependence, prior treatment for alcohol use, weekly alcohol use, and recent alcohol-related problems.

Patients Who Screened Positive Based on CAGE were Excluded

Originally, patients who screened positive for inclusion into the study based on exceeding NIAAA cutoff scores or answering positively to any item on the CAGE were included in the analysis for this hypothesis. It was decided that CAGE responders would not be included in the analysis for this hypothesis for

two reasons. First, they represent a small fraction of the entire sample (n = 65; 4%). Preliminary analysis showed that 476 screened positive by DBNL whereas only 65 patients screened positive based on the CAGE. Second, there were no questions similar to the CAGE questionnaire found in the study questionnaire that could be used to determine if those who screened positive based on positive BAC or self-report would also have screened positive on the CAGE. This could be determined for DBNL as questions pertaining to NIAAA cutoff scores are included in the study already. Therefore, the number of acutely intoxicated patients who would have screened positive based on the CAGE was unknown whereas it was determined that 95 of those who screened positive based on BAC or self-report did not DBNL. Due to the lack of CAGE-like questions and small group size, patients who screened positive based on the CAGE were not included in the analysis for this hypothesis.

Bivariate Analysis

The sample consisted of 1,336 trauma patients who screened positive for alcohol use based on positive BAC, self-report of prior alcohol use, DBNL, or reporting that at least one of the items on the CAGE occurred in the past 12 months. In the bivariate analysis of patients screening positive for an alcohol related injury, the dependent variable of how patients screened positive for alcohol use was binary.

Multivariate Analysis

The sample consisted of 1,190 trauma patients who screened positive for alcohol use either by acute intoxication or DBNL. A logistic regression regressed how patients screened positive for alcohol use.

A logistic regression was conducted post-hoc to evaluate any significant differences between the participants who were included in the analysis and those who were excluded. Those who were excluded consisted of the patients who screened positive for clinical indication or self-report of alcohol use prior to injury but did not indicate DBNL on other items (n = 95) and patients who screened positive by responding positively to an item on the CAGE in the past 12 months (n = 65).

Hypothesis 2: Determine the risk factors associated with increased causal attribution.

Thirteen risk factors were analyzed to determine association with causal attribution. They included, age, gender, education, occupation, race/ethnicity, drug use, injury type, prior alcohol treatment, screening criteria, extent to which affected by alcohol at the time of injury, prior alcohol-related injury, weekly alcohol use, and recent alcohol-related problems.

Bivariate Analysis

The sample consisted of trauma patients seen in the Trauma Department at an urban hospital who screened positive for alcohol use. Crosstabulation analyses were run (N = 1,477). Pearson correlations were run (N = 1,406) to assess the strength of associations between risk factors and the DV as well as between the risk factors themselves. The categorical variable of causal attribution was used in the crosstabulation analysis while the continuous form of causal attribution was used in the Pearson correlation and multivariate analyses for this hypothesis.

Multivariate Analysis

The sample consisted of 1,406 trauma patients who screened positive for alcohol use based on clinical indication of alcohol use prior to injury (i.e., positive BAC), self-report of alcohol use prior to injury, DBNL, or positively responding to the CAGE. Multiple regression regressed causal attribution on several risk factors. Thirteen risk factors consisted of gender, age, education, occupation, race/ethnicity, weekly alcohol volume, prior drug use, prior treatment for alcohol, injury type, previous alcohol-related injury, extent to which affected by alcohol, recent alcohol-related problems, and how patients screened positive into the study.

Two independent variables were removed after review of the bivariate correlation due to high correlations with other independent variables. The first IV

removed was whether the patient met diagnostic criteria for abuse or dependence. It shared a high Pearson correlation coefficient (r = .70) with the variable evaluating the number of alcohol-related problems experienced in the past 12 months. The IV evaluating the number of alcohol-related problems was kept because it was more sensitive than the IV assessing abuse and dependence. The second IV removed was the IV assessing whether patients reported alcohol use prior to injury. This variable shared a high Pearson correlation coefficient (r = -.85) with an IV assessing to what degree patients reported having been affected by alcohol at the time of their current injury. The theory behind removing these two IVs was that strong associations between risk factors limits the incremental utility of the IVs. The analysis is strengthened to the degree in which IVs are not related to each other so that they each capture unique variance of the DV.

Hypothesis 3: Determine the factors associated with increased readiness to change.

Thirteen IVs were analyzed to determine their association with readiness to change. They consisted of age, gender, education, occupation, race/ethnicity, drug use in the past 12 months, injury type, prior treatment for alcohol, screening criteria ,previous alcohol-related injury, causal attribution, prior alcohol use, weekly alcohol use, and recent alcohol-related problems.

Bivariate Analyses

The sample consisted of trauma patients seen in the Trauma Department at an urban hospital who screened positive for alcohol use. Crosstabulation analyses were run (N = 1,375). Pearson correlations were run (N = 1,319) to assess the strength of associations between risk factors and the DV as well as between the risk factors themselves.

Multivariate Analysis

The sample consisted of 1,319 trauma patients who screened positive for alcohol use. Multiple regression regressed stage of change on 13 risk factors. The risk factors consisted of gender, age, education, occupation, race/ethnicity, weekly alcohol volume, prior drug use, prior treatment for alcohol, injury type, previous alcohol-related injury, recent alcohol-related problems, causal attribution, and screening criteria.

A multiple regression was conducted post-hoc to evaluate any significant differences between the participants for whom scores were obtained (n = 1,319) on to the stage of change item and participants for whom scores were not obtained on the item (n = 104).

Hypothesis 4: Examine ethnic differences in reasons for screening positive, making causal attributions, and readiness to change.

Patient's ethnicity is a categorical variable of Black, Hispanic, or White. Ethnicity was an independent variable in the logistic regression for how patients screened positive for alcohol use and in the multiple regressions for causal attribution and readiness to change. Considered in this hypothesis was whether any statistically significant differences were found between the ethnicities in their association with the three dependent variables from hypotheses one, two, and three.

Potential Negative Consequences for Participants Based on Participation in the Study

The risk associated with participating in the study is minimal and primarily involves the potential for psychological distress associated with emotions and thoughts conjured up during the interview. The interview addresses issues of the patient's drinking, prior injury, and related behavior that may cause the patient concern. Training of the clinicians and ongoing supervision should limit the possibility and impact of potentially upsetting emotional reactions during the interview. In summary, the risk for adverse events is extremely low.

Potential Beneficial Consequences for Participants Based on Participation in

the Study

Prior research supports the efficacy of BIs in reducing alcohol intake and may reduce risk of future injury. Research participants, therefore, may benefit from participating in the study through improved health outcomes following injury. Offering interventions in nontraditional settings such as a medical ED provides an opportunity to serve problem alcohol users who may not otherwise seek treatment. Blacks and Hispanics have been considered an underserved population regarding medical care access and utilization which by their participation in the study, will allow them the potential for improved health outcome following their injury via reduced alcohol use and reduced potential for re-injury. In addition, outcomes of this study may provide insight into improved treatment strategies for ethnic minorities with resultant improved treatment outcomes. Overall, results from this study may improve the conditions of those experiencing injuries due to alcohol-related problems, add to the knowledge base in the scientific community, and improve the quality of care at Parkland Memorial Hospital.

Limitations of Study and Means to Address Them

1. Readiness to change was evaluated by clinicians who were trained in over 40 hours of motivational interviewing, including didactic training, group training, video training, and provided opportunities to practice interviewing. Ongoing

training and feedback occurred on a near weekly basis.

2. Due to the interviewer-administered questionnaire, patients may have felt increased social pressure and increased fear of disclosure when responding to questions concerning alcohol and drug use (Johnson & Gerstein, 1998). Compared to self-report measures, interview-administered questionnaires are perceived as less anonymous and can influence respondents (O'Malley & Johnston, 2002). As a result, patients may have underreported their use of alcohol and/or drugs and presented with increased or decreased causal attribution or as more ready to change than was true. Addressing potential overestimation of readiness to change scores was done via training of clinicians regarding change behavior and steps leading to change. As for causal attribution score, any participant who during the interview denied being currently affected by alcohol and did not respond to the causal attribution item was assigned a score of "0" ("no causal attribution").

Strengths of Study

1. Due to the large sample size, this study has the potential to detect significance when assessing the factors studied, where significance exists.

2. The diversity of the patient population allows for study outcomes that are more generalizable to the general population. Interventions based off this information will be more inclusive of a wider audience and be able to treat more

effectively minorities who in the past have been marginalized in alcohol-related treatment outcome studies.

CHAPTER 3: RESULTS

Alcohol use is a leading risk factor for injury. It is a problem that society must grapple with as the costs of alcohol misuse rise into the millions of dollars in terms of decreased work productivity and increased burden on health care resources (NIAAA, 2004). Nearly half of ER patients are found to screen positive for alcohol use (Cherpitel, Ye, et al., 2003; Field, Claassen, & O'Keefe, 2001). Since the trauma patients screened positive for alcohol misuse, their medical injuries are believed to be alcohol-related. Many people with alcohol-related problems do not seek treatment as they may not recognize they have a problem, fear social ridicule for seeking treatment, or believe that treatment will not help them. Providing alternative methods for treatment for alcohol-related problems benefits the misuser and society. Increasingly, brief interventions are conducted in ER settings in order to effectively tackle these problems. Furthermore, it is believed that by screening for and providing treatment for patients who have problems with alcohol, alcohol use and associated injuries will decrease (Gentilello, et al., 2005; Longabaugh, et al., 1995, 2001). This will in turn reduce risk to the individual as well as reduce society's burden.

Brief interventions (BIs) are well-suited to the medial environment as they are short in duration (i.e., 15 minutes) and require just one visit (Miller & Rollnick, 2002). The transtheoretical model (TTM) is the theoretical basis for many of these BIs (Miller & Rollnick, 2002). The TTM conceptualizes how

people change their behavior by providing a continuum of the change process. Five stages of change are posited, and they are precontemplation, contemplation, preparation, action, and maintenance. Taking each in sequence, people begin the change process by denying the need for change or delaying thinking about changing for at least six months. Then people recognize the need for change but do not plan on making a change for at least 30 days. In the preparation stage of change, people begin to prepare for a change and plan on making a change in the next 30 days. In the action stage, people have made short-term behavioral changes to reduce risk. In the final step, people have maintained their behavioral change for at least six months in order to reduce their risk.

Enrollment of 1,496 trauma patients at Parkland Memorial Hospital in Dallas, Texas was conducted from May 2003 to May 2005. The study assessed risk factors associated with alcohol-related injuries. Specifically, how patients screened positive for alcohol use, patient's perception of the causal relationship between their alcohol use and subsequent injury, and their stage of change based on the transtheoretical model were analyzed using risk factors assessing sociodemographics, substance use, prior treatment for alcohol problems, and prior injury. Participants completed the interview that was conducted by a study clinician at the hospital.

The majority of participants were male (n = 1,234; 83%), White (n = 670; 45%) and between the ages of 18 and 34 (n = 878; 59%). Most participants (n =

1,099; 73%) had no more than a high school diploma or GED. Nearly 70% (*n* = 1,036) were working for pay in a part-time or full-time capacity. More than half of the participants (*n* = 812; 54%) denied prior drug use in the past 12 months. Many participants met diagnostic criteria for alcohol abuse (18%) or alcohol dependence (29%). However, 61% denied receiving prior alcohol treatment and 65% denied having suffered prior alcohol-related injuries. The majority of participants (64%) denied that any relationship existed between their alcohol use and injury which brought them to the Parkland ER. In fact, 40% did not report during the interview that they consumed alcohol prior to their injury although 52% of the participants screened positive for acute alcohol problems. The majority of participants were rated as being in the precontemplation stage of change (63%) and the fewest in the action stage of change (2%). Given that this population was seen due to injuries related to alcohol use, this finding is not surprising. Average number of alcoholic drinks consumed per week was 8.7 (*SD* = 13.8). Average number of alcohol-related problems in the past 12 months was 7.7 (*SD* = 11.4). See Table 2 for complete characteristics of the study population.

Insert Table 2 here

The following are the results of each of the four hypotheses examined in

this project.

Hypothesis 1: Determine the risk factors that are highly associated with patients who are acutely intoxicated versus those who drink beyond normal limits.

Bivariate and multivariate analyses were conducted to measure the association between how patients screened positive for alcohol use and 11 risk factors. The risk factors were demographic variables, substance use and treatment variables, and an injury-related variable. Demographic variables consisted of gender, age, education, occupation, and race. Substance use and treatment variables consisted of weekly alcohol use, diagnostic criteria for alcohol abuse and dependence, problems related to alcohol use in the past 12 months, drug use in the past 12 months, and previous treatment for alcohol problems. The injury-related variable consisted of injury type.

