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EXAMINING THE INFLUENCES OF THE BOTTOMING OUT EXPERIENCE AND THE
TURNING POINT ON THE EARLY RECOVERY PROCESS FROM SUBSTANCE
DEPENDENCE USING STRUCTURAL EQUATION MODELING

by

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A dissertation proposal submitted in partial fulfillment of the requirements
for the degree of Doctor of Philosophy
in the Department of Educational and Human Sciences
in the College of Education
at the University of Central Florida
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ABSTRACT

Considering the prevalence of addiction issues within the U.S., this study focused on the topic of recovery from drug and alcohol dependence in order to add to current literature. Prevention and recovery services are two of the most common ways of combating the addiction issue, and counselors are at the forefront of both movements. The bottoming out experience (BOE) and the turning point (TTP) are two common lay terms of factors within changing addictive behaviors, yet the connection of these constructs to recovery remains unstudied and unknown. The current study tested a model that levels of the BOE and the TTP are predictive of early recovery (ER).

The data from this study was obtained from a national dataset previously collected from 230 grant-funded addiction treatment centers that utilize the Global Assessment of Individual Needs (GAIN) assessment instrument. A review of the literature gaps, coupled with available data, influenced decisions on research design and statistical analysis procedures. As clear definitions of the BOE, TTP, and ER have not been discovered through research, a descriptive, correlational research design was chosen in order to understand not only what constitutes a BOE, TTP, and ER, but also to discover the relationships between the BOE, TTP, and ER in their natural state. The purpose of correlational studies is to investigate the relationship between two or more variables without researcher manipulation and such designs are common in the counseling and counselor education research field (Heppner, et al., 2008). Because correlational research is exploratory in nature, structural equation modeling (SEM) was utilized to understand the components of each construct and was used to test the hypothesis of the relationships

between the BOE, TTP and ER. Although SEM is a confirmatory technique, it is frequently used in an exploratory manner because it combines elements of confirmatory factor analysis and multiple regressions and allows for various possibilities of the relationships between constructs and variables (Schrieber, et al., 2006). The literature on ER, BOE, and TTP provides enough evidence to test a theoretical model, which is the purpose of SEM. The hypothesized model assessed data at intake for the BOE, TTP and ER. Once constructs were delineated through measurement models/CFA, SEM path analysis was used to understand how the constructs related to one another.

The first three hypotheses were rejected in the study, and measurement model modifications were conducted, which yielded good fit indices. Results from Hypothesis One indicated that hypothesized factors did not load on the BOE, and instead, the BOE at the intake level was a measurement of mental health severity. Results from Hypothesis Two indicated that hypothesized factors did not load on TTP; however, TTP did resulting factor structure created through model modification contained factors of awareness, motivation, and support. Results from Hypothesis Three also indicated that hypothesized indicators did not load into ER; however the resulting factor structure contained indicators of abstinence and environmental support. Lastly, Hypothesis Four yielded three resulting models, all of which had good fit indices. Therefore, hypothesis four was accepted. It is noteworthy that direct effects were not all significant, and the *p* value in all final models was significant. There was not a significant relationship between the BOE and ER at the intake level; however, there was a significant relationship between the BOE and TTP, as well as TTP and ER at the intake level. The direct

effects between the BOE and ER may have had a role in the significant p values, as well as the large sample size. Within the three resulting models, the BOE had significant relationships with TTP, spiritual support, and motivation. Both spiritual support and motivation also had significant relationships with ER. Therefore, the results from the current study support that there are existing relationships between the BOE and TTP; however, the relationship between the BOE and ER at the intake level was not significant.

I dedicate this dissertation to those that have given me hope and courage -
Granny, Mom, Dad, Kimberly, Lee, Will, Dustin, Vickie T., Lisa, and Little Grace -
and the ones that haven't found the hope or courage to change yet.
You are the reason for my passion and dedication.

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opinions about this data are those of the author and do not reflect official positions of the government
or individual grantees. Please direct correspondence to *Kristina DePue*, kristinadepue@gmail.com

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CHAPTER I: INTRODUCTION

Chemical dependency and its associated problems (e.g., health problems, public impact) are a significant concern in the United States (U.S.; Substance Abuse and Mental Health Services Administration [SAMHSA], 2011a), garnering attention from both the government and treatment professionals. Chemical addiction is an encompassing term that includes social and health problems as a result of compulsive and uncontrollable use of substances (Center for Substance Abuse Treatment [CSAT], 2004). The *Diagnostic and Statistical Manual of Mental Disorders* (DSM-IV-TR; American Psychiatric Association, 2000) describes addiction using the term dependence; however, dependence and addiction are defined differently because dependence solely refers to the health problems associated with substance use, whereas addiction refers to both social and health problems (CSAT, 2004). Although there is a distinction in the definitions of addiction and dependence, both terms are used within this paper to describe the uncontrollable use of substances that results in significant health problems and/or social problems for users. This paper focuses on chemical addiction; therefore, from here forward the terms addiction and/or dependence refer to substance/chemical dependency.

SAMHSA (2011a) reported that in 2010, 22.1 million people who were over 12 years old were classified as having a substance use disorder based on the DSM-IV-TR (APA, 2000). Whereas, the prevalence rate of substance abuse or dependence has remained high since 2002 (about 22 million people over age 12 per year; SAMHSA, 2011a), older adults (ages 50 and older) have shown rapid increases in attendance at treatment facilities from 1992 (6.6%) to 2009 (12.9%; SAMHSA, 2011b). Further, the rates of individuals entering treatment for pain reliever abuse has increased from 2.2% of overall admissions in 2004 to 9.8% of overall admissions in

2008 (SAMHSA, 2010). Therefore, although there is increased funding, education, visibility, and research in the addiction field, the number of substance abusers is *not* decreasing. Considering these statistics, the problem of substance abuse and dependence in the U.S. are significant.

Although the problems associated with substance dependence are significant and the need for treatment can be high for those with substance dependence, the majority of people who need treatment for dependency do *not* receive it. For example, in 2007 - 2008, over 9% of the population (2.5% for illicit drugs; 7.1% for alcohol) over age 12 had the need for substance abuse treatment, yet did *not* receive treatment (U.S. Dept. of Health and Human Services, 2009). Whereas there are a large percentage of individuals in need of help who do not receive treatment, over 750,000 individuals received treatment in 2007 for substance dependence (SAMHSA, 2007). Therefore, although there are many individuals who are not receiving treatment, there is still a great number of people who do enter treatment. Of the treatment facilities offering substance abuse treatment, 99% utilize counselors as part of their program. Individual, group, and family counseling are the most often reported modalities of counseling in substance abuse treatment (SAMHSA, 2007). Considering the strong presence of counseling in addiction treatment, many counselors are working with clients suffering from substance dependence in such settings as: (a) inpatient hospitalization, (b) outpatient hospitalization, (c) detoxification units, (d) partial hospitalization, and (e) private practices.

Treatment facilities and self-help programs are where the majority of individuals seek help for addiction, and both areas have research supporting their effectiveness (e.g., Gomes & Hart, 2009, Miller & Rollnick, 2002; R. H. Moos & Moos, 2007). Research is growing in the field of addiction counseling; yet there is a gap in the literature between those who conduct

research and those who provide care to those struggling with addiction (Scott, 2000). For example, neuroscientists, epidemiologists, or medical doctors frequently conduct addictions research, whereas counselors, who are primarily master level clinicians with limited experience conducting research, provide treatment. Consequently, much of the addiction research has occurred in controlled studies with high internal reliability but low generalizability, and there is a need for research utilizing the common language and experience of clients to help counselors work effectively with their clients. Counselors need evidence-based techniques to help clients make meaning of their experiences, which have been demonstrated as influential to maintaining sobriety (Gilbert, 2006; McAdams, Reynolds, Lewis, Patten, & Bowman, 2001). A gap between research and practice (fieldwork) in the field of substance dependence is the different uses of the term “recovery”. Recovery is a common word used to describe the period of abstinence following addiction to alcohol and other drugs (AODs). Recovery was initially defined in the professional literature through observable, behavioral patterns (i.e., abstinence; Galanter, 2007); however, the term *recovery* is thought to include more aspects than strict abstinence (i.e. psychological health, spirituality, support systems, physical health; e.g., Flynn, Joe, Broome, Simpson, & Brown, 2003; Galanter et al., 2007). Therefore, a single definition of recovery or the concept of being “in recovery” has yet to be agreed upon (Jacobson, 2003; Van Wormer & Davis, 2008; White, 2007), and thus treatment providers may be operating from an uninformed position when working with recovering clients.

Understanding the varied components of recovery includes the actual lived experiences of those recovering from substance dependence. This study includes literature and research from mutual-help (also called self-help/12-step programs) programs, such as Alcoholics Anonymous

(AA). Five million people ages 12 and older (which equates to 2% of the population) had attended a mutual-help group for drug and alcohol use between 2006 - 2007 (U.S. Department of Health and Human Services, 2008). Mutual-help programs remain the most researched and evidence-based treatment approach to addiction from AODs (e.g. Galanter et al., 2007; Gomes & Hart, 2009; Gossip, Stewart, & Marsden, 2008; R. H. Moos & Moos, 2007). Further, 97 – 99% of all substance abuse treatment centers in 2009 utilized substance abuse counseling, and 80 – 81% of all substance abuse treatment facilities use a 12-step approach to recovery (SAMHSA, 2009). Therefore, the majority of counselors working with recovering clients in such settings use a 12-step (mutual-help) theoretical approach in their work. Consequently, components from the mutual-help community should be of interest to counseling researchers.

Counselors working with recovering clients focus on facilitating change. There are two components of change that were considered in this study: the change process (Prochaska, Velicer, Guadagnoli, & DiClemente, 1991; Prochaska, Norcross, & DiClemente, 1994) and the result of change (i.e., early recovery; APA, 2000; Betty Ford Institute [BFI], 2007). Within the change process, change can be described as the process of moving behaviorally and cognitively from a substance user (no recovery) to a non-substance user (i.e. early recovery; Brown, 1985). Within academic and recovery literature, change involves the behavioral aspects of quitting substance use, as well as the perspective/cognitive shift from a user to a non-user (Brown, 1985; DePue, Finch, & Nation, in press). Whereas behavioral components of change are easily observable (e.g., the presence or absence of substance dependence), cognitive change is a more difficult concept to understand and measure. Cognitive change can occur in stages (Prochaska et al., 1994) and/or it can be spontaneous and unexpected (Miller & C'de Baca, 2001). Cognitive

change and behavioral change may occur separately or at the same time; however, more information about the change process is needed to aid clients through their journey. As a result, the goal of this study was to understand aspects of the change process as it facilitates individuals in early recovery (ER) in order to help clients in their recovery process.

Change is denoted in the addiction literature as the physic change (*Alcoholics Anonymous*, 2001), quantum change (Miller & C’de Baca, 2001), motivation and readiness to enter new behaviors (Prochaska et al., 1994), and behavioral and cognitive change (“the turning point”; TTP; Brown, 1985, p. 33). TTP is one of the components of the overall change process and has been used to describe the moment or experience of changing from addictive to non-addictive behaviors. Whereas Brown (1985) considered TTP to include both cognitive and behavioral components of change, this study denoted TTP to include only the cognitive aspects of change. The reason for this delineation is that behavioral and cognitive changes often occur disjointed for those suffering with addiction (DePue et al., in press), and the cognitive change process aligns with current theory in change literature (e.g., Prochaska et al., 1994). Cognitive change is difficult to measure because a baseline of cognitions is rarely available (Deary, Whalley, & Crawford, 2004). Existing literature on cognitive change is presented in order to delineate the aspects of TTP that study aims to investigate.

A common element within recovery literature and research leading to change is the idea of *hitting bottom*. Research findings identify that hitting bottom is influential in the course of one’s entry into recovery (e.g. DePue et al., in press; Matzger, Kaskutas, & Weisner, 2005; Vaughn & Long, 1999; Venner & Miller, 2001; Young, 2011). The experience of *rock bottom* (i.e., the bottoming out experience) is a fundamental aspect of sustained recovery (*Alcoholics*

Anonymous, 2001; Cain, 1991; DePue et al, in press; Young, 2011), yet there is limited research to support this claim. Although research findings identify the presence of hitting bottom is correlated with change (e.g., Matzger et al., 2005; Young, 2011), the various components that constitute rock bottom have only been investigated as a complete unit qualitatively (DePue et al., in press; Young, 2011) or utilized invalid methods (Jellinek, 1954). Quantitatively, the individual components within the BOE have large amounts of empirical support linking them (i.e., heavy use) to addiction, and this study empirically combined the theoretical components of the BOE in order to understand if the variables were measuring a similar construct (the BOE) and the BOE's exact relationship to change.

As a result in the gap in the literature, researchers do not know whether such “bottoms” occur one time or multiple times within an individual's life. Hitting bottom, the “bottoming out experience”, (BOE) had been found to represent the negative experiences that lead to sobriety (DePue et al., in press). The term, BOE, encapsulates the possibility of multiple bottoming out experiences, and was therefore be utilized in this study to represent the experience of rock bottom. Although the BOE was investigated qualitatively, the contents and experiences that encapsulate the BOE have *not* been empirically substantiated as a single construct. A purpose of this study was to quantify the experiences within the BOE and understand the relationship to change.

This study investigated the nature of early recovery (ER), the BOE, and TTP in order to support the experiences within each construct and examine the relationships between these experiences as they relate to the overall change process. The following chapter provides an introduction to the study by discussing the (a) statement of the problem, (b) significance of the

study, (c) theoretical framework of the study, (d) research hypotheses, (e) research questions, (f) research design, (g) methodology, and (h) limitations.

Statement of the Problem

This study is based on three problems that exist within substance dependence treatment: (a) current treatment is based on an unsubstantiated model of addiction that includes hitting bottom, change, and early recovery; (b) the terms BOE, TTP, and ER are not clearly defined and have not been demonstrated through research; and (c) the relationships between the BOE, TTP, and ER need to be understood in order to better describe the change process and thus inform effective practices and data-driven counseling. The following section outlines the issues driving this study and explain the rationale for this investigation.

Historically, addiction has been thought of in linear terms, indicating that addiction follows a deteriorating path, and with treatment/help, individuals walk upward on the path of recovery once they stop using substances (e.g., Brown, 1985; Glatt, 1975; Jellinek, 1946). However, addiction is not linear, but rather is a chronic condition (Dennis & Scott, 2007; Volkow, Fowler, & Wang, 2004). Chronicity is defined as the tendency of individuals to continue to use substances throughout their lifetime (Dennis & Scott, 2000). Chronicity indicates that addiction may encompass several turns (i.e. ups and downs) and may continue these patterns throughout a lifetime (McLellan, Lewis, O'Brien, & Kleber, 2000). For example, addiction can be compared to other chronic medical conditions, such as asthma. Both conditions are diagnosed after problems arise from the condition and need ongoing, life-long treatment. If asthma goes untreated with medication and lifestyle changes, then individuals may have a reaction and face the possibility of death. This example may appear linear in nature; however, individuals often

have asthma attacks even with treatment, and some individuals may forego treatment at times and have slips in recovery. Substance dependence is similar in that it requires lifestyle changes, medication at times, and life-long choices aimed at sustaining remission (McLellan et al., 2000). Recovery from addiction may be linear for some individuals, similar to asthma treatment; however the road to recovery frequently includes twists and turns and is not always a straight path. Considering the chronic nature of addiction, change may necessarily involve several treatments or attempts at sobriety, which might include multiple periods of abstinence. For the BOE, chronicity could mean that instead of individuals using substances, hitting one bottom, experiencing one TTP (change), and then entering recovery, they may instead have a number of BOEs and turning points on their change journey into lasting recovery. This study utilized the historically linear conceptualizations of the BOE and the TTP in order to test the linear ideas facilitating the theories behind these concepts and understand the BOE and TTP in terms of chronic addiction.

Since the BOE and TTP are identified and defined differently across the literature, researchers have a difficult time understanding what components within the BOE might influence TTP. Further, understanding the developmental process of change (i.e., events leading to change, aspects of the change itself, and the aftermath of change), gives counselors the opportunity to utilize aspects within the process to benefit client growth and awareness, as well as enhance treatment that improves ER. Neither the BOE, TTP, nor ER have been substantiated through research with large enough data to draw inferences (details provided in Chapter 2). In fact, the most common treatment model for addiction used today is based on the Glatt (1975) curve (Venner & Miller, 2001), which is an outdated, linear model that was never verified with

valid research (Jellinek, 1946; Glatt, 1975). Without research to help give understanding and meaning behind the BOE, TTP, and the connection to early recovery, counselors might operate from personal assumptions, which can result in a lack of genuine empathy and understanding (Rogers, 1957) for the actual experiences of the client. Placing a personal worldview on the client is considered unethical practice in counseling (American Counseling Association [ACA], 2005); yet without research to inform counselors about the influences of change, they have few options in how to make meaning of how the BOE is related to TTP or recovery. Further, counselor educators have a responsibility to engage in research and teach best practices to future counselors (Association for Counselor Education and Supervision [ACES], 1993).

Without empirical research to inform counselor educators of the direct influences of ER, future counselors are *not* receiving timely and evidence-based education about the condition and treatment of addiction, which in turn means that future counselors may miss opportunities to facilitate the recovery process of clients. Counselors need to understand client experiences in relation to successful early recovery in order to facilitate sustained recovery from AODs. This study is an attempt at adding to the current literature on facilitating the recovery process. The problems driving this study were founded on whether current treatment is based off an unsubstantiated model of addiction that includes hitting bottom, change, and early recovery. Given that individuals components of the BOE, TTP, and ER have clear research and theory, yet the terms BOE, TTP, and ER have *not* been demonstrated through research, nor have the relationships between the BOE, TTP, and ER been understood empirically, this study endeavored to address these deficits.

Significance of the Study

Research is conducted for several reasons, and contributions to the field are of the utmost importance. This study has both practical and theoretical significance for the addictions counseling profession. Practical significance refers to contributing to the act of working with clients. Practically, this study's results provide knowledge that can assist counselors in their work with recovering clients. Theory refers to the ideas and concepts in which professionals understand addiction. Theoretically, this study adds to the professional literature and theory on the nature of addictions and the nature of the change process. In this section, both the practical and theoretical significance of this study are discussed.

Practical Significance

A primary implication for this study is in the area of counseling. Since counselors come into contact with most clients with addiction in treatment settings (as compared to other settings), understanding the influence of what guides people into sustained recovery is essential for best practices. For example, the Glatt curve (1975) may be better utilized (or even replaced) in treatment settings for psychoeducational purposes. As it stands, the curve delineates a linear model of addiction, which means that individuals go through a series of negative experiences and then move into recovery. However, relapse is *not* supported by this model, which can lead clients to feel hopeless when they experience slips. A clearer understanding of the experiences surrounding the change process will lead counselors to help their clients co-create goals that are research-driven. Similarly, research can be done on specific techniques that effectively facilitate client motivation with regards to change. Whereas Motivational Interviewing has been found to be effective (Miller & Rollnick, 2001); the elements of what makes it or other treatment options

effective in relation to either the BOE or TTP remains under researched. Counselors are agents of change, so empirically understanding how change from substance dependence takes place adds to current theory and enhance counseling practice.

A second implication for this study is in the area of teaching future counselors. Counselor educators are advised to teach evidence-based practices (ACA, 2005; CACREP, 2009). Given that addiction courses are common in CACREP (2009) programs, this study can potentially help all counselor educators understand how change occurs and offer practical interventions they can teach to their students that focus on specific aspects of clients' experiences that influence recovery. In turn, this may help clients change negative patterns of substance use and move into recovery.

Theoretical Significance

Theory is developing and changing in the social sciences (Berliner, 2002), and although there is growing research in the field of addiction counseling, more research is needed by counselors to address the practical experiences of clients. Addiction theory is now focusing on the chronicity of addiction, and the BOE and TTP are understood in terms of linear models (e.g., Brown, 1985; Jellinek, 1954; Glatt, 1975). This study utilized the conceptualizations of the BOE and TTP in an effort to challenge the linear understanding of these concepts and place their components in the chronic framework. This study adds to the literature on the nature of addiction as it tested the theory between the relationships of the BOE, TTP, and ER.

Given that research denotes that substance dependence may indeed be chronic in nature, understanding how change occurs as a chronic condition is important. As noted, there are two components of change in substance dependence: the change process (i.e., TTP) and the result of

change (i.e., ER). Brown (1985) discussed the change process, calling it “the turning point” (TTP; Brown, 1985, p. 33) as being the moment of cognitive and behavioral change for a drinker. Although the change moment may look different for individuals, there are commonalities within the experience, such as motivation to change and social support (Miller et al., 2008), which can be studied. Although TTP would be considered as a precursor to ER, the bottoming out experience (BOE) is also considered a fundamental component leading to recovery.

The BOE is thought to be a necessary and sufficient precursor to long-term recovery (e.g., *Alcoholics Anonymous*, 2001). Recovery literature expresses the BOE as follows: “Why all this insistence that every A.A. (i.e., Alcoholics Anonymous member) must hit bottom first? The answer is that few people will sincerely try to practice the A.A. program unless they have hit bottom” (*Twelve steps and twelve traditions*, 1952, p. 24). In fact, the BOE, a spiritual experience, and/or a traumatic experience have been found to influence sustained recovery from heavy alcohol use (Matzger et al., 2005). There is limited research on the BOE: however, the BOE is a main theme within 12-step recovery literature (e.g. *Alcoholics Anonymous*, 2001), and given that the majority of treatment centers also utilize a 12-step approach (SAMHSA, 2007, 2009), the concept of the BOE is common in treatment settings as well. Research is typically *not* performed on the construct BOE because it is difficult to define and individuals have unique experiences leading to recovery. Consequently, there is no psychometrically sound instrument to measure the BOE, mainly because the BOE is difficult to quantify. Research professionals have focused on aspects of recovery that are easier to quantify (Galanter, 2007), which would include the various components of the BOE (i.e. health problems, substance dependence). The BOE is a

common theme within recovery literature and is a valid part of people's experiences that influence recovery (e.g. DePue et al., in press; Matzger et al., 2005); thus warranting substantiation of the construct and the influence it may have on early recovery.

The relationship between the BOE and TTP with early recovery (ER) is unclear, yet a common assumption held by treatment professionals and individuals in treatment is that both the BOE and TTP are necessary in order to produce sustained recovery (e.g. *Alcoholics Anonymous*, 2001; Cain, 1991; DePue et al., in press; Matzger et al., 2005; Vaughn & Long, 1999; Young, 2011). As recovery is also difficult to define, research is needed including the BOE and TTP to provide a working definition of the variables that measure these constructs. Components of the BOE, TTP, and ER are found within the literature; however no studies were found that combined the components into single factor structures (BOE, TTP, ER), nor analyzed the relationships between the factors. Consequently, this study builds upon current models of addiction and addiction treatment by providing information about fundamental negative components influencing recovery (the BOE) and the more positive components that may be part of the change process (TTP). This study also adds to the current literature by facilitating the development of theory based on data, as well as theoretical understanding about the relationship between the BOE, TTP, and ER.

Theoretical Framework

Although the BOE and TTP are *not* researched constructs, they are based on a rich theoretical perspective and include components that have been researched in terms of substance dependence. The theoretical framework of ER, the BOE, and TTP should be discussed in order to provide understanding of the history and various definitions of the constructs. A thorough

literature review is necessary in order to conduct research (Boote & Beile, 2005); therefore, this section outlines the literature that is discussed in Chapter 2.

Change Theory

Change is denoted in the literature in terms of cognitive and behavioral change. Change can be thought of in terms of behavioral, cognitive, or spiritual change. Behavioral change is understood as observable, measureable change (i.e., decreased drinking). Behavioral change is easier to measure and may be evidenced by aspects within ER. As a result, in this study, behavioral change is measured within ER components and is noted as separate from cognitive change. In turn, cognitive change is called the turning point (TTP), thus focusing on cognitive aspects of change. Change is called the physic or spiritual change in recovery literature, and is considered to be a common attribute of successful recovery (e.g. *Alcoholics Anonymous*, 2001; Brown, 1985; *Came to Believe*, 1973; DePue, et al., in press; Prochaska et al., 1991). It is stated in recovery literature, such as *Alcoholics Anonymous* (2001) that, “We have had deep and effective spiritual experiences which have revolutionized our whole attitude toward life, toward our fellows, and toward God’s universe” (p. 25). Research also supports the contribution of spirituality to early recovery (e.g.; Galanter et al., 2007; Robinson, Krentzman, Webb, & Brower, 2011; Sterling et al., 2007). The spiritual experience (or awakening) is denoted in A.A. literature as a personality shift from self-centeredness to a spiritual focus, which results in a psychic change. The psychic change might be considered a type of cognitive change. Research (DePue, et al., in press) and theory (Brown, 1985; Prochaska et al., 1991; 1994) note that a cognitive change occurs as individuals transition into sobriety, which includes spiritual aspects, support, and motivation. Zinsmeyer (2010) noted that the spiritual experience, which leads to the

psychic change in 12-step literature, was a perspective shift for participants. Perspective taking is a cognitive task (Kegan, 1994); therefore, a perspective shift in participants would be evidence of a cognitive change. Zinsmeyer's (2010) results support that the psychic change can be considered as a cognitive shift. This study considered TTP to describe the process of change. Specifically, this study reframed the change experience as the turning point (TTP) in an effort to separate the cognitive change process from the results of change, allowing for more inclusivity to all aspects of cognitive change both within 12-step literature and in academic literature. It is also noteworthy that this study utilized existing data, and there were not sufficient indicators to include spirituality as a unique construct or variable.

Early Recovery

Recovery is associated with the period after substance dependence where individuals have quit using substances and are involved in a maintenance program (by choice) that includes self-growth activities (e.g. Best et al., 2010; Hansen, Ganley, & Carlucci, 2008; Laudet, 2007; Van Wormer & Davis, 2008). Recovery is divided into early recovery and long-term recovery (Hansen et al., 2008; Laudet et al., 2002). ER can be considered an early period of recovery whereby individuals are working to create stable recovery. The DSM-IV-TR (APA, 2000) notes that early remission from addiction consists of the first year of either full or partial abstinence. Other research on the stages of the recovery process denote four distinct periods of recovery: (a) less than six months of recovery, (b) six months to 18 months, (c) 18 months to 36 months, and (d) over three years (Laudet & White, 2010). Since recovery refers to the active maintenance of sustained change from addictive behaviors (e.g. BFI, 2007), ER can be considered the result of

the change process (i.e. TTP). In this study, ER was examined at in the intake level, in an effort to add to understanding to the time component of recovery.

The focus of much addiction treatment has been to move to a recovery-focused model (Laudet & White, 2010), which would mean avoiding acute, one time treatment, and including a holistic approach that involves both abstinence and physical/emotional/mental health outside of treatment. Although attempts have been made at defining the term recovery (e.g. BFI, 2007; del Vecchio, 2010), there is not a single definition used to delineate the meaning of recovery (Jacobson, 2003; Van Wormer & Davis, 2008; White, 2007). In fact, one study found that participants had a variety of meanings of the definition of recovery and had difficulty agreeing on a working definition of recovery (Jacobson, 2003). Limiting recovery to full abstinence is troublesome for many professionals, because of potential negative effects on clients (White, 2007). Further, researchers avoid the term “recovery”, and instead, investigate the individual components that may constitute recovery (i.e., abstinence, self-help attendance; White, 2007). If recovery means full abstinence, then recovery follows a linear, all-or-nothing trend in addiction theory (Dennis & Scott, 2000). In contrast, a chronic model would indicate that individuals in recovery might make multiple attempts at abstinence, both failing and succeeding at times. Although a single definition in the mental health profession has *not* been accepted, recovery is a clinical concept (APA, 2000) and is the goal for addiction treatment.

Although a single definition of recovery has *not* been agreed upon, a number of factors have been linked to influencing the recovery from substance dependence to include: social support (Best et al., 2010; Dennis, Foss, & Scott, 2007; Groh, Jason, Davis, Olson, & Ferrari, 2007), self efficacy (R.H. Moos & Moos), higher vocational and lower legal involvement

(Dennis et al., 2007), improved relationships (Hibbert & Best, 2011), healthy coping (Dennis et al., 2007), and lower levels of impulsivity (Charney, Zikos, & Gill, 2010). Both negative (e.g., Best et al., 2010; Matgzer et al., 2005; Young, 2011) and positive (e.g., Best et al., 2010; Hansen et al., 2008) experiences have been identified in research as influencing the pathway into recovery; however the exact relationship of these experiences is unclear. The following sections outline the negative experience of hitting bottom as well as the positive experience of change to explain the theoretical foundation of the current study on early recovery.

The Bottoming Out Experience

The BOE is thought to be the time in the addicted individual's life when pain and misery (i.e. emotional pain, physical health issues, guilt, sadness, remorse, continuous failures to control substance use) are at their highest (e.g., *Alcoholics Anonymous*, 2001; Brown, 1985). Further, the BOE is considered to be a necessary requirement for sustained recovery in most recovery literature and programs (e.g. *Alcoholics Anonymous*, 2001; *Came to Believe*, 1973; Cain, 1991; DePue et al., in press; *Narcotics Anonymous*, 1988; Young, 2011). Jellinek (1946) first described the phenomenon of rock bottom in his *Chronic* level of addiction, which included internal (i.e. depression, guilt, exhaustion) and external (i.e. jail, loss of loved ones, failure to fulfill daily obligations) consequences of drinking. Jellinek's description also included the necessity of admitting total defeat. Glatt (1975) added to Jellinek's description of the rock bottom, stating that individuals at the bottom have used all resources and people to the point they are unwilling to help, have vague spiritual desires (i.e. are not interested in spirituality), lengthy intoxications (i.e. drinking or drug benders that last for days/weeks), and surrender (i.e. they have stopped resisting and accepted they cannot control substance use). The problem is that Glatt's curve is used in

treatment settings today to describe the addictive pathway (Venner & Miller, 2000), yet there is inconclusive and incomplete evidence to support the model.

As noted, both addiction and recovery literature from 12-step programs discuss the idea of rock bottom. Recovery literature notes that recovery does *not* occur until an admission of “defeat” (*Alcoholics Anonymous*, 2001, p. 11, 152; *Alcoholics Anonymous comes of age: A brief history of A.A.*, 1957, p.46; *Twelve steps and twelve traditions*, 1952, p. 21) occurs. *Narcotics Anonymous* (1988) states, “We had to reach our bottom before we were willing to stop” (p. 7). Descriptions of the bottom have common themes of both internal and external feelings and experiences that influence motivation and willingness to change negative behaviors and enter early recovery.

The BOE is a fundamental construct found in both theoretical literature on addiction (e.g., Brown, 1985; Cunningham et al., 2005; Glatt, 1975; Jellinek, 1946; Tiebout, 1949; Matzger et al., 2005; White, 1998; Wood & Kerr, 2006); and in 12-step recovery literature (e.g., *Alcoholics Anonymous*, 2001; *Narcotics Anonymous*, 1988). Research findings support a relationship between experiences of participants who had a BOE and recovery (e.g. Bammer & Weekes, 1994; Cunningham et al., 1995; 2004; Matzger et al., 2005; Young, 2011). As literature on the chronic nature of addiction arises, framing the BOE as a single experience seems illogical; therefore, this study defined the BOE as the negative experiences leading to recovery to be inclusive of all negative aspects of a participant’s experiences. Since this study aimed to highlight aspects of participant experiences that influence ER, the BOE is a necessary component. Various definitions exist on what constitutes a BOE; therefore, this study explored

possible components identified in the literature to best determine what aspects of the theoretical BOE actually influence ER.

Although self-help groups have research supporting their effectiveness in addictions treatment (R.H. Moos & Moos, 2007), the manner in which the BOE influences TTP and ER is unclear. Cain (1991) discussed that 12-step programs have a recovery narrative that members of the programs adopt in order to provide a structure and meaning to their new lives without substances. Rock bottom is an aspect of the recovery narrative and change is also delineated in the 12-steps; therefore, a participant's involvement in 12-step groups may indicate whether the constructs influence recovery. Without research on experiences influencing change with participants who are and are not in 12-step programs, there is no way to understand whether the actual variables within the experiences directly influence recovery or are just part of a narrative. If there are components within each construct that positively affect early recovery, treatment professionals need to understand the relationships for best treatment practices. Without research in the area of how people change, counselors may operate from personal assumptions, utilizing their worldviews about what these experiences mean (Juhnkie & Culbreth, 1994). Since the BOE is a common aspect within the recovery narrative, counselors may also adopt the narrative and any assumptions about a BOE or TTP that exists. However, research can help quantify the phenomenon of change; therefore, giving a clearer picture about the actual events that comprise a BOE and TTP and how they influence recovery.

Exploratory Research Questions and Hypotheses

Research serves the purpose of identifying problems in the literature and answering specific questions about those problems. Similar to a treatment plan in counseling, research

questions guide the study design and data analysis (Heppner et al., 2008). The research questions are more general, as they describe the overall problems and questions found within the literature, whereas the hypotheses are more specific and state the expected nature of relationships between the constructs being studied (Heppner et al., 2008). The following section delineates the exploratory research questions driving the study, as well as the hypotheses derived from theory and previous research.

Exploratory Question and Hypothesis One.

Q: What is the factor loading for *the BOE* construct at intake?

H: Collinearity between the identified variables ([1] substance dependence, [2] heavy using, [3] withdrawal symptoms, [4] functionality, [5] mental distress, [6] stress, [7] consequences, [8] illegal activity, [9] suicidality/homicidality, [10] environmental risk, [11] health problems, and [12] trauma) will load into a single factor structure entitled the BOE at the intake period.

Exploratory Question and Hypothesis Two

Q: What is the factor loading for TTP construct at intake?

H: Collinearity among identified variables ([1] motivation, [2] awareness, and [3] support) will load into a single factor structure entitled TTP at the intake period.

Exploratory Question and Hypothesis Three

Q: What is the factor loading for the ER construct at intake?

H: Collinearity between the identified variables ([1] no/reduced substance dependence, [2] no/reduced substance use, [3] self-help activity, [4] low/improved health problems, [5] low/improved psychological health, [6] healthy coping styles, [7] healthy relational functioning,

and [8] living in the community) will load into a single factor structure entitled ER at the intake time period.

Exploratory Question and Hypothesis Four

Q: Does the bottoming out experience (BOE) and the turning point (TTP) contribute to the levels of early recovery (ER) at intake?

H: Levels of the BOE and levels of TTP at intake will contribute to levels of ER at the intake time period.

Research Design

Literature reviews identified gaps that exist within addiction research and practice in the practical experiences of individuals in recovery, specifically the BOE, TTP, and ER. The literature and data available from the existing database used in this study influenced decisions on research design and statistical analysis procedures. In order to understand the relationships between the BOE, TTP, and ER in their natural state, a descriptive, correlational research design was chosen. The purpose of correlational studies is to investigate the relationship between two or more variables without researcher manipulation (Heppner, Wampold, & Kivlighan, 2008).

Correlational research designs are common in the counseling and counselor education research field (Heppner, et al., 2008). Because correlational research is exploratory in nature, structural equation modeling (SEM) was used to understand the components of the BOE, TTP, and ER at intake, as well as, test the hypothesis of the relationships between the BOE, TTP and ER.

Although SEM is a confirmatory technique, it is frequently used in an exploratory manner because it combines elements of confirmatory factor analysis and multiple regression and allows for various possibilities of the relationships between constructs and variables (Schrieber, Nora,

Stage, Barlow, & King, 2006). The literature on BOE, TTP, and ER provides enough evidence to test a theoretical model, which is the purpose of SEM. Further, it is noteworthy that the GAIN was developed through a series of EFA and CFA analyses; therefore, EFA was not considered to use with this instrument.

Chapter Summary

This chapter included an introduction to the current study by discussing the problem, significance of the study, theoretical framework of the study, and methodology. Early recovery is the beginning of what is hopefully sustained remission for individuals suffering with addiction. As research grows in the area of addiction, chronicity is an area of focus for both researchers and treatment professionals. Considering that sustained remission occurs for many, influences of ER are of interest as ER is the precursor to long-term recovery. The BOE is considered to be the most negative aspect within a person's addictive pathway; however, research is sparse not only on what constitutes a BOE, but also on how the BOE is related to recovery. Further, TTP is thought to be the moment or process of cognitive change where an individual changes from substance user to non-substance user. In addition, research on what constitutes a TTP and its influence on recovery is sparse. Although TTP has been linked to recovery, the exact nature of TTP and the BOE on ER is unknown. This study employed a correlational research design in an effort to examine participants in their natural state.

CHAPTER II: REVIEW OF THE LITERATURE

Influences of early recovery (ER) are of importance because as counselors seek to help individuals struggling to reach and maintain sobriety, direct impacts on change help guide decision-making and aid in treatment planning. The bottoming out experience (BOE) has commonly been thought of as the lowest point individuals reach before entering recovery. Coupled with a cognitive shift (the turning point; TTP), the BOE appears to be a fundamental component within individual experiences leading to sobriety. Because of the lack of empirical studies on experiences influencing the change into recovery, this study utilized a correlational design in an effort to understand the relationships between the BOE, TTP and ER for the purpose of adding to both practical and theoretical knowledge. A thorough review of the literature has been done on the change process and the aforementioned constructs in an effort to gain an understanding of the history and current stance of theory and research. In order to provide the basis for the theoretical model being tested in this study. This chapter thus includes a review of the: (a) theoretical understanding of addiction, (b) chronicity of addiction, (c) change process, (d) theory and research related to TTP, (e) theory and research related to the BOE, and (f) theory and research related to ER.

Theoretical Understanding of Addiction

Without a comprehensive understanding of the history and current nature of addiction theory, the framework of this study would be unclear and unsound. A thorough review of existing literature is a prerequisite for research (Boote & Beile, 2005). Literature reviews are more difficult in the social sciences than in other fields because social climate continuously changes (Berliner, 2002); therefore what may have been found significant at one point can lose

credibility over time as society changes. Latkin (2010) argued that theories rarely are disproven in the literature, instead researchers move to new, current theories and trends. Considering this, the history of addiction theory and research does not necessarily contain theories that are wrong, per se, but instead researchers have switched trends for reasons such as societal changes, grant funding changes, or professional interest in newer theories. For example, the addictive pathway was initially described as linear (Dennis & Scott, 2000), which included the progression of addictive behaviors that climaxed at a rock bottom (e.g. Brown, 1985; Jellinek, 1946).

Individuals either suffered consequences such as death or imprisonment or they improved (White, Boyle, & Loveland, 2002). Over time, research has increased on the addictive pathway and is now thought to be more cyclical (Prochaska et al., 1994). In fact, although the disease model of addiction, which considers addiction to be chronic in nature, began around at end of Prohibition in 1933 (Van Wormer & Davis, 2008), research has re-focused on evidence to support this notion (Dennis & Scott, 2007; Volkow, Fowler, & Wang, 2004). In order to understand the framework for the study and how the BOE plays a role in an addicted person's life, current trends in the addictive pathway, as pertaining to the study, are discussed.

The Nature of the Addictive Pathway

The nature of the addictive pathway has typically been viewed as either linear or chronic (Dennis & Scott, 2000; White et al., 2002). This section discusses the differences between these approaches and discuss the approach utilized in the current study. The linear condition of addiction is the primary category that addiction models and approaches have fallen under (Dennis & Scott, 2000; White et al., 2002). Linear addiction models view addiction as a process that occurs in an organized and predictable manner. For example, linear models would argue that

individuals begin using substances, usage gets worse to a point of devastation (the BOE), and then the individual seeks treatment and thereby recovers. Although there is some truth to certain aspects of the model, research does not support the linear trend (Dennis & Scott, 2000). For example, Scott, Dennis, and Foss (2005) analyzed treatment frequency and found that 82% of participants ($N = 448$) transitioned at least once between the treatment, relapse, and recovery cycle, meaning that participants were not stable in either treatment, relapse, or recovery, and instead moved between the stages of treatment, relapse, and recovery. This provided evidence that the recovery process was not linear, but cyclical in nature.

The chronic nature of addiction posits that individuals with addiction have a biological and physiological propensity to continue to use addictive behaviors throughout the lifetime (Dennis & Scott, 2000). Brain research (Volkow et al., 2004) supports the idea of chronicity by demonstrating that repeated AOD use alters the reward system in the brain, which causes the individual to crave substances throughout the lifetime unless intervention occurs to re-wire the response system. Although it seems as if the Disease Model would naturally fall under the chronic nature of addiction, the most widely used Disease Models are in fact linear conceptions of addiction (e.g. Mendola, 2004; Szasz, 1971, 1972).

In a study reviewing the literature on addiction and chronic illness (McLellan, Lewis, O'Brien, & Kleber, 2000), the authors compared addiction with selected chronic illnesses (type II diabetes, asthma, and hypertension); similarities between addiction and chronic illnesses were found that supported the chronic nature of addiction. For example, the authors found that, like chronic illness, addiction had a diagnosis, genetic heritability, a level of personal responsibility (e.g., taking medicine for illness/attending A.A. meetings for addiction), and pathophysiology.

Treatment was also analyzed in the study in an effort to see what types of treatment responses were similar for addiction and other chronic illnesses. The first similarity found was that motivation to change occurs in both addicted persons with brief counseling and those with chronic illnesses through physician advice-giving. Medications have also been found as beneficial to both addiction and chronic illness. Whereas there is no single cure for addiction, if those with addiction will ascribe to the recommended regimen of counseling, 12-step meetings, medication, and continued lifetime care, remission prognoses are high. This is also true of the aforementioned chronic illnesses: whereas there is no cure, lifelong maintenance and adherence to the doctor-specified treatment program increases a positive prognosis.

As a result of the aforementioned trends in addiction research, which are validating the chronic condition of addiction, this study considers addiction to be chronic in nature. The exact nature of the roles of the BOE and TTP within the addictive pathway is uncertain as they are presented in current literature. The BOE is frequently thought of as a one-time event that individuals experience in their AOD careers before change occurs (e.g., *Alcoholics Anonymous*, 2001; Brown, 1985; Jellinek, 1946; Matzger et al., 2005). TTP is considered the point of psychic/mental/cognitive change that is also presented as a one-time occurrence in 12-step and counseling literature. As a result, the study aimed to describe contributions on early sobriety in an effort to understand how the chronicity of addiction may interact with actual experiences of individuals with SUDs. Rather than the BOE being a single point that a person has in their AOD career, the BOE may instead be a series of negative events that occur before entering early recovery. Further, TTP may also occur multiple times based on the other influences from the BOE. As the influences of the BOE and TTP are relatively unknown in relation to ER, the

change process is the core element in question. As such, the following section discusses the change process in addiction theory and is followed by theory and research on TTP, the BOE, and ER.

The Change Process

Change is defined as making something different or replacing one thing with another (*change*, Merriam-Webster.com, 2012). Considering this in relation to SUDs, change would mean altering the addictive behaviors and/or replacing the behaviors with something else. Change from SUDs has been considered a developmental process (Brown, 1985) and may occur in two ways (Schwarzer, 2008): (a) unconscious, stage-based change (Prochaska et al., 1994), and/or (b) conscious, spontaneous change (Miller & C’de Baca, 2001). The following section describes both types of change in relation to the current study.

Stages of Change

Stage-based theories of change rely on the developmental notion of change over time (Velicer & Prochaska, 2008). One of the most well-known and widely used models of stage-based change in the treatment of SUDs is the transtheoretical model of change (TTM), also called the stages of change (SOC; Prochaska et al., 1994). SOC posits that the process of change is an unconscious process and can be facilitated by “consciousness-raising” (Prochaska et al., 1994, p.27). SOC is based on a six-stage process of change that includes: precontemplation, contemplation, preparation, action, maintenance, and termination. Precontemplation is defined by the unawareness that a problem is occurring and can be thought of as denial in the sense that high resistance to change occurs in this stage. For SUDs, precontemplation may look like an individual continuing to use substances and remaining unaware of how the AOD use is damaging

relationships. Contemplation occurs when an individual begins to question whether or not they have a problem. In AOD treatment, contemplation may occur when an individual begins to think about stopping substance use. Preparation is when the individual begins to actively prepare to change. This may occur when someone attends a 12-step meeting for the first time or makes an appointment with a counselor. Action is the stage where the level of awareness of the problem is high enough to motivate a change in behavior. Maintenance is when the person is actively working towards maintaining a changed behavior, which would be when 12-step meeting attendance is regular, relationships are enhanced, and health is improved. Lastly, termination is when the individual can cease focus on the problem as change has been achieved. Termination is controversial in addiction treatment as the theoretical movement towards the chronicity of addiction increases. Prochaska et al. (1994) made room for these changes by including recycling as part of the change process, meaning that individuals do not necessarily move hierarchically through the stages and can move between the stages or revert to a previous stage at any given time.

The SOC model provides useful information for the current study, in that change may involve a stage-based process that is dependent on the resistance and motivation levels of participants. The SOC model is a stage based, developmental process of change, which is unconscious to the individual undergoing the change. Considering the influence of the BOE, negative experiences within addiction may increase awareness and decrease resistance for change. Resistance is frequently an unconscious process; therefore, understanding how the BOE relates to motivation to change may support stage-based models of change. Further, the process

of change (TTP) may also be influential in ER. This study aimed to understand how the BOE influences both TTP and how the interaction between these are related to ER.

Transformational Change

Transformational change is significantly different from the step-wise, developmental change procedures identified by Prochaska et al. (1994). Rather than a cyclical or procedural aspect of change, transformational change is sudden, spontaneous, understood by the person undergoing the change, and connected to lasting change (Forcehimes et al., 2008). A distinguishing feature of transformational change is that the person knows that change is happening, whereas stage-based change is typically an unconscious, developmental process. A type of transformational change that has received attention in the AOD treatment community is quantum change (Miller & C'de Baca, 2001), which is a spontaneous, life-altering moment of change. Miller and C'de Baca (2001) described quantum change as an unforgettable moment that individuals were aware of as it happened and recognized the moment as forever changing their lives. The major components of quantum change are that it is spontaneous, or a surprising moment, the change is considered positive, and that the change results in lasting/permanent changes.

Quantum change is noted as having two distinct types: insight and mystical (Miller & C'de Baca, 2001). Insight changes are cognitive changes that include changes in perception. In fact, Miller and C'de Baca (2001) considered insight changes to be turning points in people's lives. The reason for this inclusion as a "turning point" (p.19) was that insight changes were instantaneous changes whereby there was "no turning back" (p. 19). An insight change would cause the individual to see themselves and their circumstances differently. Mystical changes are

more dramatic and spontaneous than insight changes and could be considered as a result of something outside the self to be acting on the self. The types of quantum change are not independent of each other necessarily and can occur together. Considering the relationship of quantum changes to the current study, TTP, which is discussed in the following section, may contain elements of both stage-based and transformational change processes.

The Turning Point (TTP)

Theory of TTP

The turning point, or cognitive shift, has previously been thought of in recovery literature (e.g., *Alcoholics Anonymous*, 2001) as the psychic or spiritual change and is linked with successful recovery. As previously mentioned, change can occur in stages (Prochaska et al., 1994) or spontaneously (Miller & C'de Baca, 2001). The change process is fundamental in understanding how people move from substance users to non-substance users. TTP is considered to be an aspect of the change process as it denotes the cognitive components of change. The following section outlines the theory behind TTP and research on TTP to help explain how TTP was measured in the study.

In order to understand TTP, it is first necessary to discuss the role of spiritual changes in the current study. The spiritual change/spiritual awakenings, which are common constructs in both 12-step and academic literature in relation to recovery, are aspects of TTP. Twelve-step literature explains that the spiritual awakening is the change of attitude from self-centeredness to a spiritual consciousness (*Alcoholics Anonymous*, 2001). Academic literature also denotes the connection between the spiritual change and cognitive change. For example, a grounded theory study (Zinsmeyer, 2010) supported that the spiritual awakening was a shift in perspective,

attitudes, and belief systems for participants. In addition, Dossin (1996) found five themes that emerged in the spiritual awakening: choice, decision, predictability, and outcome. Both the Zinsmeyer (2010) and Dossin (1996) studies highlight the relationship between spiritual/psychic change and cognitive change. As a result of this connection between the spiritual/psychic change and cognitive change, this study reframed the psychic shift as the cognitive shift because research supports that the cognitive shift is a change in perception, which includes spiritual components of change (Miller & C'de Baca, 2001). This study did *not* omit spirituality from data analysis; rather, spirituality was included as part of the cognitive change process. For the purposes of this study, since cognitive change is difficult to measure, components of the change process were measured instead, which include: (a) motivation to change (i.e. Miller & Rollnick, 2002; Prochaska et al., 1991), (b) awareness of the need to change, and (c) support for change (e.g. Dennis, Foss & Scott, 2007; Groh, Jason, Davis, Olson, & Ferrari, 2007). Therefore, the following section highlights the roles of motivation, awareness, and support in the change process, as these were markers of cognitive change in the current study.

Cognitive change is a change in thinking, also considered to be a change in perception for those changing from SUDs (Flora, 2012). Perspective taking is considered to be a cognitive task (Kegan, 1994); therefore the ability to cognitively shift from one perspective to the next would reflect cognitive change. Over the course of addiction, AOD users adopt a substance user identity, which must be changed in order to have successful recovery (Cain, 1991). Brown (1985) discussed that “the turning point” (p. 33) was the experience of both behavioral and cognitive change from substance user to non-substance user. For Brown (1985), TTP included the culmination of both internal and external events, which when occurring in conjunction had

two outcomes: (a) caused increased negative emotions about AOD use; and (b) resulted in a cognitive shift from believing one could control AOD use to the admission that AOD use cannot be controlled. Flora (2012) noted that TTP occurs through awareness of the issues surrounding AOD use, negative emotions that result from such awareness, and a decision to change. Thus, awareness is a key factor within TTP and was included as an indicator of the presence of TTP.

Awareness has been found to be directly correlated with motivation to change (Norcross, Krebs, & Prochaska, 2011). Change research (Prochaska et al., 1991; Miller & Rollnick, 2002) suggests that motivation is necessary in the process of change, with higher levels of motivation leading to success in sustained change. It could be said that cognitive change from substance user to non-substance user is an engagement in a cognitively complex process, as the decision to change substance use would be difficult to make. Motivation has been found as linked to the engagement in cognitively challenging activities (Hess, Emery, & Neupert, 2012); therefore the more motivation one has the more likely they are to engage in TTP. Considering that TTP is denoted as cognitive change, it is noteworthy that cognitive changes and decision-making are correlated with motivation (Hess et al., 2012); therefore, the more motivation one has, the more likely they will be involved in cognitive demanding activities. A study by Flora (2003) demonstrated that the recovery process included adoption of a recovery narrative in ER, whereby more optimistic narratives included self-awareness and low resistance to treatment. Considering these findings, TTP, which is the experience of the cognitive change, is defined as including both awareness and motivation to change.

As awareness and motivation are linked with the cognitive change process, the role of support is also necessary to include as a fundamental component of cognitive change. Social

support might include family support, spiritual support, environmental support for recovery, and peer support. Relationships can be profoundly impacted by addiction and can have either positive or negative influences in the course of recovery (Ripley, Cunion, & Noble, 2006). For example, Flora (2003) noted that individuals with pessimistic outlooks in ER typically had lower levels of social support. Further, group support systems are considered to be a component in the collective decision making process for groups (Ackerman & Eden, 2011). Considering the role of 12-step programs or treatment groups in cognitive decision-making, the collective process can be said to positively support the difficult decision to change addictive behaviors. Support networks are considered to be a necessary element for sustained change in both recovery literature and academic literature, thus TTP is defined as including support.

Inferences may also be drawn in the connection of cognitive change and support networks from the literature on aging, which demonstrates that social support systems are strong predictors of cognitive functioning over time (Gow, Pattie, Whiteman, Whalley, & Deary, 2007). Perspective taking is a cognitive ability; therefore, inferences can be drawn that the cognitive change occurring in TTP would be facilitated by social support systems. The following section denotes research in TTP, specifically the measurable components of cognitive change to include: motivation, awareness, and support.

Research of TTP

In order to build the rationale for the inclusion of motivation, awareness, and support in TTP, research is presented on the connection between these variables and the change process. The nature of TTP suggests that the culmination of negative experiences from the BOE is not sufficient to explain why people change. In a study by Field et al. (2007), 200 substance

dependent veterans were assessed using linear regression analyses to determine baseline characteristics and motivation to change their addictive behaviors. The study analyzed Committed Action (CA) and Readiness to Change (RTC) in association with a variety of addiction issues. Both CA and RTC were negatively correlated with addiction severity scales, anxiety, anger and depression. Inferences can be drawn from the study to include that a BOE (i.e., negative experiences) alone would *not* motivate individuals to change, indicating that negative drinking experience and life stressors were negatively correlated with motivation to change. Further, in a study by Flynn et al. (2003), only positive life experiences were found to separate those individuals in recovery from those not in recovery. Negative experiences occurred for both groups and were *not* correlated with recovery or not being in recovery. Thus, conclusions can be drawn from these studies that more positive experiences associated with being ready to change (i.e., motivation, awareness, and support) are needed in order to promote change.

Similar results were found in a phenomenological study by DePue et al. (in press), which explored the BOE as it related to recovery. The study included six (three male, three female) participants who were active members within A.A. with less than five years of sobriety. The study demonstrated themes within participant stories that distinct experiences existed in the road to recovery for the participants: TTP and the BOE. The researchers concluded that a BOE alone was not sufficient to explain the influences of recovery for participants and that TTP was a separate experience. TTP was considered as *only* the cognitive shift from drinker to non-drinker, rather than both the cognitive and behavioral shifts for the participants studied (as noted by

Brown, 1985). They also found themes within TTP, which included: awareness, support, 12-step attendance, and a friend/family member in 12-step groups.

In another study by Forcehimes et al. (2008), the researchers were interested in aspects of change, of which they analyzed similarities to Glatt's curve and the BOE. The authors were interested in identifying aspects of transformational change for individuals in A.A. The authors analyzed events leading to and following a moment of change and determined that 81% of participants indicated a transformational change that occurred in the middle of their journey. Events occurring close to the change were: initial A.A. attendance and a desire for help, whereas events leading up to the change included rock bottom (94%), attended at least one A.A. meeting (81%), attempted to stop drinking (69%), achieved abstinence (69%), worked at least one of the 12 steps (69%), exhibited readiness to change (63%), had diminished or low spiritual desires (75%), and admitted defeat (81%). This study supported not only the idea of commonalities leading to change, but that transformational change occurs within the middle of the progression to recovery. The study also demonstrated the commonalities surrounding the moment of change to include support from A.A. and motivation to change.

Research has highlighted the connection between motivation and support as part of the change process. For example, Vaughn and Long (1999) performed a phenomenological study with seven young adult participants in an effort to understand the adolescent recovery process. Participants were poly-drug users and were defined as having a dysfunctional family/home background. They found that internal motivation, such as fear and guilt, motivated adolescents to change their negative drinking behaviors, and external motivation was only motivating when accompanied with care and concern. These results support both the motivational and supportive

aspects found within TTP. As will be noted within the BOE section, a study by Matzger et al. (2005) also found that internal motivation was essential for change. Further, Flynn et al. (2003) examined contributing factors for recovery and found that motivation to change, support from family members, spiritual strength, and treatment were all positive influences of change.

As personal awareness and motivation are linked with change, support has also been found as influencing change in addiction populations. For example, Dennis, Foss, and Scott (2007), reported support to be highest in early recovery and decreased after three years in recovery. The study also noted that long-term (8 year) abstinence was associated with higher levels of social support, a decrease in risk factors, and an increase in the number of friends who were in recovery. Two types of support are discussed in relation to addiction: (a) general, and (b) specific (Beattie & Longbaugh, 1999; Groh et al., 2007). General support refers to overall support and has an inverse relation with alcohol use. Whereas specific support can be negative or positive based on the specific area of support (e.g., working in a bar would be considered negative support for recovery). An individual may have support to continue drinking or an individual may have support to go to 12-step meetings. Both are types of specific support, but one is positive and one negative. In a study by Beattie and Longabaugh (1999), specific support for abstinence and general support were both found to predict early recovery; whereas only specific support for abstinence was predictive of long term abstinence. Therefore, support is a fundamental component of TTP and is necessary to include in measuring the construct.

Lastly, twelve-step programs are mutual support systems and are necessary to include in the research on support and cognitive change. In a study by R. H. Moos & Moos (2007), 461 (47% women, 53% men, 80% White) individuals who had sought help for alcohol use were

studied at the intake, 3 year, 8 year, and 16 year intervals. Participants were screened using instruments to detect alcohol use disorder via alcohol consumption, alcohol problems, and drinking patterns, and the presence of an alcohol use disorder was a qualifier for participation in the study. The researchers used the term “remitted” to denote individuals at follow-up that were: (a) abstinent from alcohol or engaged in light to moderate drinking in the past six consecutive months, (b) had no presence of alcohol problems within the past six months, and (c) did not consume more than 2 ounces of alcohol in the past month (i.e. no intoxication). Findings demonstrated that participation in Alcoholics Anonymous was related to remitted status and remission from alcohol use problems, even more so than the effect of treatment on remission. This study provides evidence of the effectiveness of the 12-step program, A.A., on remission from alcohol use. Since the study lacks in ethnic diversity, a need exists for repetition with a more diverse sample. The aforementioned theory and research denote the presence of motivation, awareness, and support in the cognitive change process. The following section discusses the hypothesized precursors to TTP, which include the negative experiences resulting from AOD use.

The Bottoming Out Experience

The BOE is considered to be the experience of negative events that lead to and influence decisions to change addictive behavior. As a result, before discussing the theory and research behind the BOE, it is necessary to discuss important negative factors that are common within substance dependence. The following section outlines theory behind the BOE, commonalities within the BOE, and research supporting the BOE.

Theory of BOE

The idea of rock bottom originated from the Disease/Medical Model of addiction (Young, 2011). The Medical Model views addiction similar to a disease, which is why the model is interchangeable with the term “Disease Model”. The concept behind the model is that individuals with addiction have an illness and an underlying cause to the addiction. Various reasons have been hypothesized to cause addiction (i.e. biological, social, physiological, and behavioral) and many of these have received empirical support; however a single causal model for addiction has not yet been proven (Morse, 2004). The Disease Model suggests that the individual with addiction did not choose to have addiction and cannot control their cravings and responses once addictive behavior begins. Alcoholics Anonymous was founded on the Medical Model, utilizing language such as “manifestation of an allergy” (*Alcoholics Anonymous*, 2001, p. xxviii), and the terms sick, illness, and recovery used throughout the main texts (i.e. *Alcoholics Anonymous*, 2001; *Twelve steps and twelve traditions*, 1952) of Alcoholics Anonymous (Davis & Jansen, 1998).

Critics of the Medical Model suggest that the concept of illness is a social construction of biological abnormalities; therefore, it would seem that all biological abnormalities would fall under the classification system of illness (Veatch, 1973). However, this is not the case, and many types of biological deviances are not socially unacceptable and some are even rewarded (i.e. biological abnormalities that make people tall are currently rewarded in U.S. culture; Veatch, 1973). Szasz (1972) claimed that all mental illness was a social construction because only the body (and not the mind) can be affected by illness. Further, Szasz (1972) argued that alcohol abuse was habitual, and that if professionals consider it a disease, then any negative habits could

subsequently be called diseases. Thus there are sufficient arguments against the Disease Model, which include disagreements with the classification of mental illnesses. However, the DSM (APA, 2000) long embraced the idea of mental illness; thus, although there are noteworthy arguments against the Disease Model of addiction, the psychiatric and medical community both accept the inclusion of addiction as a mental illness.

Regardless of the arguments against the Disease Model, the model has prevailed, and in fact, gained more credibility as the chronic model of addiction (a disease concept) grows. The idea of hitting bottom grew out of the Disease Model and found attention from members of A.A. (Young, 2011). Within A.A., hitting bottom became not only an indicator, but also an agreed upon requirement for recovery (*Twelve steps and twelve traditions*, 1952). Medical doctors began to look into the addictive pathway and formulate theories on addiction and treatment. The following section denotes the most common and widely used models of addiction to date in an effort to highlight the need for more research on experiences within the addictive cycle.

Jellinek and Glatt's Relation to the BOE

Research and theory by E.M. Jellinek has been at the forefront of the movement of addiction research, and his theory on alcoholism remains at the core of discussions on addiction treatment and conceptualizations (Page, 1988). Research began on classifying alcoholism in the 1930's, and Jellinek was the first researcher to create a systematic way of understanding the pathway of addiction (Beresford, 1991). Jellinek (1946) posited that there were two groups of individuals who engaged in excessive drinking: "alcohol addicts" and "non-addictive alcoholics" (Jellinek, 1954, p. 36). Although both groups of individuals used alcohol heavily, only the alcohol addicts reached a "loss of control" (Jellinek, 1954, p. 36) with alcohol use. Jellinek

ascribed to the disease model of addiction for the addict group, presuming that although underlying mental health issues were at the root of the excessive drinking for both groups, the loss of control that occurred with the alcohol addicts separated them from non-addicts.

Jellinek (1946) described the developmental process of alcohol addiction and formed his developmental stages based on research with members of A.A. that were white, male members of A.A., which resulted in descriptions of the alcoholic phases (Venner & Miller, 2001). In the original publication, there was no information about the quality of the study nor the number of participants (Jellinek, 1946); thus, the study was eventually discredited and Jellinek distanced himself from it. Although the study now is accepted as not valid, the descriptions continue to be widely used throughout treatment modalities (Venner & Miller, 2001) and Jellinek's (1946) study set the stage for current addiction models (Keup, 1990), which include the BOE.

Jellinek's (1946) developmental process of addiction was defined through five distinct phases: pre-alcoholic, prodromal, crucial, chronic, and the way back (see Appendix A for graphical image of Jellinek's stages). Jellinek described in stages. The Pre-alcoholic phase lasted from two months to two years and was defined as social drinking; however prospective alcohol addicts found a relief in drinking and utilized alcohol as a coping mechanism to deal with stress. Jellinek did not know whether these individuals had more stress than their counterparts or if they did not deal with them appropriately. Over the course of the Prealcoholic phase, tolerance may be noticed and more alcohol abuse frequency increases. The Prodromal phase was defined as the occurrence of blackouts, called "alcoholic palimpsests" (Jellinek, 1946, p. 40) as a result of heavy drinking. This phase lasts from six months to four or five years. The distinction between a non-addictive alcoholic and an alcohol addict was that although both may experience blackouts

at some point, the alcoholic addict will experience them more frequently and with less alcohol intake than the non-addict. Further, once blackouts occur, behaviors such as hiding drinking, a preoccupation with drinking or with alcohol, drinking more in less amount of time, guilty feelings about drinking, and avoidance of conversations about alcohol begin to occur. The combination of these behaviors and blackouts are predictive of individuals who are developing addiction to alcohol.

Jellinek's (1946) Crucial phase marks the loss of control that alcohol addicts experience with regards to being able to control the amount of alcohol consumed once beginning drinking. In this phase, a person can still decide whether or not they choose to drink; however, physical tolerance and cravings are common and frequently lead to drinking episodes. Also distinct to the Crucial phase is the rationalization of drinking, social pressure to stop drinking, grandiosity, "persistent remorse" (p.43), loss of friends or family, job loss, diminished interests in things other than drinking, lack of or decreased sex drive, neglectful of health and wellness, and self-pity. Friends and family typically will remove themselves from alcohol addict's life in this phase and the family dynamic shifts. The individual suffers from resentment during this phase because of loved one's reactions to the problem. Alcohol addicts engage in periods of abstinence in an effort to regain control of drinking, as well as, changing the manners in which they drink, i.e. drinking wine instead of beer, drinking on weekends only, or never drinking alone.

Rock bottom occurs during the Crucial phase and is defined by Jellinek (1954) as follows:

...prolonged intoxication or benders, marked ethical deterioration, impairment of thinking, alcoholic psychoses, changing friends to those that drink like the addict, using

things other than regular alcohol, i.e. rubbing alcohol, mouthwash, to get drunk, fears, tremors, psychomotor inhibition, obsessive personality, vague religious desires, and the rationalization that previously worked, now fails (p. 45).

Jellinek (1946) explained that an individual did not have to reach “defeat” (p.45) in order to change, and that prevention of such a bottom was possible. Jellinek’s model is a linear model of the addictive pathway, suggesting a progression of the disease of addiction that ultimately leads to hitting bottom. The Crucial phase can be avoided and prevented because many signs of addiction occur before it gets to that level; however, Jellinek did not discuss relapse or other phases of addiction that may be more cyclical in nature than linear. Further, Jellinek’s description was based on a limited population, only including men and members of A.A. The credibility of the research backing these stages is limited and much about the procedures is unknown.

Jellinek’s original descriptions of the phases of alcoholism only included alcoholics, whereby Glatt (1975) expanded the pathway to include addictive behaviors other than alcohol: drugs, gambling, food, and smoking. Considering the great number of addictions other than alcohol listed in the current DSM-IV-TR (APA, 2000) and those that will be listed in the DSM-V, having the pathway represent more than alcohol is necessary and pertinent to today’s clinical world. Glatt also added to Jellinek’s descriptions of the phases of addiction. Within the Pre-alcoholic phase, Glatt discussed that individuals can become addicted to AODs without feeling a sense of relief from using. For example, if AODs are a part of specific cultures, individuals with no emotional predisposition can become addicted. This added a physiological and environmental component to drug and alcohol, whereby the substances themselves were addicting and

environmental risk factors contributed to addiction. As new research has moved in the direction of the anatomy of the brain and substances, Glatt's addition to the model was appropriate and is currently supported in the literature (e.g. Denis & Scott, 2000; Volkow et al., 2004). Within the Prodromal phase, Glatt discussed the importance of social roles and expectations as the biggest contributor of addiction. He discussed how guilty feelings and hiding one's drug or alcohol use, is influenced by their social world. Further, Glatt denoted that risky behavior, such as impaired drinking, was also a key factor at this stage for those who develop addiction. Glatt (1975) clarified the "loss of control phenomenon (LoC)" (p. 29 - 30) by discussing how LoC does not mean that every time a person drinks they lose control. Rather, LoC means that the loss of control is unpredictable and may not happen for years but will inevitably occur. Many people with addiction can sustain their drinking at a normal level; however, the LoC is present and may look different depending on environmental and psychological factors that are individualized.