The dependent variable assessed how patients screened positive for alcohol use, which was measured by the criteria with which the patient became eligible to participate in the study. Four criteria were used in screening patients for alcohol use and inclusion into the study. Criterion 1 and 2 indicated acute alcohol use (i.e., either positive BAC or self-report), and criterion 3 and 4 indicated excessive or harmful alcohol use (i.e., exceeded NIAAA cut off limits or answered positively to any question on the CAGE). Most patients (n = 860) who screened positive for acute intoxication also reported drinking beyond

normal limits (DBNL). The few patients (n = 95) who did not show signs of DBNL were not included in the analysis. Since the majority of patients who screened positive for harmful consumption patterns of alcohol use screened positive based on the NIAAA criteria, the few patients (n = 65) who screened positive based on the CAGE were not included in this analysis. In summary, the dependent variable was made up of patients who screened positive based on acute intoxication and patients who screened positive based on DBNL. The distribution of the variable was normal.

Results of Bivariate Analysis

Table 3 (N = 1,336) presents the proportion of acutely intoxicated patients and patients who DBNL along with the chi-square and associated p-values for the 11 risk factors. Acutely intoxicated and DBNL patients significantly differed on whether they were employed or not (X^2 = 7.71, df = 1, p < .01). The total sample was nearly split regarding use of drugs in the past 12 months (47% yes). However, whether or not they had used drugs in the past 12 months significantly differed between these two groups (X^2 = 5.41, df = 1, p < .05). Screening for acute intoxication versus DBNL was significantly associated with differences in whether one had an intentional or unintentional injury (X^2 = 28.21, df = 1, p < .001), met criteria for alcohol abuse, alcohol dependence, or neither (X^2 = 58.78,

df = 2, *p* < .001), had been treated for alcohol problems in the past (X^2 = 8.60, *df* = 1, *p* < .001), consumed more alcohol per week (*t*(1324.13) = -5.81, *p* < .001), and had more alcohol-related problems (*t*(1229.56) = -9.56, *p* < .001). Whites (*n* = 374), Blacks (*n* = 150), and Hispanics (*n* = 336) were more likely to screen positive based on acute intoxication rather than DBNL. Intentional injuries were more common for acutely intoxicated patients (25%) than DBNL patients (13%). Patients who met diagnostic criteria for alcohol abuse or dependence were more likely to screen positive for acute intoxication (*n* = 498) than DBNL (*n* = 166).

Insert Table 3 here

Assumptions of Multivariate Analysis are Met

There are 11 assumptions that must be met in order to run a logistic regression (Garson, 2006). The following discussion describes what those assumptions are and how they were met for this analysis.

1. The class of greatest interest should be coded last in order to make output meaningful.

Utilizing SPSS, factors of greatest interest were coded last. For instance, in this analysis, patients who screened positive for acute intoxication were coded last relative to patients who screened based on DBNL to facilitate interpretation of

results.

2. Inclusion of all relevant variables in the regression model.

Preliminary analyses were run to review the relevancy of risk factors of the DV. Only conceptually relevant IVs were included.

3. Exclusion of all irrelevant variables in the regression model.

Preliminary analyses were run to review the relevancy of risk factors of the DV. Factors that were conceptually irrelevant were excluded from further analysis.

4. Error terms are assumed to be independent.

Independent sampling occurred as participants did not provide multiple observations at different times.

5. Low error in the explanatory variables.

Measurement error is considered low. Where missing cases occurred, similar factors were reviewed to estimate correlates to the missing factors. This is discussed in the methodology section when appropriate.

6. A linear relationship exists between the risk factors and the log odds (logit) of the DV.

This concern was mitigated by categorizing continuous factors, thereby obtaining separate logits for various levels of the variable.

7. No multicollinearity.

Correlations between risk factors were assessed and found to be weakly associated with each other, which mitigates the risk of multicollinearity.

8. No outliers should be used.

All participants screened positive for inclusion into the study based on one of four criteria (clinical indication of alcohol use, self-report of alcohol use, DBNL, or positively responding to an item on the CAGE in the past 12 months). No outliers existed.

9. Large samples must be used.

At least 10 events should occur per parameter in the model to ensure reliability of estimates. In this analysis, there were 121 participants for every risk factor.

10. Sampling adequacy.

Crosstabulation analyses were run to ensure that all cell frequencies were more than one and no more than 20% of cells were less than five, which ensures goodness of fit.

11. Expected dispersion.

Observed dispersion should closely resemble expected variance; otherwise, standard errors will be over-optimistic and unreliable. In this analysis, observed and expected dispersion were similar.

Cross-Validation of the Model

The sample size (n = 1,190) was sufficient in size given that 15 participants should be in the sample for every risk factor (Shannon & Davenport, 2001), and there were 11 risk factors in this analysis giving a ratio of 108

participants for every risk factor.

Results of Multivariate Analysis

A logistic regression regressed how patients screened positive on 11 risk factors. It was found that acutely intoxicated patients were more likely to not be employed for wages (*OR* = 1.44, 95% CI = 1.07 to 1.95, $p < .05$), have an intentional injury (*OR* = 2.24, 95% CI = 1.55 to 3.23, $p < .001$), and to have experienced more alcohol-related problems in the past 12 months (*OR* = 3.72, 95% CI = 2.53 to 5.45, $p < .001$) compared to patients who drank beyond normal limits. Table 4 presents a summary of the multivariate analysis.

Insert Table 4 here

A logistic regression was conducted post-hoc to assess whether the patients who were included in the analysis for the hypothesis significantly differed from patients who were excluded from the analysis. Those who were excluded consisted of patients who screened positive by 1) either clinical indication or self-report of alcohol use but did not indicate DBNL on other measures ($n = 95$) and 2) responding positively to an item on the CAGE in the past 12 months ($n = 65$). It was found that patients who were excluded from the

analysis of the hypothesis were significantly more likely to be older (*OR* = 0.44, 95% CI = 0.25 to 0.77, $p < .01$ for ages 18 to 24 and *OR* = 0.41, 95% CI = 0.23 to 0.73, $p < .01$ for ages 25 to 34), be Black (*OR* = 2.61, 95% CI = 1.63 to 4.18, $p < .001$), have an intentional injury (*OR* = 1.89, 95% CI = 1.18 to 3.05, $p < .01$), consume fewer number of alcoholic beverages per week (*OR* = 0.22, 95% CI = 0.15 to 0.31, $p < .001$), and to have fewer recent alcohol-related problems (*OR* = 0.46, 95% CI = .26 to .83, $p < .01$). They were less likely to have completed high school or obtained a GED (*OR* = 0.50, 95% CI = 0.31 to 0.82, $p < .01$) or to meet criteria for alcohol abuse (*OR* = 0.42, 95% CI = 0.70 to 1.62, $p < .05$).

Hypothesis 2: Determine the risk factors associated with increased causal attribution.

Bivariate and multivariate analyses were conducted to measure the association between causal attribution and 11 risk factors. The risk factors were demographic variables, substance use and treatment variables, and injury-related variables. Demographic variables consisted of gender, age, education, occupation, and race. Substance use and treatment variables consisted of drug use in the past 12 months, how patients screened positive for alcohol use, to what extent patients were affected by alcohol prior to the injury, previous treatment for alcohol problems, weekly alcohol use, and problems related to alcohol use in the past 12 months. Injury-related variables consisted of injury type and previous

alcohol related injury. All of these sets were unordered.

The dependent variable was causal attribution, which was measured by a questionnaire item asking, "On a scale of 0-10, how much do you think your injury was related to your use of alcohol?". Due to a large number of missing causal attribution scores (n = 196), patients for whom no score was present on this variable and who reported not having consumed alcohol prior to their current injury were coded with score=0, representing no causal attribution (n = 179). Further, patients who reported no causal attribution and reported not having consumed alcohol prior to their current injury were coded with score=0.5 (n = 410) to differentiate this group from the previous group. The dependent variable was normally distributed.

Results of Bivariate Analyses

Results of Chi-Square Analysis

Table 5 (N = 1,477) presents the proportions of levels of causal attribution along with the chi-square and associated p-values for 13 risk factors. Of the sociodemographic factors, only ethnicity was statistically significant with causal attribution. Patients' level of causal attribution significantly varied by race (X^2 = 32.06, df = 6, p < .001). The majority of Blacks (n = 211), Whites (n = 444), and Hispanics (n = 297) did not report any association between their alcohol use and

subsequent injury. Of the total sample, nearly half (46%) had used drugs in the past 12 months. Level of causal attribution significantly varied by whether or not patients had used drugs in the past 12 months ($X^2 = 10.17$, $df = 3$, $p < .05$). Most patients ($n = 894$) denied prior treatment for alcohol-related problems, and this factor differed significantly between groups ($X^2 = 9.01$, $df = 3$, $p < .05$). For nearly all causal attribution levels, the majority of patients screened positive based on their BAC except for the no causal attribution group. The majority of patients who reported no causal attribution screened positive by exceeding NIAAA cutoff scores ($n = 449$). Level of causal attribution significantly differed by screening criteria ($X^2 = 360.69$, $df = 9$, $p < .001$). Of those who responded to the causal attribution item, most ($n = 255$) denied being affected by alcohol and denied any causal attribution. Further, the majority of patients who reported being very affected by alcohol had at least a moderate association between their alcohol use and subsequent injury ($n = 128$). Overall, causal attribution level varied by the extent to which they were affected by alcohol at the time of the injury ($X^2 = 1123.98$, $df = 12$, $p < .001$). The level of causal attribution also varied significantly by previous alcohol-related injury ($X^2 = 37.80$, $df = 3$, $p < .001$), weekly alcohol volume (F (3, 1472) = 26.45, $p < .001$), and number of alcohol-related problems experienced in the past 12 months (F (3, 1420) = 93.09, $p < .001$).

Insert Table 5 here

Results of Pearson Correlations

Strength of correlations is measured along a continuum where the Pearson correlation coefficient (*r*) is considered weak when it is approximately +/-.10, moderate when it is approximately +/-.30, and strong when it is approximately +/-.50 (Weinberg & Abramowitz, 2002). One risk factor was strongly associated with causal attribution. Reports of having been "very affected" by alcohol at the time of their injury was moderately associated with increased perception that alcohol use was related to their current injury ($r = .57$). Approaching strong associations with causal attribution were number of alcohol-related problems in the past 12 months ($r = .43$, $p < .001$) and screening positive for alcohol use by DBNL ($r = -.41$, $p < .001$). Of the 13 risk factors, 10 were significantly associated with causal attribution. Increased recognition of the relationship between injury and alcohol use was positively associated with age ($r = .06$, $p < .01$), having less than a high school education ($r = .08$, $p < .01$), being Hispanic ($r = .13$, $p < .001$), having used drugs in the past 12 months ($r = .05$, $p < .01$), screening positive for alcohol use by self-report or a clinical indication ($r = .10$, $p < .001$), reporting having been affected by alcohol a little bit ($r = .17$, $p < .001$), somewhat ($r = .17$, $p < .001$), or very affected ($r = .57$, $p < .001$), having a

previous alcohol-related injury (r = .15, p < .001), prior treatment for alcohol problems (r = .07, p < .01), increased weekly alcohol volume (r = .24, p < .001), and increased alcohol-related problems in the past 12 months (r = .43, p < .001). Having received a high school diploma or GED (r = -.05, p < .05), being Black (r = -.11, p < .001), screening positive for alcohol use by exceeding the NIAAA cutoff scores or answering positively to the CAGE (r = -.41, p < .001), and reporting not being affected by alcohol at the time of the injury (r = -.22, p < .001) were negatively associated with causal attribution.

Review of the semi-partial correlations found that reporting being "very affected" by alcohol at the time of injury was moderately associated (r = .41) with causal attribution, explaining 16.89% of the variance of the DV holding the other IVs constant. Reporting being "somewhat" affected by alcohol at the time of injury was also moderately associated (r = .26) with causal attribution, explaining 6.60% of the variance of the DV holding the other IVs constant. Table 6 provides a summary of the bivariate correlations and semi-partial correlations with the DV.

Insert Table 6 here

Because risk factors are chosen to uniquely explain variance of the dependent variable, weaker correlations are wanted when reviewing associations between risk factors. In this analysis, the correlations among the risk factors

ranged from .00 to –.58. Only two risk factors were moderately associated. Having a high school diploma or GED was moderately inversely associated with having less than a high school education (r = -.58, p < .001). Increased number of alcohol-related problems in the past 12 months was moderately associated with increased weekly alcohol consumption (r = .51, p < .001). Using the criteria that an association of +/- .80 between risk factors is of concern (Shannon & Davenport, 2001), none of the risk factors overlapped to a concerning degree. See Table 7 for a listing of Pearson correlation coefficients between risk factors.

Insert Table 7 here

Assumptions of Multivariate Analysis are Met

There are four assumptions that must be met in order to draw conclusions about a population based on a regression analysis (Field, 2000; Norusis, 2002). The following discussion describes what those assumptions are and how they were met for this analysis.

1. All of the observations must be independent.

Data used in this study was gathered from participants at one time period only. The same questions were not repeated but instead, gathered only one time. Normal distribution of the sample data was demonstrated on a Q-Q plot.