Glatt (1975) expanded Jellinek's notion of a rock bottom in the Crucial phase by showing the alcoholic experience in a V-shaped chart, whereby the bottom of the V-shape was the rock bottom (see Appendix A for Glatt's curve). Glatt (1975) defined the rock bottom:

Rock bottom is of course not a fixed material 'bottom' but an individual experience that may enable the sufferer to call a halt to his drinking and self-destructive career long before he has lost home, health, job, and self-respect (p. 25 - 26).

Glatt (1975) described that a person suffering with addiction did not have to hit bottom, but could take "short-cuts" (p. 26) along the curve and skip the losses associated with hitting bottom. He claimed that a client did not have to be motivated to change but motivation could happen within the therapeutic process utilizing the chart and discussions about the chart. A common

myth is that all people with addiction hit the bottom of the chart, but Glatt claimed that was not true and that the bottom was avoidable. Glatt's contribution to Jellinek's phases was significant because he was inclusionary with environmental factors and other types of addictions. Further, Glatt dismissed the idea that a rock bottom was inevitable and the fear of hitting bottom could motivate individuals in treatment.

The Jellinek (1946) and Glatt (1975) models serve as the foundations for current perceptions on addiction treatment (Venner & Miller, 2001). Jellinek was the first notable scientist to describe a way of understanding the pathway of addiction. Glatt's visual representation of the Jellinek theory has influenced widespread use and acceptance of the medical model of addiction. As a result, this study utilized the concepts within Jellinek and Glatt's theories to help build a definition of the BOE. Further, as noted, the Jellinek and Glatt theories are aspects of a linear conceptualization of addiction, and utilizing these concepts within the current study was foundational to combining linear models of addiction with chronic models of addiction.

Brown's Model

Brown (1985) also developed a widely used model of alcoholism. Brown viewed alcoholism as a developmental, stage based process that included: the drinking stage, the transition stage, early recovery, and ongoing recovery. The drinking stage consisted of the attempts to gain control over drinking because the drinker had the belief that control was possible. Hitting bottom occurred during the drinking period, as well as, the turning point, which marked the change into the transition period. Hitting bottom was the culmination of many negative experiences, which explains the individualization of the BOE. Bottom included

Tiebout's (1949) concept of surrender, which meant an acceptance that control of AOD use could not be attained and a change in perception (TTP). This study separated the concept of rock bottom from the change in perception to gain the most accurate picture of what occurs during the change process. Jellinek and Glatt both offered explanations of the addictive pathway, with specific examples of what one could expect in the BOE. Whereas, Brown denoted the importance of the bottom, but also acknowledged that hitting bottom would include many negative experiences. As a result of these conceptualizations of what the rock bottom may include, this study is using the term "bottoming out experience" (DePue et al., in press) to denote the accumulation of negative experiences that occur as a result of substance dependence. The following section discusses the research that exists on the BOE in an effort to highlight empirical support for this construct.

Research of BOE

Jellinek and Glatt

As noted, the Jellinek (1946) developmental stages were developed from a study considered as unsound today; however, there is some limited research on both the Jellinek (1946) stages and Glatt (1975) curve. For example, Venner and Miller (2001) conducted a study in a Navajo sample ($N = 99$) in order to determine the cross-cultural comparisons between Jellinek's model and actual experiences in other cultures. The Jellinek (1946) study was done with white men, who were members of A.A.; therefore, examining the theory with different cultures is necessary for understanding the practicality of using the model today. The card-slot method was utilized, which is an approach that has names of events (in this case, events from the Jellinek chart) written on the cards, and participants rank order these in terms of chronological order of

occurrence in their lives. If an experience did not occur in their lifetime, then that card was left out. Results indicated moderate correlations ($r = .41, p = .005$) with Jellinek's hypothesized developmental stages of the progression of drinking. These results indicate that more research is needed in order to generalize Jellinek's stages cross-culturally. However, it is noteworthy that a significant moderate correlation was found between the Navajo sample and Jellinek's white male sample, thus adding empirical evidence to support Jellinek's inclusions in the BOE.

Forcehimes, Feldstein, and Miller (2008) conducted the first and only study to date on the Glatt curve. The purpose of the study was to examine the period of change denoted in Glatt's curve in comparison with lived experiences of individuals in Alcoholics Anonymous (A.A.). Researchers recruited participants from A.A. in New Mexico, who were over age 18 and had six months of sobriety (abstinence) at the time of the study. The sample ($N = 16$) was divided evenly between men and women, with the sample being 81.3% ($n = 13$) Caucasian. A card slot was utilized, which included 39 cards that had descriptions of Glatt's points along the curve, representations from the Venner and Miller (2001) study, and the 12 steps of A.A., as well as, four blank cards that participants could write in additional experiences. Participants sorted the cards according to the developmental progression of their drinking history and were instructed to only sort cards relevant to their experiences. In order to compare the developmental progression of addiction for participant experiences with the Glatt progression, the card slots identified by participants were connected to a mean chronological age. For example, seeking medical help may have been connected with the age of 45, whereas attending A.A. for the first time might have occurred at age 47. A Spearman rank order correlation with Glatt's curve and the sample indicated a relationship between Glatt's theoretical model and the lived experiences of

participants ($r_s = 0.59$; $p < .01$). This study, although it included a small sample size, is a starting point showing some validity to the Jellinek and Glatt hypotheses. The current study included aspects of the Jellinek and Glatt models in order to provide quantitative data with a large sample size that aims to understand the initial year of recovery.

Other Support for the BOE

There are some research studies that support the idea of the BOE. In the study mentioned above by Forcehimes et al. (2008), events leading to change included rock bottom (94%), attended at least one A.A. meeting (81%), attempted to stop drinking (69%), achieved abstinence (69%), worked at least one of the 12 steps (69%), exhibited readiness to change (63%), had diminished or low spiritual desires (75%), and admitted defeat (81%). In another study by Matzger et al. (2005) a logistic regression was used to compare reasons for drinking less from problematic drinkers in the general population ($n = 239$) and a treatment sample ($n = 429$). The researchers were interested in differences between the populations and if reasons for quitting related to sustained remission from drinking. Results indicated that the treatment sample reported more reasons for quitting than the general population sample; however reasons for cutting down on drinking were: (a) considering the benefits and negative impacts of drinking (general population, 53%; treatment sample, 73%), (b) experiencing significant changes in lifestyle (general population, 65%; treatment sample, 68%), and (c) health problems associated with drinking (general population, 31%; treatment sample, 58%). The most significant difference in the two groups for cutting down was the experience of hitting rock bottom (general population, 10%, treatment sample, 67%). Comparative reasons for quitting were found from logistical regression that predicted sustained remission from drinking: (a) having a rock bottom experience

(general population, Odds Ratio [OR] = 4.35; treatment sample, OR = 1.92), (b) experiencing a traumatic event (general population, OR = 2.66; treatment sample, OR = 2.16), and (c) a spiritual experience (general population, OR = 2.94; treatment sample, OR = 2.36). The researchers also discovered that external motivators (i.e. family pressure to stop drinking) either did not influence remission or had a negative impact on decisions to remain in remission. This study confirms that the BOE influences recovery status, and raises questions about whether a BOE alone would be sufficient to bring about change.

In another study by Cunningham, et al. (1995), hitting rock bottom was also found as a significant predictor of change. Participants ($N = 235$) were recruited from a local science center in an effort to understanding reasons for drinking cessation. An assessment was given to determine whether participants had a prior drinking problem, and two groups were determined: resolved problem and abstinent ($n = 27$), and resolved problem but non-abstinent ($n = 37$). The two groups were then placed into groups who had received treatment to resolve drinking problems ($n = 16$) and those who had not received any treatment ($n = 48$). For both groups, the top reason for quitting/cutting back was that the benefits of quitting outweighed the positives for continued use. For those that received treatment other major reasons for quitting were: hitting rock bottom (68.8%), a traumatic event (50%), knew someone else that had quit (37.5%), lifestyle change (37.5%), warning from a spouse or other person to quit (50%), and health problems (31.3%).

In another study by Young (2011), the experience of hitting bottom was investigated in a sample ($N = 263$) of participants in A.A. The author assessed three types of potential bottom experiences that occurred for participants: high, medium, and low. High bottom was defined as

stopping drinking before significant losses occurred. Medium bottoms were defined as having severe consequences but not losing everything. Low bottoms were defined as losing family, friends, physical health, and employment. Demographic variables also affected the identification of hitting bottom, where white participants were 2.4 times as likely as other ethnicities to state the presence of a high-bottom, where non-whites were 2.4 times as likely to have had a low-bottom. Further, individuals claiming to have religious affiliations were 1.5 times more likely to have had a high-bottom than those who were non-religious. Lower levels of bottom included greater social, physical, and psychological problems throughout the course of AOD use, providing evidence that social, physical, and psychological problems correlate with the BOE. Further, individuals in the low bottom group significantly used drugs more than those with the high bottom. Lastly, individuals who drank more frequently also experienced lower bottoms, thus providing evidence for the connection of heavy use and the BOE.

From the aforementioned studies, conclusions can be drawn that not only is there empirical support for the Jellinek (1946) stages and Glatt (1975) curve, but also the presence of the BOE appears to be a significant predictor of change for SUDs. There are no studies that specifically analyzed the relationship of items within the BOE and change, although the majority of inclusions of the BOE have been researched individually. As a result, this study aims to frame the negative experiences in substance dependence as the BOE and aims to understand the relationship of those items to change. The following section discusses commonalities within the BOE that help frame the theoretical and research-driven definition that this study is using to describe the BOE.

Commonalities of the BOE

The BOE could be considered as unique and individual for each person. However, even 12-step literature denotes commonalities within these experiences. For example, *Alcoholics Anonymous* (2001) and *Came to Believe* (1973) discuss in the literature and stories of A.A. members similarities within the BOE such as pain, misery, despair, guilt, sickness, and fear. Although 12-step programs highlight how individuals experience the BOE differently from one another, there are striking similarities within the literature. Cain (1991) discussed that hitting bottom was necessary in order for people to recover from addiction and that hitting bottom was a crisis moment caused by the consequences of using. Consequently, Cain (1991) argued that hitting bottom is a unique experience, yet, included commonalities such as consequences and crisis within the experience.

As noted, theory and research exist that support the BOE's influence on recovery. In order to understand how the BOE was defined within this study, commonalities of the BOE that are found within the literature are discussed. Substance dependence is a criterion for having a BOE, and the DSM-IV-TR (APA, 2000) definition of substance dependence provides a framework for discussing inclusions in the BOE definition. The following section first describes the commonalities found within the DSM-IV-TR (APA, 2000) definition of substance dependence, and then present other commonalities within the BOE from the literature. It is noteworthy that these commonalities are all found within the Glatt (1975) curve, which is an extension of the Jellinek (1946) phases of the addictive cycle. Further, the commonalities within the BOE have extensive literature and research supporting their affect on the addictive cycle; therefore, this study was an attempt to empirically validate that the negative experiences within

addiction can be conceptualized as the theoretical concept of BOE. As a result of this theoretical conceptualization, this study challenged the linear assumption that a rock bottom happens one time before individuals reach sobriety, and instead the rock bottom is an experience of negative events that may occur numerous times and in various levels of severity in the course of addiction.

Substance Dependence

Substance dependence is defined in the DSM-IV-TR (APA, 2000) as being characterized by tolerance, withdrawal symptoms, using substances in larger amounts and for longer periods of time than intended, unsuccessful attempts to stop or cut down use, large amounts of time spent on using substances or obtaining substances to use, a reduction in social or work activities because of using substances, and continued use with the knowledge of adverse effects. Substance dependence is found in explanations of the BOE (e.g., *Alcoholics Anonymous*, 2001; Brown, 1985; DePue et al., in press; Glatt, 1975; Jellinek, 1946; Venner & Miller, 2001; Young, 2011). Considering the characterization of substance dependence by the DSM-IV-TR (APA, 2000), commonalities are noteworthy in the BOE that are found within the criteria to include: (a) heavy using, (b) withdrawal, (c) decrease in functionality, (d) mental distress, and (e) health problems.

Heavy Using

The NSDUH defines heavy drinking as binge drinking (i.e., five drinks on the same occasion) on at least five days within the past month (SAMHSA, 2011a). Heavy drug use is more difficult to define, and behavioral approaches are often used that measure the frequency and amount of drug use (Schildhaus et al., 2004). Heavy drug use is sometimes considered to be *problematic drug use* [PDU] and is indicated by the presence of harm as a result of drug use

(Roy, 2008). Heavy use is considered to cover the following DSM-IV-TR (APA, 2000) criteria: tolerance and using more substances and/or for longer periods of time than expected. Taking large amounts of substances and for longer periods than intended has been found to be associated with substance dependence (Wu et al., 2012). Since defining heavy use becomes more difficult with drug use, this study focused on the frequency of use for all illicit substances as an indicator of heavy use. It is also noteworthy that in the recovery literature (e.g., *Narcotics Anonymous*, 1988), a high frequency of substance use is mentioned with relation to hitting bottom. In *Came to Believe* (1973), “I could not see my excessive drinking as the cause” (p.9). Heavy using is a part of many substance dependent clients’ lives and is an influence of treatment entry (Weisner & Matzger, 2002), thus demonstrating a connection between the amount of substances one consumes and need for treatment. As a result of the connection with heavy use and substance dependency, heavy use is considered to be a component of the BOE.

Attempts to Stop Using Substances

The inability to control substance use is associated with the presence of substance dependence (Wu et al., 2012). In recovery literature (e.g., *Alcoholics Anonymous*, 2001), the inability to control substance use is frequently mentioned in relation to hitting bottom and a dominating influence on quitting. In a study by Smith, Cleeland, and Dennis (2010), the inability to control using substances was the most common reasons that young adults and adolescents reported for ceasing AOD use. In the literature on cigarette treatment, a previous attempt at quitting smoking was correlated with participants being in the contemplation or preparation stages (Prochaska et al., 1994) in current treatment (Teater & Hammond, 2010). Further, previous attempts with treatment have been positively correlated with predictions of entering

treatment again (Weisner & Matzger, 2002), meaning that if individuals have previously been in treatment, the likelihood of re-entering treatment again is high. Therefore, previous treatment is also an indicator of substance use, as previous attempts increase the likelihood of self-awareness and motivation to quit (Teater & Hammond, 2010).

Withdrawal

Withdrawal is one of the most often cited criteria for substance dependence in the DSM-IV-TR (APA, 2000). Withdrawal typically as a result of long periods of heavy use (Winters, Martin, & Chung, 2011) and is defined as physical and psychological symptoms that occur in the absence of substance use; thus causing continued use in an effort to avoid withdrawal symptoms (APA, 2000). Withdrawal is a common attribute of individuals with substance dependence who enter treatment (e.g., Ahmadi, Kampman, Dackis, Sparkman, & Pettinati, 2008; Milin, Manion, & Walker, 2008) and is an indicator of substance dependence severity (Wilhelm et al., 2011). Withdrawal symptoms are discussed in the recovery literature (e.g., *Alcoholics Anonymous*, 2001) in connection with attempts to quit using substances and notes that a point came in AOD use where individuals could not live without the substances. Further, both Jellinek (1946) and Glatt (1975) discuss withdrawal as negative aspects of the addictive pathway. As a result of the prevalence of withdrawal symptoms in connection with dependency and the road to recovery, withdrawal is a necessary inclusion in the definition of BOE.

Decrease in Functionality

Decreases in functionality are denoted in the DSM-IV-TR (APA, 2000) criteria for substance dependence in the section discussing the reduction in work or social activities. Work problems have been identified as one of the most common problems associated with alcohol

dependence (Öjesjö, 2000) and drug dependence (Brecht, O'Brien, Mayrhauser, & Anglin, 2004). Therefore, declining functionality in work or school is a necessary inclusion in the definition of the BOE. Further, relationships are frequently damaged in the course of addiction (Ripley et al., 2006), and social relationships have the power to be supportive or damaging in the recovery process (Groh et al., 2007). Both work and relational functionality are represented in the recovery literature as aspects of the BOE. For example, *Came to believe* (1973) states, “I really didn’t have to face the work in the morning, because I no longer had a job to go to, nor a wife to nag at me, nor kids to badger me for school money” (p. 30). As a result of the connection of addiction and relational functioning, functionality in relationships is also included in the definition of the BOE.

Mental Distress

Mental distress, also called psychological distress, is related to mental health status, specifically related to anxiety and depressive symptoms (Schmitz, Lesage, & Wang, 2009). Anxiety (e.g., Shapira & Courbasson, 2011) and depression (e.g., Boschloo et al., 2011) are positively correlated with addiction severity; therefore, the higher amounts of anxiety or depression, the higher amount of addiction severity. In a study by Maisto, McKay, & O’Farrell (1995), participants reported that the experience of negative emotions was a top reason for stopping AOD abuse. It is also noteworthy that psychiatric severity has a relationship to AOD treatment entry (Weisner & Matgzer, 2002). In recovery literature (e.g., *Twelve steps and twelve traditions*, 1952), mental distress is discussed in terms of guilt, depression, anxiety, remorse, hopelessness, and/or helplessness. As a result of the comorbidity with mental distress and dependency, mental distress is included in the definition of the BOE.

Health problems

Physical health problems are a top reason that many people stop using substances (e.g., Cunningham et al., 1995; Karel, Lynch, & Moye, 2000). The DSM-IV-TR (APA, 2000) indicates that substance dependence can include using substances in spite of ongoing health concerns. Common health problems found within individuals seeking treatment for SUDS include: neurological, gastrointestinal, liver, and dermatological problems (Keany et al., 2011). In a study by Clark, Samnaliev, and McGovern (2009), individuals with substance dependency behavioral problems and other types of behavioral problems were compared to one another in relation to Medicare expenditures. The SUDs group had significantly higher levels of Medicare expenditure, which almost all were used for physical health problems. As a result of the connection of health problems to SUDs, as well as the inclusion of health problems in descriptions of the BOE (e.g., Jellinek, 1946), health problems are considered an indicator of the presence of the BOE.

The aforementioned inclusions in the definition of the BOE can be found within the DSM-IV-TR's (APA, 2000) classification system of possible criteria within substance dependence. It is noteworthy that there are other symptoms associated with dependence, and the negative experiences of individuals who are substance dependent, may contribute to their willingness to change. The following section discusses other factors common to substance dependence to include: (a) stress, (b) negative consequences, (c) illegal activity, (d) suicidality/homicidality, (e) environmental risk, and (f) traumatic experiences.

Stress

Stress is defined in terms pressure or tension that results from personal sources of stress as a result of relationships or environmental factors at work or school. During stressful experiences, people undergo a neurological stress response in the brain (Wand, 2008). Neurological research demonstrated that stress increases the likelihood of voluntary drug use moving to involuntary drug use (Schwabe, Dickinson, & Wolfe, 2011; Wand, 2008). For example, in early stages of addiction, stress influences the use of AODs; however, as addiction progresses, the presence of stress can impair the reward system of the brain with AODs and the individual will take more AODs in order to achieve the same relief from stress (Wand, 2008). On a molecular level, stress is a significant indicator of the development of addiction, increased usage, and relapse (Briand & Blendly, 2010). Stress has been shown to affect the decision-making capacity for individuals who are experiencing the stressful incident (i.e., giving a speech in front of a large group of people; Kosten, 2011); therefore, the presence of stress could be an indicator or influence of higher levels of the BOE. It is also noteworthy that stress-reduction techniques are common in the treatment for addiction, and 12-step programs also utilize stress-reduction activities (Young, DeLorenzi, & Cunningham, 2011). Therefore, the inclusion of stress in the BOE is necessary and expected to be an indicator of the experience of hitting bottom.

Negative Consequences

Negative consequences are not only a part of the substance dependence lifestyle, but also a motivating factor to stop using substances. The fear of negative problems and consequences associated with substance use has been demonstrated as one of the top reasons for cessation (Hodgins, Ungar, el-Guebaly, Armstrong, 1997). In a study by Maisto, O'Farrekkm, Connors,

McKay, & Pelkovits (1988), self-control to avoid negative consequences was one of the top reasons that individuals reported stopping relapses and re-entering sobriety. Many individuals report that entering sobriety was influenced by weighing out the pros of substance use versus the cons (e.g. Cunningham et al., 1995; Stasiewicz, Bradizza, & Maisto, 1997). Some of the negative consequences associated with AOD use may include loss of family/friends, jail, loss of employment, and/or financial difficulty. Although there are other negative aspects directly measured within this study (e.g., depressive symptoms, work problems), it was necessary to also include negative consequences, which cover any consequences that the participant seems to value as important.

Illegal Activity

As negative consequences were discussed in the previous section, illegal activity is separate from negative consequences because not all illegal activity has observable consequences (i.e., jail). Individuals who are drug-seeking and/or using AODs commonly engage in illegal activities (Chandler, Fletcher, & Volkow, 2008). Illegal activity has been demonstrated to be associated with heavy drug use (e.g., DeBeck, Shannon, Wood, Li, Montaner, & Kerr; Paim Kessler et al., 2012). One such reason for individuals who injected AODs was that money was needed in order to pay for the AODs; therefore, drug dealing and sex work were common illegal activities in which participants engaged to pay for the AOD use. Another reason for illegal activity involvement is that long-term AOD use changes brain chemistry and decision-making ability (Chander et al., 2008); therefore, the likelihood of making poor decisions and engaging in illegal activity increases as a person's AOD use persists. The inclusion of illegal activity is thus an accurate representation of one of the negative experiences in the BOE.

Suicidality/Homicidality

Suicidality refers to the thoughts or attempts to harm the self, whereas homicidality refers to the thoughts or attempts to harm others. Both suicide and homicide can be considered as types of unnatural death. Suicide has been reported to positively correlate with illicit drug use (e.g., Hakansson, Bradvik, Schlyter, & Berglund, 2010; Howard et al., 2010); therefore suggesting individuals who are dependent on AODs are at a high risk for suicide. Suicide is linked to mental distress symptoms (Penney, Mazmanian, Jamieson, & Black, 2012); consequently, suicide is a necessary inclusion in the definition of the BOE, as mental distress symptoms are another indicator of the BOE. Considering that the BOE is the culmination of negative events in addiction, it is not surprising that suicidality would be found within this experience.

The risk of homicide to the self or to others drastically increases with the presence of substance use (Darke, 2010). Homicide can be considered as poor decision-making, and as noted, decision-making and substance-use are related. Younger (aged 25 and younger) individuals that attempt or commit homicide are likely to engage in substance use/misuse and have a background of violence (Hunt et al., 2010). Both homicidality and suicidality have both been linked to the use of substances. For example, in a study by Combs-Orme, Taylor, Scott, and Holmes (1983), suicide was the most common type of violent deaths (51% of *all* recorded deaths for the sample) for participants and homicide was the second most common type. Both suicide and homicide have also been linked to the number of addictive substances used in the lifetime (Brådvik, Berglund, Frank, Lindgren, & Löwenhielm, 2009). For example, the more types of addictive substances one has used in his lifetime, the more likely that individual is to attempt suicide or homicide. Cross-culturally, alcohol has been demonstrated to have a positive

correlation with both homicide and suicide in a Russian sample (Pridemore & Chamlin, 2006). As a result of the relationships between suicidality, homicidality, and substance use, both suicidality and homicidality are included as indicators of the BOE.

Environmental Risk

Environmental risk is considered to include any factors within an individual's environment that impede life without substance use and/or change from addictive behaviors. For example, in a study by Sareen and Kaur (2012) individuals with SUDs exhibited family environments that were defined by conflict and control, whereas individuals that did not have SUDs had family environments that promoted independence and cohesion. Within family systems that use AODs, weaker family ties and a hostile environment exist (Jêdrzejczak, 2005). Socialization theory states that addiction is a learned behavior through family, peers, and school (Oetting, Donnermeyer, & Deffenbacher, 1998). Therefore, peers and family are a large influence on substance use as individuals adopt the norms of the group (Perkins & Berkowitz, 2006). In a study by Cunningham et al. (1995), participants indicated a major lifestyle change as a motivation to quit using substances by former problematic drinkers. Changing using friends and places that a person used can be a beneficial part of recovery, and highlights the effects of environmental risk.

Traumatic Experiences

Trauma can be defined as current stress that results from past experiences with extremely stressful or distressing experiences (e.g., abuse, PTSD; GAIN Coordinating Center, 2011). Individuals who have suffered traumatic experiences often develop negative coping mechanisms to deal with the trauma, such as addictive disorders (Dayton, 2000). For example, PTSD has

been positively correlated with AOD use (e.g., Logrip, Zorilla, & Koob, 2012). Also, individuals reporting traumatic memories note that substance use had an affect on decreasing the strength or distress associated with the memories (Reynolds, Nayak, & Kouimtsidis, 2010). Not only is having a traumatic experience a motivating predictor for change from AOD use (Cunningham et al., 1995), but traumatic experiences have also been linked to sustained recovery from SUDs (Matzger et al., 2005). Further, women in prison systems for substance abuse have also reported high levels of PTSD (Rowan-Szal et al., 2012), suggesting that gender could be a factor in the BOE. As a result of the strong connection between traumatic experiences and the BOE, traumatic experiences were indicators of higher levels of the BOE.

This section summarizes the themes in current literature on the negative experiences within the addictive cycle. Considering that the BOE is the culmination of negative experiences, it is hypothesized that higher levels of a BOE would result in stronger relationships within the model. The purpose of studying the BOE was to understand how negative experiences relate to the change process and ER. Therefore, the BOE was considered a precursor to change, and ER was thought of as the result of change. The following section outlines the theory and research behind the concept of ER.

Early Recovery (ER)

As noted, addiction has previously been thought of in linear terms of acute care, where an individual enters treatment, gets help, and re-enters society as a higher functioning person (Dennis & Scott, 2000). As the focus on chronicity of addiction strengthens, the application of a “recovery paradigm” of treatment has also increased (White, 2007, p.229). However, difficulties defining recovery exist because the idea has various meanings within medical and treatment

communities. The Betty Ford Institute (BFI; The Betty Ford Institute Consensus Panel, 2007) noted that a formal definition of recovery is unnecessary for those in recovery, but in order for researchers, politicians, and others outside the world of recovery to understand what it is and help reduce stigma, an accepted definition is needed. Typically, researchers and clinicians steer away from the term recovery because it lacks a single, measurable definition in the mental health field (Best & Lubman, 2012). White (2007) explains that in order to have an accepted, working definition of recovery it must meet six criteria: precision, inclusiveness, exclusiveness, measurability, acceptability, and simplicity. In this section, the difficulties surrounding the definition process and various definitions of recovery are presented in an effort to provide the context for how statistical decisions were made in this study and why confirmatory factor analysis was chosen as the method to define early recovery.

Definitions of Recovery

Defining recovery is not only challenging in terms of content, but determining which individuals qualify to be part of defining the term is of question. The idea of defining recovery is threatening to many treatment and insurance institutions (Kelly, 2004). Consider what it might mean if recovery was strictly defined as abstinence: treatment centers that promote other types of physical well-being may have funds cut. It is important to discuss why this study aims at defining recovery in order to help misunderstandings. Without a clear definition of recovery and factors that influence the change into ER, helping clients achieve change can be more difficult. Therefore, the point of defining early recovery in this context is to benefit treatment, research, and facilitate the best practices of counselors.

The term *recovery* comes from the term *recover*, which is defined as, “to get back, to bring back to a normal position or condition” (*recover*, Merriam-Webster.com, 2012). Although the term, *recovery*, had been used widely in 12-step programs since the 1940’s, the term began working its way into mental health professions in the 1980’s as researchers started finding that individuals could work on improving their quality of life and return to a state of health (Jacobson, 2003). The term, *recovery*, was first applied to all psychological conditions, and associated with rehabilitation counseling. Deegan (1988) noted that rehabilitation differed from recovery in that rehabilitation included services provided to a person to help improve his/her life quality, whereas recovery was the actual experiences and cognitive changes that individuals undergo as they accept their dependency to substances and change. Considering this definition in terms of recovery from addiction, it could be said Deegan (1988) was suggesting that recovery included an acceptance of the condition of addiction and then the conscious changes and activities that people engage in to help sustain remission from addiction.

The Betty Ford Institute (BFI) is one of the largest, well-respected treatment programs in the United States for addiction. In an effort to reduce the stigma of recovery and help families and loved ones of addicted people have a better understanding of how to facilitate recovery, the BFI worked on creating a working definition of recovery in 2007 through a consensus process. The process included a consensus panel of 12 individuals chosen to represent treatment, policy, and the research on addiction and recovery. Once selected, literature on defining recovery was presented to the panel during a two-day conference. The conference included presentations on the varying definitions and troubles defining recovery, as well as, debates between the members to come up with a definition. The conference resulted with a working draft of a definition for

recovery with an 11 to 1 vote of agreement on the definition. The working definition included three parts: sobriety, personal health, and citizenship. Sobriety was defined in terms of abstinence (i.e. not using any AODs for recreation). Personal health was considered to be a measurable construct, thus defined through “physical health, psychological health, independence, and spirituality” (BFI Consensus Panel, 2007, p. 222). Citizenship referred to the idea of living with a moral regard for other people and fulfilling social and financial obligations (i.e. work). Considering this definition, recovery involves more than just abstinence, and is a function of improving quality of life issues (Laudet, 2007; Van Wormer & Davis, 2008).

Another definition of recovery was offered by White (2007), who argued that inclusivity and the qualitative nature of recovery must be taken into account. Therefore White (2007) defined recovery to include:

Recovery is the experience (a process and a sustained status) through which individuals, families, and communities impacted by severe alcohol and other drug (AOD) problems utilize internal and external resources to voluntarily resolve these problems, heal the wounds inflicted by AOD-related problems, actively manage their continued vulnerability to such problems, and develop a healthy, productive, and meaningful life (p. 236).

Within this definition, the willingness of individuals to seek out services and work on their quality of life is emphasized. Another aspect of the definition that is worth highlighting is that the author claimed that recovery was an experience, a process, and a sustained status. Others also claim that recovery is a process (Prochaska et al., 1994), but White (2007) was careful not to

include abstinence as a requirement because it was considered as not conducive to the process of recovery.

The Substance Abuse and Mental Health Services Administration (SAMHSA) created a working definition of recovery in 2011, which was revised again in 2012. The overall definition from SAMHSA (del Vecchio, 2012, para 5) stated: “Recovery is a process of change through which individuals improve their health and wellness, live a self-directed life, and strive to reach their full potential.” SAMHSA also included four dimensions within the definition of recovery, which included: health, home, purpose, and community. Health included abstinence from substances, and physical and psychological health. Home included having a stable place to live. Purpose referred to not only engaging in meaningful activities (e.g., family, job, school), but also having the financial resources to engage in these activities. As a result, purpose also includes fulfilling social and economic responsibilities (e.g., working). Lastly, community included being a part of a social system bigger than oneself; therefore engaging in meaningful relationships and being a part of a group (e.g., 12-step meetings, social circle, spiritual group, family). Recovery thus is a process of change, whereby self-improvements to one’s quality of life are at the core of its meaning. Central to the definition is the power of choice and autonomy as one works to have a life without substances. It is noteworthy that SAMHSA included both mental health and addiction in this definition of recovery. Considering previous definitions of recovery, which aimed to include measureable variables, the definition from SAMHSA, although comprehensive, seems difficult to measure. However, similar themes are found within the SAMHSA definition as others: abstinence, physical health, psychological health, self-directed healing, and financial stability.

As abstinence is a significant component in all definitions of recovery presented thus far, it is essential to discuss oppositions to this inclusion. Abstinence is not only at the core of academic definitions of recovery (as noted), but also the 12-step recovery narrative (Weegmann, & Piwowoz-Hjort, 2009). If abstinence is a prerequisite to being in recovery, then individuals who have reached moderation in their using, as well as those who struggle with chronic relapse could not be considered to be in recovery. This discussion began with explaining this study's purpose in defining recovery, and the point must be addressed in references to abstinence. The goal of this study was to benefit clients and clinicians in their efforts at reaching and facilitating the recovery process. The inclusion/exclusion of abstinence had both positive and negative effects. For example, if abstinence is a required condition of recovery, many individuals are excluded from the group. Positively, the exclusion/inclusion criteria of abstinence aids research by providing clear, concrete criteria for recovery. However, lived experiences of recovery demonstrate that recovery is a process that frequently includes relapse (Dennis & Scott, 2000; Prochaska et al., 1994). Many clients already feel guilty about relapsing or their moderate use; therefore, removing individuals who are fulfilling other aspects of the definition of recovery and working to improve their lives could be harmful. Although there are pros and cons to the inclusion of abstinence in the definition of recovery, this study understands recovery to be an attempt to gain abstinence; consequently, the strength of substance dependence was taken into account in the statistical testing of ER. Although initial results did not provide strong evidence for varying amounts of substance dependence, future research on this topic will continue to aim at analyzing the range of dependency. This aims at broadening the definition of recovery to include improvements in substance use and is consistent with the concept of chronic addiction.

Research of ER

Based on the available research in ER, this study hypothesized that ER is composed of the following elements: (a) no/reduced substance dependence, (b) no/reduced substance use, (c) self-help activity, (d) low/improved physical health problems, (e) low/improved psychological health, (e) healthy coping styles, and (f) living in the community. The following section discusses research in the area of ER, in order to demonstrate why statistical decisions were made with the hypothesized inclusions of ER for this study.