2. For each value of the IV, the distribution of the values of the DV must be normal.

Analysis of residuals (difference between observed value of the DV and value predicted by the regression line) demonstrated normal distribution of the values of the DV for each value of the IV. This was indicated by a mean of zero and standard deviation of approximately one for unstandardized, standardized, and Studentized residuals.

3. The variance of the distribution of the DV must be the same for all values of the IV.

Two risk factors were transformed as their distribution was not normally distributed. Risk factors of recent alcohol-related problems and weekly alcohol volume were log transformed which successfully transformed the distributions into normal ones.

4. The relationship between the DV and the IV must be linear in the population.

A scatterplot of points between the DV and regression Studentized deleted (press) residual showed that a linear relationship exists between the factors in the sample population.

Cross-Validation of the Model

Adjusted R square shows that in the general population, causal attribution

is estimated to be at 0.58 which is similar to the sample finding of 0.59. The sample size was sufficient given that approximately 15 participants are needed for every risk factor (Shannon & Davenport, 2001). In this analysis where there were 1,406 participants and 13 risk factors, there were approximately 108 participants for every risk factor. Multicollinearity was not a concern in the analysis for this hypothesis as correlations between two risk factors in the regression model never exceeded -.58, which indicates only a moderate association (Weinberg & Abramowitz, 2002).

Only two risk factors were moderately associated. Having a high school diploma or GED was moderately inversely associated with having less than a high school education (r = -.58, p < .001). Increased number of alcohol-related problems in the past 12 months was moderately associated with increased weekly alcohol consumption (r = .51, p < .001). Using the criteria that an association of +/- .80 between risk factors is of concern (Shannon & Davenport, 2001), none of the risk factors overlapped to a concerning degree.

Results of Multivariate Analysis

The linear combination of risk factors was significantly related to causal attribution, F (19, 1386) = 103.220, p = .00. The sample multiple correlation coefficient was .77, indicating that approximately 59% of the variance of causal attribution in the sample can be accounted for by the linear combination of risk

factors.

The multiple regression results suggest that Hispanics (B = 0.50, 95% CI = 0.21 to 0.78, $p < .001$), patients reporting having been a little bit (B = 2.44, 95% CI = 1.97 to 2.91, $p < .001$), somewhat (B = 3.98, 95% CI = 3.45 to 4.50, $p < .001$), and very affected (B = 6.52, 95% CI = 5.97 to 7.06, $p < .001$) by alcohol at the time they were injured, and patients reporting increased experiences of alcohol-related problems in the past 12 months (B = 0.85, 95% CI = 0.56 to 1.13, $p < .001$) were statistically significantly more likely to have increased causal attribution. Having an intentional injury (B = -0.43, 95% CI = -0.76 to -0.14, $p < .01$) and screening positive for DBNL or by responding positively to an item on the CAGE in the past 12 months (B = -0.42, 95% CI = -0.83 to –0.01, $p < .05$) were significantly negatively associated with causal attribution. Table 8 presents a summary of the regression model.

Insert Table 8 here

Hypothesis 3: Determine the factors associated with increased readiness to change.

A multiple regression analysis was conducted to measure the association between stage of change and 14 risk factors. The risk factors were gender, age,

education, occupation, race, drug use in the past 12 months, previous treatment for alcohol problems, weekly alcohol use, how patients screened positive for alcohol use, recent alcohol-related problems in the past 12 months, injury type, causal attribution, and previous alcohol-related injury. All of these sets were unordered.

Results of Bivariate Analyses

Results of Chi-Square Analysis

Table 9 (N = 1,477) presents the proportions of stages of change along with the chi-square and associated p-values for 13 risk factors. Six of the 13 risk factors were significantly associated with stages of change. Patient's stage of change significantly varied by whether or not they had prior treatment for alcohol-related problems ($X^2 = 11.83$, $df = 3$, $p < .01$). Across the stages, there were more participants who denied prior treatment than those who had been in treatment except in the preparation stage where the split was more even (46% reported "no"). Patient's stage of change significantly varied by how patients screened positive for alcohol use ($X^2 = 29.91$, $df = 9$, $p < .001$). The majority of participants were in the Contemplation stage regardless of whether they screened positive by BAC (n = 374), self-report (n = 218), DBNL (n = 309), or CAGE (n = 35). Whether or not patients had a previous alcohol-related injury statistically

differed by stage of change ($X^2 = 9.20$, $df = 3$, $p < .05$). Eighty-eight percent of those who had a previous alcohol-related injury and ninety percent who denied having a previous alcohol-related injury were judged as being in the preparation or contemplation stage of change. Stages of change and levels of causal attribution significantly differed ($X^2 = 39.89$, $df = 9$, $p < .001$). Nearly the same number of participants who reported having a moderate causal attribution were in the precontemplation stage ($n = 29$) as were in the preparation stage ($n = 28$). The number of participants reporting a very strong perception that their alcohol use was associated with their injury doubled from the precontemplation stage ($n = 8$) to the preparation stage ($n = 17$). Change in weekly alcohol use (F (3, 1371) = 4.20, $p < .01$).and in number of alcohol-related problems experienced in the past 12 months (F (3, 1320) = 28.08, $p < .001$) resulted in statistically significant change in stage of change.

Insert Table 9 here

Results of Pearson Correlations

Table 8 presents the bivariate correlations between the risk factors and readiness to change. Strength of correlations is measured along a continuum where the Pearson correlation coefficient (r) is considered weak when it is approximately +/-.10, moderate when it is approximately +/-.30, and strong when

it is approximately +/-.50 (Weinberg & Abramowitz, 2002). All of the correlations between the risk factors and readiness to change were weakly associated as the range was .00 to .22. Of the 16 risk factors, nine were statistically significant with readiness to change. Stage of change was positively associated with age ($r = .07$, $p < .01$), having screened positive for alcohol use based on self-report or other clinical indication ($r = .05$, $p < .05$), having a previous alcohol-related injury ($r = .08$, $p < .01$), increased causal attribution ($r = .15$, $p < .001$), prior treatment for alcohol problems ($r = .08$, $p < .01$), increased weekly alcohol use ($r = .08$, $p < .01$), and increased number of alcohol-related problems in the past 12 months ($r = .22$, $p < .001$). Stage of change was negatively associated with being employed ($r = -.05$, $p < .05$) and screening positive for alcohol use based on exceeding NIAAA cutoff scores or positively responding to an item on the CAGE, ($r = -.07$, $p < .01$).

Review of the semi-partial correlations found that all were weakly associated with readiness to change as the range of association was .00 to .17. Adjusting for the other risk factors, number of alcohol-related problems in the past 12 months accounted for the largest proportion of the variance of stage of change (2.76%).

Insert Table 10 here

Table 11 presents the correlations between the risk factors of stage of change. The correlations among the risk factors ranged from .00 to –.59. Having a high school diploma or GED was moderately associated with having less than a high school education (r = -.59, p < .001). Three associations were moderately associated with stage of change. Screening positive for alcohol use by DBNL or CAGE was negatively associated with screening positive for alcohol use by self-report (r = -.43, p < .001). Experiencing alcohol-related problems in the past 12 months approached moderate association with causal attribution (r = .42, p < .001). Causal attribution was negatively associated with screening positive for alcohol use by DBNL or CAGE (r = -.40, p < .001). Using the criteria that an association of +/- .80 between risk factors is of concern (Shannon & Davenport, 2001), none of the risk factors overlapped to a concerning degree.

Insert Table 11 here

Assumptions of Multivariate Analysis are Met

There are four assumptions that must be met in order to draw conclusions

about a population based on a regression analysis (Field, 2000; Norusis, 2002). The following discussion describes what those assumptions are and how they were met for this analysis.

1. All of the observations must be independent.

Data used in this study was gathered from participants at one time period only. The same questions were not repeated but instead, gathered only one time. Normal distribution of the sample data was demonstrated on a histogram of the DV against the regressed standardized residuals.

2. For each value of the IV, the distribution of the values of the DV must be normal.

Analysis of residuals (difference between observed value of the DV and value predicted by the regression line) demonstrated normal distribution of the values of the DV for each value of the IV. This was indicated by a mean of zero and standard deviation of approximately one for standardized and Studentized residuals. Although higher than expected (2.10), the unstandardized residual was still within normal range.

3. The variance of the distribution of the DV must be the same for all values of the IV.

Two risk factors were transformed as their distribution was not normally distributed. Risk factors of recent alcohol-related problems and weekly alcohol

volume were log transformed which successfully transformed the distributions into normal ones.

4. The relationship between the DV and the IV must be linear in the population.

A scatterplot of points between the DV and the regression Studentized deleted (press) residuals showed that a linear relationship exists between the factors in the sample population.

Cross-Validation of the Model

Adjusted R square shows that in the general population, stage of change is estimated to be at 0.06 which is similar to the sample finding of 0.07. The sample size was sufficient given that approximately 15 participants are needed for every risk factor (Shannon & Davenport, 2001). In this analysis where there were 1,319 participants and 13 risk factors, there were approximately 101 participants for every risk factor. Multicollinearity was not a concern in the analysis for this hypothesis as correlations between two risk factors in the regression model never exceeded -.59, which indicates only a moderate association (Weinberg & Abramowitz, 2002).

Results of Multivariate Analyses

The linear combination of risk factors was significantly related to stage of

change, F (16, 1302) = 5.894, $p < .000$. The sample multiple correlation coefficient was .26, indicating that approximately 6.8% of the variance of stage of change in the sample can be accounted for by the linear combination of risk factors. Multivariate analysis of stage of change demonstrated that older patients (B = 0.01, 95% CI = 0.00 to 0.02, $p < .01$), patients with increased causal attribution (B = 0.04, 95% CI = 0.01 to 0.07, $p < .01$), and patients reporting increased experiences of alcohol-related problems in the past 12 months (B = 0.70, 95% CI = 0.48 to 0.92, $p < .001$) were statistically significantly more likely to be ready to make a change in their alcohol use. Table 12 provides a summary of the multivariate analysis.

Insert Table 12 here

A multiple regression was conducted post-hoc to assess any significant differences between patients whose stage of change was scored (n = 1,319) and those whose stage of change was not scored by clinicians (n = 104). Overall, the linear combination of risk factors was not significantly different between these two subgroups (F (16, 1402) = 1.13, p = .32). It was found that for patients who were not evaluated on readiness to change, they were more likely to be female (B = -0.04, 95% CI = -0.08 to 0.00, $p < .05$) and to not be employed for wages (B = -0.04, 95% CI = -0.07 to -0.01, $p < .05$).

Hypothesis 4: Examine ethnic differences in reasons for screening positive, making causal attributions, and readiness to change.

In the three prior analyses involving ethnicity as an independent variable, ethnicity was found to statistically influence the dependent variable one time only. In the multiple regression analysis of causal attribution, Hispanics were more likely than Whites or Blacks to perceive a relationship between their alcohol use and subsequent injury. Specifically, adjusting for the other independent variables, being Hispanic is associated with an increase of 0.50 in causal attribution. Although not statistically significant, Hispanics were nearly more likely than Whites and Blacks to screen positive for acute intoxication (*OR* = 1.32, 95% CI = 0.95 to 1.83, *p* = .10). See Table 13 for a summary of results from prior analyses.

Insert Table 13 here

CHAPTER 4: DISCUSSION

The effort to increase effectiveness of brief interventions to trauma patients who might not otherwise seek treatment for their alcohol problems prompted interest in examining risk factors associated with readiness to change and casual attribution. Considered in the primary aim was the patient's readiness to change, as judged by the clinician following the interview, as it related to stopping their alcohol use. In addition, this study examined risk factors which differentiated patients who were acutely intoxicated from patients who DBNL as indicated by how they screened positive into the study, evaluated patients' perceptions that their injury was related to their alcohol use (causal attribution), and finally, identified the influence, if any, that ethnicity had on these dependent variables. Altogether, health care providers can provide more effective treatment based on increased understanding of where the patient is in the change process based on the studied factors.

This chapter presents the summary of the findings. Initial efforts of the study involved recruiting and interviewing patients at a level one trauma department who were seeking medical attention for their injuries. Based on a number of factors, including having screened positive based on positive BAC, clinical indication of alcohol use prior to injury, DBNL, or responding positively to an item on the CAGE in the past 12 months, patients were invited to participate in the study after signing informed consent. Discussed next are the findings,

limitations, and implications for treatment and research for each hypothesis. This will be followed by study conclusions and directions for future research.

Discussion of Findings

Hypothesis 1: Determine the risk factors that are highly associated with patients who are acutely intoxicated versus those who drink beyond normal limits.

Results indicate that acutely intoxicated patients engage in more risky behaviors compared to DBNL patients. Bivariate analyses showcase the many risk factors associated with acute intoxication. Acutely intoxicated patients were more likely than DBNL patients to have used drugs in the past 12 months, have an intentional injury, meet criteria for alcohol abuse or dependence, to have had prior treatment for alcohol problems, and to have had recent alcohol-related problems. When holding the other risk factors constant, three risk factors are significant. Acutely intoxicated patients were more than one time more likely to not be employed for wages, over two times more likely to have suffered an intentional injury, and nearly four times as likely to have experienced more alcohol-related problems in the past 12 months compared to patients who drank beyond normal limits. Due to its high odds ratio, the risk factor of recent alcohol-related problems is hypothesized to subsume the variance accounted for by other risk factors that were significant in the bivariate but not in the multivariate analysis.

The findings from this hypothesis are a step forward in the field. Prior

research has examined the effectiveness of BIs primarily on acutely intoxicated patients (see Longabaugh et al., 1995). Gentilello and colleagues (1999) found that screening for DBNL garnered a 44% increase in positive screening rates for alcohol misuse by trauma patients. It is an important finding that acutely intoxicated patients are more likely to experience problems related to their alcohol misuse than patients who DBNL.

Limitations of Analysis of Hypothesis 1

Possible bias in reporting by acutely intoxicated patients may have occurred. Acutely intoxicated patients may have overreported their risky behaviors due to recognition that their alcohol use led to their current injury. This may have prompted these patients to perceive their current injuries as more violent and to have increased awareness of recent alcohol-related problems than patients who screened positive for DBNL. Research supports that acutely intoxicated patients are more sensitive to the role that alcohol played in their injury than patients who DBNL as the temporal association for the latter group is decreased (Apodaca & Schermer, 2002; Gentilello, et al., 2005; Longabaugh, et al., 1995, 2001).

Implications for Treatment

Brief interventions have largely focused on screening for and providing

treatment to acutely intoxicated patients in the medical environment. The present analysis indicates that acutely intoxicated patients have more problems than the DBNL patients. The results raise several questions. First, is a single brief session of intervention sufficient in addressing and effectively treating the many issues facing acutely intoxicated patients? More intensive case management may be required in order for change to occur and be long-lasting.

At the same time, several researchers (Gentilello, et al., 2005; Longabaugh, et al., 1995, 2001) suggest that acutely intoxicated patients are more amenable to change based on the limited time lapse between their alcohol use and subsequent injury. For acutely intoxicated patients more than those who DBNL, an association between the two events is often perceived more readily. Treatment providers can rely on this increased likelihood to perceive the two events as related which will facilitate treatment effectiveness.

Implications for Research

The analysis of the current hypothesis separated patients who screened positive for alcohol misuse into two groups. Preliminary analyses indicated that one group overlapped considerably with the second group. Of the 955 patients who screened positive for a clinical indication or self-report of alcohol use prior to their injury, 90% of them also exceeded the cutoff criteria for alcohol consumption set by the NIAAA. Due to this finding, patients who did not DBNL

were excluded from analysis as they represented a minority of the group. Other researchers need to consider the way in which they screen for alcohol use and the likelihood that patients will screen positive on several factors assessing alcohol misuse. This has important implications for analysis of subgroups of alcohol misusers as risk factors are associated differentially between types of users.

A post-hoc multivariate analysis was run to evaluate whether any significant differences existed between the patients included in the analysis for the hypothesis and those who were excluded. It was found that those who were excluded from the analysis were significantly more likely to be older, have an intentional injury, consume fewer number of alcoholic beverages per week, and to have fewer recent alcohol-related problems. Excluded patients were less likely to have completed high school or obtained a GED or to meet criteria for alcohol abuse. It is hypothesized that the excluded patients, who did not DBNL, tend not to engage in lifestyle choices that include alcohol as often as patients who were included in the analysis for the hypothesis. This finding creates an opportunity for further research.

Hypothesis 2: Determine the risk factors associated with increased causal attribution.

The multivariate analysis of this hypothesis successfully determined risk factors that account for nearly 60% of the variance of causal attribution in the

sample. Adjusting for the other risk factors, the largest pieces of the pie accounted for were participants who reported having been "Very affected" and "Somewhat affected" by alcohol at the time of injury (16.89% and 6.60%, respectively). These two items explain a large piece of the variance due to the similarity they share with the causal attribution variable. The same level of insight into their level of intoxication at the time of injury is needed to answer questions pertaining to extent to which they were affected by alcohol and extent of insight that alcohol played in their current injury. For instance, of those who reported that their injury was absolutely due to their alcohol use, only six patients (5%) denied having been affected by alcohol while 77 (61%) reported having been very affected at the time of injury. This indicates that inquiring as to the extent to which patients were affected by alcohol at the time of injury is a good gauge of their causal attribution. The finding that increased recognition of alcohol inebriation leads to increased causal attribution is in keeping with the literature. Cherpitel, Ye, and colleagues (2003) conducted a review of 13 studies of ER patients and found that feeling intoxicated at the time of injury was one of the three significantly associated risk factors for causal attribution.

Other important risk factors were significantly associated with causal attribution. Multivariate analysis results showed that causal attribution was significantly associated with having been affected in any amount by alcohol at the time of injury, being Hispanic, and increased number of recent alcohol-related

problems. Cherpitel (1996, 1998) has found that causal attribution is increased based on report of being affected by alcohol at time of injury. She also has found that Hispanics in the ER setting are more likely to meet criteria for alcohol abuse or dependence compared to Hispanics not in the ER setting, which may contribute to the finding in the present study that Hispanics were more likely compared to Whites and Blacks to attribute causation of injury to their alcohol use.

Causal attribution was negatively associated with having an intentional injury and screening positive by DBNL or the CAGE in the past 12 months, when adjusting for other risk factors. Both of these risk factors are negatively associated with causal attribution. Patients may not perceive their alcohol use as a relevant factor in their having been injured due to the nature of their injury. Intentional injuries, as determined by the coding classifications set forth in the ICD-9 (WHO, 1992), include gun shot wounds and stab wounds. Patients with intentional injuries may reason that they were victims of a crime rather than acknowledge the role that alcohol played in the injury occurring. For instance, a patient may not acknowledge that his inebriation decreased his inhibitions leading to his involvement in a fight which led to his being shot. The more his injury can be considered not his fault, the more likely the patient is to have decreased insight into the role his alcohol use played in his being injured. The second risk factor may be explained in terms of decreased temporal association between alcohol use and the injury. Patients who screened positive based on DBNL or by the CAGE

were by definition not currently inebriated (e.g., or else they would have screened positive for those factors first and not progressed to these latter criteria). This indicates that the amount of time from when they last consumed alcohol to the time of the immediate injury was increased relative to injured patients who consumed alcohol prior to the injury. The decreased temporal association has been shown to negatively influence causal attribution (Cherpitel, 1996, 1998; Cherpitel, Bond, et al., 2003).

Bivariate analyses indicate that many other of the risk factors considered were significantly associated with causal attribution. Causal attribution increased as alcohol use per week increased and as the number of recent alcohol-related problems increased. Patients who denied any causal attribution reported an average of 4.76 recent alcohol-related problems while patients who recognized that alcohol played a substantial role in their injury reported experiencing an average of 17.82 recent alcohol-related problems. Patients who reported increased number of alcohol-related injuries were likely to have increased causal attribution scores as well. This is in keeping with findings from the literature where experiencing a life-threatening injury is associated with increased causal attribution (Field, et al., 2005; Gentilello, et al., 1999). The present study's finding was not significant when adjusting for the other factors but likely shares variance accounted for by recent alcohol-related problems.

Another important finding in the bivariate analysis was the association

between screening criteria and causal attribution. Patients who screened positive for alcohol misuse based on self-report were more likely to perceive a relationship between their alcohol use and resultant injury. This supports other findings suggesting that acutely intoxicated patients are more likely to report increased causal attribution (Cherpitel, 1996, 1998; Cherpitel, Bond, et al., 2003).

Limitations of Analysis of Hypothesis 2

As predicted, many of the risk factors included in the analysis were significantly related to causal attribution and accounted for much of the variance of causal attribution. However, two limitations are worthy to address. First, since the study was cross-sectional, rather than longitudinal in nature, it is not possible to examine the consequence that causal attribution has on incidence of future alcohol-related injuries. It is hypothesized that increased causal attribution results in decreased likelihood of injuries resulting from alcohol use as patients will be motivated to decrease alcohol use as a result of the current injury. Stout (2003) found that patients often decreased their alcohol consumption following a stressful event perceived to be related to alcohol use. Therefore, it is believed that causal attribution is negatively associated with future alcohol-related injuries (Cherpitel, Bond, et al., 2003).

Second, although screening criteria significantly related to causal attribution, more than half of patients who screened positive for alcohol use by

self-report denied any casual attribution. It was primarily the patients who screened positive based on BAC who recognized the role that alcohol played in the current injury that contributed to the significant difference from DBNL patients. Many prior studies screened patients based on physiological measures such as BAC (see Cherpitel, Ye, et al., 2003) and therefore did not evaluate patients who self-reported alcohol use. Patients who self-reported alcohol use may have differed from patients with a clinical indication of alcohol use (i.e., positive BAC) due to reporting bias. Bias may be observed when patients fear negative reaction as a result of having an alcohol-related injury (Johnson & Gerstein, 1998). This bias may have been accentuated by the manner in which the data was gathered. Compared to self-report measures, interview-administered questionnaires are perceived as less anonymous and can influence respondents (O'Malley & Johnston, 2002).

Implications for Treatment

Health care providers can provide more effective treatment for alcohol misuse based on the knowledge gleaned from this study. Patients with increased causal attribution may be more amenable to treatment as they recognize that their current injury is a negative consequence of their alcohol use (Cherpitel et al., 2003). Treatment providers can recognize patients more apt to have increased causal attribution based on the risk factors found to significantly associate with

causal attribution in the study. Such patients can be identified by easily discernible data such as ethnicity, where Hispanics are more likely to have increased causal attribution, and injury type, where intentional injuries are negatively associated with causal attribution. Patients with increased causal attribution can also be identified via a short screen assessing whether or not patients report having been at least a little bit affected by alcohol use, experiencing several alcohol-related problems in the past 12 months, and recent drug use. After evaluation of these few risk factors, patients who are identified as likely to have increased causal attribution may be more amenable to treatment and require a shorter amount of time to yield success.

Implications for Research

The analysis of causal attribution successfully identified primary risk factors accounting for a large portion of the variance of causal attribution. Research should next assess the degree to which causal attribution predicts treatment outcome. The more than increased causal attribution leads to improved post-treatment abstinence of alcohol use, the more treatment can be enhanced by targeting the modifiable factors leading to causal attribution. Another avenue worth pursuing is researching more fully the relationship between self-report of alcohol use and causal attribution. In this study, more than half of the patients who self-reported alcohol use denied any causal attribution.

Hypothesis 3: Determine the factors associated with increased readiness to change.

Readiness to change is a principal ingredient in order to provide effective treatment. Patients who are provided brief treatments based upon their stage of change have been shown to reduce their alcohol consumption (Dunn et al., 2001). The analysis of the current hypothesis accounted for nearly 7% of the variance of stage of change in the sample. Risk factors were selected in the analysis based upon prior studies and logical deductions. However, results indicate that readiness to change is a multi-determined construct. Internal and external factors differentially motivate trauma patients to make a change to their alcohol use; alternatively, these factors can motivate individuals to maintain status quo. Not all risk factors yield the same amount of amenability to change across patients. The risk factors that are found to be significant, then, are all the more important to incorporate into brief interventions. The largest piece of variance of readiness to change was explained by recent alcohol-related problems, when adjusting for the other risk factors. Participants who reported having experienced more alcohol-related problems in the past 12 months were more likely to be ready to make a change to their alcohol use. This factor accounted for 2.76% of the variance of readiness to change. This is in keeping with prior research which shows that experiencing increased number of alcohol-related negative consequences

increases patients' motivation for change (Apodaca & Schermer, 2003; Longabaugh, et al., 1995). This has clinical relevance as treatment providers can recognize that patients are more motivated to change in relation to the number of alcohol-related problems they have experienced in the past 12 months.

Multivariate analysis of stage of change demonstrated that older patients, patients reporting increased experiences of alcohol-related problems in the past 12 months, and patients with increased causal attribution were significantly more likely to be ready to make a change in their alcohol use. The demographic variable of age may be significantly associated with readiness to change as older patients may have increased exposure to the negative consequences of alcohol use compared to younger patients. In a related vein, patients who reported more recent alcohol-related problems were more likely to make a change. This is consistent with the literature as is the finding that recent alcohol-related problems risk factor shares a stronger association with stage of change than the factor of age (Apodaca & Schermer, 2003; Longabaugh, et al., 1995).

The analysis of this hypothesis advanced the field in two ways by revealing a relationship between causal attribution and readiness to change. First, results indicate a significant association between causal attribution and stage of change. Apodaca and Schermer (2003) failed to find that patient's perception of the role that alcohol played in the injury predicted readiness to change. The analysis in this hypothesis may have been able to detect significant differences

due to the increased sample size relative to Apodaca and Schermer's study of 50 injured patients. Another reason significance may have been detected is due to differences in screening criteria between the two studies. Apodaca and Schermer screened patients based on BAC only whereas the present study accounted for four different criteria. Including additional criteria may have recruited patients with more divergent motivations for change. In addition, screening criteria was significantly associated with stage of change in the bivariate analysis. The second important finding of the results is that significance between the two factors was found in a larger and more representative sample. Longabaugh and colleagues (1995) had found a significant association between causal attribution and readiness to change. This study expanded on their research by having a larger sample size, controlling for ethnicity, and inclusion of more women.