Influences of ER

Abstinence correlates with a number of other factors within recovery: coping styles, healthy relationships, better physical and psychological health, and support systems. For example, Dennis, Foss, & Scott (2007) analyzed 1,162 adults in various treatment settings for SUDs that were recruited in 1996 - 1998 and lasting for eight years. The study consisted of mostly African-American (89%) women (61%). Length of abstinence at the termination of the eight year study was divided into four categories: 1 - 12 months ($n = 232$), 1 - 3 years ($n = 127$), 3 - 5 years ($n = 65$), and 5 or more years ($n = 77$). Results indicate that as abstinent time increased, the amount of relapses decreased and number of individuals sustaining abstinence increased. Where as 36% of individuals with 1 - 12 months of abstinence sustained abstinence, 66% of individuals with 1 - 3 years of abstinence sustained, and 86% sustained abstinence with over five years. The researchers found that the number of clean and sober friends consistently rose throughout the duration of abstinence. Perceived social, family, and spiritual support were also positively correlated with time abstinent. Therefore, as abstinent time increased, perceived social, family, and spiritual support increased. Findings also showed that illegal activity and

illegal income was inversely correlated with the amount of time abstinent and vocational activities were positively correlated with abstinence time. Further, as expected, environmental risk decreased as abstinent time increased. They also found that within the first year of abstinence, coping mechanisms, such as seeking guidance and support as a coping style, were high and peaked in years one to three. After year three, coping mechanisms decreased to levels below that of one month - 12 months abstinence. This finding supports that coping mechanisms, such as support systems, are important in the first stages of recovery as individuals make important decisions and change negative coping behaviors. This study suggests that as abstinent time increased, overall functioning increased. Therefore, ER is necessarily defined by an attempt to reduce or eliminate substance use.

In another study, Scott, Dennis, and Foss (2005) studied 448 adults, who were in treatment for SUDs and randomly assigned to either (a) the group that received quarterly assessments or (b) the group that received quarterly assessments plus a Recovery Management Checkup (early re-intervention). Results indicated that individuals transitioned between cycles of in the community using, in treatment, and in recovery, with many participants transitioning more than one time. These findings support previous studies on the chronic nature of addiction: 18% of individuals transferred from in the community using to recovery during the study, 8% went back into treatment, and 3% were incarcerated. For those that entered recovery from the community using, treatment (25%) and self-help group attendance (65%) were reported by participants, which support evidence of treatment and self-help group attendees with early recovery. Moving into recovery from treatment was 33% more likely than moving from the community using to recovery. For individuals that began each quarter in recovery ($n = 189$), 76%

remained in recovery. Further, participants with more severe problems were less likely to enter recovery than those with less severe problems. For those participants, the likelihood of moving into recovery increased with increased self-efficacy, problem orientation (believing that problems can be solved), self-help attendance, and treatment. These results indicate that the transition into recovery is easier for individuals who have received treatment and who have less severe problems. For individuals with severe problems, the transition to recovery is more likely with self-help attendance, treatment, self-efficacy, and problem orientation.

As noted in the research on the BOE, health problems, mental distress, stress, and suicidality/homicidality are all associated with the use of substances; therefore, these factors are expected to be low in ER. One such reason for this is that 12-step programs (e.g., A.A., N.A.) and treatment facilities promote healthy coping. Further, it can be argued that increased coping styles cause individuals to engage in personal wellness (Lewis & Meyers, 2012), which would improve physical and mental health. In a study by R.H. Moos & Moos (2007), 461 (47% women, 53% men, 80% White) individuals who had sought help for alcohol use were studied at the intake, 3-year, 8-year, and 16-year intervals. The researchers found that coping styles, such as self-efficacy and approach coping (defined as seeking alternatives and emotional coping) were positively correlated with remission, and correlations increased as the duration of sobriety increased. For example, individuals at the 3-year follow-up had significant correlations with self-efficacy ($r = .26$) and approach coping ($r = .26$); however those at the 16-year remission mark had even stronger correlations with self-efficacy ($r = .59$) and approach coping ($r = .39$). In opposition, avoidant coping had a negative correlation with remission at the 3 year ($r = -.07$), 8-year ($r = -.57$), and 16-year ($r = -.68$) follow-ups. Since approach coping would be a more

positive coping style than avoidant coping, the relationships with recovery are logical conclusions. It is also noteworthy that findings showed that individuals who received treatment were more likely to have remission and less likely to relapse than individuals that chose not to enter treatment of any kind. Therefore, coping styles are associated with recovery and are a necessary inclusion to the expected definition of ER.

The aforementioned studies highlight the importance of including abstinence, coping styles, healthy relationships, better physical and psychological health, self-help attendance, and support systems as factors within ER. Lastly, living in the community was chosen as an indicator of ER to denote the absence of being incarcerated. ER is expected to include low levels of all items present in the BOE; therefore, if an individual is incarcerated and not living in the general community, that participant would not represent the general population in ER.

This section has highlighted the various definitions of ER in an attempt to explain the statistical decisions made on the inclusions in CFA for ER. Within the ER, expected inclusions are no/low substance use and abuse, self-help activity, healthy coping styles, and living in the community. This study utilized measurement models/CFA in an effort to delineate ER at the intake time period and then test the relationships of ER with the BOE and TTP.

Chapter Summary

The change process is a primarily under researched area in the addictions field, and the exact nature of the influences of change are not understood. The BOE is thought to be the culmination of negative experiences in addiction and a prerequisite for successful recovery. Further, cognitive changes are denoted in both academic and recovery literature as an integral part of the change process; therefore this study is framing cognitive changes as TTP. Lastly, ER

could be considered the result of the BOE coupled with TTP, yet an empirical definition of ER has not been developed. This study attempted to delineate the BOE, TTP, and ER at the intake period for participants. Once constructs were established, the model was tested relating the BOE, TTP, and ER to one another.

CHAPTER III: METHODOLOGY

The purpose of this research study was to test a theoretical model through analyzing the constructs BOE, TTP, and ER in an effort to determine if theoretical components within the constructs are accurate representations of the nature of the construct. For example, motivation, awareness, and support should theoretically be aspects of TTP, and data analysis procedures help explain if these factors load for TTP. Once the measures within the constructs were delineated, the relationship between the BOE, TTP, and ER was then tested. The following section discusses the (a) research design, (b) methods checks, (c) participants and sampling, (d) instrumentation, (e) procedures (f) constructs and operational definitions, (g) research hypotheses (h) exploratory research questions, and (i) data analysis procedures.

Research Design

The data from this study was obtained from a national dataset previously collected from 230 grant-funded addiction treatment centers that utilize the Global Assessment of Individual Needs (GAIN) assessment instrument. A review of the literature gaps, coupled with available data, influenced decisions on research design and statistical analysis procedures. As clear definitions of the BOE, TTP, and ER have *not* been discovered through research, a descriptive, correlational research design was chosen in order to understand not only what constitutes a BOE, TTP, and ER, but also to examine the relationships between the BOE, TTP, and ER in their natural state. The purpose of correlational studies is to investigate the relationship between two or more variables without researcher manipulation and such designs are common in the counseling and counselor education research field (Heppner, et al., 2008). Because correlational research is exploratory in nature, structural equation modeling (SEM) was utilized to understand

the components of each construct and was then used to test the hypothesis of the relationships between the BOE, TTP and ER. Although SEM is a confirmatory technique, it is frequently used in an exploratory manner because it combines elements of confirmatory factor analysis and multiple regressions and allows for various possibilities of the relationships between constructs and variables (Schrieber et al., 2006). The literature on ER, BOE, and TTP provides evidence to test a hypothetical model, which is the purpose of SEM. The hypothesized model assessed data at intake for the BOE, TTP and ER. Once constructs were delineated through measurement models/CFA, SEM path analysis was used to understand how the constructs related to one another.

Methods Checks

Methods checks are necessary when performing quantitative studies because of threats to internal and external validity, as well as issues with reliability. Validity refers to whether an instrument measures what it was intended to measure (Heppner et al., 2008). Internal validity focuses on the variables of interest and whether the independent variable (IV) is the cause of the dependent variable (DV). Threats to internal validity typically are high when there is *not* an experimental control group. Since this study aimed at understanding participants in their natural setting, threats to internal validity were high because the researcher had no control over participants or the settings. Two considerations of internal threats to validity threats in this study were history and attrition. History is a threat to internal validity because it is anything that occurs during the course of treatment. For example, one person may have had a better relationship with a counselor than another or maybe a family member died during the course of treatment. These are circumstances that cannot be controlled for and can affect whether the IV accurately predicts

the DV. Also, attrition is a factor when one considers the number of treatment dropouts (a common issue in substance abuse research; Heppener et al., 2008). Although the researcher could not control for history or attrition within the study, removing outliers and missing data was employed in an attempt to protect against these threats.

Population and Sampling

The data used within this study was archival data from the CSAT 2011 database managed by Chestnut Health Systems. The researcher was granted permission to utilize the data once an abstract explaining the study was approved from the GAIN Coordinating Center. The following section explains the sampling procedures and participant characteristics from the current study.

Sampling

The population from which the sample was drawn included adult individuals with substance use disorders in non-incarcerated treatment settings, which equates to over 750,000 people who receive treatment services each year (SAMHSA, 2007). The sample was drawn from those individuals receiving treatment at the 230 facilities that receive grant funds for research using the Global Assessment of Individual Needs (GAIN) instrument. The treatment setting population included all levels of care (i.e. inpatient, outpatient, short and long term care, and aftercare) between the years 1998 – 2011 in the United States, including large urban areas, small and large rural settings, and reservations. The total number of sites within the dataset was 230 sites. Purposive sampling was utilized, and all participant data received was used in the analysis unless missing data within specific cases was removed in analysis. The sample was purposive; thus, all data within the database that meets criteria was utilized. The sample received ($N = 4970$) met the requirement for having an intake measurement and substance dependence within the

lifetime. Within factor analysis, “50 participants is a poor sample size, 100 is poor, 200 is fair, 300 is good, 500 is very good, and 1000 is excellent” (Tabachnick & Fidell, 2007, p. 613). Once the data was cleaned, the resulting sample size was $N = 2148$, which was an excellent sample size for SEM.

Instrumentation

The GAIN (Chestnut Health Systems, 2002; Dennis, White, Titus, & Unsicker, 2006) instrument is an evidence based treatment assessment, meaning that the assessment has undergone rigorous supporting validity and reliability and is used in hundreds of agencies and treatment settings across the nation. The GAIN includes eight core sections (Background, Substance Use, Physical Health, Risk Behaviors and Disease Prevention, Mental and Emotional Health, Environment Living Situation, Legal, and Vocational), and it has been found reliable and valid with diverse samples (e.g., Conrad et al., 2010; Conrad et al., 2009a, 2009b, 2011; Dennis et al., 2006; Funk, Lennox, Dennis, & Ives, 2006). Within the eight core sections of the GAIN, numerous scales, subscales, and variables comprise the instrument. Although the GAIN has been studied as a complete assessment, the individual scales and subscales were included from various sources by the assessment creators in order to provide a comprehensive assessment of clients. In this study, scales, subscales, and variables from the GAIN was used in order to measure the BOE, TTP, and ER. Information about the individual measurements is discussed in the following sections. The GAIN has two versions: intake (GAIN-I) and follow-up (M90). The intake is the initial screening assessment given to participants and was used within this study as the baseline measurement for BOE, TTP, and ER.

The GAIN demonstrates cross-population generalizability because it has been used by agencies in large rural areas (e.g., Los Angeles) to moderately sized areas and small urban communities (e.g., Bloomington, IL), and also rural areas and reservations (e.g., Four Corners, NM). Several multisite major studies also use the GAIN: to include the Adolescent Residential Treatment (ART) program, the National Institute on Drug Abuse (NIDA), and the National Institute on Alcohol Abuse and Alcoholism (NIAAA) (Chestnut Health Systems, 2002).

It is noteworthy that the GAIN utilizes a grouping method for data; therefore most data points have a raw score and a grouping score, which is based off a clinical judgment scale. Groupings fall into three sections: low clinical severity, moderate clinical severity, and high clinical severity (see Appendix E for scale/subscale groupings). To explain further, scales and variables that have grouping scores, have been transformed into three groups of clinical severity: low, medium, and high. Many scores, such as substance problems, that have higher raw scores also have a high grouping score. However, inverse items, such as social support, have an inverse relationship between the raw and grouping scores. Therefore, higher levels of social support place the grouping value in the low severity grouping, rather than in the high severity grouping. In this study, although grouping variables were available, total scores were used to obtain the most accurate information about the data. This was most appropriate for the current study in order to utilize the most accurate data. Grouping variables are used for clinical classifications, and this study aimed to provide the most accurate representation of the relationships.

Validity

The purpose of validity in quantitative research is to understand instrument consistency and draw the most accurate conclusions about the relationships being measured in a study

(Heppner, Wampold, & Kivlighan, 2008). Construct validity describes how well the constructs within an assessment measure what they are intended to measure. For example, if an instrument was designed to measure substance dependence, then good construct validity demonstrates that the assessment accurately measures substance dependence. Factor analysis was performed on many of the GAIN scales (i.e. Conrad et al., 2009a; 2009b; Conrad et al., 2006; & Titus et al., 2008) and is still being produced on subscales. Thus far, all scales that have been measured significantly predict the fit of the theoretical model, meaning that construct validity has been established because CFA demonstrates that the instrument accurately measures the constructs. Specific validity and reliability of the scales and subscales used within this study are discussed in the following sections. External validity refers to the generalizability of the study. The GAIN has undergone some external validity checks and has shown to be a sound instrument thus far (Ives et al., 2012).

Reliability

Reliability refers to the consistency of a measure (Heppner et al., 2008). For example, if the assessment were given again, participants should score similarly on the repeated assessment. Internal consistency for the GAIN was evaluated and a Cronbach's alpha of .80 was demonstrated on main scales and over .70 on subscales (see Appendix E for psychometric properties; Conrad et al., 2009a; 2009b; Conrad et al., 2010; Conrad et al. 2011; Dennis, Chan, & Funk, 2006; Titus et al., 2008). The GAIN has strong test-retest reliability overall with the scales (ρ = averages around .70, κ = averages around .60). Cross-validation reliability was also strong, demonstrating that scales measuring the same constructs correlated around .70 and those not measuring the same constructs between .0 and .4. Scales and subscales were utilized in order

to measure each construct, For example, a construct is a theoretical idea and is measured using tests or instruments, rather than a direct measurement (Reynolds, Livingston, & Willson, 2009); therefore, different instruments and variables are used to measure various constructs. In this study, various scales, subscales, and variables were used to measure each construct and have been chosen based on what was discussed in Chapter Two. The specific validity and reliability of each is discussed in the constructs section of this chapter.

Procedures

In order to obtain access to the CSAT database, the author was required to seek prior approval by drafting and submitting a Data Request Abstract (see Appendix B for Data Request Abstract). The study abstract was first analyzed by the GAIN research team for feasibility and conceptual approval (see Appendix C for feasibility report). Once approved by the GAIN researchers, the abstract was then sent to each data collection site. The sites had the opportunity to deny access to their data; however, all sites approved data usage for this study. Permission was granted to the researcher to use data from the SAMHSA Center for Substance Abuse Treatment (CSAT) 2011 dataset, which utilizes the following assessments: (a) Global Assessment of Individual Needs-Initial (GAIN-I), (b) the Global Assessment of Individual Needs- Monitoring 90 Days (Gain-M90) and (c) the Treatment Transition Log (TTL). The TTL is included in the GAIN Assessment and includes descriptive questions about the type of treatment participants received and other descriptives about current and past treatment. The requested dataset excluded Adolescent Treatment Model records (ATM) and Cannabis Youth Treatment records (CYT) because these records utilized an older version of the GAIN and are *not* consistent with the new version. Before receiving the data, the UCF Institutional Review Board approved the study for

exempt status (see Appendix D for IRB exemption). The data was delivered through a secure, password-protected file using SPSS formatting.

Constructs and Variables to be Studied

The purpose of this study was to define and understand the relationships between (a) Bottoming Out Experience (BOE), (b) The Turning Point (TTP), and (c) Early Recovery (ER). As a result, theoretical components are assumed to load within each construct, and GAIN scales, subscales, and variables that were included in the measurement/CFA model need to be explained in detail for each of the three constructs (See Appendix E for psychometrics of scales/subscales). Therefore, this section explains the BOE, TTP, and ER in an effort to help the reader understand how the measurements of these constructs was determined. Once measurement models are validated for each construct with this data, then factors loaded for the assigned time periods were placed into a SEM structural model in order to test the relationships between the BOE, TTP, and ER. The hypothesized factor loadings for each construct are described in the following section. It is noteworthy that all scales, subscales, and variables come from the GAIN assessment, and examples of each measurement are taken directly from the GAIN or from evaluator information for the GAIN (GAIN Coordinating Center, 2011). Given the magnitude of the instruments used from the GAIN, the researcher elected to put all psychometrics regarding the scales in the Appendix E. In addition, the CSAT 2011 dataset taken from the GAIN and undergone extensive data cleaning and transformations; therefore, some of the scales use the “missing replaced versions”, which are transformed versions of the scales in order to account for missing data. Transformation of data is a common and necessary practice when dealing with large datasets and multivariate statistics (Tabachnick & Fidell, 2007).

Bottoming Out Experience

The BOE is defined as the culmination of negative experiences in a person's substance abuse trajectory and is expected to include variables that have been denoted as aspects of the BOE in the literature (i.e. Brown, 1985; DePue et al., in press; Glatt 1975; Jellinek, 1946): substance dependence, heavy using, withdrawal symptoms, functionality, mental distress, stress, illegal activity, suicidality/homicidality, environmental risk, health problems, and trauma. The following is a list of the variables and scales that was used to measure the variables of the BOE:

- (1) Substance dependence (measured by the Substance Dependence Scale [SDSm_0, SDSy_0, SDSl_0])
- (2) Attempts to stop using substances (measured by the *Times Received Treatment* variable: S7)
- (2) Heavy using (measured by the *Substance Frequency Scale* [SFS8p_0])
- (3) Withdrawal symptoms (as measured by the *Current Withdrawal Scale* [CWS_0])
- (4) Functionality (as defined by the *Employment Activity Scale* [EmPS_0], the *Training Activity Scale* [TAS5p_0] and *Weekly Family Problems* [wkyfmp] variables).
- (5) Mental distress (as measured by three subscales of the *Internal Mental Distress Scale* [IMDS_0]: *Somatic Symptom Index* [SSI_0], *Depressive Symptom Scale* [DSS9_0], and *Anxiety/Fear Symptom Scale* [AFSS_0])
- (6) Stress (as measured by the missing replaced *Personal Sources of Stress Index* [mPSSI_0], and the missing replaced *Other Sources of Stress Index* [mOSSI_0])
- (7) Consequences [as measured by the *Consequences* variable: "Consq_0")
- (8) Illegal activity (measured by the *General Crime Scale* [GCS_0], and the *Illegal Activity Scale* [IAS5p_0])

- (9) Suicidality/homicidality (as measured by the *Homicidal/Suicidal Thoughts Scale* [HSTS_0])
- (10) Environmental risk (as measured by the *Environmental Risk Scale* [ERS21_0])
- (11) Health problems (as measured by the *Health Problems Scale* [HPS3p_0])
- (12) Trauma (as measured by the *Traumatic Stress Scale* [TSS_0]).

Examples of questions within scales, subscales, and variables come directly from the GAIN assessment (Chestnut Health Systems, 2002) or the evaluator manual for the GAIN (GAIN Coordinating Center, 2011).

Substance Dependence

Substance dependence is defined as the psychological and/or physiological dependence to AODs (APA, 2000) and is measured with the *Substance Dependence Scale* (SDS) within the Substance Problem Scale (SPS). The *Substance Problem Scale* Past Month, past year, and Lifetime is comprised of four subscales: the substance dependence scale, the substance issues index, the substance abuse index and the substance use disorder scale. The SPS is a count of 16 items that measure substance abuse, dependence, and substance induced health and physiological disorders. The *Substance Dependence Scale* (SDS) is one of the four subscales within the SPS and includes seven, self-reported items that match criteria for substance dependence based on the DSM-IV (APA, 1994). There are three time periods measured by the SDS: past month, past year, and lifetime dependence. Lifetime dependence (SDSL) requires one to have three or more symptoms in the lifetime, whereas past year dependence (SDSY) requires three or more in the lifetime and at least one symptom of the three within the past year. Lastly, past month dependence (SDSM) is based on the presence of dependence symptoms within the past month. No symptoms in the past year indicates sustained remission, no symptoms within the past month

indicates early remission, 1 - 2 symptoms in the past year indicates sustained partial remission, and 1 - 2 symptoms in the past month indicates early partial remission. Higher scores on the SDS equate to higher levels of substance dependence.

The SDS asks questions such as: When was the last time that (a) you needed more alcohol or drugs to get the same high or found that the same amount did not get you as high as it used to, (b) you used alcohol or drugs in larger amounts, more often for a longer time than you meant to, and (c) you kept using alcohol or drugs even after you knew it was causing or adding to medical, psychological, or emotional problems you were having (GAIN Coordinating Center, 2011). The SPS has strong internal consistency (Cronbach's alpha = .9; Conrad et al , 2009a) for adults and adolescents and good test-retest reliability ($r = .73$), with the SDS subscales also demonstrating excellent reliability (.89 - .93). The Rasch person reliability was also good for the SPS (.80; Conrad et al., 2009a) and the subscales within the SPS also have good test-retest reliability (SII, .67; SAI, .70; SDS, .83; SUDS, .87; Conrad, et al., 2009a).

Attempts to Stop Using Substances

Attempts to stop using substances are indicated by the inability to control substances use (Wu et al., 2012), which is represented in this study by the variable *Times Received Treatment: S7*. S7 is a count of the number of times the participant has ever received treatment for substance abuse. Higher values indicate a greater number of times in treatment. Since S7 is a counted item and represented by the question of how many times have you received treatment for substance abuse, validity cannot be calculated.

Heavy Using

Heavy using is defined by high substance frequency in terms of number of days on substances and staying impaired on substances for the majority of the day (SAMHSA, 2011a). The *Substance Frequency Scale* (SFI8p) was used to measure heavy using within the sample for the *past 90 days*. The SFI8p is an average of the percent of days the participant reports using AODs, heavy use, and problems from drug/alcohol use. Higher scores on the SFI8p indicate higher levels of substance frequency in terms of days of drug/alcohol use, amount of time in a day spent on AODs, and days causing problems from drug/alcohol use. Scores over .14 may have difficulty quitting without assistance. The SFI8p includes questions such as: During the past 90 days, on how many days have you (a) used any kind of alcohol, (b) used painkillers, opiates, or other analgesics, and (c) on how many days did you go without using any alcohol, marijuana, or other drugs (GAIN Coordinating Center, 2011)? The SFI8p has good test-retest reliability ($r = .74$) and moderate internal consistency for both adults (.77) and adolescents (.80).

Withdrawal Symptoms

Withdrawal symptoms are defined as withdrawal symptoms present within the *past week* that are psychological (e.g., tired, anxious, irritable) and physiological (e.g., seizures, diarrhea, constipation, sweats, chills)(APA, 2000; GAIN Coordinating Center, 2011). The *Current Withdrawal Scale* (CWS) was utilized to measure physiological and psychological withdrawal symptoms within the past week. In addition, the CWS measures attempts to try to cut down, limit, or stop using AODs in the past week. Higher scores on the scale represent more withdrawal symptoms, and scores above 12 indicate a need for medical monitoring and/or evaluation. The scale was created by merging the withdrawal symptoms associated with each

substance in the DSM-IV and experts in the field agreeing on common terms for the questions that patients would understand. Examples of questions on the CWS are: When you did this, did you have any of the following withdrawal symptoms or problems? (a) move and talk slower than usual, (b) yawn more than usual, (c) feel tired, (d) have bad dreams that seemed real, (e) throw up or feel like throwing up, and (f) sweat more than usual, have your heart race, or goose bumps (GAIN Coordinating Center, 2011). The CWS demonstrates high internal consistency for both adults (.94) and adolescents (.92; GAIN Coordinating Center, 2011). The demonstrated Rasch person internal consistency reliability is .79, and the item reliability was found to be 1.00 (Conrad et al., 2010).

Functionality

Functionality is defined as using drugs or alcohol causing a reduction in tasks such as work or social activities (APA, 2000). Scales used to measure functionality are: (a) *Training Activity Scale* (TAS5), (b) *Employment Activity Scale* (EAI5p), and (c) the variable *Weekly Family Problems* (whyfmp_0). The *Training Activity Scale* (TAS5p) was used to measure the days in school or training at work, days in trouble, and days missed and suspended in the past year (GAIN-I) and past 90 days (M90). Higher scores are indicative of more days spent in training, more days at school, and less trouble at work or school. The TAI5p includes questions such as: During the past 90 days, how many... (a) days did you go to any school or training, (b) days did you miss school or training for any reason, and (c) days did you get in trouble at school or work for any reason? (GAIN Coordinating Center, 2011). The TAI5p has strong internal consistency for adults (.95; GAIN Coordinating Center, 2011).

The *Employment Activity Scale* (EmASp) was utilized to measure functionality in the sample in the past year (GAIN-I) and past 90 days (M90). The EmASp is calculated by averaging the number of items indicated by participants and then dividing that score by the range. Items include days spent working, days working full-time, days in trouble at work, and days suspended from work and days missed. Higher scores indicate higher levels of employment and less days of trouble at work. Sample questions from the EAI5p are: During the past 90 days, how many... (a) did you work for money at a job or business, (b) did you work full time (7 or more hours per day), and (c) did you miss work for any reason? (GAIN Coordinating Center, 2011). The EAI5p has strong internal consistency for both adults (.95) and adolescents (.93; GAIN Coordinating Center, 2011).

The variable *wkyfmp* is a dichotomous variable that measures the presence of weekly family problems within the past 90 days based on the question: In the past 90 days, on how many days have you gotten in trouble at home or with your family for any reason? (GAIN Coordinating Center, 2011). Twelve days and under are coded as zero, meaning no problems, and 13 days and over are coded as 1, indicating the presence of weekly family problems. Since the variable is dichotomous, specific reliability cannot be calculated.

Mental Distress

Mental distress is defined as having internalizing disorders (i.e. general mental distress, somatization, depressive symptoms, anxiety, and suicidal/homicidal thoughts) in the past year (GAIN Coordinating Center, 2011; Schmitz et al., 2009). The *Internal Mental Distress Scale* (IMDS) was used to measure mental distress in the sample and is a count of mental distress symptoms. The IMDS was created through confirmatory factor analysis (Dennis, Chan, & Funk,

2006) and has good Rasch person internal consistency reliability (.89) and the item reliability results were 1.00 (Conrad et al., 2009b). The IMDS includes 43 items, in which higher scores indicate higher levels of internal mental distress. Examples of scale questions include: (a) When was the last time, if ever, your life was significantly disturbed by nerve, mental or psychological problems or that you felt you could not go on, including those things we just talk about?; (b) During the last 12 months, have you had a significant problem with: (1) Headaches, faintness, dizziness, tingling, tingling, numbness, sweating or hot and cold spells, (2) Pain or heavy feeling in your heart, chest, lower back, arms, legs or other muscles?, and; (c) When was the last time, if ever, you had any problems paying attention, controlling your behavior, or broke rules you were supposed to follow? (GAIN Coordinating Center, 2011). The IMDS is made of subscales, and because of multicollinearity issues and the need for the most accurate results, subscales of the IMDS was used to measure mental distress rather than full scales. Subscales of the IMDS that were utilized to measure mental distress of participants include: (a) the *Somatic Symptom Index* (SSI), (b) the *Depressive Symptom Scale* (DSS), and (c) the *Anxiety/Fear Symptom Scale* (AFSS).

The *Somatic Symptom Index* (SSI) is a count of four items, which assesses the number of physical symptoms within the past year that are typically related to mental distress. Higher scores indicate a stronger presence of somatic symptoms. Examples of questions include: During the past 12 months, have you had significant problems with...(a) headaches, faintness, dizziness, tingling, numbness, sweating or hot or cold spells, (b) sleep trouble, such as bad dreams, sleeping restlessly or falling asleep during the day, and (c) having dry mouth, loose bowel movements, constipation, trouble controlling your bladder or related itching? (GAIN Coordinating Center,

2011). This scale was developed from the Bohlig and Dennis (1996) factor analysis of the Hopkins Symptom Checklist -25 (Derogatis, Lipman, & Covi, 1973; Lipman, Covi, & Shapiro, 1979) and is a summative scale of self-reported symptoms.

The *Depressive Symptom Scale* (DSS9) counts the nine DSM-IV (APA, 1994) criteria for past year symptoms of depression. Higher scores on the DSS indicate higher levels of depressive symptoms, as well as, higher levels of indecisiveness and/or hopelessness. The DSS9 was also based on the Bohlig and Dennis (1996) factor analysis of the Hopkins Symptoms Checklist. Examples of questions on the DSS9 are: During the past 12 months, have you had significant problems with (a) feeling very trapped, lonely, sad, blue, depressed, or hopeless about the future (b) losing interest or pleasure in work, school, friends, sex, or other things you cared about, and (c) moving and talking much slower than usual? (GAIN Coordinating Center, 2011).

The *Anxiety/Fear Symptom Scale* (AFSS) is a count of the self-reported past year symptoms, based on the 12 DSM-IV (APA, 1994) criteria, of anxiety disorder. Higher scores on the AFSS indicate higher levels of anxiety symptoms. Examples of questions from the AFSS are: During the past 12 months, have you had any significant problems with (a) having to repeat an action over and over, or having thoughts that kept running over in your mind (b) thoughts that other people were taking advantage of you, not giving you credit or causing you problems and (c) being unable or finding it difficult to control your worries? (GAIN Coordinating Center, 2011).

Stress

Stress is considered to be general personal and life stressors. Stress was measured by the (a) *Personal Sources of Stress Index* (PSSI), and (b) *Other Sources of Stress Index* (OSSI). The

Personal Sources of Stress Index (PSSI) was used to measure personal stress (defined as the number of stressors related to personal relationships [i.e. health, relationships, fights, loss of family/friends]) in the past year (GAIN-I). For this study, the missing replaced version of the PSSI (mPSSI) was utilized for data analysis, which means that if one item was missing from the index, the data was transformed because all items must be present in order to calculate the PSSI. The PSSI counts the number of stressors that are related to relational issues in the past 90 days and past year. Higher values are indicative of higher levels of personal stress. Examples of questions on the PSSI are: During the past 12 months, have you been under stress for any of the following reasons related to your family, friends, classmates, or coworkers: (a) birth or adoption of new family member, (b) health problem of a family member or close friend, and (c) major change in relationships (marriage, divorce)? (GAIN Coordinating Center, 2011). The PSSI is a summative scale; therefore, internal consistency cannot be measured.

Other Sources of Stress Index (OSSI) was also used to measure stress as a result of substance use. OSSI is a count of the number of stressors that are environmental, such as work or school that have occurred in the past year (GAIN-I) and past 90 days (M90). Higher values indicate higher levels of external stress. For this study, the missing replaced version of the OSSI (mOSSI) was utilized for data analysis, which means that if one item was missing from the index, the data was transformed because all items must be present in order to calculate the OSSI. Examples of questions on the OSSI include: During the past 12 months, have you been under stress because of the following kinds of demands on you: (a) Major change in housing or bad housing, (b) Hard work or school schedule, and (c) Interruption or loss of housing, job, school, or transportation? (GAIN Coordinating Center, 2011). Both the PSSI and OSSI were adapted

from the DSM-IV (APA, 1994). The OSSSI is a summative scale; therefore internal consistency cannot be measured.

Consequences

Consequences was measured using the Consequences [*Consq*] variable, which is a dichotomous variable that asks: During the past 90 days (GAIN-I only), (a) how stressful have things been for you because of your use of AODs, (b) How much has your use of AODs caused you to reduce or give up important activities, and (c) How much has your use of AODs cause you to have emotional problems? (GAIN Coordinating Center, 2011). Scores less than two indicate a lack of severe consequences as a result of substance use. Scores greater than or equal to two indicate that the individual is experiencing extreme consequences as a result of substance use. As a result, a number one is assigned to those who have scores of two or greater to represent having extreme consequences, and the number zero is assigned to those with scores under two in order to represent those not having extreme consequences. *Consq* is a dichotomous variable; therefore, internal consistency cannot be calculated.

Illegal Activity

Illegal activity is defined as any activity that is *not* legal (e.g., selling drugs, stealing, or driving under the influence of AODs; GAIN Coordinating Center, 2011) and was measured by the *Illegal Activities Scale* (IAS5P) and the *General Crime Scale* (GCS). The IAS5P measures the amount of days that a person has engaged in illegal activity or supported him or herself financially with illegal activity (i.e. prostitution, selling drugs) throughout the lifetime. Higher scores on the scale indicate more recent illegal activity, more dependence on illegal activity for financial support, and more total days of illegal activity; therefore higher scores indicate overall

higher amounts of illegal involvement and dependence. The scale includes questions such as: (a) During the past 90 days, on how many days were you involved in any activities you thought might get you into trouble or be against the law? (Besides drug use), and (b) On how many of these days were activities involved that you thought might get you into trouble or be against the law? (GAIN Coordinating Center, 2011). The IAS5P demonstrated moderate internal validity with a Cronbach's alpha of .69 for adults (GAIN Coordinating Center, 2011).

The *General Crime Scale* (GCS) was also be used to measure the amount of general crimes self-reported by participants. The GCS is a count of the number of illegal activities that the participant self-reports as being involved with in the past year (GAIN-I) and past 90 days (M90). The GCS was based on statements that matched with the National Household Survey on Drug Abuse (1997; Office of Applied Statistics [OAH], 1996) crime reports. Factor analyses were also performed on the GCS in order to create the scale. Higher scores on the GCS are indicative of higher levels of illegal activity. The GCS is made up of three subscales: The Property Crime Scale, the Interpersonal Crime Scale, and the Drug Crime Scale. Total scores were used for the GCS rather than subscale scores. Examples of the GCS include: During the past 12 months, how many times have you... (a) purposively damaged or destroyed property that did not belong to you, (b) broken into a house or building to steal something or just to look around, and (c) made someone have sex with you by force when they did not want to have sex? (GAIN Coordinating Center, 2011). The GCS demonstrated good internal reliability with a Cronbach alpha of .78 (GAIN Coordinating Center, 2011).

Suicidality/Homicidality

Suicidality/homicidality is defined as suicidal or homicidal thoughts or attempts (GAIN Coordinating Center, 2011). The *Homicidal/Suicidal Thoughts Scale* (HSTS) was utilized to indicate the presence of suicidal/homicidal thoughts within the past year (GAIN-I) and past 90 days (M90). The HSTS is a subscale of the Internal Mental Distress Scale, which was discussed within the mental distress section. The scale counts the number of items reported that indicate thoughts, plans, or actions related to killing oneself or someone else: higher scores on the HSTS indicate a higher risk of suicide or homicide. For psychometrics of the IMDS, please see the mental distress section. The HSTS includes questions such as: During the past 12 months have you (a) thought about killing or harming yourself, (b) thought about ending your life or committing suicide, and (c) thought about killing or harming someone else? (GAIN Coordinating Center, 2011). The HSTS is a subscale within IMDS, which has demonstrated strong reliability with an alpha of .95 (GAIN Coordinating Center, 2011).

Environmental Risk

Environmental risk is defined as environmental and social risks to sustained sobriety (e.g., individuals with high levels of environmental risk have higher numbers of peers and environmental supports that encourage and sustain substance use behaviors; e.g., Jędrzejczak, 2005; Sareen & Kaur, 2012). The *Environmental Risk Scale* (ERS21) was used to measure environmental risk for participants within the past year and measures how many people in various environments of the participant's life (e.g., school, work, social settings) that are involved in criminal activities, substance use, and lack of engagement in work, school, or recovery. The ERS21 includes three subscales: *Living Risk Index*, *Vocational Risk Index*, and the

Social Risk Index. Total scores were utilized in this study rather than subscale scores. Higher scores on the ERS21 indicate higher numbers of friends/peers that abuse AODs, are involved in criminal activity, who argue or fight, are not involved with work or school, and are not involved with recovery services. Examples of questions on the ERS21 include: Of the people you have regularly lived with, would you say that none, a few, some, most or all of them (a) Were employed or in school or training full time, (b) Would describe themselves as being in recovery, and (c) Have ever been in drug or alcohol treatment? (GAIN Coordinating Center, 2011). The ERS21 demonstrated moderate internal reliability with a Cronbach alpha of .67 (GAIN Coordinating Center, 2011).

Health Problems

Health problems are defined as any medical or physical problems reported in the past 90 days (GAIN Coordinating Center, 2011), which was measured by the *Health Problem Scale* (HPS3p) to determine the presence and magnitude of health problems for participants. The HPS3p measures the presence, recent occurrence, and severity of self-reported health problems. Higher scores indicate recent presence of health problems and more interference of health problems with functionality. Examples of items include: (a) During the past 90 days, on how many days were you bothered by medical or health problems? and (b) During the past 90 days, on how many days have medical or health problems kept you from meeting your responsibilities at work, school or home? (GAIN Coordinating Center, 2011). Higher scores indicate a greater number of health problems and more interference with responsibilities. The HPS3p demonstrates moderate internal reliability with a Cronbach alpha of .72.

Trauma

Trauma is defined as current stress that results from past experiences with extremely stressful or distressing experiences (e.g., abuse, PTSD; GAIN Coordinating Center, 2011) and was measured using the *Traumatic Stress Scale* (TSS). The TSS is a subscale of the IMDS (see mental distress section for psychometrics of the IMDS). The TSS is a count of the number of symptoms or memories related to trauma or other severe mental stress (i.e. complex PTSD) within the past year (GAIN-I) and past 90 days (M90). Higher scores on the TSS indicate a stronger presence of traumatic symptoms or memories. Examples of questions on the TSS are: During the past 12 months, have the following happened to you: (a) when something reminds you of the past, you became very distressed and upset, (b) you had nightmares about things in your past that really happened, and (c) when you think of things you have done, you wish you were dead? (GAIN Coordinating Center, 2011). The TSS demonstrated strong internal reliability with a Cronbach alpha of .93.

The Turning Point

TTP is defined as the cognitive shift from substance user to non-substance user (Brown, 1985; DePue et al., in press) and includes (a) motivation, (b) awareness, and (c) social and environmental support (e.g., Miller & Rollnick, 2001; Prochaska et al., 1991; 1994; Robinson et al., 2011; Simpson & Joe, 1993). The following section delineates the three hypothesized variables of TTP and the scales, subscales, and variables from the GAIN that was used in this study. Examples of questions within scales, subscales, and variables come directly from the GAIN assessment (Chestnut Health Systems, 2002) or the evaluator manual for the GAIN (GAIN Coordinating Center, 2011).

Motivation

Motivation is measured using the (a) *Treatment Motivation Index*, (b) *Treatment Resistance Scale*, and (c) *Reasons for Quitting Scale*. These scales look at the reasons someone enters treatment and his or her level of motivation to change. The *Treatment Motivation Index* (TMI) measures the current amount of external pressure for treatment, internal motivation for treatment, support for treatment, and hope for self-improvement through the treatment system. Higher scores on the TMI indicate higher levels of internal and/or external motivation for treatment. Examples of questions on the TMI include: Do you currently feel that (a) there is a lot of pressure for you to be in alcohol or drug treatment, (b) you need to be in treatment for at least a month, and (c) you will probably need to come back to treatment again one or more times during your lifetime? (GAIN Coordinating Center, 2011). The scale was initially adopted from Simpson and Joe (1993), who used the scales *Drug Use Problems* (DP), *Treatment Readiness* (TR), and *Desire for Help* (DH) in a study to predict methadone dropouts. The scales demonstrated moderate reliability (DP, .88; TR, .72; DH, .77). Confirmatory factor analysis for the DH scale yielded results of .97 for goodness of fit, the DP scale resulted in a .85 goodness of fit, and the TR scale had a .90 goodness of fit. As such, the Simpson and Joe (1993) scale provide evidence that the background of the TMI has sound psychometrics. The TMI is a summative index; therefore, internal consistency cannot be calculated. Considering the origin of the scale, it is reasonable to say that the scale is sound.

The *Treatment Resistance Index* (TRI) was also adapted from the Simpson and Joe (1993) scale and counts the current number of items that assess resistance to treatment or having difficulty with treatment. Higher scores on the TR indicate higher levels of resistance to

treatment. The TRI scale works in conjunction with the TMI in that moderate amounts of motivation without resistance can yield positive results; however, low to moderate motivation coupled with resistance does not typically lead to good treatment outcomes. This study assumed that the TRI score would be low within the TTP. The TRI includes questions such as: Do you currently feel that (a) being in a treatment program is too demanding for you, (b) you have too many other responsibilities now to be in a treatment program, and (c) your old friends may try to get you to drink or use drugs again? (GAIN Coordinating Center, 2011). The TRI is a summative scale; therefore, internal consistency cannot be calculated.

The *Reason for Quitting Scale* (RFQ33) is a count of dichotomous (i.e. yes/no) reasons that the sample gives for quitting substance use. Two subscales are included: *Personal Motivation Scale* (PMS18) and the *Interpersonal Motivation Scale* (IMS8). Within this study, the subscales scores were utilized in order to provide the most detail about the types of motivation for quitting. Higher scores on the PMS18 and IMS8 indicate more identifiable reasons for quitting by the participant. Both the PMS18 and IMS8 count the reasons that participants give for wanting to stop using substances. Two answers are possible on each of the scales: yes or no, which is why they are called dichotomous. Examples of the PMS18 include: You want to quit using AODs at this time...(a) so you will be able to think more clearly, (b) because you want to have more energy, and (c) because you want to do better in life? (GAIN Coordinating Center, 2011). All eight items of the IMS8 were included in MM-C: You want to quit using AODs at this time...(a) so that you can get a lot of praise from people you are close to, (b) because someone has told you to quit or else, and (c) to get your child or children back, (d) because you parents, girlfriend, boyfriend or other person you are close to will stop nagging you if you quit, (e)

because someone has told you to quit or else, (f) because you will receive a special gift if you quit, (g) because there is an alcohol or drug testing policy in detention, probation, parole or school, and (h) because of legal problems related to your alcohol or drug use? (GAIN Coordinating Center, 2011). Both the PMS18 and IMS8 demonstrate good reliability with alphas of .92 (PMS18) and .82 (IMS8; GAIN Coordinating Center, 2011).

Awareness

Awareness is defined as conscious understanding that a substance problem exists and treatment is needed (Flora, 2012). The perception/awareness for the need of treatment is measured using the GAIN variables: Self-reported need for any treatment (*NeedANYtx*; GAIN-I only) and Ever Attended 12-Step Meeting (*S6*). *NeedANYtx* is a dichotomous variable that measures if an individual recognizes the need for AOD treatment. Questions include: “Between alcohol, marijuana, cocaine, heroin and any other drugs... for which ones do you most need treatment?” (GAIN Coordinating Center, 2011). The results are then coded for the substances participants endorse: for example, if a participant indicates the need for alcohol treatment, then she would receive a score of 1, whereas a score of 0 indicates a lack of perceived need for alcohol treatment. The second variable, *Ever Attended 12-Step Meeting* is also a dichotomous variable that asks if the participant has ever attended A.A., N.A., etc. A score of 0 indicates the individual has never been to a 12-step meeting, whereas a score of 1 indicates that the participant has attended a 12-step meeting in their lifetime. *S6* is expected to load into awareness because attending 12-step meetings would indicate a level of awareness that the need for change may exist.

Support

Support is defined as the social (peer, family, friends) and environmental (living situation, work, school) help and assistance for sustained recovery (Ripley et al., 2006). Social support was measured by the (a) *General Social Support Index*, and (b) *Spiritual Social Support Index*, whereas environmental support was measured using the (a) *Recovery Environment Risk Scale*, (b) *Environmental Strengths Index*, and (c) *Environment Risks Scale*.

Social Support. Social support measures the social assistance for maintaining recovery. The *General Social Support Index* (GSSI) is a summative index that indicates the number of social support systems identified by the participant. Higher scores indicate a greater amount of social support in the person's life, whereas low scores indicate the opposite. Examples of questions on the GSSI are: During the past 12 months, did you have the following kinds of social support: (a) a professional counselor or other health care provider to talk to, (b) people at work or school you could talk to about day-to-day things, and (c) Someone you felt like you could talk to about needs and emotions? (GAIN Coordinating Center, 2011).

The *Spiritual Social Support Index* (SSSI) is also a summative index that indicates the amount of spiritual support identified by the participant. Higher values indicate higher amounts of spiritual support. All six items were used from the SSSI scale in one measurement model; therefore those questions on the SSSI are as follows: (a) Do you consider yourself to be a good [State religion from E13; E13C1_0], (b) Do you regularly attend services or ceremonies (E13c2_0), (c) Do you consider your religious or spiritual beliefs to be very strong (E13d1_0), (d) Do you consider your religious or spiritual beliefs to be very important to you (E13d2_0), (e) Do you consider your religious or spiritual beliefs to often influence your decisions (E13d3_0),

and (f) Is it important for your friends to share your religious or spiritual beliefs (*E13e_0*)? (GAIN Coordinating Center, 2011). The only item not included in the measurement model analysis with items was: Religious Affiliation (*E13a_0*). This item was nominal and recoded into a dichotomous variable (*rE13a_0*): scores of 1 indicated religious affiliation of some kind and scores of 0 indicated no affiliation. The recoded item loaded as linearly dependent in the measurement model and was removed from that analysis (Measurement Model C). Further, administrators at the GAIN Coordinating Center also recommended removing the item from that analysis.

Environmental Support. Environmental support is defined as the conditions that the participant lives and works and was measured using the scales: (a) the *Recovery Environment Risk Scale*, (b) *Environmental Strengths Index*, and (c) the *Environmental Risk Index*. The *Recovery Environment Risk Scale* (RERI13p) is an indicator of the environmental support for recovery and the involvement in self-help activities by the participant. Self-help activities would be part of the environment, and therefore, are included within the RERI13p. Higher scores are indicative of higher amounts of environmental risk and lower amounts of attendance at self-help and/or substance free activities. Examples of questions on the RERI13p include: (a) During the past 90 days, on how many days have you attended one or more self-help group meetings (such as AA, NA, CA or Social Recovery), (b) When was the last time (if ever) that during an argument with someone else you swore, cursed, threatened them, threw something, pushed or hit someone in any way, and (c) During the past 90 days, on how many days have you been homeless or had to stay with someone else to avoid being homeless? (GAIN Coordinating Center, 2011). During TTP, the RERI13p score is expected to be low, since support is an

indicator of the TTP. Test-retest reliability for the RERI13p demonstrated an $r = .82$ (Dennis, Godley, & Funk, 2005). The missing replaced version of the RERI13p was used in this study to account for any missing items.

The *Environmental Strengths Index* (ESI) is a summative index of a possible 12 environmental factors that are positive environmental supports (i.e. a lack of fighting with others, exposure to others in recovery). Higher values indicate higher levels of environmental strengths in the participant's life. Environmental strengths are expected to be high, as environmental support is an expected inclusion in TTP. Some examples of the GAIN variables within the ESI include: anyone at home in recovery (*Anyrechom*), anyone at home ever in drug or alcohol treatment (*Anytxhom*), any social peers in treatment (*Anytxsoc*), and any social peers in recovery (*Anyrecsoc*). These are all dichotomous (yes/no) variables that measure the existence of treatment or recovery exposure in the participant's life. The ESI is a summative scale; therefore internal consistency cannot be calculated.

Environmental risk is considered as environmental and social risks to sobriety (GAIN Coordinating Center, 2011). Individuals with high levels of environmental risk have higher numbers of peers and environmental supports that encourage and sustain substance use behaviors. The *Environmental Risk Scale* (ERS21) was used to measure environmental risk in participants. The ERS21 was also utilized to measure the BOE; however, scores are expected to be high in the BOE and low in TTP. Environmental risks are a factor within the BOE because of the social and environmental situations individuals place themselves that maintain their substance use. However, environmental risk should be lower in TTP, thus supporting cognitive

change. Please see the environmental risk subsection within the BOE scales/variables for the full description of the ERS21.

Early Recovery

Early recovery can be considered abstinence from substances between one day and one year (APA, 2000) and the involvement in self-help activities/maintenance program (Hansen, Ganley, & Carlucci, 2008; Laudet, 2007). Early recovery is now thought to include both mental and physical health aspects (e.g., BFI, 2007); therefore, these elements were included as indicators in the factor ER. The following section delineates the eight hypothesized variables of ER and the scales, subscales, and variables from the GAIN that were used in this study. Early recovery is hypothesized to include the following factors:

- (1) No/reduced substance dependence (DSM-IV-TR; APA, 2000) as measured by the Substance Dependence Scale (SDSm_0 and SDSy_0) and the variable *Past Month Abstinence* (pmabst_0)
- (2) No/reduced substance use (DSM-IV-TR; APA, 2000) as measured by the Substance Frequency Scale (SFS8p_0)
- (3) Involvement in self-help activities (e.g., SAMHSA, 2011; White, 2007) as measured by the Self-Help Activities Scale (SHAS_0)
- (4) Low/improved physical health (e.g., BFI, 2007; del Vecchio, 2012) as measured by the Health Problems Scale (HPS3p_0)
- (5) Low/improved psychological health (e.g., BFI, 2007; del Vecchio, 2012) as measured by the IMDS subscales: Somatic Symptoms Index (SSI_0), Depressive Symptoms Index (DSS9_0), Anxiety/Fear Symptom Scale (ASFS_0), Homicidal/Suicidal Thoughts Scale (HSTS_0), and Traumatic Stress Scale (TSS_0)

(6) Healthy relational functioning (e.g., del Vecchio, 2012; White, 2007) as measured by the variable *No Family Problems* (nofhp_0)

(7) Healthy coping styles (e.g., Dennis et al., 2007) as measured by the Personality Coping Styles Scale (PCSS)

(8) Living in the community (not in a treatment center or jail for at least 30 days; e.g., BFI, 2007; White, 2007) as measured by the variable *Living in the Community* (InCom_0)

Examples of questions within scales, subscales, and variables come directly from the GAIN assessment (Chestnut Health Systems, 2002) or the evaluator manual for the GAIN (GAIN Coordinating Center, 2011). The following section outlines the scales that were used to measure each of the expected factors within ER.

Abstinence

The GAIN instrument has a variable called “*Recov.*” *Recov* includes the *Substance Problem Scale* past month, the variable representing Living in the Community (*InCom*), and the variable representing Past Month Abstinence (*pmabst*). Because of multicollinearity issues with the *Substance Problem Scale*, the *Substance Dependence Sub-Scale* was used, as well as the other two criteria for the variable *Recov*. An additional reason for this decision was to be inclusive to the concept of recovery without achieving full abstinence; therefore, the individual items provided more information than the variable *Recov*. Therefore, like the BOE, the Substance Dependence Sub-Scale (SDS) *past month and past year* was utilized. Please see the BOE section for details about the SDS. Whereas on the BOE, the score for SDS is expected to be high, in ER, the score is expected to be low. Similarly, the Substance Frequency Scale (SFI8) was also used

to measure the BOE with expected high scores in the BOE. However, the SFI8 is expected to have low scores within ER.

An additional measurement that was used to test abstinence is the GAIN variable: Past Month Abstinence (*pmabst*). This is a dichotomous variable that asks whether or not a person has used substances within the past month: lack of use is indicative of early recovery and expected to correlate with other aspects of early recovery. Scores of zero indicate the lack of abstinence for the past month, whereas scores of one indicate the presence of abstinence for the past month.

Self-Help Activity

Self-help is defined in this participation in 12-step or other types of mutual help groups (GAIN Coordinating Center, 2011) and was measured using the *Self Help Activities Scale* (SHAS). The *Self Help-Activity Scale* (SHAS) was used to measure the amount of self-help activities that participants engage. The SHAS is a count of 19 possible items that indicate participation and involvement in self-help activities. Higher scores on the SHAS indicate higher levels of self-help activity. Some examples of items are as follows: In the past 90 days (a) have you talked to your sponsor at a meeting, (b) spoken up (shared) at a self-help meeting, and (c) considered yourself a member of a home group? (GAIN Coordinating Center, 2011). Higher scores indicate higher amounts of participation and involvement in self-help groups. The SHAS has demonstrated strong reliability with a Cronbach's alpha of .94 (GAIN Coordinating Center, 2011).

Low/Improved Physical Health

The lack of or low health problems was measured using the *Health Problem Scale* (HPS3p), which was also used within the BOE (please see the BOE section for full information

about the HPS). HPS3p was used to determine the presence and magnitude of health problems for participants within the past 90 days at intake. Unlike the BOE, scores for health problems in ER are expected to be lower.

Low/Improved Psychological Health

Low or improved psychological health in ER was measured using the subscales of the IMDS (see BOE section on mental distress, trauma, and suicidality for full descriptions of these scales). In opposition to the BOE, in ER, scores are expected to be low on all subscales of the IMDS.

Healthy Relational Functioning

Relational functioning is defined as the overall level of functioning of family and personal relationships in an individual's life (APA, 2000). Within this study, relational functioning is indicated by the variable: *nofhp*. *Nofhm* is a dichotomous variable that indicates whether a participant has had family or home problems within the past 90 days. Questions include: (a) During the past 90 days, on how many days have you been homeless or had to stay with someone else to avoid being homeless; (b) During the past 90 days, on how many days did other people use alcohol where you were living; (c) During the past 90 days, on how many days did other people use drugs where you were living; and (d) During the past 90 days, on how many days have you gotten into trouble at home or with your family for any reason? (GAIN Coordinating Center, 2011). Scores of 0 indicate the lack of family/home problems, whereas scores of 1 indicate the presence of family/home problems. Internal consistency could not be calculated because the scale was dichotomous.

Coping Styles

Coping styles are defined as the manners in which individuals deal with emotional issues (Dennis et al., 2007). The *Personality Coping Styles Scale* (PCSS) was used to measure coping styles in participants. The PCSS is a 21-item scale that measures self-reported manners of dealing with emotional issues. The subscales of the PCSS correlate with the DSM-IV (APA, 1994) Type II Personality Disorders: Cautious Personality Index, Impulsive Personality Index, and Worrying Personality index. Total scores, rather than subscale scores, was utilized for the PCSS. Higher scores on the PCSS indicate higher levels of negative emotional coping. Examples of questions on the PCSS are: Do each of these statements describe you within the past 12 months? (a) You could not really trust people, (b) You lied often and easily, and (c) You had a hard time changing the way you did things? (GAIN Coordinating Center, 2011). The PCSS demonstrated good reliability with a Cronbach alpha of .89.

Living in the Community

Living in the community was measured using the GAIN variable: living in the community more than 14 of the past 90 days not in a controlled environment (*InCom*). *InCom* is a dichotomous variable that measures whether or not an individual was living in a controlled environment (i.e. jail, treatment center) or a group home (i.e. half-way house). Since *InCom* is a dichotomous variable, internal consistency cannot be measured.

This section discussed the constructs (BOE, TTP, and ER) that were being investigated in this study. Various indicators were discussed that were hypothesized to load into the single factor structure of the BOE, TTP, and ER. If available, validity and reliability of the indicators were discussed, and conclusions may be drawn that the hypothesized indicators have demonstrated

good reliability and validity. The GAIN is comprised of eight core section, and indicators were chosen that were closest to matching the theory behind the BOE, TTP, and ER.

Variables Considered for the Study

The aforementioned section denoted the variables that were chosen to use within the current study. Certain variables were considered but not utilized. For example, the *Global Assessment of Relational Functioning* is a DSM (APA, 2000) scale that measures healthy relational functioning. The GARF is indicated in the GAIN based on the clinician's judgment of the client, and consequently, frequently left unanswered. Although the GARF would have been an excellent indicator of relational functioning, the lack of available data excluded the measurement. Other variables were also included that indicated descriptives about past treatment, the type of current treatment, and detailed descriptions about the types of substances participants were abusing. These questions did not specifically address the research questions at hand, and although they peaked the researcher's curiosity, it was essential to remain loyal to the research question. Lastly, some variables were repetitive, and therefore, excluded from the study. For example, the *Substance Frequency Scale* is a valid instrument that measures the frequency of substance use. There are variables that also ask about frequency of use, but the researcher chose to use scales or subscales, rather than variables, if possible because of the additional validity and reliability checks for scales and subscales.

Exploratory Research Questions and Hypotheses

Research serves the purpose of identifying problems in the literature and answering specific questions about those problems. Similar to a treatment plan in counseling, research questions guide the study design and data analysis (Heppner et al., 2008). The research questions

are more general, as they describe the overall problems and questions found within the literature, whereas the hypotheses are more specific and state the expected nature of relationships between the BOE, TTP, and ER (Heppner et al., 2008). The following section delineates the exploratory research questions driving this study, as well as the hypotheses derived from theory and previous research.

Exploratory Question and Hypothesis One

Q: What is the factor loading for *the BOE* construct at intake?

H: Collinearity between the identified variables ([1] substance dependence, [2] heavy using, [3] withdrawal symptoms, [4] functionality, [5] mental distress, [6] stress, [7] consequences, [8] illegal activity, [9] suicidality/homicidality, [10] environmental risk, [11] health problems, and [12] trauma) will load into a single factor structure entitled the BOE at the intake period.

Exploratory Question and Hypothesis Two

Q: What is the factor loading for TTP construct at intake?

H: Collinearity among identified variables ([1] motivation, [2] awareness, and [3] support) will load into a single factor structure entitled TTP at the intake period.

Exploratory Question and Hypothesis Three

Q: What is the factor loading for the ER construct at intake?

H: Collinearity between the identified variables ([1] no/reduced substance dependence, [2] no/reduced substance use, [3] self-help activity, [4] low/improved health problems, [5] low/improved psychological health, [6] healthy coping styles, [7] healthy relational functioning, and [8] living in the community) will load into a single factor structure entitled ER at the intake time period.

Exploratory Question and Hypothesis Four

Q: Does the bottoming out experience (BOE) and the turning point (TTP) contribute to the levels of early recovery (ER) at intake?

H: Levels of the BOE and levels of TTP at intake will contribute to levels of ER at the intake time period (See Figure 1).

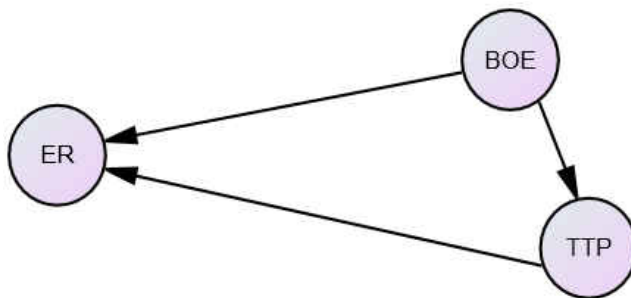


Figure 1: Path Analysis Model

Data Analysis Procedures

The data was analyzed using *Statistical Program Systems Software 20th edition* (SPSS; IBM, 2012) and the *Analysis of Moment Structure 19th edition* (AMOS; Arbuckle, 2010). SPSS was utilized to analyze descriptive data about participants, clean the dataset, and check that all statistical assumptions were met. AMOS is a general tool to analyze data using confirmatory factor analysis and path analysis procedures (Arbuckle, 2010). SEM was utilized to test the theoretical model denoted in the research. SEM is a confirmatory technique that is frequently used with correlational designs (Tabachnick & Fidell, 2007). SEM is the combination of statistical analyses procedures that allow the researcher to test a variety of relationships between multiple DV and IVs that are discrete or continuous (Schreiber, et al., 2006; Tabachnick &

Fidell, 2007; Ullman, 2006). SEM uses both confirmatory factor analysis and path analysis to test theoretical models. SEM is a five-step process that includes: (a) model specification, (b) model identification, (c) model estimation, (d) model testing, and (e) model modification (Kline, 2011). There are three general types of SEM: (a) strictly confirmatory; (b) alternative models; and (c) model generating (MG; Byrne, 2010). This study utilized a MG approach, which is distinguished from other types in that the researcher imposes a model on the existing data to determine whether there is a good fit. If the fit is not statistically sufficient, then the researcher determines scenarios in which the fit can be improved and changes the model accordingly (Byrne, 2010). Consequently, MG is a method of using SEM in an exploratory manner. The first step of SEM includes two types of model specification: (a) the measurement model (CFA), and (b) the path analysis model. Measurement models must be statistically sound in order to proceed with the path analysis. Consequently, data analysis involved a series of testing the three constructs individually before combining them into a single measurement model.

SEM has a few notable characteristics that made it the most appropriate statistic to use for the current study. First, this study hypothesized a theoretical model, and the research question deemed that the statistic confirmed, rather than explored, the relationships between BOE, TTP, and ER. SEM is a confirmatory approach; therefore, it was an appropriate technique (Byrne, 2010). Second, a benefit to using SEM was that errors were estimated and accounted for within the model; therefore, the results were not skewed by error (Byrne, 2010; Tabachnick & Fidell, 2007). Third, SEM accounts for non-normal distributions, and since data in the human sciences does *not* always yield normal distributions, SEM is an appropriate technique to combat these issues (Kaplan, 2000). Fourth, SEM allows the inclusion of both observed and unobserved

variables, and since this study hypothesized the relationships between three unobserved variables, SEM was appropriate (Byrne, 2010). Lastly, there are no alternatives to SEM that have similar characteristics as listed in this section, (Byrne, 2010) and as a result, SEM was the statistic of choice for the study.

Statistical Power

Power analysis is essential in reporting SEM results. Power can be analyzed multiple ways for SEM. In this study, power was reported based on MacCallum et al. (1996), which provides a chart with power guidelines for SEM. The MacCallum et al. (1996) chart is based on sample size and the degrees of freedom of the model; therefore, power was reported for each model results in Chapter 4.

Model Fitting and Fit Indices

The model fitting process in SEM is done by testing models, analyzing regression weights of loading factors, analyzing the fit indices that result from analysis, and then changing the model based on results (Byrne, 2010). This section discusses the fit indices that were used in this study to assess model fit. This study utilized the MI method of SEM; therefore three types of fit indices were used: (a) absolute indices, (b) incremental indices, and (c) parsimony indices.

Absolute Indices

Absolute fit indices are used to test the hypothesis that the theoretical model is a good fit for the data. Absolute fit indices are the most accurate method for determining model fit because they test whether the model fits the data compared to having no model (Hooper et al., 2008). The following absolute fit indices were reported in this study: (a) the chi-square (χ^2), (b) the χ^2 ratio,

(c) the goodness of fit index (GFI), and (d) the root mean square error of approximation (RMSEA).

Chi-Square (χ^2)

The χ^2 statistic tests the discrepancies between the hypothesized model, variances, covariances, and overall factor loadings fit with the actual model, variances, covariances, and overall factor loadings (Byrne, 2010). Consequently, a model with good fit would result in the χ^2 statistic as insignificant at the .05 level (Hooper et al., 2008), indicating that the discrepancies were not significant. The χ^2 statistic was the foundational statistic in SEM and is the only inferential statistic within the fit indices (Iacobucci, 2010); however, multiple issues have been reported with the use of χ^2 (Byrne, 2010). For example, in large sample sizes, the χ^2 statistic “nearly always rejects the model when large sample samples are used” (Hooper, et al., 2008, p. 54). Further, the χ^2 statistic also assumed that normality is present in the variables; therefore, deviations in the sample from normality can result in a significant result even if the model is good (Hooper et al., 2008). As a result of the issues with the χ^2 statistic, the results of this analysis is presented in this study; however, other indices were also used that have been specifically created to deal with the failings of the χ^2 statistic (Byrne, 2010). Descriptive information and cutoff scores for the remaining fit indices is presented in Table 1.

Table 1: Fit Indices

Table of Fit Indices		
Fit Index	Summary	Cut off Score
<i>Absolute Fit Indices</i>		
Chi - Square (χ^2)	Tests discrepancies between hypothesized model and the data.	$p > .05$ indicates good fit

Table of Fit Indices		
Fit Index	Summary	Cut off Score
Chi - Square (χ^2) Ratio	The χ^2 value divided by the degrees of freedom.	5.0 and under represent a good fit
Goodness of Fit (GFI)	Estimates the goodness of fit of the model with the actual variance and co-variance tables of the data. Often used as an alternative to χ^2 .	.90 or higher indicate good fit
Root Mean Square Error of Approximation (RMSEA)	Measures the amount of variance within the hypothesized model. Sensitive to the degrees of freedom in the model and does well with fewer parameters.	.05 or lower indicate good fit
<i>Incremental Fit Indices</i>		
Comparative Fit Index (CFI)	Compares covariance matrix to the χ^2 of the hypothesized model to the χ^2 of the null model. The null model is calculated by assuming latent variables and indicators are uncorrelated. Least affected by sample size, thus widely used in model fitting.	.96 or higher indicate good fit
Normed Fit Index (NFI)	Compares the χ^2 of the hypothesized model to the χ^2 of the null model. The null model is calculated by assuming latent variables and indicators are uncorrelated.	.90 and higher indicate good fit
Tucker and Lewis Index (TLI)	Derived from the Normed Fit Index. Compares the χ^2 of the hypothesized model to the χ^2 of the null model. TLI has a lower index than NFI, thus making it sensitive to complex models.	.95 or higher indicate good fit
<i>Parsimony Indices</i>		
Parsimony Goodness of Fit Index (PGFI)	Based on the GFI. PGFI adjusts for the loss of degrees of freedom.	.50 and lower indicate good fit

Chart adopted from Hooper et al., 2008; Hu & Bentler, 1999; MacCallum et al., 1996

Incremental Fit Indices

Incremental indices are comparative indices that test the hypothesized model against a worst possible scenario model (where all latent variables are uncorrelated; Hooper et al., 2008). Values closer to 1 indicate good model fit and values close to 0 indicate poor model fit (Byrne, 2010). Incremental indices are important to include in reporting SEM results because they do not use the χ^2 statistic, which, as noted, has controversial limitations (Byrne, 2010). Incremental indices reported in this study were: (a) the comparative fit index (CFI), (b) the normed fit index (NFI), and (c) the Tucker Lewis Index (TLI).