Bivariate analysis demonstrated additional valuable findings. As weekly alcohol volume increased, patients were more likely to be motivated to make a change to their alcohol use. This finding differed, however, for patients assessed to be in the action stage of change. They consumed the least number of drinks per week on average at 5.83 (SD = 8.90) compared to patients in preparation stage who consumed on average 11.85 drinks (SD = 18.69) per week. The association between weekly alcohol use and stage of change is corroborated by research. Barnett and colleagues (2002) evaluated adolescents and found that those in the action stage had lower alcohol consumption than those in earlier stages of change.

Limitations of Analysis of Hypothesis 3

As predicted, several risk factors were significantly associated with readiness to change. However, 93% of the total variance of readiness to change remained unaccounted. Two reasons exist to explain the limited reach of the present analysis. First, readiness to change is a construct made up of multiple influences that as of yet, the field has not adequately explained. Readiness to change is based on the theoretic framework outlined in the Transtheoretical Model (TTM) (DiClemente & Velasquez, 2002; Prochaska, et al., 1992, 1997). The TTM posits that change occurs in a sequential step-wise fashion as a result of logical analysis of the pros and cons of alcohol use. Critics of the framework argue that change often occurs suddenly and without deliberation. The TTM may not adequately capture the influence of unconscious and situational factors, and these factors play an important role in influencing patients to maintain status quo or make changes (Etter, 2005; Etter & Sutton, 2002; West, 2005).

A second limitation is that injury severity was not controlled for in the present analysis. This was because the data was not available. However, injury type, which assesses the level of violence associated with an injury, was evaluated. This risk factor was not significantly associated with readiness to change. Other studies have examined injury severity with respect to readiness for change. Longabaugh and colleagues (1995) and Barnett and colleagues (2002)

found that injury severity was associated significantly with readiness to change. Perhaps the present study, with its large sample size and power, may have been able to corroborate their work in associating the two variables.

Implications for Treatment

Brief interventions can be made more effective as treatment providers are given more tools with which to increase motivation to change. The present analysis provides treatment providers additional tools. The risk factor of recent alcohol-related problems was found in this study to be the largest contributor in readiness to change. Treatment providers can assess this factor easily, which will help them assess patient's motivation for change. The second risk factor found to be significantly associated with stage of change is causal attribution. This has important clinical implications as this is a new finding in the field. Causal attribution is a modifiable risk factor whereas many other risk factors including prior treatment for alcohol use or recent alcohol-related problems are not subjective to change as they either have or have not occurred. Already, brief interventions make use of scales to help engage patients in the change process. Causal attribution should be incorporated into brief interventions via a scale assessing patients' insight into the role alcohol played in their current injury. In summary, the finding that causal attribution is linked to stage of change has two important clinical implications. First, treatment providers can offer more

effective treatment based on having a better understanding of where the patient is currently in the change process, and assessing causal attribution provides such information. Second, as causal attribution is a modifiable risk factor, it is a tool for providers to influence to help patients with alcohol problems curb their alcohol use and thereby reduce alcohol-related injuries.

Implications for Research

The present analysis yielded valuable findings for researchers in the field. First, causal attribution, a modifiable risk factor, was found to be significantly associated with readiness to change. This aids researchers in assessing the important explanation of variance of stage of change. Brief interventions that incorporate causal attribution can be evaluated to determine to what degree causal attribution aids in predicting decreased alcohol use and associated injuries.

The method for evaluating stage of change in the present study provided certain advantages over previous studies. Most prior studies have evaluated stage of change based on patient self-report (see Apodaca & Schermer, 2003; Barnett, et al., 2002). This has two drawbacks. First, patients may not accurately identify their stage of change based on reporting bias or limited insight into their problems. Second, the target change behavior is not controlled for as patients may set different goals for change. For instance, a patient who wants to decrease his alcohol use by one drink per week may score himself in the action stage while

another patient scores herself in the contemplation stage as she is not ready to completely quit alcohol use. The advantages of the method employed in this study were that trained study clinicians assessed patients on their amenability to change following the study questionnaire. This addressed both drawbacks in prior studies. First, the study clinicians were trained in the motivational interviewing and knew how to assign patients based on understanding the stages of change. Second, all study clinicians evaluated patients on stage of change based on the same target goal of quitting alcohol use.

Hypothesis 4: Examine ethnic differences in reasons for screening positive, making causal attributions, and readiness to change.

Ethnic influences were evaluated in the assessment of factors associated with acute intoxication versus DBNL, causal attribution, and readiness to change. It was found that Hispanics were more likely than Whites or Blacks to have increased causal attribution. Recognizing that differences between these groups are multi-determined, several hypotheses regarding cultural differences were made to help explain the finding. Hispanics as a culture are more likely to engage in episodic and heavy alcohol use compared to Whites or Blacks (Cherpitel & Bond, 2003). This may be explained in part due to the fact that Mexican culture is considered a wet society. Cherpitel, Ye, and colleagues (2003) found that patients in wet societies are more likely to report causal attribution as less stigma

is associated with alcohol use. Second, increased likelihood of heavy drinking is associated with increased likelihood of suffering negative consequences of alcohol use (Cherpitel, Ye, et al., 2003). Analysis of hypothesis 2 found that recent alcohol-related problems was significantly associated with causal attribution. Tying this together, it may be that Hispanics are more likely to report causal attribution because it has less perceived shame in their culture and because they have risk factors related to increased causal attribution.

A less significant but still noteworthy finding of the present hypothesis is that Hispanics have an increased likelihood to screen positive for acute intoxication rather than DBNL compared to Whites and Blacks. Although this difference was not significant when holding other risk factors constant, the association suggests what was stated above. That is, Hispanics are more likely to engage in episodic and heavy alcohol use and experience negative consequences as a result.

A reason that less ethnic differences were observed might be that the change process is less environmentally influenced than originally predicted and all people, regardless of ethnicity, proceed through the change process in the same manner. Considering the TTM of change, it might be reasonable to expect only minimal observed differences between Blacks, Whites, and Hispanics as change is dependent upon factors such as internal motivation and logical deduction of the negative consequences that alcohol has in one's life. Regardless of ethnicity,

alcohol creates the same physiological effects which can create similar impairment in motor functioning, thereby resulting in similar type negative consequences for similar levels of intoxication across ethnicity.

Limitations of Analysis of Hypothesis 4

A limitation of the analysis is that two of the three factors were not found to statistically differ by ethnicity. Hispanics, Blacks, and Whites did not appreciably differ based on screening criteria or readiness to change. A reason for this might be that it is not ethnicity or race themselves that are associated with these variables, but rather the factors associated with ethnicity and race. These factors, such as community involvement, were not evaluated and likely influence to a large degree the method in which participants screen positive for alcohol use and stage of change.

Implications for Treatment

Treatment can be made more effective based on a better understanding of how ethnicity influences treatment variables. The present study aids treatment providers by helping them better distinguish patients who are likely to have increased causal attribution. Knowing that Hispanics are more likely than Whites or Blacks to have increased causal attribution aids health care providers because they can more quickly establish with this group the reasons for their alcohol-

related injury and to proceed in treatment with minimal delay. This has important clinical implications for treatment outcomes as causal attribution is significantly linked to readiness to change.

Implications for Research

The present analysis contributed important findings to the field as limited research has been conducted examining ethnic differences regarding the factors of screening criteria, causal attribution, and stage of change. Previous studies have not found significant differences between Blacks, Whites, and Hispanics on treatment outcomes (Hettema, et al., 2005; WHO, 1996). Further exploration of the multi-dimensional factors surrounding ethnicity is warranted. For instance, considering the role of acculturation as measured by country of origin and language preference are valid lines of further inquiry.

Conclusions and Directions for Future Research

The following discussion summarizes the major findings of the study and posits areas where research efforts should be targeted.

A primary aim of the study was to assess risk factors associated with readiness to change. A major finding of the current study was the indication that causal attribution and stage of change are significantly associated, adjusting for other risk factors. Causal attribution stands out among the risk factors as a

modifiable risk factor. Treatment can enhance patient insight into the association between alcohol use and subsequent injury and thereby enhance treatment effectiveness. Incorporating a scale for causal attribution is a new idea as the association between the two has been rarely reviewed in the field. However, causal attribution not only helps the treatment provider identify more accurately the stage the patient is current in, but it also can be used to increase patient's amenability to change by raising the idea that the two might be related. Even if the patient denies any causal attribution, he is forced to consider the notion that they are connected simply by answering the question. Treatment providers, as they do with other scales already using in BIs, can educate the patient as to what the average score of causal attribution is for most other injured patients. This also helps influence change as patients compare themselves to an average responder and find themselves with either more or less insight into their problem. Future research is warranted in evaluating the treatment effectiveness of brief interventions which incorporate causal attribution.

This study helped increase understanding of stage of change by recognizing the important role that causal attribution plays. Future research should continue to more clearly elucidate the change process. The change process can be more fully understood through two ways, which are enhancement of the tools which measure stage of change and clearer conceptualization of the stage process. First, improvement of the psychometric properties of self-report

measures as well as more sophisticated clinical measures assessing stage of change will serve this purpose. Second, the change process was conceptually constructed based on the TTM. The model is the foundation for brief interventions which are often utilized in medical care settings. In order to effectively treat problems with alcohol use, it is important to know where the patient is in the change process. The current study was able to explain only 7% of the variance of stage of change. This leaves many risk factors unaccounted for. Although the TTM is an often-used model for explaining the change process, it does not fully explain the change process for all patients. Patients may change based on immediate situational factors or unconscious motivations rather than after a deliberate and sequential change in internal motivation as the TTM suggests. Such limitations of the TTM as well as limited psychometric properties of the clinical measure used in the study may account for the limited reach that risk factors had in explaining readiness to change. A fuller explanatory model for the process of change and more sophisticated instruments are needed to gain a more comprehensive understanding of how more people and in different ways decide to change their alcohol use. Future research should continue to explore the construct and assessment of readiness to change and how treatment can be provided based on patient's stage of change.

The third area where research efforts should be targeted is the treatment of patients who use both alcohol and drugs. Although the focus of the present study

was alcohol problems, it was found that nearly half of the sample population (*n* = 682; 46%) reported having used drugs at least once in the past 12 months. Drug use included illicit substances as well as prescriptive narcotics that were either not prescribed to them or was prescribed to them but was used more or for longer periods than was indicated. The most commonly reported drug used by patients in the sample was marijuana, which is consistent with studies showing increasing prevalence and incidence of the substance (Mohler-Kuo, et al., 2003). This study's finding indicated that acutely intoxicated patients were slightly less likely to report recent drug use, although this finding was not significant when adjusting for other risk factors. A significant interaction was found between recent drug use and causal attribution, where 61% of patients reporting recent drug use denied any causal attribution between their alcohol use and current injury. The majority of patients (89%) reporting recent drug use were evaluated as being in the early stages of change although this was not a significant interaction.

Most people with substance use problems also have alcohol problems, although the inverse is not necessarily true (O'Malley and Johnston, 2002; SAMHSA, 2005). Due to the propensity of alcohol-related injury, it is reasonable to conclude that many injuries also occur as a result of substance use. Just as this study focused on risk factors associated with alcohol-related injuries, it is a worthwhile project to reduce future substance-related injuries by addressing risk factors leading to such injuries. Brief interventions which address alcohol misuse

would be well advised to evaluate a need for drug treatment as well. Due to the comorbidity of drug and substance use, treatment is more effective when it helps reduce the frequency of both so that the total health of the patient is improved. Current brief interventions do not incorporate drug interventions, and it is recommended that BIs seek to reduce drug use as well for patients who have problems with both alcohol and drugs. In addition, future research should focus on the interaction of alcohol and other substances on injury occurrence.

TABLE 1: Factors Predicting Readiness to Change in Injured Patients at Medical Settings

Study	No. of Patients	Factor(s)	Significance
Apodaca & Schermer (2003)	50	Experiencing Negative Consequences	Yes
Barnett et al. (2002)	334	1. Injury Severity 2. Anticipated Consequences	Yes to both
Longabaugh et al. (1995)	24	1. Experiencing Negative Consequences; 2. Aversiveness of Injury; 3. Awareness of role that alcohol played in injury	Yes to all
Mello et al. (1995)	539	Type of Injury (motor vehicle collisions)	Yes

TABLE 2: Characteristics of sample group (N = 1,496).