Parsimony Fit Indices

Parsimony refers to the complexity of a model. The more complex models become, the easier it may be to impose a structure on the data that does *not* adequately represent the data. Therefore, the most ideal models are those that explain the data with the smallest amount of complexity (Byrne, 2010). Parsimony indices were created to help with the issue of model complexity and are sensitive to models with many parameters. Unfortunately, adequate cutoff scores for parsimony indices have not been supported (Hooper et al., 2008); therefore, only one parsimony fit index was reported in this study: parsimony goodness of fit index (PGFI).

Preliminary Data Analysis

There are specific statistical assumptions that must be met within SEM: sample size must be large; normality, linearity, missing data must be transformed or dropped; multicollinearity, singularity, and adequacy of covariances. Freedman (1987) argued that the validity of SEM depends on meeting statistical assumptions with the data, and statistical assumptions in SEM are difficult to meet (Pedhazur, 1982). As a result, before primary statistical analyses could be

conducted on the data, two types of preliminary analyses were performed: (a) assumption checking, and (b) data cleaning. The data was examined before running analysis procedures to ensure that all assumptions were met. Normality was met for the majority of cases; however, there were instances of normality violation (i.e., substance dependence scale, substance problem scale, current withdrawal scale, training activity scale, and employment activity scales). Violations of normality are common in the human services industry (Reynolds, Livingston, & Willson, 2009), and SEM has capabilities of handling issues with non-normal distributions in large sample sizes via Asymptotically Distribution-Free (ADF) estimation (Byrne, 2010). Within large datasets where variables are skewed because of non-normality, ADF is a preferred method (Maydeu-Olivares, Coffman, & Hartman, 2007). In addition, transformations of normality are not suggested with scales that are widely used (Tabachnick & Fidell, 2007), and as the GAIN assessment and scales are widely used assessments, the researcher chose not to transform non-normal data and utilize ADF estimation in AMOS. Linearity, multicollinearity, singularity, and adequacy of covariances were all assessed and the data met these assumptions.

SEM also has three unique assumptions that must be met: (a) the path analysis is measured without error, (b) residuals are not intercorrelated, and (c) a lack of feedback loops in the model (Schreiber et al., 2006). Error is a common concern in human relations and educational research, and there are errors associated with the measurement of variables used within this model. The assumptions for residual intercollinearity and feedback loops were met. Although not all assumptions were met within this study, assumption violations in nonexperimental research are common (Schreiber et al., 2006).

The CSAT data (based on the GAIN assessment) is managed by Chestnut Health Systems and data preparation and cleaning techniques were recommended (See Appendix F for missing data suggestions). Therefore, before any statistical procedures were performed, the researcher examined the dataset for missing data. Out of the variables and scales utilized in the study, only 11 had missing data that was over 5% of the total sample. If more than 5% of data is missing, best practices in statistical procedures would be to transform the data or delete the cases (Tabachnick & Fidell, 2007). Since the data was not missing at random, the researcher determined to use listwise deletion in the analysis procedures, which deletes cases with missing data (Tabachnick & Fidell, 2007). For those cases that were missing data less than 5%, the researcher transformed the data by the advanced method of regression prediction (Tabachnick & Fidell, 2007). This process occurred in two steps for each non-categorical variables/scales missing less than 5%: (a) correlation matrices, and (b) multiple regression prediction models. The first step involved creating a correlation matrix of all variables and noting the highest correlated variables for the variable of interest (See Table 2). A multiple regression model was then created with the variable of interest as the DV and the variables with high correlations as the IVs. The table below gives detailed information about what was used to predict each variable. All prediction models were significant that were used, and if a variable was not significant in the prediction model, then the researcher explored models and utilized the most significant fit. Many values within the dataset were previously coded by the database managers (Chestnut Health Systems) as negative values that were missing. It was recommended *not* to compute -3 and -6 values, and -4 and -8 values could potentially be computed through regression. The majority of -4 and -8 values in this dataset were categorical, thus the researcher opted not to compute these

and recode the values as missing. Further, one participant was indicated as an outlier and was removed from the analyses.

Table 2: Missing Data

Missing Data Explanations					
Variable	Valid	Number Missing	Percent Missing	Final N after Transformation	Variables used to predict
GSSI_0	3269	1709	34.4	3212	not imputed
SSSI_0	3276	1702	34.2	3212	not imputed
SDSm_0	3212	0	0	3212	N/A
SDSy_0	3212	0	0	3212	N/A
SDSI_0	3212	0	0	3212	N/A
SPSm_0	3212	0	0	3212	N/A
SPSy_0	3212	0	0	3212	N/A
SPSI_0	3212	0	0	3212	N/A
SFS8p_0	3212	0	0	3212	N/A
CWS_0	3209	3	0.1	3212	SDSm_0, SFS8p_0, SPSm_0
TAS5p_0	3192	20	0.6	3212	SDSI_0, SPSI_0, SFS8p_0
EmPS_0	3185	27	0.8	3212	SFS8p_0, SDSm_0, SPSI_0
SSI_0	3197	15	0.6	3212	SDSm_0, SPSy_0, SFS8p_0
DSS9_0	3212	0	0	3212	N/A
HSTS_0	3209	3	0.2	3212	SPSy_0, SFS8p_0, SDSI_0
AFSS_0	3210	2	0.2	3212	SPSy_0, SFS8p_0, SDSI_0
TSS_0	3208	4	0.3	3212	SPSy_0, SFS8p_0, SDSI_0
mPSSI_0	3185	27	33.8	3293	SPSy_0, DSS9_0, SDSm_0
mOSSI_0	3173	39	34.1	3281	SPSy_0, DSS9_0, SDSm_0
consq_0	4416	562	11.3	2726	not imputed - categorical
IAS5p_0	2688	38	1.4	2726	SDSy_0, SPSm_0, SFS8p_0
GCS_0	2696	30	1.1	2726	SDSy_0, SPSy_0, SFS8p_0
ERS21_0	2725	1	0	2726	SDSI_0, SPSy_0, SFS8p_0
HPSP3_0	2696	30	1.1	2726	SDSI_0, DSS9_0, SSI_0
TMI_0	2590	136	5	2726	SDSI_0, SPSy_0, SPSI_0, DSS9_0
TRI_0	2681	45	1.7	2726	DSS9_0, SPSI_0, SDSm_0, SFS8p_0
PMS18	2688	38	1.4	2688	Not imputed
IMS8_0	2688	38	1.4	2688	Not imputed

Missing Data Explanations

Variable	Valid	Number Missing	Percent Missing	Final N after Transformation	Variables used to predict
needAN Ytx	2688	0	0	2688	N/A
needNOt x	2688	0	0	2688	N/A
mRERI1 3p_0	2620	68	2.5	2688	SDSm_0, SPSm_0, SDSy_0
ESI_0	2687	1	0	2688	needsANYtx, needsNOTx, SPSm_0, SPSy_0, SPSI_0
pmabst_0	2687	1	0	2687	not imputed - categorical
shas_0	2177	510	19	2174	not imputed
PCSS	2172	2	6	2174	SPSm_0, SDSy_0, SPSI_0, DSS9_0
incom_0	4978	0	0	2174	N/A
xsite	4978	0	0	2174	N/A
program	4978	0	0	2174	N/A
A4a (why cme to tx)	3317	1661	33.4	3317	not imputed - categorical
A4d (referral source)	3287	1691	34	3287	not imputed - categorical
B1 (gender)	2174	0	0	2174	N/A
B3av1	2174	0	0	2174	N/A
B3a1	2174	0	0	2174	N/A
B3a2	2174	0	0	2174	N/A
B3a3	2174	0	0	2174	N/A
nofhp_0	2134	40	1.8	2134	Logically imputed from wkyfmp_0 if possible
wkyfmp_ 0	2128	6	0.3	2134	Deleted cases with missing
agegm3	2174	0	0	2134	N/A
agega	2174	0	0	2134	N/A
B2a_0	2174	0	0	2134	N/A
TXTYPE	2174	0	0	2134	N/A
TXTIME	2174	0	0	2134	N/A
txtypeg	2174	0	0	2134	N/A
txtypen	2174	0	0	2134	N/A

Missing Data Explanations

Variable	Valid	Number Missing	Percent Missing	Final N after Transformation	Variables used to predict
famhist	2136	38	1.7		not imputed - categorical
S7 (times rec tx)	2123	11	0.5		not imputed - consider replace with mean
S6 (ever went to 12 step)	2172	2	0.1	2134	Logically imuted from previous scores - i.e., SHAS
M5a (mental health)	2173	3	0.1	2134	not imputed - categorical
E7g (in recovery)	2150	24	1.1	2134	not imputed - categorical
recov_0				2134	not imputed - categorical

Research Hypotheses

SEM is typically considered to be a confirmatory technique that is frequently used with correlational designs (Tabachnick & Fidell, 2007). SEM is the combination of statistical analyses procedures that allow the researcher to test a variety of relationships between multiple DV and IVs that are discrete or continuous (Tabachnick & Fidell, 2007). Although SEM is considered to be a confirmatory technique, it is frequently used in an exploratory manner, as the researcher can explore the relationships of the constructs by altering the model to find the best fit with the data (Ullman, 2006). SEM uses both confirmatory factor analysis (CFA; measurement model) and path analysis to test theoretical models (Tabachnick & Fidell, 2007). The measurement model/CFA is the first step in SEM and was utilized three times: one time for each construct. The individual measurement models answered the first three research questions concerning which components/variables load onto BOE, TTP, and ER. The measurement model/CFA differs from other types of factor analysis in that the model is based on existing theory (Schrieber, et al.,

2006). Measurement models/CFA is used when the researcher has a theory-driven model that is hypothesized to have a specific population covariance (Schrieber et al., 2006). For example, within this study, three theory-driven constructs (BOE, TTP, and ER) were hypothesized to contain variables that would load into single factor structures. Because the BOE, TTP, and ER are theoretical constructs and have expected factor structures, the first step of SEM (measurement model/CFA) was the most appropriate technique to utilize to empirically support the hypothesized components of the BOE, TTP, and ER. Once the measurement models were individually performed on each construct to form working factor structures, measurement models were then conducted on all three constructs together. Results from the combined measurement models were included in the SEM path analysis/structural model and answered research question four.

The DV/outcome variable in this model was ER, also considered to be the *endogenous* variable in SEM. The IVs/predictor variables, also called the *exogenous* variables, are BOE and TTP. The basic structure of the path diagram model was represented in Figure 1. Direct effects are the direct effect of an IV on a DV, whereas indirect effects are the effect of the IV on the DV indirectly through a mediating variable (Kaplan, 2007). Both direct and indirect effects of the BOE and TTP on early recovery were analyzed. Within the path diagram, lines with one arrow represent a direct effect from one variable on another variable, whereas covariances are represented by two-directional arrows (Kline, 2011). The constructs (BOE, TTP, and ER) within the model are *latent* variables (represented by circles and ovals in the diagram), meaning that the variables cannot be directly observed and need two or more indicators to represent the variable (Ullman, 2006). The BOE, TTP, and ER cannot be measured directly, so indicators are used for

each construct that were explained in the constructs section within the methodology. As noted, the BOE, TTP, and ER all have multiple indicators that must be utilized in the path analysis, where ideally, there would be one indicator per construct in the path analysis (Schrieber, et al., 2006). However, using items to indicate a latent construct rather than the individual items constituting a scale helps prevent error within the model (Ullman, 2006).

Chapter Summary

This study utilized a correlational research design to test the predicted relationships between the bottoming out experience, the turning point, and early recovery. Each of the constructs has a strong theoretical and research-oriented background; however no quantitative studies existed that analyzed the factor structure of the constructs or the relationships between them. Therefore, this study tested the hypothesized model of the relationships using structural equation modeling (SEM). The first step in SEM is the measurement model, or confirmatory factor analysis (CFA). The purpose of this study was to gain understanding about the hypothesized variables that constitute each construct.

CHAPTER IV: RESULTS

This study investigated the contributions of the substance dependent clients' BOE and TTP to their levels of ER. The data was analyzed using *Statistical Program Systems Software 20th edition* (SPSS; IBM, 2012) and the *Analysis of Moment Structure 19th edition* (AMOS; Arbuckle, 2010). Statistics utilized within the study were descriptive statistics, Pearson Product Correlations (Two-Tailed), and Structural Equation Modeling. Because of previous theory and research on each construct, a model was proposed and tested utilizing Structural Equation Modeling (SEM). SEM is a five-stage process, which includes: the following (a) Model Specification, (b) Model Identification, (c) Model Estimation, (d) Model Testing, and (e) Model Modification. The results of the study are presented as follows: (a) Participant factors, (b) SEM Five-Stage Process, and (c) Post-Hoc Analyses.

Participant Factors

This study utilized archival data from the CSAT (2011) database after approval data from Chestnut Health Systems. The original sample included all adult (18 and over) participants within the database that met the criterion for lifetime substance dependence ($N = 4978$). Specific scales, subscales, and variable were selected from the GAIN in order to test the latent factors: BOE, TTP, and ER. The resulting sample ($N = 2148$) resulted in 43.1% of useable data, once data cleaning and listwise deletion occurred. Of the 2148 participants, 100% of this data was useable, and the results are based on this sample.

Participant Demographics

Descriptive statistical analyses are presented in Table 3. Results indicated that 56.5% ($n = 1213$) of the sample were men, 43.5% ($n = 934$) were women, and < 0% ($n = 1$) was transgender.

Age of participants was reported as: 36.8% ($n = 790$) of participants were young adults (ages 18 – 25), 28.3% ($n = 608$) were between the ages of 26 – 35, 26% ($n = 559$) of participants were between the ages of 36 – 49, and 8.9% ($n = 191$) were ages 50 or older..Results indicated that 49.9% ($n = 1072$) of the participants self-reported as White/Caucasian, 15.4% ($n = 331$) reported as Black/African American, 23.0% ($n = 493$) reported as Hispanic/Latino, 8.1% ($n = 173$) reported as Mixed Race, 2.9% ($n = 63$) reported as Native American/Alaskan, .4% ($n = 8$) reported as Asian, and .4% ($n = 8$) reported as Other.

Table 3: Descriptive Statistics on Gender, Age, and Ethnicity

Gender, Age, and Ethnicity Demographics		
Type	Percentage	<i>n</i>
Gender		
Male	56.5	1213
Female	43.5	934
Transgender	<1	1
Age		
18 - 25	36.8	790
26 - 35	28.3	608
36 – 49	26.0	559
50+	8.9	191
Ethnicity		
White	49.9	1072
Black/African American	15.4	331
Latino/Hispanic	23.0	493
Mixed Race	8.1	173
Native American/Alask.	2.9	63
Asian	.4	8
Other	.4	8

Demographics relating to participant history are presented in Table 4. Demographical results indicated that 61% ($n = 1310$) of participants began using substances before age 15, 31.1% ($n = 668$) began using between the ages of 15 – 18, and 7.7% ($n = 166$) began using after age 18. Further, over half (51.4%, $n = 1103$) of participants reported that they had never been

diagnosed with any psychological problem, whereas 48.6% ($n = 1043$) indicated they had been diagnosed with a psychological problem as some point in life. Many participants had received substance abuse treatment in their lifetimes, and the range for the amount of times participants had ever received substance abuse treatment was 0 – 50 ($M = 1.67$, $SD = 2.54$). Most participants (71.5%; $n = 1535$) reported that they had attended an AA, NA, CA, SR, or other recovery group in their lives. Family history results indicated that 77.8% ($n = 1673$) of the participants reported as having a family history of substance use, while 20.5% ($n = 441$) reported no family history of substance use.

Table 4: Participant History Demographics

Participant History Demographics		
Type	Percentage	<i>n</i>
Age of 1 st substance use		
Before age 15	61.0	1310
15 – 18	31.1	668
After age 18	7.7	166
Ever been diagnosed with psych problem		
Yes	51.4	1103
No	48.6	1043
Ever attended AA, NA, CA, SR or any other recovery group		
Yes	71.5	1535
No	28.5	613
Family substance abuse history		
Yes	77.8	1673
No	20.5	441

Demographics relating to the current treatment were: (a) length of time reported in treatment, (b) reasons for coming to treatment, and (c) referral source for treatment. The length

of time reported in treatment ranged from 1 to 662 days ($N = 2134$; $M = 199.03$; $SD = 131.01$). The primary reason reported for coming to treatment was general personal motives (58.7%, $n = 1260$). The second highest reported reason for coming to treatment was pressure from the Criminal Justice System (27.1%, $n = 583$). The highest reported referral sources for treatment were from a judge (20.3%, $n = 437$) and a probation officer (13.7%, $n = 294$). Other examples of referral sources indicated were as follows: social workers (11.4%, $n = 244$), other individuals (9.2%, $n = 197$), criminal justice agencies (7.4%, $n = 159$), lawyers (6.5%, $n = 140$), and self-referred (6%, $n = 129$).

SEM Five-Stage Process

As noted, SEM is a five-stage process that involves: (a) Model Specification, (b) Model Identification, (c) Model Estimation, (d) Model Testing, and (e) Model Modification. Model specification is the first step in SEM, and utilizes previous research and theory (found in Chapter 2) to hypothesize a theoretical model. There are two types of models that are specified: the structural model and the measurement model. Both the structural and measurement models are informed by the path analysis model, which is presented first in this section. Further, although the structural model is also called the path analysis model (Byrne, 2010), a basic, preliminary path analysis model is presented first to provide insight into the direction of analyses. The measurement model, also called confirmatory factor analysis (CFA), provided a measurement definition of the contents within each variable and tested hypotheses one, two, and three. The structural model tested the relationships between the constructs, thus testing hypothesis four. As a result, the measurement model was conducted first in order to gain accurate understanding of the path analysis model. The following section first presents the results from the hypothesized

measurement models for the BOE, TTP, and ER, as well as the results of the final measurement models for each construct. Lastly, this section presents findings from the three constructs together in one measurement model. The SEM process is multi-dimensional; therefore, the steps are not completed in order; consequently, the results are presented for this process in order of (a) Path Analysis, (b) Hypothesis One, (c) Hypothesis Two, (d) Hypothesis Three, (e) Hypothesis Four, (f) Post Hoc Testing, and (e) Limitations. The following section presents the results of the SEM process for the hypothesized relationships between BOE, TTP, and ER.

Path Analysis

The path analysis model is depicted graphically in Figure 2. The purpose of the path analysis is to show the hypothesized relationships between the BOE, TTP, and ER. All variables are latent constructs, thus testing was conducted on each individual construct in order to provide the best estimates for the full measurement model. Within this path analysis, the BOE and TTP are both exogenous variables (IVs), and predicted to have an effect on the endogenous variable, ER (DV). Relationships between the variables, also called factors, are depicted by the arrows in the path analysis model. The BOE is hypothesized to have an effect on both TTP and ER. The following section presents results from the measurement model analyses and structural analyses.

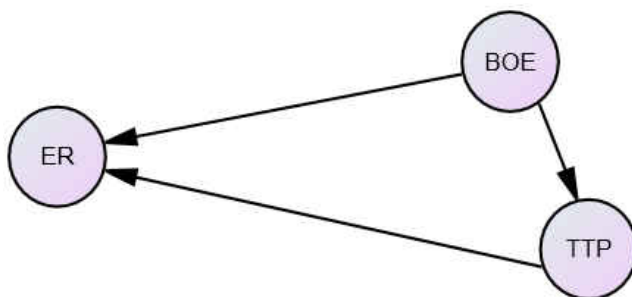


Figure 2: Path Analysis Model

Model Identification

Model identification is the process of assessing the parameters within the hypothesized model, which includes two requirements: (a) the model degrees of freedom must be equal to or greater than zero, and (b) all latent variables in the model are assigned scales (Kline, 2011). Limitations on the number of parameters that may be estimated in a model must be calculated. For example, an equation is used in SEM to ensure that the number of estimated parameters is *not* greater than the number of variances and covariances $[(v \times (v + 1))/2]$ (Kline, 2011). The model cannot have “more estimated parameters than observations” (Kline, 2011, p. 102). In other words, the degrees of freedom must be below the number of observed indicators. The degrees of freedom for the model are calculated in AMOS by the equation: $df_m = p - q$. P is the number of observations and q is the number of estimated parameters (Kline, 2011). Within each model, degrees of freedom is presented and each model was overidentified (Byrne, 2010). An overidentified model is ideal in that overidentification means there are multiple ways to estimate the parameters.

Hypotheses One: BOE Model Specification

The hypothesized BOE Model (BOE Model A) is described graphically in Figure 3. As shown in Table 5, initial results from the first model specification testing revealed that the model was *not* a good fit: $\chi^2 = 1880.633$; $df = 189$, $p < .001$; RMSEA = .065 with CI_{90} : (.062, .067); CFI = .604; GFI = .937; and TLI = .56. Based on the degrees of freedom ($df = 189$) and sample

size over 500 ($N = 2148$), the statistical power for this model was 1.00 (MacCallum et al., 1996, p. 142). The Cronbach alpha for this model was .667, $N(\text{items}) = 21$.

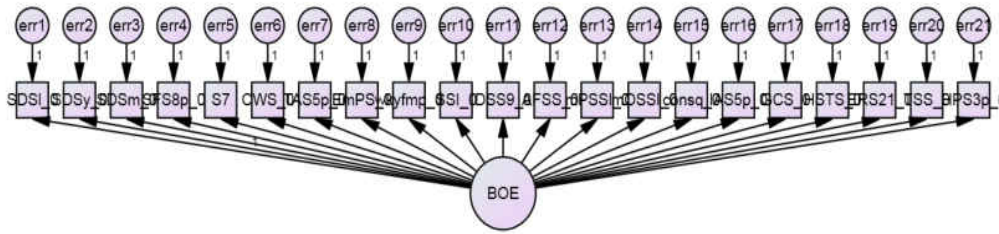


Figure 3: BOE Measurement Model A

Therefore, the hypothesized measurement model for the BOE was rejected for these data.

Table 5: Summary of BOE Fit Indices

<i>BOE Measurement Model</i>												
Models	<i>N</i>	<i>df</i>	χ^2	<i>p</i>	χ^2/df	CFI	GFI	RMSEA	TLI	NFI	RMR	PGFI
BOE Model A (Hypothesis)	2148	189	1880.633	0	9.95	0.604	0.937	0.065	0.56	0.58	1.389	0.766
BOE Model B	2148	16	49.176	0	3.074	0.984	0.996	0.031	0.972	0.976	0.09	0.443
<i>Δ A to B</i>	0	173	1831.457	0	6.876	0.38	0.059	0.034	0.412	0.396	1.299	0.323

Post hoc testing proceeded by analyzing modification indices, standardized regression weights, and deleting variables measuring similar ideas for parsimony (Byrne, 2010). The modification process included a series of model testing and modification. The resulting model is described below. Upon analysis of standardized regression weights, ERS21_0, SDSMm_0, wkyfmp, HPS3p_0, SDSI_0, CWS_0, EmPS_0, TAS5p_0, IAS5p_0, GCS_0, SSI_0, S7, and SFS8p_0 were removed from the model. As noted by Kline (2011), all standardized regression

weights that loaded below .2 were removed from the model if possible; therefore, specific regression weights are *not* reported as they changed depending on the order of removal. Modification indices suggested covariance and theoretical knowledge of the indicators of the BOE, four pairs of errors were freed. The errors included: (1) SDSy_0 and AFSS_0; (2) SDSy_0 and consq_0; (3) DSS9_0 and AFSS_0; and (4) mPSSI_0 and mOSSI_0 (See Figure 4). As shown in Table 5, the results indicated a good model fit: $\chi^2 = 49.176$; $df = 16$, $p < .001$; RMSEA = .031 with CI_{90} : (.021, .041); CFI = .984; GFI = .996; and TLI = .972. Based on the degrees of freedom ($df = 16$) and sample size over 500 ($N = 2148$), the statistical power for this model was approximately 0.76 (MacCallum et al., 1996, p. 142). The Cronbach alpha for the resulting model was .756, $N(\text{items}) = 8$.

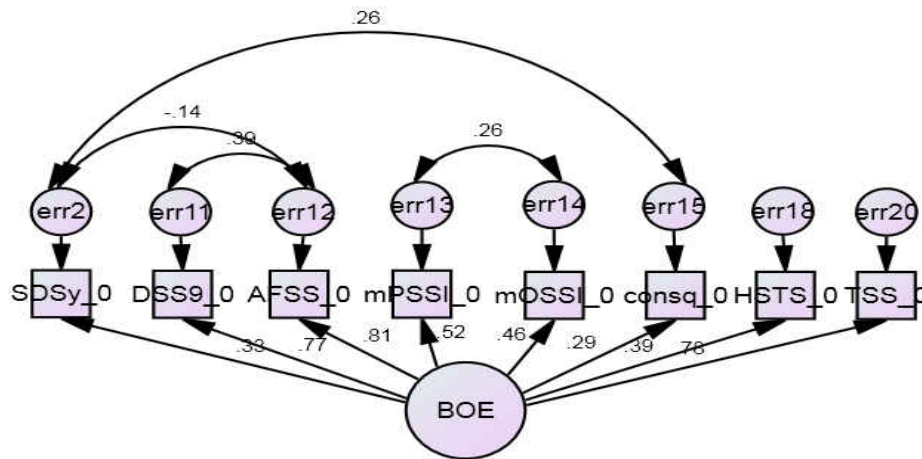


Figure 4: BOE Measurement Model B

Further, comparing BOE Model A to BOE Model B, there was a decrease in the degrees of freedom by 173. The CFI increased by .38, as well as the GFI increasing by .059 and the TLI increasing by .412. In addition, the RMSEA decreased by .034. The BOE Modification Model B was considered a valid measurement and utilized within the hypothesized combined measurement model.

Hypothesis Two: TTP Model Specification

The hypothesized TTP Model (TTP Model A) is described graphically in Figure 5. As shown in Table 6, initial results from the first model specification testing revealed that the model was *not* a good fit: $\chi^2 = 360.859$; $df = 27$, $p < .001$; RMSEA = .76 with $CI_{90} (.069, .083)$; CFI = .551; GFI = .967; and TLI = .402. Based on the degrees of freedom ($df = 27$) and sample size over 500 ($N = 2148$), the statistical power for this model was between approximately .90 (MacCallum et al., 1996, p. 142). The Cronbach alpha for this model was .371, $N(\text{items}) = 9$.

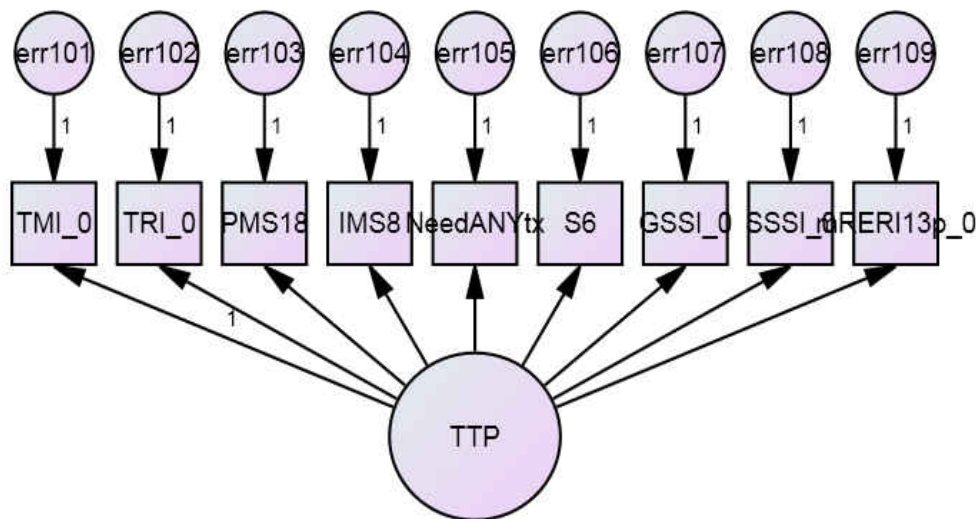


Figure 5: TTP Measurement Model A

Therefore, the hypothesized measurement model for TTP was rejected with this data.

Table 6: Summary of TTP Fit Indices

<i>TTP Measurement Model</i>												
Model	<i>N</i>	<i>df</i>	χ^2	<i>p</i>	χ^2/df	CFI	GFI	RMSEA	TLI	NFI	RMR	PGFI
TTP Model A (Hypothesis)	2148	27	360.859	0	13.365	0.551	0.967	0.076	0.402	0.537	0.367	0.58
TTP Model B	2148	5	19.918	.001	3.984	0.969	0.997	0.037	0.907	0.96	0.101	0.237
<i>Δ A to B</i>	0	22	<i>340.941</i>	<i>.001</i>	<i>9.381</i>	<i>0.418</i>	<i>0.03</i>	<i>0.039</i>	<i>0.505</i>	<i>0.423</i>	<i>0.266</i>	<i>0.343</i>

Post hoc testing proceeded by analyzing modification indices, standardized regression weights, and deleting variables measuring similar ideas for parsimony (Byrne, 2010). The modification process included a series of model testing and modification. The resulting model is described below and graphically represented in Figure 6. Upon analysis of standardized regression weights, mRERI13p_0, TRI_0, and S6 were removed from the model. Modification indices suggested covariance and theoretical knowledge of the indicators of the BOE, four pairs of errors were freed. The errors included: (1) PMS18 and IMS8; (2) PMS18 and NeedANYtx; (3) PMS18 and SSSI_0; and (4) GSSI_0 and SSSI_0. As shown in Table 6, the results indicated a good model fit: $\chi^2 = 19.918$; $df = 5$, $p = .001$; RMSEA = .037 with CI₉₀: (.021, .055); CFI = .969; GFI = .997; and TLI = .907. Based on the degrees of freedom ($df = 5$) and sample size over 500 ($N = 2148$), the statistical power for this model was .39 (MacCallum et al., 1996, p. 142). It is noteworthy that although GSSI_0 and SSSI_0 did *not* load strongly onto TTP, the model did *not* fit when they were removed. The Cronbach alpha for this model was .406, $N(\text{items}) = 6$. The measurement model for TTP was difficult to create, and results indicate that TTP model needs to be strengthened in the future.

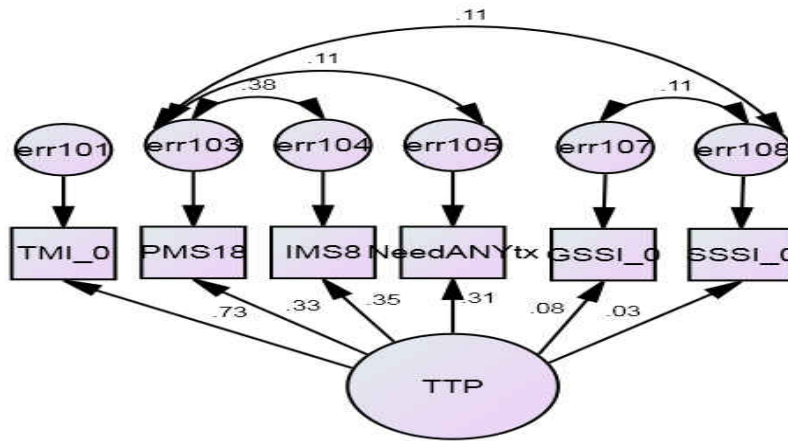


Figure 6: TTP Measurement Model B

Further, comparing TTP Model A to TTP Model B, there was a decrease in the degrees of freedom by 22. The CFI increased by .418, as well as the GFI increasing by .03. In addition, the RMSEA decreased by .039 and the TLI increased by .505. Although the model yielded good fit statistics, the standardized regression weights did *not* produce a good measurement of TTP and suggested that the indicators were measuring different latent variables. As a result, two measurement models were specified, one included the TTP model modification as presented in Figure 6, and another separated indicators of TTP into Interpersonal Motivation and Spiritual Social Support.

Hypothesis Three: ER Model Specification

The hypothesized ER Model (ER Model A) is described graphically in Figure 7. As shown in Table 7, initial results from the first model specification testing revealed that the model was not a good fit: $\chi^2 = 2246.906$; $df = 104$, $p < .001$; RMSEA = .098 with CI_{90} : (.094, .102); CFI = .551; GFI = .990; and TLI = .482. Based on the degrees of freedom ($df = 104$) and sample

size over 500 ($N = 2148$), the statistical power for this model was 1.00 (MacCallum et al., 1996, p. 142). The Cronbach alpha for this model was .469, $N(\text{items}) = 15$.

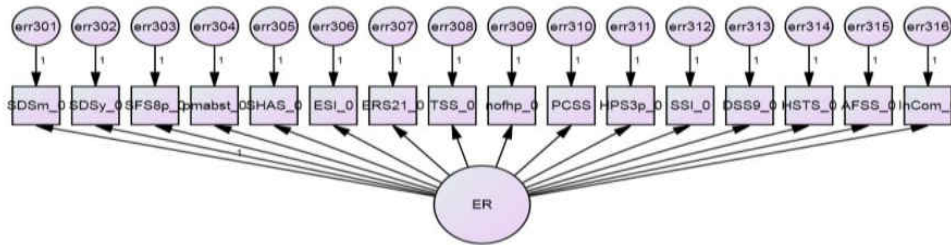


Figure 7: ER Modification Model A

Therefore, the hypothesized measurement model for ER was rejected for this data.