Characteristic	*n*	%
Gender		
Male	1,234	83%
Female	262	18%
Age		
18-24	438	29%
25-34	440	29%
35-44	342	23%
45+	274	18%
Education		
Some high school or less	579	39%
High school diploma or GED	520	35%
More than high school	395	26%
Occupation		
Homemaker, Student, Unable to Work, Retired, & Other	459	31%
Employed for wages	1,036	69%
Race/Ethnicity		
Hispanics	538	36%
Blacks	288	19%
Whites	670	45%
Drug use (past 12 months)		
Yes	682	46%
No	812	54%
Injury Type		
Unintentional	1,179	79%
Intentional	317	21%
Alcohol Level		
Abuse	267	18%
Dependent	435	29%
Neither	691	46%
Prior Alcohol Treatment		
Yes	588	39%
No	906	61%

TABLE 2, continued

Characteristic	*n*	%
Screening Criteria		
Clinical indication of alcohol use	589	39%
Self-report of alcohol use prior to injury	366	25%
Exceeded NIAAA cutoff scores	476	32%
CAGE	65	4%
Previous Alcohol-Related Injury		
Yes	519	35%
No	975	65%
Causal Attribution		
No causal attribution	952	64%
Limited causal attribution	186	12%
Moderate causal attribution	213	14%
Absolute causal attribution	126	8%
Affected by Alcohol		
Not at all affected	346	23%
A little affected	227	15%
Somewhat affected	146	10%
Very affected	147	10%
Did not report drinking before injury	603	40%
Stages of Change		
Precontemplation	287	19%
Contemplation	936	63%
Preparation	125	8%
Action	27	2%
Alcohol use		
^Weekly volume (number of drinks)	8.77 (13.79)	
Alcohol Problems Recent, past 12 months (SIP[a] Plus 6)		
^Total Score with Plus 6	7.71 (11.39)	

^Mean (standard deviation)

[a] SIP - Short Inventory of Problems

TABLE 3: Bivariate Analysis of Patients Screening Positive for an Alcohol-Related Injury (N=1,336)

	Acutely Intoxicated[a] (n = 860)		Drinking Beyond Normal Limits[b] (n = 476)		X^2	df
Risk Factor	n	%	n	%		
Gender					1.04	1
Male	725	84%	391	82%		
Female	135	16%	85	18%		
Age					0.61	3
18-24	260	30%	143	30%		
25-34	262	30%	145	30%		
35-44	194	23%	102	21%		
45+	142	17%	86	18%		
Education					0.88	2
Some high school or less	345	40%	188	39%		
High school diploma or GED	295	34%	175	37%		
More than high school	218	25%	113	24%		
**Occupation					7.71	1
Homemaker, Student, Unable to Work, Retired, & Other	277	32%	119	25%		
Employed for wages	582	68%	357	75%		
Race/Ethnicity					3.50	2
White	374	43%	232	49%		
Black	150	17%	78	16%		
Hispanic	336	39%	166	35%		

TABLE 3, continued

Risk Factor	Acutely Intoxicated[a] (n = 860)		Drinking Beyond Normal Limits[b] (n = 476)		X^2	df
	n	%	n	%		
*Drug use (past 12 months)					5.41	1
Yes	421	49%	202	42%		
No	437	51%	274	58%		
***Injury Type					28.21	1
Unintentional	644	75%	415	87%		
Intentional	216	25%	61	13%		
***Alcohol Level					58.78	2
Abuse	176	20%	78	16%		
Dependent	322	37%	88	18%		
Neither	319	37%	257	54%		
**Prior Alcohol Treatment					8.60	1
Yes	366	43%	164	34%		
No	492	57%	312	66%		
***Alcohol use					F (1, 1331) = 25.70	
^Weekly volume (number of drink	10.95 (16.05)		6.86 (9.59)			
***Alcohol Problems Recent, past 12 months (SIP[c] Plus 6)					F (1, 1282) = 73.84	
^Total Score with Plus 6	10.18 (12.48)		4.56 (8.47)			

*p<.05, **p<.01, ***p<.001

TABLE 3, continued

^Mean (standard deviation)

[a] Nearly all patients who screened positive for acute alcohol intoxication also DBNL. The few patients (n = 95) who did not DBNL were not considered in this analysis.

[b] Patients who screened positive by exceeding the NIAAA cut off scores indicated a tendency to drink beyond normal limits. Due to a small number (n = 65) of patients screening positive via the CAGE, only patients who screened positive by exceeding the NIA

[c] SIP - Short Inventory of Problems

TABLE 4: Summary of Multivariate Analysis for Risk Factors Associated with Screening Criteria (N = 1,190)

Risk Factor	OR	95% CI
Gender		
Male	0.88	(0.62, 1.25)
Female	1.00	---
Age		
18-24	1.19	(0.79, 1.79)
25-34	1.13	(0.76, 1.69)
35-44	1.17	(0.78, 1.78)
45+	1.00	---
Education		
Some high school or less	0.72	(0.50, 1.04)
High school diploma or GED	0.74	(0.53, 1.04)
More than high school	1.00	---
Occupation		
Homemaker, Student, Unable to Work, Retired, & Other	1.44*	(1.07, 1.95)
Employed for wages	1.00	---
Race/Ethnicity		
White	1.00	---
Black	1.09	(0.76, 1.56)
Hispanic	1.32	(0.95, 1.83)
Drug use (past 12 months)		
Yes	0.89	(0.67, 1.17)
No	1.00	---
Injury Type		
Unintentional	1.00	---
Intentional	2.24***	(1.55, 3.23)
Alcohol Level		
Abuse	0.93	(0.64, 1.34)
Dependent	0.96	(0.64, 1.44)
Neither	1.00	---

TABLE 4, continued

Risk Factor	OR	95% CI
Prior Alcohol Treatment		
Yes	1.10	(0.84, 1.45)
No	1.00	---
Alcohol use		
^Weekly Volume (number of drinks)	1.17	(0.91, 1.52)
Alcohol Problems Recent, past 12 months (SIP[a] Plus 6)		
^Total Score with Plus 6	3.72***	(2.53, 5.45)

*p<.05
**p<.01
***p<.001
^Mean (standard deviation)
[a] SIP - Short Inventory of Problems

TABLE 5: Bivariate Analysis of Causal Attribution (CA) (N = 1,477)

	No CA (n = 952)		Limited CA (n = 186)	
Risk Factor	*n*	%	*n*	%
Gender				
Male	776	82%	151	81%
Female	176	18%	35	19%
Age				
18-24	265	28%	57	31%
25-34	281	30%	53	28%
35-44	215	23%	50	27%
45+	191	20%	26	14%
Education				
Some high school or less	347	36%	66	35%
High school diploma or GED	342	36%	70	38%
More than high school	263	28%	50	27%
Occupation				
Homemaker, Student, Unable to Work, Retired, & Other	289	30%	54	29%
Employed for wages	663	70%	132	71%
***Race/Ethnicity				
White	444	47%	80	43%
Black	211	22%	28	15%
Hispanic	297	31%	78	42%
*Drug use (past 12 months)				
Yes	411	43%	87	47%
No	541	57%	99	53%
Injury Type				
Unintentional	753	79%	144	77%
Intentional	199	21%	42	23%
*Prior Alcohol Treatment				
Yes	363	38%	64	34%
No	589	62%	122	66%

TABLE 5, continued

	No CA (*n* = 952)		Limited CA (*n* = 186)	
***Screening Criteria				
Clinical indication of alcohol use	255	27%	108	58%
Self-report of alcohol use prior to injury	190	20%	63	34%
Exceeded NIAAA cutoff scores	449	47%	13	7%
CAGE	58	6%	2	1%
***Affected by Alcohol				
Not at all affected	255	27%	59	32%
A little affected	68	7%	77	41%
Somewhat affected	23	2%	28	15%
Very affected	12	1%	7	4%
Did not report drinking before inju	584	61%	12	6%
***Previous Alcohol-Related Injury				
Yes	282	30%	72	39%
No	670	70%	114	61%
***Alcohol use				
^Weekly Volume (number of drink	6.70 (9.39)		10.19 (14.11)	
***Alcohol Problems Recent, past 12 months (SIP [a] Plus 6)				
^Total Score with Plus 6	4.76 (8.42)		8.51 (9.20)	

TABLE 5, continued

	Moderate CA (n = 213)		Absolute CA (n = 126)		X^2	df
Risk Factor	n	%	n	%		
Gender					2.61	3
Male	182	85%	107	85%		
Female	31	15%	19	15%		
Age					8.60	9
18-24	69	32%	40	32%		
25-34	63	30%	41	33%		
35-44	46	22%	26	21%		
45+	35	16%	19	15%		
Education					10.44	6
Some high school or less	95	45%	60	48%		
High school diploma or GED	69	32%	37	29%		
More than high school	49	23%	29	23%		
Occupation					1.53	3
Homemaker, Student, Unable to Work, Retired, & Other	72	34%	41	33%		
Employed for wages	140	66%	85	67%		
***Race/Ethnicity					32.06	6
White	85	40%	52	41%		
Black	32	15%	14	11%		

TABLE 5, continued

	Moderate CA (n = 213)		Absolute CA (n = 126)		X^2	df
Risk Factor	n	%	n	%		
Hispanic	96	45%	60	48%		
*Drug use (past 12 months)					10.17	3
Yes	115	54%	65	52%		
No	98	46%	61	48%		
Injury Type					4.12	3
Unintentional	160	75%	106	84%		
Intentional	53	25%	20	16%		
*Prior Alcohol Treatment					9.01	3
Yes	96	45%	60	48%		
No	117	55%	66	52%		
***Screening Criteria					360.69	9
Clinical indication of alcohol use	132	62%	88	70%		
Self-report of alcohol use prior to injury	73	34%	37	29%		
Exceeded NIAAA cutoff scores	6	3%	0	0%		
CAGE	2	1%	1	1%		
***Affected by Alcohol					1123.98	12
Not at all affected	23	11%	6	5%		

TABLE 5, continued

	Moderate CA (n = 213)		Absolute CA (n = 126)		X^2	df
Risk Factor	n	%	n	%		
A little bit affected by alcohol	61	29%	20	16%		
Somewhat affected by alcohol	74	35%	19	15%		
Very affected by alcohol	51	24%	77	61%		
Did not report drinking before injury	2	1%	3	2%		
***Previous Alcohol-Related Injury					37.80	3
Yes	100	47%	62	49%		
No	113	53%	64	51%		
***Alcohol use					F (3, 1472) = 26.45	
^Weekly Volume (number of drinks)	13.24 (20.41)		15.53 (21.87)			
***Alcohol Problems Recent, past 12 months (SIP [a] Plus 6)					F (3,1420) = 93.09	
^Total Score with Plus 6	14.78 (14.67)		17.82 (16.26)			

*p<.05, **p<.01, ***p<.001

^Mean (standard deviation)

[a] SIP - Short Inventory of Problems

TABLE 6: Bivariate Correlations Between Risk Factors and Causal Attribution

Risk Factor	Correlation Between Risk Factor and Causal Attribution	Semi-Partial Correlation
Gender	-0.03	-0.01
Age	0.06**	-0.01
Education		
Some high school or less	0.08**	0.02
High school diploma or GED	-0.05*	0.02
More than high school	---	---
Occupation	-0.03	0.00
Race/Ethnicity		
Hispanics	0.13***	0.06
Blacks	-0.11***	-0.01
Whites	---	---
Drug use (past 12 months)	0.05**	-0.02
Injury Type	-0.01	-0.05
Screening Criteria		
Clinical indication of alcohol use	---	---
Self-report of prior alcohol use	0.10***	-0.01
Exceeded NIAAA cutoff scores or CAGE	-0.41***	-0.04
Affected by Alcohol		
Did not report prior alcohol use	---	---
Not affected by alcohol	-0.22***	0.02
A little bit affected by alcohol	0.17***	0.18
Somewhat affected by alcohol	0.29***	0.26
Very affected by alcohol	0.57***	0.41
Previous Alcohol-Related Injury	0.15***	0.00
Prior Alcohol Treatment	0.07**	-0.01
Weekly Alcohol Volume	0.24***	0.02
Alcohol Problems Recent, past 12 months (SIP[a] Plus 6)	0.43***	0.10

*p<.05, **p<.01, ***p<.001

[a] SIP - Short Inventory of Problems

TABLE 7: Pearson Correlations Between Risk Factors of Causal Attribution (N = 1,406)

Risk Factor	Gender	Age	Some high school or less	High school diploma or GED	More than high school (referent group)
Gender	1.00	0.03	-0.07**	-0.01	---
Age		1.00	-0.13***	0.01	---
Some high school or less			1.00	-0.58***	---
High school diploma or GED				1.00	---
More than high school (referent group)					---

TABLE 7, continued

Risk Factor	Occupation	Hispanics	Blacks	Whites (referent group)	Drug use (past 12 months)	Injury Type	Clinical indication of alcohol use (referent group)
Gender	-0.15***	-0.13***	0.04	---	-0.01	-0.11***	---
Age	-0.09***	-0.27***	0.19***	---	-0.15***	-0.09***	---
Some high school or less	0.04	0.40***	-0.13***	---	-0.04	0.10***	---
High school diploma or GED	-0.06*	-0.19***	0.18***	---	0.08**	0.05*	---
More than high school (referent group)	---	---	---	---	---	---	---
Occupation	1.00	0.13***	-0.18***	---	-0.12***	-0.07**	---
Hispanics		1.00	-0.36***	---	-0.11***	0.11***	---
Blacks			1.00	---	0.04*	0.13***	---
Whites (referent group)				---	---	---	---
Drug use (past 12 months)					1.00	0.12***	---
Injury Type						1.00	---

TABLE 7, continued

Risk Factor	Self-report of alcohol use prior to injury	Exceeded NIAAA cutoff scores or CAGE	Not at all affected by alcohol prior to injury	A little affected by alcohol prior to injury	Somewhat affected by alcohol prior to injury	Very affected by alcohol prior to injury
Gender	0.02	-0.01	-0.01	-0.01	0.08**	-0.03
Age	0.06*	0.03	0.05*	-0.07**	0.04*	-0.04*
Some high school or less	-0.03	-0.02	0.00	0.01	0.00	0.04
High school diploma or GED	0.06*	0.02	0.01	0.02	-0.03	-0.04
More than high school (referent group)	---	---	---	---	---	---
Occupation	-0.13***	0.08**	-0.05*	-0.01	-0.04	-0.04
Hispanics	-0.04	-0.05*	-0.04	0.08**	0.00	0.03
Blacks	0.09**	-0.01	0.10***	-0.03	0.01	-0.07**
Whites (referent group)	---	---	---	---	---	---
Drug use (past 12 months)	-0.02	-0.05*	-0.05*	0.08**	0.03	0.06*
Injury Type	0.12***	-0.13***	0.09***	0.08**	0.00	-0.01

TABLE 7, continued

Risk Factor	Pt did not report drinking before injury (referent group)	Previous Alcohol-Related Injury	Prior Alcohol Treatment	Weekly Alcohol Volume	Alcohol Problems Recent, past 12 months (SIP[a] Plus 6)
Gender	---	-0.07**	0.01	-0.20***	-0.12***
Age	---	0.15***	0.09***	0.06*	-0.03
Some high school or less	---	-0.02	-0.04	0.05*	0.05*
High school diploma or GED	---	0.01	0.03	0.02	-0.02
More than high school (referent group)	---	---	---	---	---
Occupation	---	-0.05*	-0.12***	0.02	-0.05*
Hispanics	---	-0.07**	-0.07**	0.02	0.06*
Blacks	---	-0.03	0.01	-0.02	-0.08**
Whites (referent group)	---	---	---	---	---
Drug use (past 12 months)	---	0.21***	0.15***	0.18***	0.27***
Injury Type	---	0.03	0.02	0.06*	0.05*

TABLE 7, continued

Risk Factor	Self-report of alcohol use prior to injury	Exceeded NIAAA cutoff scores or CAGE	Not at all affected by alcohol prior to injury	A little affected by alcohol prior to injury	Somewhat affected by alcohol prior to injury	Very affected by alcohol prior to injury
Clinical indication of alcohol use (referent group)	---	---	---	---	---	---
Self-report of alcohol use prior to injury	1.00	-0.43***	0.24***	0.13***	0.08**	0.04
Exceeded NIAAA cutoff scores or CAGE		1.00	-0.35***	-0.30***	-0.23***	-0.24***
Not at all affected by alcohol prior to injury			1.00	-0.24***	-0.18***	-0.18***
A little affected by alcohol prior to injury				1.00	-0.14***	-0.14***
Somewhat affected by alcohol prior to injury					1.00	-0.11***
Very affected by alcohol prior to injury						1.00

TABLE 7, continued

Risk Factor	Pt did not report drinking before injury (referent group)	Previous Alcohol-Related Injury	Prior Alcohol Treatment	Weekly Alcohol Volume	Alcohol Problems Recent, past 12 months (SIP[a] Plus 6)
Clinical indication of alcohol use (referent group)	---	---	---	---	---
Self-report of alcohol use prior to injury	---	0.02	0.03	0.05*	0.04
Exceeded NIAAA cutoff scores or CAGE	---	-0.10***	-0.07**	-0.12***	-0.25***
Not at all affected by alcohol prior to injury	---	-0.05*	0.03	-0.04	-0.07**
A little affected by alcohol prior to injury	---	0.07**	0.01	0.10***	0.14***
Somewhat affected by alcohol prior to injury	---	0.07**	0.03	0.08**	0.17***
Very affected by alcohol prior to injury	---	0.11***	0.07**	0.14***	0.29***
Pt did not report drinking before injury	---	---	---	---	---

TABLE 7, continued

Risk Factor	Pt did not report drinking before injury (referent group)	Previous Alcohol-Related Injury	Prior Alcohol Treatment	Weekly Alcohol Volume	Alcohol Problems Recent, past 12 months (SIP[a] Plus 6)
Previous Alcohol-Related Injury		1.00	0.19***	0.29***	0.35***
Prior Alcohol Treatment			1.00	0.13***	0.20***
Weekly Alcohol Volume				1.00	0.51***
Alcohol Problems Recent, past 12 months (SIP[a] Plus 6)					1.00

*p<.05
**p<.01
***p<.001
[a] SIP - Short Inventory of Problems

TABLE 8: Summary of Multivariate Analysis for Risk Factors Associated with Causal Attribution (N = 1,406)

	Model R Square: 0.59	
Risk Factor	B	95% CI
Gender	-0.07	(-0.38, .23)
Age	0.00	(-0.01, 0.01)
Education		
Some high school or less	0.22	(-0.09, 0.52)
High school diploma or GED	0.13	(-0.16, 0.43)
More than high school	---	---
Occupation	0.03	(-0.22, 0.28)
Race/Ethnicity		
Hispanics	0.50**	(0.21, 0.78)
Blacks	-0.07	(-0.38, 0.25)
Whites	---	---
Drug use (past 12 months)	-0.14	(-0.39, 0.10)
Injury Type	-0.43**	(-0.76, -0.14)
Screening Criteria		
Clinical indication of alcohol use	---	---
Self-report of alcohol use prior to injury	-0.11	(-0.41, 0.18)
Exceeded NIAAA cutoff scores or CAGE	-0.42*	(-0.83, -0.01)
Affected by Alcohol		
Did not report alcohol use prior to injury	---	---
Not affected by alcohol	0.18	(-0.24, 0.61)
A little bit affected by alcohol	2.44***	(1.97, 2.91)
Somewhat affected by alcohol	3.98***	(3.45, 4.50)
Very affected by alcohol	6.52***	(5.97, 7.06)
Previous Alcohol-Related Injury	-0.02	(-0.27, 0.24)
Prior Alcohol Treatment	-0.07	(-0.30, 0.17)
Weekly Alcohol Volume	0.15	(-0.07, 0.37)
Alcohol Problems Recent, past 12 months (SIP[a] Plus 6)	0.85***	(0.56, 1.13)

*p<.05, **p<.01, ***p<.001, [a] SIP - Short Inventory of Problems

TABLE 9: Bivariate Analysis of Stage of Change (N = 1,375)

	Precontemplation (n = 287)		Contemplation (n = 936)		Preparation (n = 125)	
Risk Factor	*n*	%	*n*	%	*n*	%
Gender						
Male	232	81%	774	83%	102	82%
Female	55	19%	162	17%	23	18%
Age						
18-24	97	34%	268	29%	30	24%
25-34	87	30%	278	30%	32	26%
35-44	61	21%	204	22%	42	34%
45+	42	15%	186	20%	21	17%
Education						
Some high school or less	116	40%	362	39%	47	38%
High school diploma or GED	95	33%	339	36%	43	34%
More than high school	76	26%	235	25%	35	28%
Occupation						
Homemaker, Student, Unable to Work, Retired, & Other	83	29%	273	29%	48	38%
Employed for wages	204	71%	662	71%	77	62%
Race/Ethnicity						
White	133	46%	405	43%	53	42%
Black	47	16%	196	21%	21	17%
Hispanic	107	37%	335	36%	51	41%

TABLE 9, continued

	Action (n = 27)		X^2	df
Risk Factor	n	%		
Gender			0.90	3
Male	21	78%		
Female	6	22%		
Age			15.61	9
18-24	8	30%		
25-34	6	22%		
35-44	8	30%		
45+	5	19%		
Education			10.85	6
Some high school or less	6	22%		
High school diploma or GED	7	26%		
More than high school	14	52%		
Occupation			4.78	3
Homemaker, Student, Unable to Work, Retired, & Other	9	33%		
Employed for wages	18	67%		
Race/Ethnicity			5.90	6
White	15	56%		
Black	5	19%		
Hispanic	7	26%		

TABLE 9, continued

	Precontemplation (n = 287)		Contemplation (n = 936)		Preparation (n = 125)	
Risk Factor	*n*	%	*n*	%	*n*	%
Drug use (past 12 months)						
Yes	118	41%	441	47%	59	47%
No	169	59%	495	53%	66	53%
Injury Type						
Unintentional	234	82%	734	78%	96	77%
Intentional	53	18%	202	22%	29	23%
**Prior Alcohol Treatment						
Yes	112	39%	355	38%	67	54%
No	175	61%	581	62%	58	46%
***Screening Criteria						
Clinical indication of alcohol use	107	37%	374	40%	49	39%
Self-report of alcohol use prior to injury	66	23%	218	23%	42	34%
Exceeded NIAAA cutoff scores	106	37%	309	33%	22	18%
CAGE	8	3%	35	4%	12	10%
*Previous Alcohol-Related Injury						
Yes	79	28%	338	36%	50	40%
No	208	72%	598	64%	75	60%
***Causal Attribution						
No causal attribution	217	76%	575	61%	68	54%
Limited causal attribution	30	10%	118	13%	12	10%

TABLE 9, continued

	Action (n = 27)		X^2	df
Risk Factor	n	%		
Drug use (past 12 months)			3.31	3
Yes	12	44%		
No	15	56%		
Injury Type			1.76	3
Unintentional	22	81%		
Intentional	5	19%		
**Prior Alcohol Treatment			11.83	3
Yes	9	33%		
No	18	67%		
***Screening Criteria			29.91	9
Clinical indication of alcohol use	8	30%		
Self-report of alcohol use prior to injury	10	37%		
Exceeded NIAAA cutoff scores	7	26%		
CAGE	2	7%		
*Previous Alcohol-Related Injury			9.20	3
Yes	8	30%		
No	19	70%		
***Causal Attribution			39.89	9
No causal attribution	22	81%		
Limited causal attribution	2	7%		

TABLE 9, continued

	Precontemplation (n = 287)		Contemplation (n = 936)		Preparation (n = 125)	
Risk Factor	*n*	%	*n*	%	*n*	%
Moderate causal attribution	29	10%	140	15%	28	22%
Absolute causal attribution	8	3%	92	10%	17	14%
**Alcohol use						
^Weekly volume (number of drinks)	7.02 (10.80)		8.85 (13.52)		11.85 (18.69)	
***Alcohol Problems Recent, past 12 months (SIP[a] Plus 6)						
^Total Score with Plus 6	4.16 (8.14)		7.91 (10.93)		14.70 (15.73)	

TABLE 9, continued

	Action (n = 27)		X^2	df
Risk Factor	n	%		
Moderate causal attribution	1	4%		
Absolute causal attribution	2	7%		
**Alcohol use			F(3, 1371) = 4.20	
^Weekly volume (number of drinks)	5.83 (8.90)			
***Alcohol Problems Recent, past 12 months (SIP[a] Plus 6)			F(3, 1320) = 28.08	
^Total Score with Plus 6	3.07 (4.90)			

*p<.05
**p<.01
***p<.001
^Mean (standard deviation)
[a] SIP - Short Inventory of Problems

TABLE 10: Bivariate Correlations Between Risk Factors and Stage of Change (N = 1,319)

Risk Factor	Pearson Correlation	Semi-partial Correlation
Gender	0.00	0.01
Age	0.07**	0.07
Education		
Some high school or less	0.00	-0.03
High school diploma or GED	-0.03	-0.04
More than high school	---	---
Occupation	-0.05*	-0.03
Race/Ethnicity		
Hispanics	0.02	0.03
Blacks	0.00	0.01
Whites	---	---
Drug use (past 12 months)	0.04	-0.01
Injury Type	0.02	0.02
Screening Criteria		
Clinical indication of alcohol use (referent group)	---	---
Self-report of alcohol use prior to injury	0.05*	0.05
Exceeded NIAAA cutoff scores or CAGE	-0.07**	0.04
Previous Alcohol-Related Injury	0.08**	0.00
Causal Attribution	0.15***	0.07
Prior Alcohol Treatment	0.08**	0.03
Weekly Alcohol use	0.08**	-0.05
Alcohol Problems Recent, past 12 months (SIP[a] Plus 6)	0.22***	0.17

*p<.05

**p<.01

***p<.001

[a] SIP - Short Inventory of Problems

TABLE 11: Pearson Correlations Between Risk Factors of Stage of Change (N = 1,319)

Risk Factor	Gender	Age	Some high school or less	High school diploma or GED	More than high school (referent group)
Gender	1.00	0.04	-0.07**	-0.01	----
Age		1.00	-0.13***	0.00	----
Some high school or less			1.00	-0.59***	----
High school diploma or GED				1.00	----