Table 7: Summary of ER Fit Indices

<i>ER Measurement Model</i>												
Models	<i>N</i>	<i>df</i>	χ^2	<i>p</i>	χ^2/df	CFI	GFI	RMSEA	TLI	NFI	RMR	PGFI
ER Model A (Hypothesis)	2148	104	2246.906	0	21.605	0.551	0.99	0.098	0.482	0.541	5.055	0.757
ER Model B	2148	1	5.008	0.025	5.008	0.996	1	0.043	0.957	0.995	0.027	0.067
<i>Δ A to B</i>	<i>0</i>	<i>103</i>	<i>2241.898</i>	<i>.025</i>	<i>16.597</i>	<i>0.445</i>	<i>0.01</i>	<i>0.055</i>	<i>0.475</i>	<i>0.454</i>	<i>5.028</i>	<i>0.69</i>

Post hoc testing proceeded by analyzing modification indices, standardized regression weights, and deleting variables measuring similar ideas for parsimony (Byrne, 2010). The modification process included a series of model testing and modification. The resulting model is described below and graphically represented in Figure 8. Based on the goal of parsimony, all indicators that loaded in the BOE were removed: SDSm_0, SDSy_0, DSS9_0, AFSS_0, HSTS_0, and TSS_0. Theoretically, removing the items from ER was more appropriate than removing those particular items from the BOE because they were theoretically directly correlated

with the BOE and inversely correlated with ER. Upon analysis of standardized regression weights, PCSS, HPS3p_0, SSI_0, and ERS21_0 were removed from the model. Modification indices suggested covariance and theoretical knowledge of the indicators of the ER, four pairs of errors were freed. The errors included: (1) SHAS_0 and nofhp_0; (2) SHAS_0 and InCom_0; (3) SHAS_0 and ESI_0; and (4) nofhp_0 and ESI_0. As shown in Table 7, the results indicated a good model fit: $\chi^2 = 5.008$; $df = 1$, $p = .025$; RMSEA = .043 with CI₉₀: (.012, .084); CFI = .996; GFI = 1.000; and TLI = .957. Based on the degrees of freedom ($df = 189$) and sample size over 500 ($N = 2148$), the statistical power for this model was less than .397 (MacCallum et al., 1996, p. 142). The Cronbach alpha for this model was .147 for this data, $N(\text{items}) = 5$.

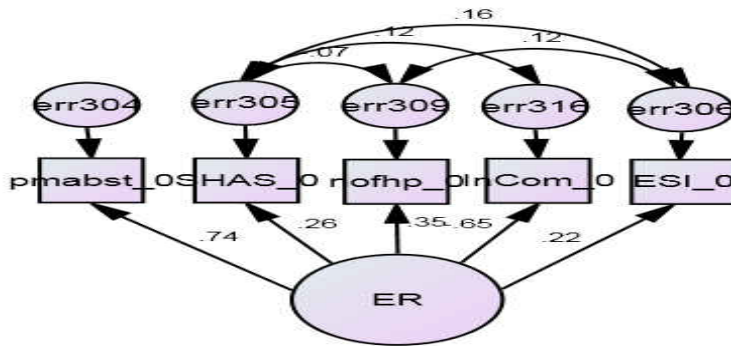


Figure 8: ER Modification Model B

Further, comparing ER Model A to ER Model B, there was a decrease in the degrees of freedom by 103. The CFI increased by .445, as well as the GFI increasing by .01. In addition, the RMSEA decreased by .055 and the TLI increased by .475. Thus, the ER Modification Model B was considered the most valid measurement and utilized within the structural SEM model.

Although ER Modification Model B was a better fitting model than A, the model was weak.

Factor loadings were low and most parameters were freed. Results supported the difficulty in delineating ER at the intake level.

Hypothesis Four: Model Testing

Following the measurement model testing on each individual construct, the models were combined as a single measurement model before the structural model analysis. Combining the models was done in order to account for any differences in the models once they were combined. All measurement model results are presented in Table 8.

Table 8: Summary of Measurement Model Indices

<i>Measurement Model</i>												
Models	<i>N</i>	<i>df</i>	χ^2	<i>p</i>	χ^2/df	CFI	GFI	RMSEA	TLI	NFI	RMR	PGFI
MM - A	2148	137	1290.923	< .001	9.423	.76	.995	.063	.7	.74	.593	.717
MM - B	2148	107	531.164	< .001	4.964	.906	.998	.043	0.881	.886	.381	.698
<i>Δ A to B</i>	0	30	759.759	0	4.459	.146	.003	.02	.181	.146	.212	.019
MM - C	2098	260	1237.857	< .001	4.761	.915	1.000	.042	.895	.895	.130	.800
MM - D	2148	38	125.286	< .001	3.297	.996	.993	.033	.95	.952	.276	.572
<i>Δ C to D</i>	50	222	1112.571	0	1.464	.081	.007	.009	.055	.057	.146	.228
<i>Δ A to C</i>	50	123	53.066	0	4.662	.155	.005	.021	.195	.155	.463	.083
<i>Δ A to D</i>	0	99	1165.637	0	6.126	.236	.002	.03	.25	.212	.317	.145

Measurement Model A

The hypothesized measurement model (Measurement Model A; MM-A) was created by using results from the measurement models previously reported for the constructs of interest. MM-A is presented graphically in Figure 9. As shown in Table 8, initial results from MM-A revealed that the model was a moderate fit: $\chi^2 = 1290.923$; $df = 137$, $p < .001$; RMSEA = .063

with CI_{90} : (.060, .066); CFI = .760; GFI = .995; and TLI = .700. Based on the degrees of freedom ($df = 137$) and sample size over 500 ($N = 2148$), the statistical power for this model was 1.00 (MacCallum et al., 1996, p. 142).

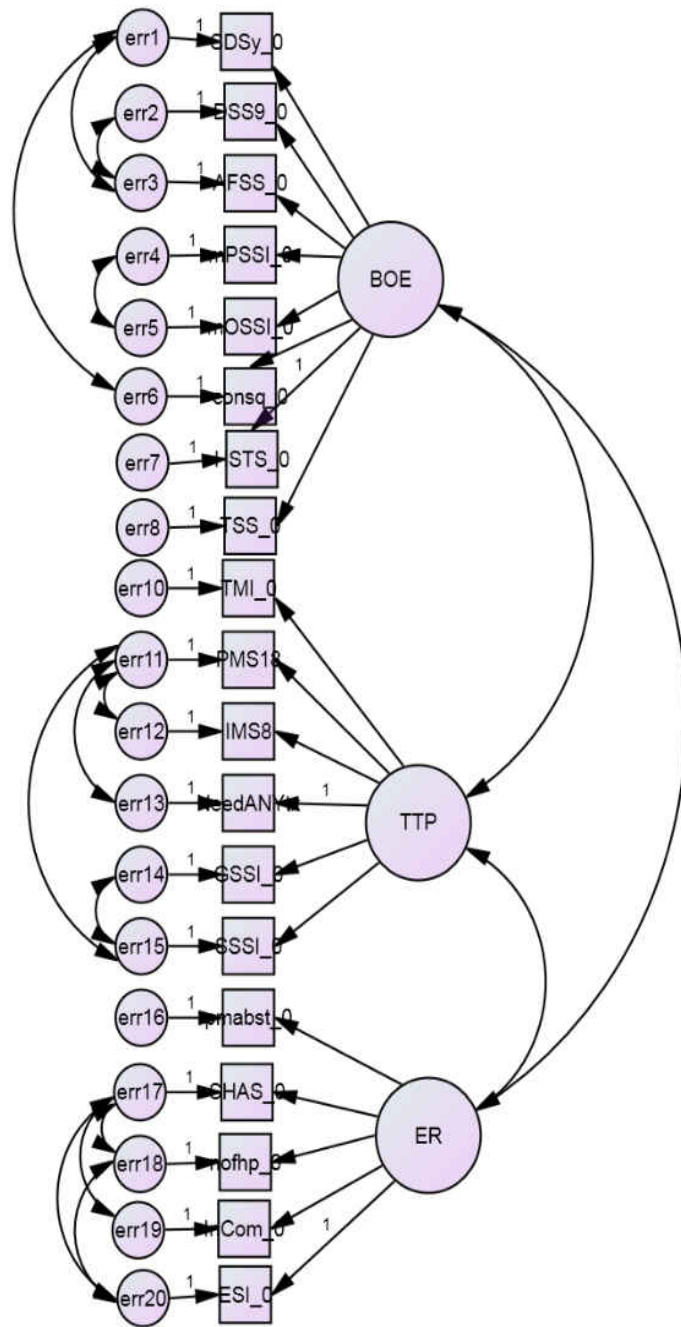


Figure 9: Measurement Model A

Measurement Model B

A second measurement model (Measurement Model B; MM-B) was created through post hoc testing in order to find a better fit for the data and is presented graphically in Figure 10. Changes that were made in post hoc testing included: adding SDSm_0 to the model, co-loading factors, and removing factors with low regression weights. The GAIN has undergone much testing, and co-loading was expected with many of the GAIN's major scales (Dennis et al., 2006). As shown in Table 8, results from MM-B revealed that the model was a moderate fit: $\chi^2 = 531.164$; $df = 107$, $p < .001$; RMSEA = .043 with CI₉₀: (.039, .047); CFI = .906; GFI = .998; and TLI = .881. Since the model was a moderate fit, results from MM-B were used to create Structural Model A (SM-A), which is discussed in the section following measurement model results. Based on the degrees of freedom ($df = 107$) and sample size over 500 ($N = 2148$), the statistical power for this model was 1.00 (MacCallum et al., 1996, p. 142).

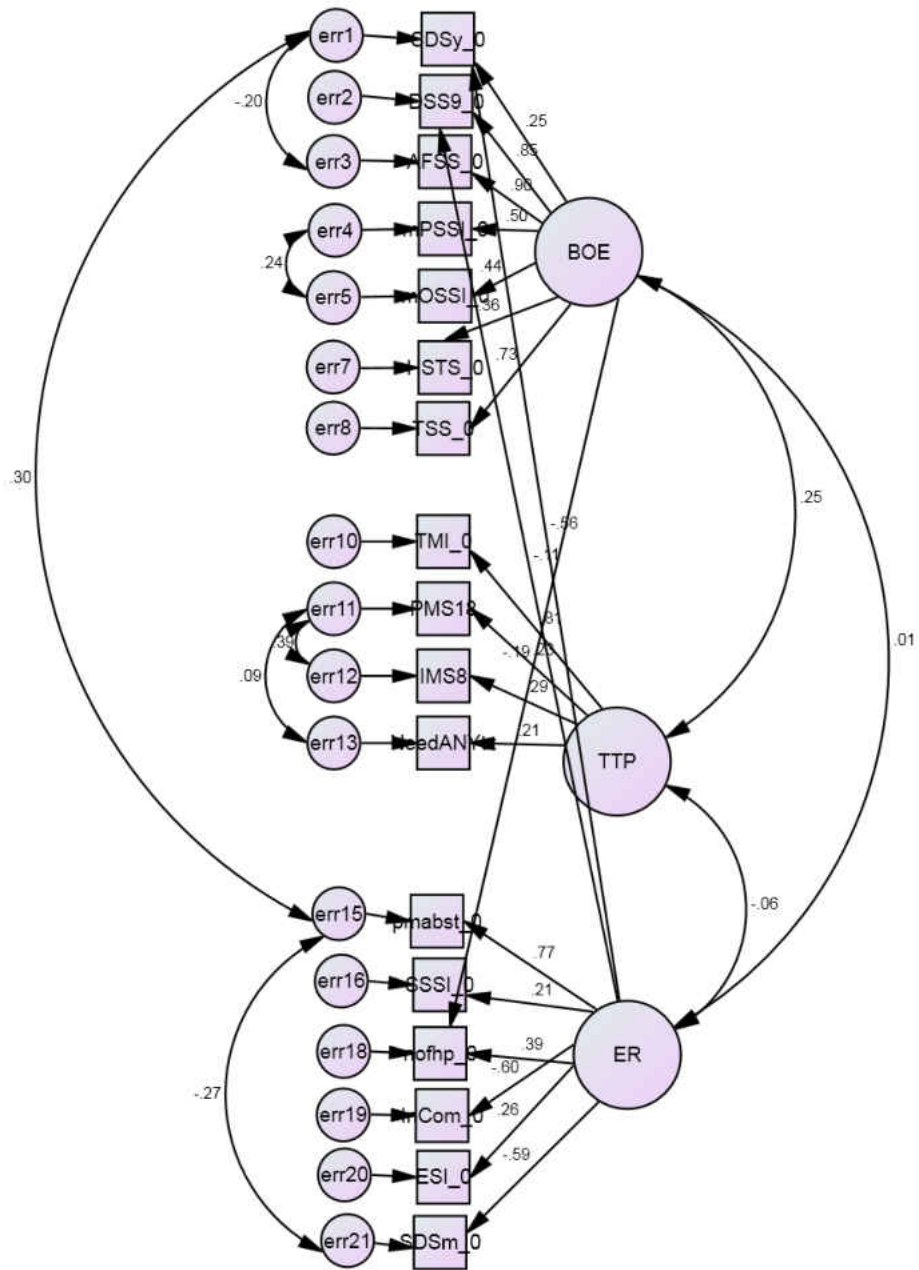


Figure 10: Measurement Model B

MM-B resulted in significant changes from the individual measurement models of the constructs. One of the changes seen in the model from the individual measurement models included GSSI_0 being dropped from the model due to low factor loadings. Further, SSSI_0 moved from TTP to an indicator of ER. MM-B was a difficult model to fit without freeing parameters between the BOE and ER. Consequently, the Beta weights between TTP, ER, and the BOE are low. MM-B highlights that once all the constructs are combined, there are too many similarities between ER and the BOE to accurately understand the constructs individuals. The model was confusing; consequently, the confusion was also reflected in the structural model (discussed following the measurement model results).

Measurement Model C

As result of the moderate fit in MM-B, additional post hoc modifications were conducted and results are presented in Figure 11. Changes that were made in additional post hoc testing consisted of eliminating indicators that loaded poorly (below .2; Kline, 2011), co-loading indicators, re-entering SDSm_0 to the model, and removing TTP as a latent variable. In place of TTP, two indicators (SSSI_0 and IMS8) were used to represent motivation and support. IMS8 was chosen because specific items within the IMS8 were more closely related with external motivations, which was important to differentiate between spiritual supports. SSSI_0 was chosen to represent spiritual support because the other measure of support (GSSI_0) did *not* load in MM-B. The resulting model (MM-C; See Table 8) was a moderate fit: $\chi^2 = 1237.857$; $df = 260$, $p < .001$; RMSEA = .042 with CI₉₀: (.040, .045); CFI = .915; GFI = 1.000; and TLI = .902. The results of MM-C were utilized in Structural Model B (SM-B). Based on the degrees of freedom

($df = 260$) and sample size over 500 ($N = 2098$), the statistical power for this model was 1.000 (MacCallum et al., 1996, p. 142).

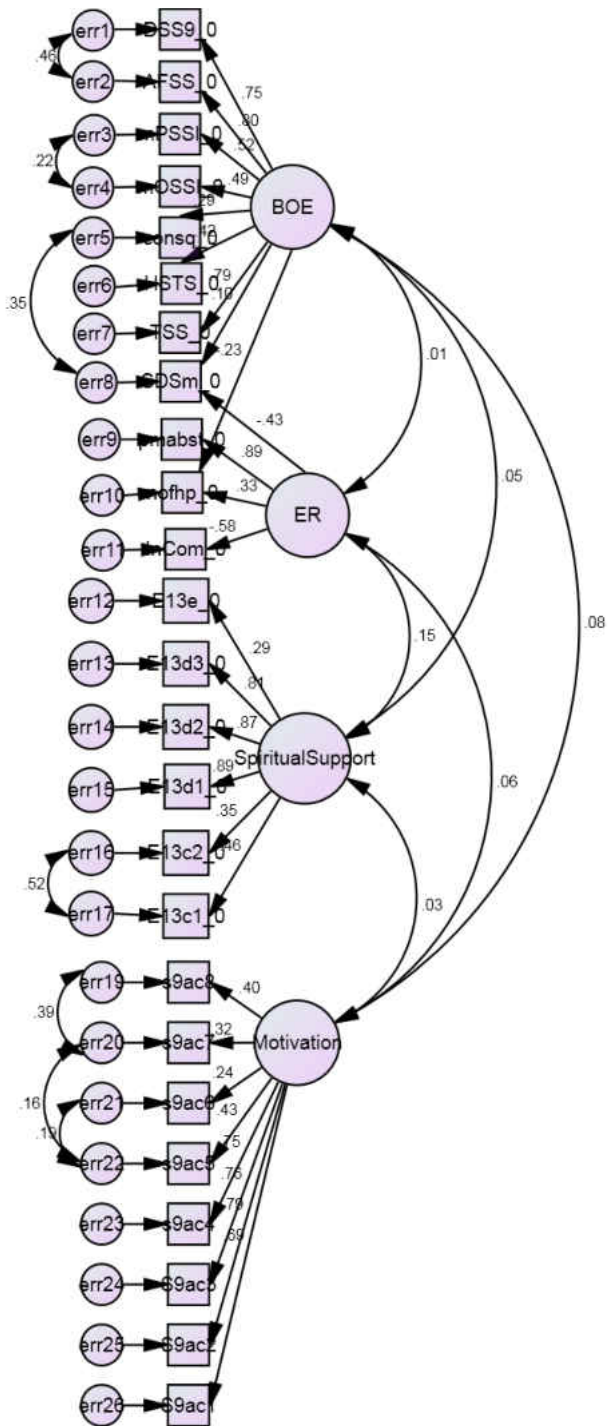


Figure 11: Measurement Model C

Measurement Model D

As noted, MM-C had selected good fit indices; however, there were potential issues with the model fit, as indicated by the CMIN/df (5.369) and the TLI (.889). As a result, a fourth measurement model (Measurement Model D; MM-D) was also created that combined the BOE and ER into a single latent variable. MM-D is depicted graphically in Figure 12. As shown in Table 8, the resulting model was a good fit: $\chi^2 = 289.938$; $df = 54$, $p < .001$; RMSEA = .033 with CI₉₀: (.026, .039); CFI = .996; GFI = .993; and TLI = .95. Based on the degrees of freedom ($df = 54$) and sample size over 500 ($N = 2148$), the statistical power for this model was .997 (MacCallum et al., 1996, p. 142).

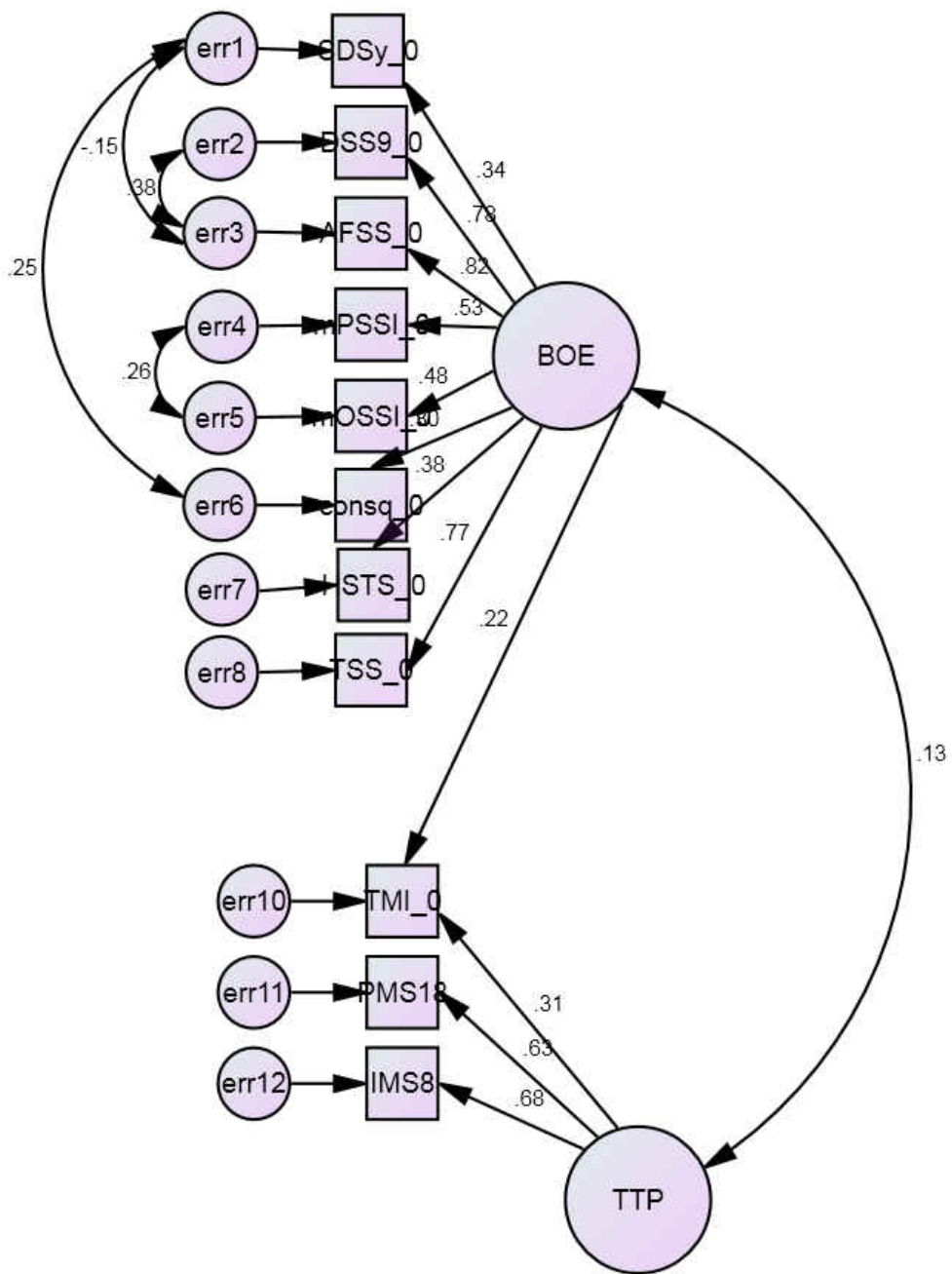


Figure 12: Measurement Model D

Results indicated that MM-D was a better fit than MM-A, MM-B, and MM-C, and used within Structural Model C (SM-C). One of the reasons for this is because of the difficulty differentiating ER from the BOE at the intake level. In MM-D, Er and the BOE were combined, thus MM-D is the best fitting model. Since MM-A, MM-B, and MM-C models yielded good fits, yet different results, MM-B was used to test SM-A, and MM-C was used to test SM-B, and MM-D was used to test SM-C.

The aforementioned measurement models were created through a series of model creation and testing on the individual constructs, followed by testing on the combined constructs. As a result, the best-fitting measurement models (MM-B, MM-C, and MM-D) were used to create the structural models (SM-A, SM-B, and SM-C), which tested the hypotheses between the relationships of the BOE, TTP, and ER.

Structural Model A

The hypothesized SM-A is presented graphically in Figure 13, and tested whether the exogenous variables (BOE and TTP) had an effect on the endogenous variable, ER. As shown in Table 9, SM-A yielded a moderate fit: $\chi^2 = 531.164$; $df = 107$, $p < .001$; RMSEA = .043 with CI₉₀: (.039, .047); CFI = .906; GFI = .998; and TLI = .881. The overall composite indicated that the variance in ER represented by the model was less than 1% ($R^2 = .004$; small effect size). TTP had a significant individual contribution ($\beta = -.066$, $p = .039$). Therefore, as TTP scores increased per unit, ER scores decreased by .066 units. However, the BOE did *not* have a significant contribution ($\beta = .028$, $p = .348$) to ER. However, the BOE was related to TTP ($\beta = .225$, $p = .003$), representing 5% ($R^2 = .05$) of the variance within TTP. As BOE scores increased per unit, TTP increased .225 units.

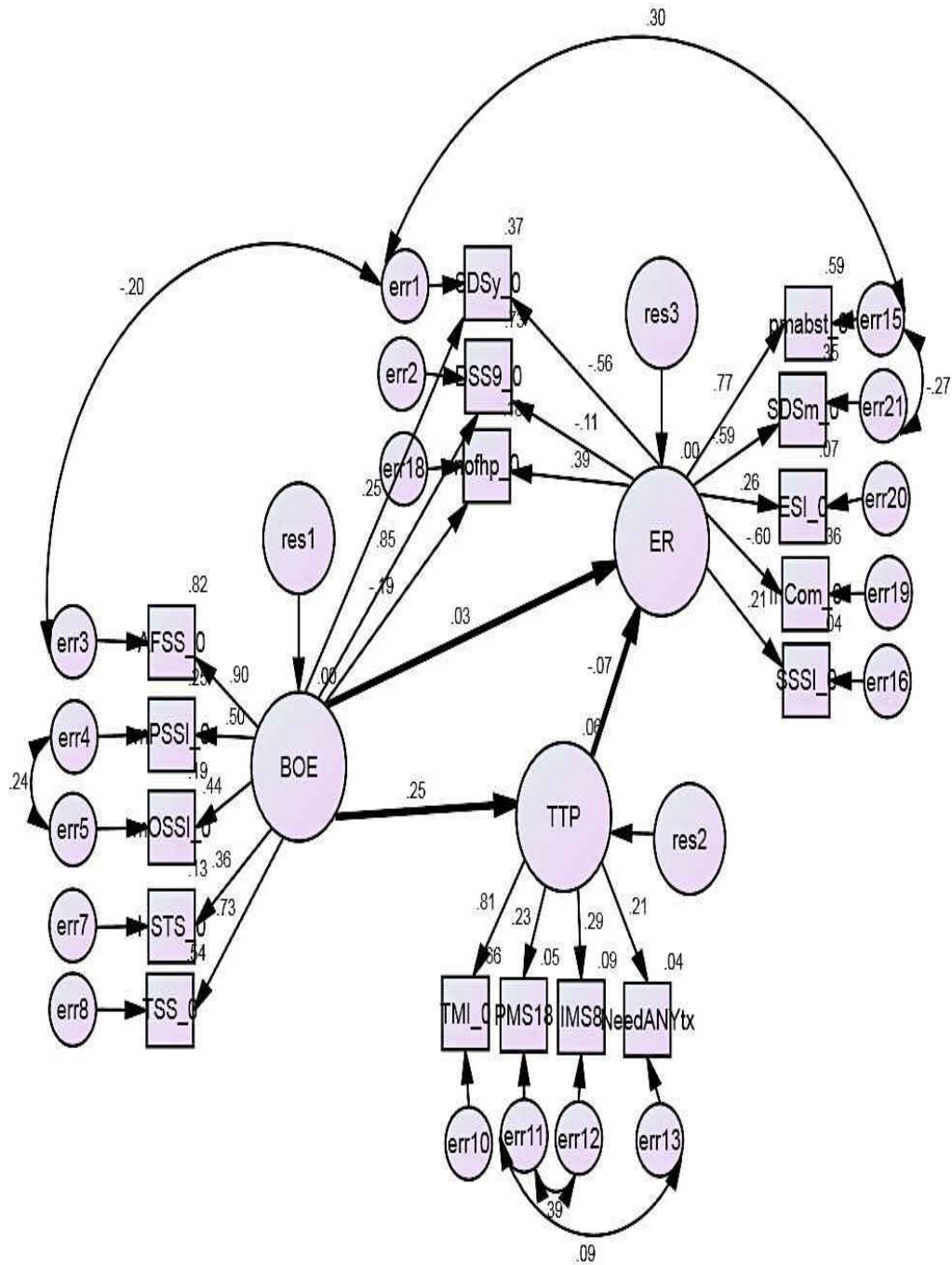


Figure 13: Structural Model A

Additional post hoc testing was not conducted on the model because goodness of fit tests indicated that the model fit was good for these data. As a result of SM-A, Hypothesis Four was accepted with caution. Because the effect size was small for the model, any findings must be interpreted with caution.

Table 9: Summary of Structural Model Fit Indices

<i>Structural Model</i>												
Models	<i>N</i>	<i>df</i>	χ^2	<i>p</i>	χ^2/df	CFI	GFI	RMSEA	TLI	NFI	RMR	PGFI
SM - A	2148	107	531.164	< .001	4.964	.906	.998	.043	.881	.886	.381	.698
SM - B	2098	260	1237.857	< .001	4.761	.915	1	.042	.895	.895	.13	.8
<i>Δ A to B</i>	50	153	-706.693	0	.203	.009	.002	.001	.014	.009	.251	.102
SM - C	2148	38	125.286	< .001	3.297	.996	.993	.033	.95	.952	.276	.572
<i>Δ B to C</i>	50	222	1112.571	0	1.464	.081	.007	.009	.055	.057	.146	.228
<i>Δ A to C</i>	0	69	405.878	0	1.667	.09	.005	.01	.069	.066	.105	.126

Structural Model B

The hypothesized SM-B is presented graphically in Figure 14 and tested whether the exogenous variables (BOE, Motivation [IMS8], and Support [SSSI_0]) had an effect on the endogenous variable, ER, while also testing for relationships between the exogenous variables. Figure 14 depicts both the measurement model and the path analysis. The path analysis is represented by the **bold** colored lines. As shown in Table 9, results from model testing of SM-B indicated that the model was a good fit: $\chi^2 = 305.496$; $df = 54$, $p < .001$; RMSEA = .046 with CI₉₀: (.041, .051); CFI = .926; GFI = .999; and TLI = .895.

The overall composite indicated that the variance in ER represented by the model was 2.5% ($R^2 = .025$; small effect size). Spiritual Support had a significant individual contribution to

ER ($\beta = .150, p < .001$). Therefore, as Spiritual Support scores increased per unit, ER scores increased by .150 units. Motivation also had a significant individual contribution to ER in the model ($\beta = .051, p = .027$). As Motivation scores increased per unit, ER scores increased by .051 units.

Similar to results in SM-A, the BOE did *not* contribute to ER ($\beta = -.004, p = .866$) to ER. However, the BOE was related to Spiritual Support ($\beta = .045, p = .043$). As BOE scores increased per unit, the Spiritual Support increased .045 units. The BOE was also related to Motivation ($\beta = .075, p = .003$), meaning that as BOE scores increased per unit, Motivation increased by .075 units. Spiritual Support and Motivation were *not* related to one another in the model ($\beta = .029, p = .192$). Again, results must be interpreted with caution because of the small effect size in the overall model.

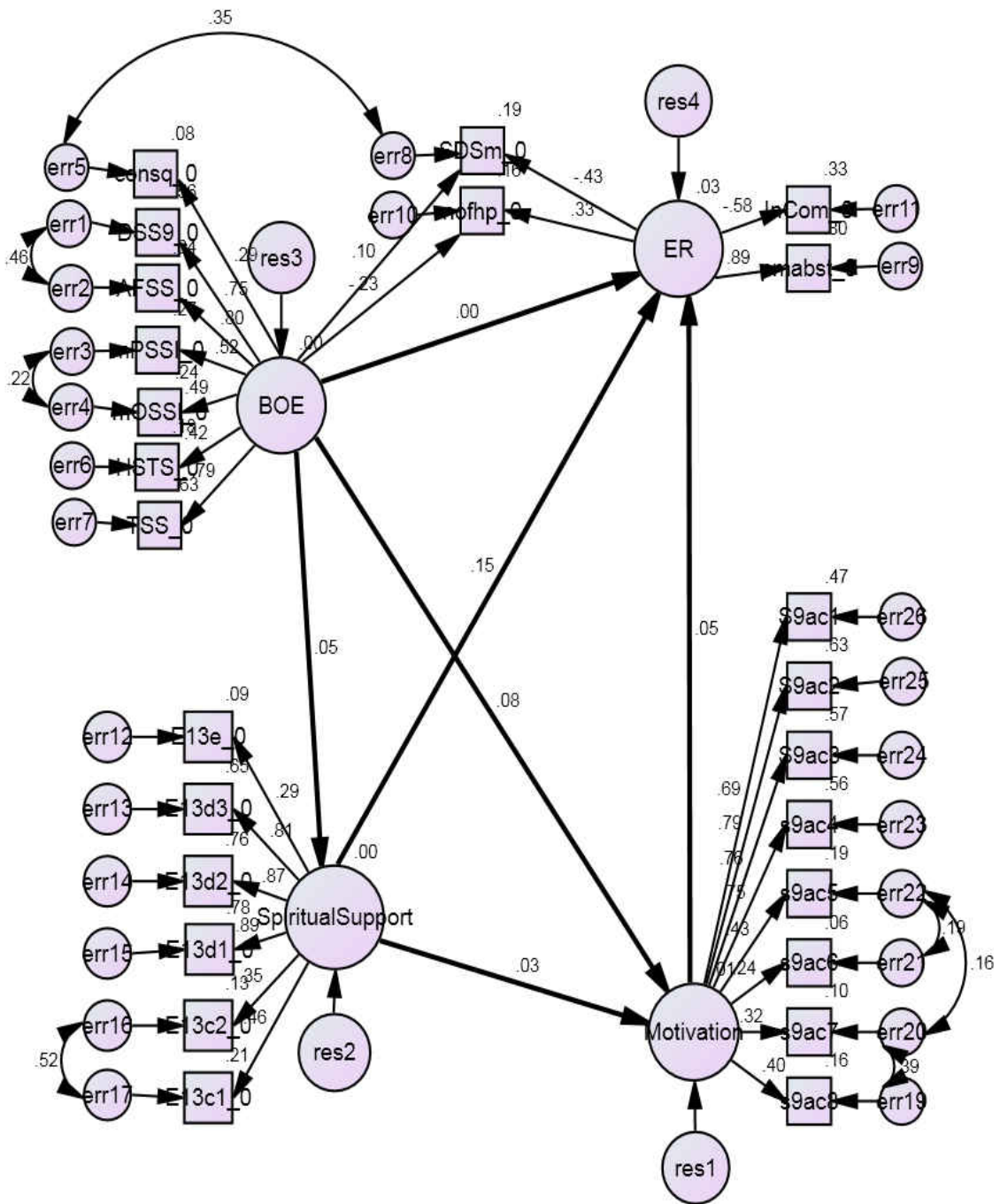


Figure 14: Structural Model B

Post hoc testing was *not* conducted on the model because goodness of fit tests indicated that the model fit was good.