TABLE 11, continued

Risk Factor	Occupation	Hispanics	Blacks	Whites (referent group)	Drug use (past 12 months)	Injury Type
Gender	-0.16***	-0.13***	0.04	----	-0.01	-0.10***
Age	-0.09**	-0.28***	0.19***	----	-0.14***	-0.08**
Some high school or less	0.02	0.41***	-0.13***	----	-0.05*	0.11***
High school diploma or GED	-0.04	-0.19***	0.18***	----	0.08**	0.04
More than high school (referent group)	----	----	----	----	----	----
Occupation		0.13***	-0.17***	----	-0.12***	-0.08**
Hispanics		1.00	-0.37***	----	-0.11***	0.12***
Blacks			1.00	----	0.05*	0.12***
Whites (referent group)				----	----	----
Drug use (past 12 months)					1.00	0.13***
Injury Type						1.00

TABLE 11, continued

Risk Factor	Clinical indication of alcohol use (referent group)	Self-report of alcohol use prior to injury	Exceeded NIAAA cutoff scores or CAGE	Previous Alcohol-Related Injury	Causal Attribution
Gender	----	0.01	0.00	-0.08**	-0.03
Age	----	0.06*	0.03	0.15***	-0.07**
Some high school or less	----	-0.03	-0.01	-0.02	0.08**
High school diploma or GED	----	0.06*	0.02	0.01	-0.05*
More than high school (referent group)	----	----	----	----	----
Occupation	----	-0.13***	0.10***	-0.05*	-0.02
Hispanics	----	-0.04	-0.06*	-0.07**	0.14***
Blacks	----	0.09**	-0.01	-0.03	-0.11***
Whites (referent group)	----	----	----	----	----
Drug use (past 12 months)	----	-0.02	-0.06*	0.21***	0.08**
Injury Type	----	0.14***	-0.14***	0.02	-0.02
Clinical indication of alcohol use (referent group)	----	----	----	----	----
Self-report of alcohol use prior to injury		1.00	-0.43***	0.03	0.10***

TABLE 11, continued

Risk Factor	Prior Alcohol Treatment	Weekly Alcohol use	Alcohol Problems Recent, past 12 months (SIP[a] Plus 6)
Gender	0.01	-0.21***	-0.12***
Age	0.09**	0.05*	-0.02
Some high school or less	-0.05*	0.05*	0.04
High school diploma or GED	0.04	0.02	-0.01
More than high school (referent group)	----	----	----
Occupation	-0.12***	0.01	-0.06*
Hispanics	-0.06*	0.01	0.06*
Blacks	0.02	-0.02	-0.08**
Whites (referent group)	----	----	----
Drug use (past 12 months)	0.15***	0.18***	0.27***
Injury Type	0.01	0.06*	0.05*
Clinical indication of alcohol use (referent group)	----	----	----
Self-report of alcohol use prior to injury	0.02	0.06*	0.03

TABLE 11, continued

Risk Factor	Clinical indication of alcohol use (referent group)	Self-report of alcohol use prior to injury	Exceeded NIAAA cutoff scores or CAGE	Previous Alcohol-Related Injury	Causal Attribution
Exceeded NIAAA cutoff scores or CAGE			1.00	-0.10***	-0.40***
Previous Alcohol-Related Injury				1.00	0.14***
Causal Attribution					1.00
Prior Alcohol Treatment					
Weekly Alcohol use					
Alcohol Problems Recent, past 12 months (SIP[a] Plus 6)					

TABLE 11, continued

Risk Factor	Prior Alcohol Treatment	Weekly Alcohol use	Alcohol Problems Recent, past 12 months (SIP[a] Plus 6)
Exceeded NIAAA cutoff scores or CAGE	-0.06*	-0.12***	-0.25***
Previous Alcohol-Related Injury	0.17***	0.29***	0.35***
Causal Attribution	0.06**	0.23***	0.42***
Prior Alcohol Treatment	1.00	0.13***	0.20***
Weekly Alcohol use		1.00	0.50***
Alcohol Problems Recent, past 12 months (SIP[a] Plus 6)			1.00

*p<.05
**p<.01
***p<.001
[a] SIP - Short Inventory of Problems

TABLE 12: Summary of Multivariate Analysis for Risk Factors Associated with Stage of Change (N = 1,319)

	Model R Square: 0.07	
	Unstandardized Coefficients	
Risk Factor	B	95% CI
Gender	0.04	(-0.20, 0.27)
Age	0.01**	(0.00, 0.02)
Education		
Some high school or less	-0.14	(-0.38, 0.10)
High school diploma or GED	-0.16	(-0.38, 0.07)
More than high school	---	---
Occupation	-0.10	(-0.30, 0.10)
Race/Ethnicity		
Hispanics	0.11	(-0.11, 0.33)
Blacks	0.06	(-0.19, 0.30)
Whites	---	---
Drug use (past 12 months)	-0.03	(-0.22, 0.16)
Injury Type	0.07	(-0.15, 0.29)
Screening Criteria		
Clinical indication of alcohol use (referent group)	---	---
Self-report of alcohol use prior to injury	0.19	(-0.03, 0.42)
Exceeded NIAAA cutoff scores or CAGE	0.15	(-0.07, 0.37)
Previous Alcohol-Related Injury	-0.01	(-0.21, 0.19)
Causal Attribution	0.04**	(0.01, 0.07)
Prior Alcohol Treatment	0.10	(-0.08, 0.28)
Weekly Alcohol use	-0.14	(-0.31, 0.02)
Alcohol Problems Recent, past 12 months (SIP[a] Plus 6)	0.70***	(0.48, 0.92)

*p<.05
**p<.01
***p<.001
[a] SIP - Short Inventory of Problems

TABLE 13: Screening Positive for Alcohol Use, Causal Attribution, and Stage of Change by Ethnicity

	HISPANICS		BLACKS		WHITES	
Risk Factor	Score	95% CI	Score	95% CI	Score	95% CI
Screening Criteria (Odds Ratio)	1.32	(0.95, 1.83)	1.09	(0.76, 1.56)	1.00	---
Causal Attribution (MR Coefficient)	0.50**	(0.21, 0.78)	-0.07	(-0.38, 0.25)	1.00	---
Stage of Change (MR Coefficient)	0.11	(-0.11, 0.33)	0.06	(-0.19, 0.30)	1.00	---

*p<.05
**p<.01
***p<.001

APPENDIX A: CAGE QUESTIONNAIRE

This four-item questionnaire is a brief screener for alcohol misuse meant for ages 16 and above. It is often used in a general medical population being examined in a primary care setting. It has been found to be both sensitive (accurately screen for those who have alcohol problems) and specific (accurately screen out those who do not have alcohol problems) (NIAAA, 1990). The four questions consist of: In the past 12 months: Have you ever felt that you should cut down on your drinking?, Have people annoyed you by criticizing your drinking?, Have you ever felt bad or guilty about your drinking?, Have you ever had a drink first thing in the morning to steady your nerves or get rid of a hangover?. A response of "yes" to any of these questions that occurred in the past year is to have screened positive for harmful alcohol use.

APPENDIX B: ALCOHOL-RELATED PROBLEMS IN THE PAST 12 MONTHS – SIP PLUS 6 ITEMS

Here are a number of events that many people have reported in connection with their drinking. Listen carefully and tell me if this has ever happened to you.

a. (**READ ITEM**) Has this ever happened to you?
b. If "**YES**'', about how often has this happened to you, during the past 12 months?

APPENDIX B, continued

	a. Ever		b. Past 12 months				
	No	Yes	Never	Once or a few times	Once or twice a month	Once or twice a week	Daily or almost daily
I have driven a motor vehicle after having three or more drinks	0	1	0	1	2	3	4
I have been unhappy because of my drinking	0	1	0	1	2	3	4
Because of my drinking I have not eaten properly	0	1	0	1	2	3	4
I have failed to do what is expected of me because of my drinking	0	1	0	1	2	3	4
I have felt guilty or ashamed because of my drinking	0	1	0	1	2	3	4
I have taken foolish risks because of my drinking	0	1	0	1	2	3	4
When drinking, I have done impulsive things that I have regretted later	0	1	0	1	2	3	4
I have gotten into a physical fight while drinking	0	1	0	1	2	3	4
My physical health has been harmed by my drinking	0	1	0	1	2	3	4
I have had money problems because of my drinking	0	1	0	1	2	3	4

APPENDIX B, continued

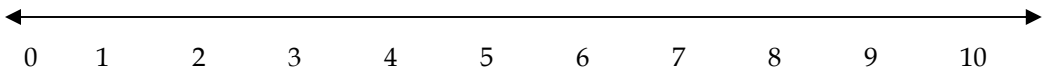
	a. Ever		b. Past 12 months				
	No	Yes	Never	Once or a few times	Once or twice a month	Once or twice a week	Daily or almost daily
My physical appearance has been harmed by my drinking	0	1	0	1	2	3	4
My family has been hurt by my drinking	0	1	0	1	2	3	4
A friendship or close relationship has been damaged by my drinking	0	1	0	1	2	3	4
My drinking has gotten in the way of my growth as a person	0	1	0	1	2	3	4
My drinking has damaged my social life, popularity, or reputation	0	1	0	1	2	3	4
I have spent too much or lost a lot of money because of my drinking	0	1	0	1	2	3	4
I have been arrested for driving under the influence of alcohol	0	1	0	1	2	3	4
I have had trouble with the law (other than driving while intoxicated) because of my drinking	0	1	0	1	2	3	4

APPENDIX B, continued

	a. Ever		b. Past 12 months				
	No	Yes	Never	Once or a few times	Once or twice a month	Once or twice a week	Daily or almost daily
I have had an accident while drinking or intoxicated	0	1	0	1	2	3	4
While drinking or intoxicated, I have been physically hurt, injured or burned	0	1	0	1	2	3	4
While drinking or intoxicated, I have injured someone else	0	1	0	1	2	3	4

APPENDIX C: CAUSAL ATTRIBUTION ITEM

On a scale of 0-10, how much do you think your injury was related to your use of alcohol?



Not at all Related
(Has nothing to do with injury)

Extremely Related
(Wouldn't be here if not drinking)

APPENDIX D: CRITERION FOR SCREENING POSITIVE FOR ALCOHOL USE AND INCLUSION INTO THE STUDY

FIRST CRITERIA	□ **Any Clinical Indications of Alcohol Use** □ **No Clinical Indications of Alcohol Use**
□ **Positive Blood Alcohol Concentration** **Level: _____** □ **Drug Use Including positive drug screening** **Specify:_____** □ **Smells of Alcohol on clothes or breath** □ **Appears intoxicated** □ **Reports by EMS of alcohol use or containers at site of injury** □ **Reports by friends or family of alcohol use** □ **Other signs of alcohol use** **Specify:_____**	
GCS:_____ □ **GCS < 14** **IF PATIENT NONRESPONSIVE DISCONTINUE SCREENING** □ **Expired**	
IF THE PATIENT MEET THE CRITERIA ABOVE PLEASE MAKE REFERRAL	

SECOND CRITERIA	□ **Drinking while injured**

Were you drinking today (or before you were injured)?

□ Yes □ No

IF THE PATIENT MEET THE CRITERIA ABOVE PLEASE MAKE REFERRAL

THIRD CRITERIA □ **Drinking Habits**

How many **days per week** do you drink alcohol??

Occasions per week:_____

On a typical day when you drink, how many **drinks per day** do you have?

Drinks per day:_____

What is the maximum number of drinks you had on any given occasion **during the last month**?

Drinks/Occasion:_____

_____occasions per week X _____ drinks/occasion = _____ drinks/week

Patients may be at-risk for alcohol related problems if alcohol consumption is:

MEN	**WOMEN**
□ More than 14 drinks/week	□ More than 7 drinks/week
□ More than 4 drinks/occasion	□ More than 3 drinks/occasion

IF PATIENT MEETS THE ABOVE CRITERIA PLEASE MAKE REFERRAL

FOURTH CRITERIA □ **CAGE**
□ **Does not drink**

Have you ever felt that you should **C**ut down on your drinking?

□ Yes
□ No

Have people **A**nnoyed you by criticizing your drinking?

□ Yes
□ No

Have you ever felt bad or **G**uilty about your drinking?

□ Yes
□ No

Have you ever had a drink first thing in the morning to steady your nerves or get rid of a hangover (Eye opener)?

□ Yes
□ No

Has this occurred during the past year?

□ Yes
□ No

MAKE REFERRAL IF THE ANSWER TO ANY OF THE ABOVE QUESTIONS IS YES **AND** IT OCCURRED DURING THE PAST YEAR

APPENDIX E: STAGE OF CHANGE ITEM

To Clinician: Mark your impression of the patient's stage of change before opening randomization envelope and randomizing.

Not Ready	Unsure	Ready	Doing
1 . . . 2	**3 . . . 4 . . .5 . .**	**6 . . . 7 . . . 8**	**. . 9 . . .10**
Precontemplation	Contemplation	Preparation	Action

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VITAE

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