Structural Model C

The third hypothesized structural model was created through measurement model testing. MM-D resulted in a two variable model, rather than a three variable model. As a result, SM-C tested if the BOE had an effect on TTP. Results are presented graphically in Figure 15. Although the indicator TMI_0 loaded onto both the BOE and TTP, in this model, the co-loading was removed in order to get the best understanding of the relations between the constructs. As shown in Table 9, results from model testing of SM-C indicated that the model was a good fit: $\chi^2 = 207.065$; $df = 39$, $p < .001$; RMSEA = .045 with CI₉₀: (.039, .051); CFI = .934; GFI = .989; and TLI = .906.

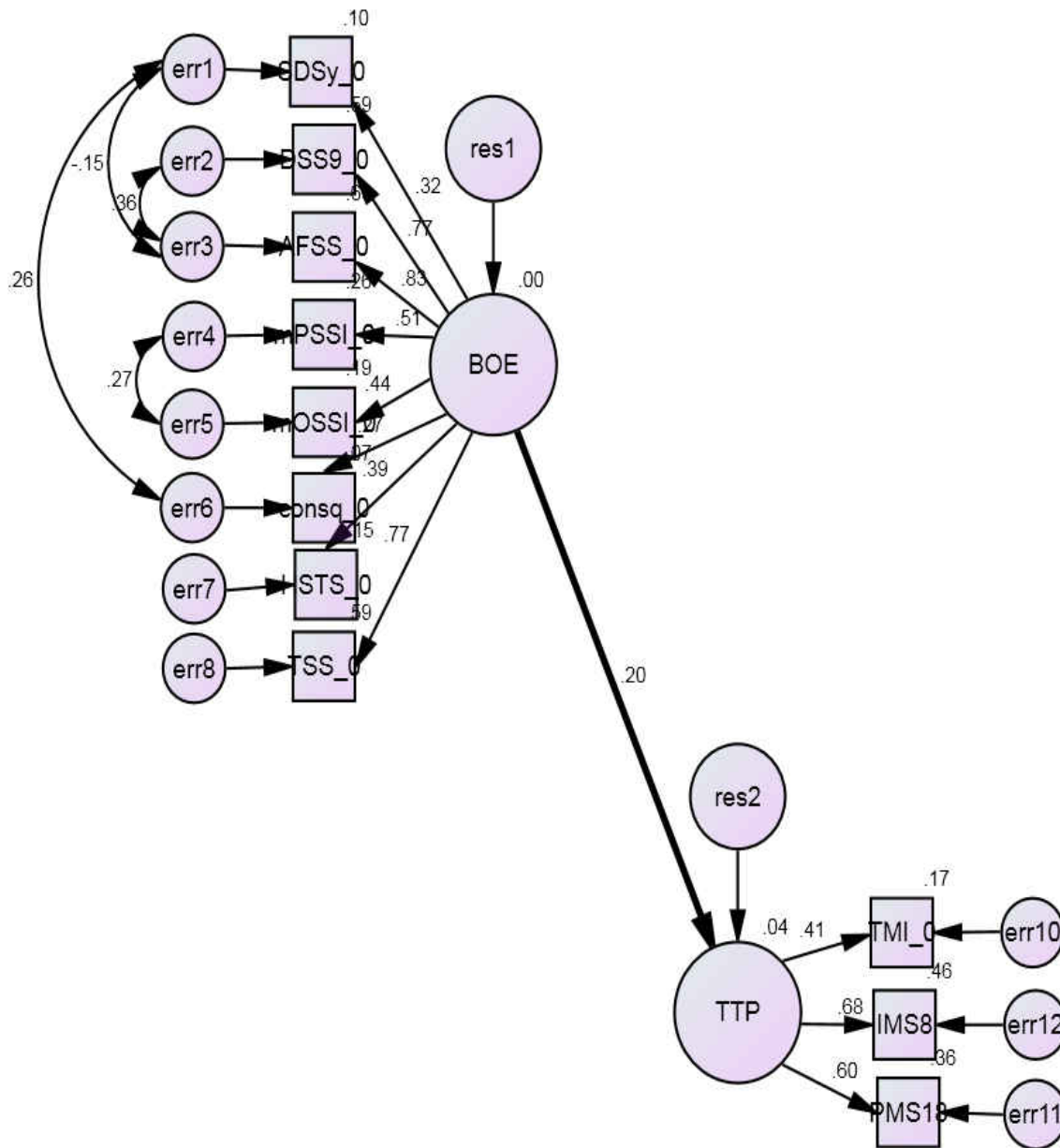


Figure 15: Structural Model C

The overall composite indicated that the variance in TTP represented by the model was 4% ($R^2 = .041$; small effect size). The BOE had a significant individual contribution to TTP ($\beta = .202, p < .001$). Therefore, as BOE scores increased per unit, TTP scores increased by .202 units.

Additional post hoc testing was not conducted on the model because goodness of fit tests indicated that the model fit was good. As a result of the three structural equation models, the direct relationship between the BOE and ER was *not* supported at the intake level in this study. However, results from SM-A confirmed hypothesis four. Results from all structural models must be interpreted with caution as the effect sizes were small in each model.

This section discussed the steps and results of the five-stage SEM process, which included model specification, model identification, model estimation, model testing, and model modification. SEM was utilized in a confirmatory manner to test hypothesized relationships; however, post hoc testing was used in an exploratory way in order to gain understanding of the relationships between the indicators and variables. The first three hypotheses were *rejected* in the analysis, and additional post hoc model modification yielded better-fitting models, which were used in the structural models. Hypothesis four was *confirmed* in SM-A. It is noteworthy that although final structural models had good fit indices, regression scores were low in both SM-A and SM-B, indicating the need for measurement model re-specification in future research.

Exploratory Post Hoc Testing

In order to gain better understanding as to where future research might focus, as well as understanding about why the model fitting did *not* yield a high variance, post hoc testing was conducted on the data. The post hoc testing was directed by the indicators within the ER of interest to future research: past month abstinence, self-help activities, mental distress, and treatment motivation.

Past Month Abstinence

First, a multiple linear regression (MLR; enter-method) analysis was used to examine if any of the indicators used within BOE predicted past month abstinence at intake. Therefore, in the first MLR, pmabst_0 (Past Month Abstinence) was the DV and all 21 indicators from the BOE (SDSI_0, SDSy_0, SDSm_0, SFS8p_0, CWS_0, S7, TAS5p_0, EmPS_0, DSS9_0, AFSS_0, HSTS_0, TSS_0, SSI_0, consq_0, IAS5p_0, GCS_0, HPS3p_0, ERS21_0, wkyfmp_0, mOSSI_0, mPSSI_0) were IVs. Overall, the linear composite of the predictor variables (indicators from BOE) significantly predicted 34.4% ($R^2 = 34.4$; medium effect size) of the variance in past month abstinence at intake, $F(21, 2126) = 53.090, p < .001$. Among predictor variables, IAS5p_0 ($\beta = -.064$), AFSS_0 ($\beta = .083$), HSTS_0 ($\beta = -.040$), TAS5p_0 ($\beta = -.062$), CWS_0 ($\beta = -.080$), S7 ($\beta = .038$), SDSI_0 ($\beta = .161$), SDSm_0 ($\beta = -.285$), and SFS8p_0 ($\beta = -.245$) had significant beta weights. As evidenced by the beta weights, substance dependence over the past month and substance frequency were the strongest predictors of past month abstinence at intake. For example, for every unit increase in substance dependence over the lifetime, there was a .161 unit increase for past month abstinence, and for every unit increase in substance frequency, there was a .245 unit decrease in past month abstinence.

Next, another MLR (enter-method) was conducted to determine if any indicators hypothesized within TTP (TMI_0, TRI_0, PMS18, IMS8, NeedANYtx, S6, GSSI_0, SSSI_0, mRER13Ip_0) predicted the DV: past month abstinence at intake (pmabst_0). The linear composite of the predictor variables predicted 14.0% ($R^2 = 14.0$; small effect size) of the variance in past month abstinence at intake, $F(9, 2138) = 38.780, p < .001$. The following indicators had significant beta weights: TRI_0 ($\beta = -.065$), PMS18 ($\beta = .057$), S6 ($\beta = .178$),

SSSI_0 ($\beta = .093$), and mRERI13p_0 ($\beta = -.258$). As evidenced by the beta weights, recovery environment risk and the variable measuring if participants had ever been to self-help groups (S6) represented the strongest predictors in the model for past month abstinence at intake. For every unit increase in recovery environment risk, there was a .258 unit decrease in past month abstinence at intake, and for every unit increase in previous attendance in self-help groups at intake, there was a .176 increase in past month abstinence.

Self-Help Activities

In order to proceed with post hoc testing, another variable which loaded in ER was tested: SHAS_0. A MLR (enter-method) was conducted to predict whether variables that were hypothesized as BOE indicators (SDSI_0, SDSy_0, SDSm_0, SFS8p_0, CWS_0, S7, TAS5p_0, EmPS_0, DSS9_0, AFSS_0, HSTS_0, TSS_0, SSI_0, consq_0, IAS5p_0, GCS_0, HPS3p_0, ERS21_0, wkyfmp_0, mOSSI_0, mPSSI_0) predicted self-help activity involvement (SHAS_0). Overall, the linear composite predicted 19.2% ($R^2 = .192$; small effect size) of the variance found within SHAS_0, $F(21, 2126) = 23.991, p < .001$. The following indicators had significant beta weights: SDSI_0 ($\beta = .192$), SDSy_0 ($\beta = .066$), SDSm_0 ($\beta = -.096$), SFS8p_0 ($\beta = -.095$), S7 ($\beta = .151$), mPSSI_0 ($\beta = .049$), GCS_0 ($\beta = .067$), and ERS21_0 ($\beta = -.173$). As evidenced by the beta weights, substance dependence over the lifetime and environmental risk had the highest contribution to the prediction of self-help activity level at intake. For every unit increase in substance dependency levels over the lifetime, there was a .192 unit increase in self-help activity level, and for every unit increase in recovery environment risk, there was a .173 unit decrease in self-help activities.

Next, another MLR (enter-method) was conducted to determine if any indicators hypothesized within TTP (TMI_0, TRI_0, PMS18, IMS8, NeedANYtx, S6, GSSI_0, SSSI_0, mRER13Ip_0) predicted the DV: self-help attendance at intake (SHAS_0). Overall, the linear composite of the IVs significantly predicted 34.0% ($R^2 = .34$; medium effect size) of the variance found within the DV (SHAS_0), $F(9, 2138) = 122.548, p < .001$. Within the IVs, the following indicators had significant beta weights: TMI_0 ($\beta = .066$), TRI_0 ($\beta = -.045$), PMS18 ($\beta = .041$), S6 ($\beta = .466$), GSSI_0 ($\beta = .156$), SSSI_0 ($\beta = .074$), and mRERI13p_0 ($\beta = -.123$). As evidenced by beta weights, general social support and the variable measuring if participants believed they needed treatment (NeedANYtx) had the strongest predictive scores of self-help activities at intake. For every unit increase in participants believing they needed any type of treatment, there was a .466 unit increase in self-help activity level, and for every unit increase in general social support, there was a .156 unit increase in self-help activity level.

Mental Distress

Overall mental distress was also an interest in order to see how various aspects of the BOE, TTP, and ER related to mental health. As a result, the total mental distress scale (IMDS_0) was utilized as the DV in three regressions: testing the effects of the BOE on mental distress, the effects of TTP on mental distress, and the effects of ER on mental distress. These were tested by removing the IMDS subscales from all three constructs and testing the remaining hypothesized variables as IVs.

First, a MLR was conducted using the remaining BOE indicators (IVs; SDSI_0, SDSy_0, SDSm_0, SFS8p_0, CWS_0, S7, TAS5p_0, EmPS_0, consq_0, IAS5p_0, GCS_0, HPS3p_0, ERS21_0, wkyfmp_0, mOSSI_0, mPSSI_0) to predict mental distress (DV). Overall, the linear

composite predicted 34.4% ($R^2 = .344$; medium effect size) of the variance in mental distress at intake, $F(16, 2131) = 69.904, p < .001$. Among the IVs, the following indicators had significant Beta weights: SDSI_0 ($\beta = .138$), SDSy_0 ($\beta = .057$), CWS_0 ($\beta = .051$), wkyfmp_0 ($\beta = .040$), mOSSI_0 ($\beta = .207$), mPSSI_0 ($\beta = .274$), consq_0 ($\beta = .069$), HPS3p_0 ($\beta = .162$), and GCS_0 ($\beta = .076$), and ERS21_0 ($\beta = .041$). Of these indicators, personal sources of stress (mPSSI_0) and other sources of stress (mOSSI_0) had the strongest beta weights. Therefore, as personal sources of stress increased per unit, there was a .274 unit increase in mental distress. As other sources of stress increased per unit, there was a .207 unit increase in mental distress.

Second, another MLR was conducted using TTP indicators (TMI_0, TRI_0, PMS18, IMS8, NeedANYtx, S6, GSSI_0, SSSI_0, mRER13Ip_0) to predict mental distress levels at intake. Overall, the linear composite significantly predicted 16.6% ($R^2 = 16.6$; small effect size) of the variance in internal mental distress at intake, $F(9, 2138) = 47.333, p < .001$. The following indicators had significant beta weights: TMI_0 ($\beta = .148$), S6 ($\beta = .123$), GSSI_0 ($\beta = -.040$), SSSI_0 ($\beta = .081$), and mRERI13p_0 ($\beta = .330$). Recovery environment risk (mRERI13p_0) and treatment motivation (TMI_0) had the strongest beta weights. Therefore, as recovery environment risk increased per unit, there was a .330 unit increase in mental distress, and as treatment motivation increased per unit, there was a .148 unit increase in mental distress.

Lastly, a MLR was conducted using remaining ER indicators (SDSm_0, SDSy_0, SFS8p_0, InCom_0, PCSS, SHAS_0, HPS3p_0, ERS21_0, ESI_0, nofhp_0, pmabst_0) to predict mental distress (IMDS_0). The overall linear composite significantly predicted 48.5% ($R^2 = .485$; large effect size) of the variance within internal mental distress at intake, $F(11, 2136) = 182.730, p < .001$. The following indicators had significant beta weights: SDSm_0 ($\beta = .054$),

HPS3p_0 ($\beta = .149$), SHAS_0 ($\beta = .046$), nofhp_0 ($\beta = -.038$), and PCSS ($\beta = .625$). Personal coping styles (PCSS) had the strongest beta weight, followed by health problems (HPS3p_0) at intake. Therefore, as personal coping styles (PCSS) increased per unit, there was a .625 unit increase in internal mental distress, and as health problems (HPS3p_0) increased per unit, there was a .149 unit increase in internal mental distress.

Treatment Motivation

In order to help gain understanding about how events in addiction influence motivation to change, one additional MLR analyses was conducted. The BOE indicators (SDSI_0, SDSy_0, SDSm_0, SFS8p_0, CWS_0, S7, TAS5p_0, EmPS_0, DSS9_0, AFSS_0, HSTS_0, TSS_0, SSI_0, consq_0, IAS5p_0, GCS_0, HPS3p_0, ERS21_0, wkyfmp_0, mOSSI_0, mPSSI_0) were tested in order to predict treatment motivation at intake: TMI_0. Overall, the linear composite significantly contributed to 11.6% ($R^2 = 11.6$; small effect size) of the total variance found within treatment motivation at intake, $F(21, 2126) = 13.310, p < .001$. The following indicators had statistically significant beta weights: SDSI_0 ($\beta = .183$), SDSm_0 ($\beta = .064$), SFS8p_0 ($\beta = -.072$), S7 ($\beta = .056$), DSS9_0 ($\beta = .147$), HSTS ($\beta = -.051$), SSI_0 ($\beta = -.057$), consq_0 ($\beta = .055$), and mOSSI_0 ($\beta = .076$). Of these indicators, substance dependence over the lifetime (SDSI_0) and depressive symptom scales (DSS9_0) were the strongest predictors. As a result, as substance dependence over the lifetime (SDSI_0) increased per unit, treatment motivation increased by .183 units, and as depressive symptom scale scores (DSS9_0) increased per unit, treatment motivation increased by .147 units.

This section discussed results from the post hoc MLR analyses that were conducted on four areas of interest following SEM analyses: past month abstinence, self-help activity

involvement, mental distress, and treatment motivation. These analyses were informed by the SEM results, and added to the understanding of the cycle of addiction. Results indicated that current addiction severity was inversely related to treatment motivation and self-help activity involvement. Further, ER hypothesized variables predicted 48.5% of the variance in mental distress, thus supporting a relationship between aspects of the BOE and ER.

Summary

This study analyzed the components within the BOE, TTP, and ER, as well as the relationships between the constructs in an effort to understand influences of recovery. The first three hypotheses were rejected in the study, and measurement model modifications were conducted, which yielded good fit indices. Results from Hypothesis One indicated that hypothesized factors did not load on the BOE, and instead, the BOE at the intake level was a measurement of mental health severity. Results from Hypothesis Two indicated that hypothesized factors did not load on TTP; however, TTPs resulting factor structure was created through model modification and contained factors of awareness, motivation, and support. Results from Hypothesis Three also indicated that hypothesized indicators did *not* load into ER; however the resulting factor structure contained indicators of abstinence and environmental support. Lastly, Hypothesis Four yielded three resulting models, all of which had good fit indices. Therefore, hypothesis four was accepted. Direct effects were not all significant, and the *p* value in all final models was significant. There was *not* a significant relationship between the BOE and ER at the intake level; however, there was a significant relationship between the BOE and TTP, as well as TTP and ER at the intake level. The direct effects between the BOE and ER may have had a role in the significant *p* values, as well as the large sample size. Within the three resulting

models, the BOE had significant relationships with TTP, spiritual support, and motivation. Both spiritual support and motivation also had significant relationships with ER. Therefore, the results from the current study support that there are existing relationships between the BOE and TTP; however, the relationship between the BOE and ER at the intake level was not significant.

CHAPTER V: DISCUSSION

The purpose of this study was to understand the contributions of the bottoming out experience (BOE) and the turning point (TTP) on early recovery (ER) at intake. By utilizing SEM, the components of the constructs, as well as the relationships between them were analyzed. This chapter discusses the results presented in Chapter 4 and connects the results to previous theory and research noted in Chapter 2. Following the discussion of results, the chapter includes (a) limitations of the study, (b) recommendations for future research, and (c) implications for addiction theory and practice.

Summary of the Study

Influences of ER are of importance because as counselors seek to help individuals struggling to reach and maintain sobriety, direct impacts on change help guide decision-making and aid in treatment planning. The bottoming out experience (BOE) has been thought of as the lowest point individuals reach before entering recovery. Coupled with a cognitive shift (the turning point; TTP), the BOE appears to be a fundamental component within individual experiences leading to sobriety. This study was based on three problems that exist within substance dependence treatment: (a) current treatment is based on an unsubstantiated model of addiction that includes hitting bottom, change, and early recovery; (b) the terms BOE, TTP, and ER are not clearly defined and have not been empirically tested; and (c) the relationships between the BOE, TTP, and ER need to be understood in order to better describe the change process and thus inform best practices and data-driven treatment.

Literature reviews identified gaps that exist within addiction research and practice in the practical experiences of individuals in recovery; specifically, the BOE, TTP, and ER. The

literature and data available from the existing database used in this study influenced decisions on research design and statistical analysis procedures. In order to understand the relationships between the BOE, TTP, and ER in their natural state, a descriptive, correlational research design was chosen. Because correlational research is exploratory in nature, structural equation modeling (SEM) was used to understand the components of the BOE, TTP, and ER at intake, as well as, test the hypothesis of the relationships between the BOE, TTP and ER. Although SEM is a confirmatory technique, it is frequently used in an exploratory manner because it combines elements of confirmatory factor analysis and multiple regression and allows for various possibilities of the relationships between constructs and variables (Schrieber, Nora, Stage, Barlow, & King, 2006). The literature on BOE, TTP, and ER provided evidence to test a theoretical model, which is the purpose of SEM. Further, the GAIN was developed through a series of EFA and CFA analyses; therefore, EFA was not considered to use with this instrument as EFA does not allow the researcher to test a theoretical model.

Discussion of Findings

This section provides a review and discussion of the results presented in Chapter 4. Results are organized based on (a) hypotheses one, two, three, and four discussions; and (b) post-hoc analyses. Outcomes of the study are discussed, as well as theory and research relating to the results.

Hypothesis One Discussion

H: Collinearity between the identified variables ([1] substance dependence, [2] heavy using, [3] withdrawal symptoms, [4] functionality, [5] mental distress, [6] stress, [7] consequences, [8]

illegal activity, [9] suicidality/homicidality, [10] environmental risk, [11] health problems, and [12] trauma) will load into a single factor structure entitled the BOE at the intake period.

Hypothesis One was tested by utilizing an individual measurement model/CFA for the BOE and hypothesized factors. As shown in Figure 16, results indicated that the model was not a good fit: $\chi^2 = 1880.633$; $df = 189$, $p < .001$; RMSEA = .065 with CI₉₀: (.062, .067); CFI = .604; GFI = .937; and TLI = .56. In conclusion, hypothesis one was rejected. Post hoc testing was conducted on the model and another model revealed itself through model modification which included: Substance Dependency Past Year, (SDSy_0), Depression Symptom Scale (DSS9_0), Anxiety/Fear Symptom Scale (ASFS_0), Personal Sources of Stress (mPSSI_0), Other Sources of Stress (mOSSI_0), Consequences (consq_0), Homicidal and Suicidal Symptom Scale (HSTS_0), and Trauma Symptom Scale (TSS_0). These scales can all be considered aspects of mental health and mental distress/stress. All the IMDS_0 subscales, with the exception of SSI_0, loaded onto the BOE. The post hoc analysis was also conducted using IMDS as a total scale; however, results were similar. Consequently, the BOE accurately appeared to measure mental distress issues with this data.

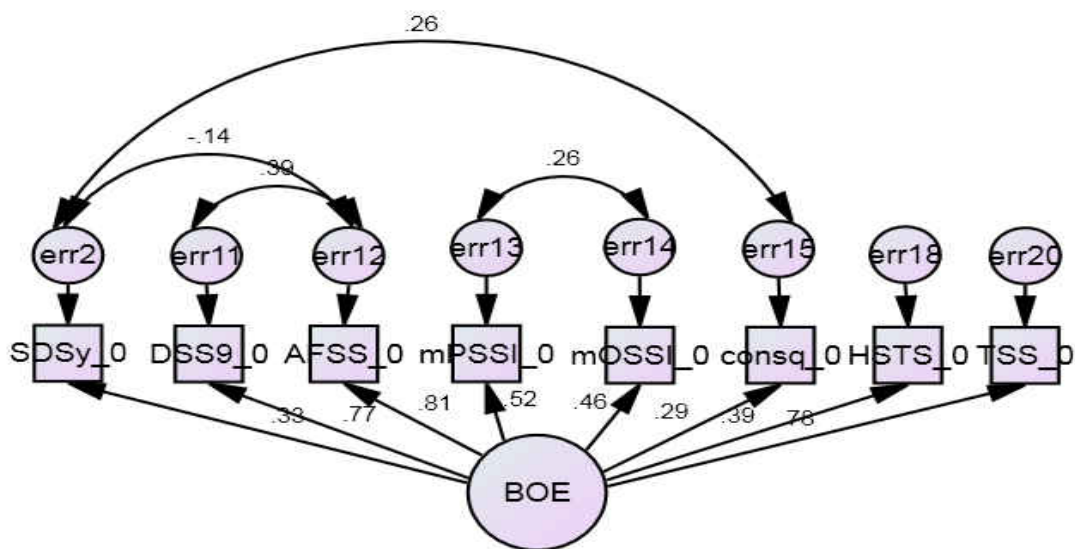


Figure 16: BOE Modification Model

Results from the current study support previous research (e.g., Venner & Miller, 2001; Young, 2011), indicating that substance dependence is an aspect of the BOE. DePue et al. (in press) noted that participants reported a time difference in having a BOE and entering sobriety. Results from the current study support this finding in that substance dependence in the past month did *not* load onto the BOE, rather substance dependence in the past year loaded. This findings suggests that time may be a factor in having a BOE and the willingness/motivation to enter treatment.

Results from the current study also supported previous findings that levels of mental distress (e.g., anxiety and depression, Schmitz et al., 2009; Shapira & Courbasson, 2011) and stress (e.g., Schwabe et al., 2011) influenced decisions to enter treatment. Although research had *not* specifically measured mental distress levels and stress levels in relation to the BOE, the

current study demonstrated that both are indicators of a BOE. These results were expected since the BOE is an accumulation of negative events in addiction, which necessarily includes both mental distress symptoms and stress.

As hypothesized, homicide and suicide symptoms loaded onto the BOE. Previous research (e.g., Darke, 2010; Howard et al., 2010) links both suicidal and homicidal symptoms to AOD use. Further, suicidal symptoms have been linked to mental distress symptoms (Penney et al., 2012). Traumatic symptoms were also found as indicators of the BOE. Previous research (e.g., Logrip et al., 2012) links traumatic experiences with AOD use, as well as demonstrating traumatic experiences as motivating factors for sustained recovery (Matzger et al., 2005). Thus, traumatic experiences were hypothesized to be one of the negative experiences within the BOE, and results supported this hypothesis. The inclusion of homicidal and suicidal symptoms, as well as traumatic experiences within the BOE yields further evidence of a strong mental distress presence in the BOE.

Theory of the BOE has noted that the BOE is the accumulation of negative events throughout addiction (Brown, 1985). Results from this study supported that mental distress, stress, and consequences were the predominating commonalities in the BOE. Jellinek and Glatt considered the BOE to be the result of many negative events within addiction as well. Neither Brown, Glatt, or Jellinek discussed the inclusion of mental health in their models. One of the reasons for this may be that the inclusion of mental health as a co-occurring disorder with SUDs has increased and changed over time. Addiction theory did not begin with the notion that mental health was related to dependence, and as this concept is now widely accepted, it is not surprising that mental distress items loaded onto the BOE.

Cain (1991) discussed that although the BOE was unique for each person, commonalities existed within the experience such as consequences of using substances and crisis. Results from the current study support that consequences from using are an indicator of the BOE, as well as crisis. Although this study did *not* specifically measure for crisis, mental distress scales were used, which provide measures of resulting crisis (e.g., Reynolds et al., 2010). Therefore, results from the current study support Cain's (1991) inclusion of both crisis and consequences as commonalities of the BOE. It is noteworthy that consequences were expected to be a factor loading within the BOE as they have been demonstrated as a primary reason for AOD cessation (e.g., Hodgins et al., 1997). Negative consequences were measured by using the variable "consq", which is a self-perceived measure of consequences due to substance use. The inclusion of consequences as factor loading on the BOE, suggests that participant values and/or meaning making of negative events may play a role in the BOE.

Previous research (DePue et al., in press) suggested that meaning making of negative events may play a role in defining the BOE. For example, meaning making of events in addiction could lead to higher levels of mental distress, thus causing higher levels of a BOE. For example, Young (2011) identified three types of rock bottom experiences that occurred for participants: (a) high, (b) medium, and (c) low. The ratings were based on the self-perceived losses in a participant's life. Results from the current study add to Young's (2011) results by indicating that rather than the specific incidents influencing BOEs, high, medium, and low rock bottom experiences may affect mental distress levels, thus influencing the level of the BOE. Further, the need for narrative therapy in addiction treatment is highlighted within this study.

Other theory (e.g., *Alcoholics Anonymous*, 2001) and research (e.g., DePue et al., in press) indicate that value systems may play a role an individual reaching a BOE, and since value systems are unique to the individual, BOEs would be unique to the individual as well. Results from the current study support these findings as they show that the BOE reduced to an indicator of mental distress, consequences, and stress, and various factors could contribute to each of these variables. Individual experiences in addiction may vary; however, resulting mental stress and distress could be either result from AOD use and/or influences of AOD use.

Considering the factor loadings of the BOE at intake, specific negative events may *not* have an impact on the BOE. For example, specific aspects of the BOE that were expected to load were withdrawal, heavy using, attempts to stop using substances, functionality, health problems, illegal activity, and environmental risk. Each of these indicators could be said to result in higher levels of mental distress, stress, or consequences. For example, heavy using is indicated by higher frequencies of drug/alcohol use, which can result in a raised awareness of dependency, stronger need for more substances, financial difficulty in obtaining substances, and other stressors. As a result, although heavy using did *not* load onto the BOE, mental distress factors such as Anxiety/Fear and Depression could be outcomes and/or influences of heavy using. Another unexpected result was that previous attempts to stop using substances did *not* load onto the BOE. Similar to heavy use, previous attempts in treatment may increase mental distress levels as individuals gain more awareness of their dependency issues, as well as feelings of guilt at failed treatment attempts. Although it was unexpected that none of aforementioned areas loaded onto the BOE for this data, the results might be explained by either reducing the specific

events into the resulting mental distress/stress levels or considering the relationship of mental distress, stress, and consequences was simply higher to one another.

Hypothesis Two Discussion

H: Collinearity among identified variables ([1] motivation, [2] awareness, and [3] support) will load into a single factor structure entitled TTP at the intake period.

Results from the current study indicated that hypothesized model for TTP was *not* a good fit: $\chi^2 = 360.859$; $df = 27$, $p < .001$; RMSEA = .76 with CI₉₀: (.069, .083); CFI = .551; GFI = .967; and TLI = .402. In conclusion, hypothesis two was rejected. Post model modifications were conducted and another model revealed itself which included: Treatment Motivation Index (TMI_0), Personal Motivation Scale (PMS20), Interpersonal Motivation Scale (IMS8), Perception for Need of Treatment (NeedANYtx), General Social Support Index (GSSI_0), and Spiritual Social Support Index (SSSI_0; See Figure 17). The two areas hypothesized to represent support loaded lowest in the model: GSSI_0 ($\beta = .08$) and SSSI_0 ($\beta = .03$). The results indicated that although the model yielded good fit statistics, the indicators may *not* be measuring a similar construct, and/or there may be dimensions of TTP *not* represented in the utilized measures. As a result of this finding, TTP was separated into individual constructs measuring motivation and support, as these had the highest loadings in the measurement model. This is discussed in the hypothesis four section of this chapter.

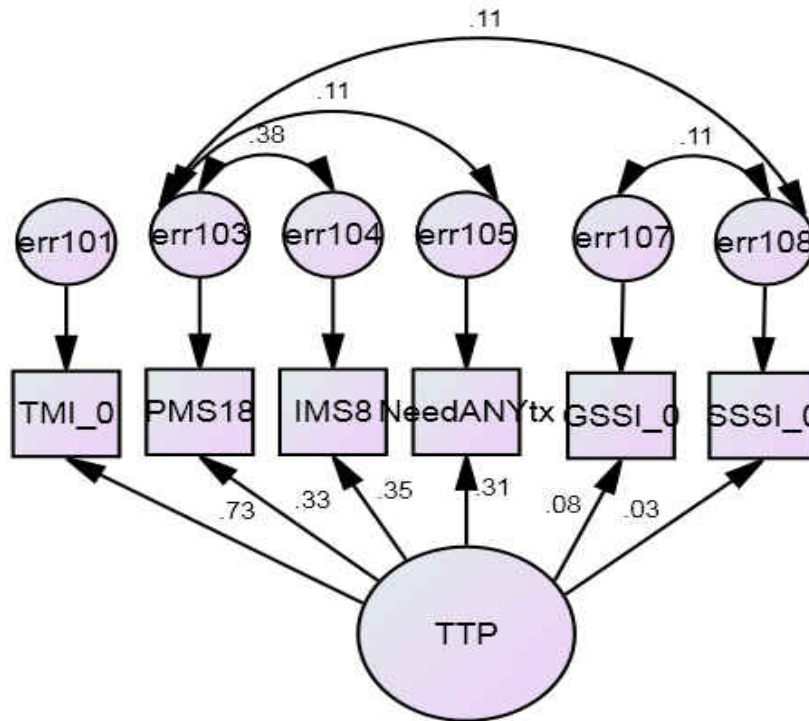


Figure 17: TTP Measurement Model Results

Although noted indicators loaded low in TTP model and there was high co-varying in the model, the model yielded good fit statistics warrants discussion. First, treatment motivation (TMI_0), personal motivation (PMS18), and interpersonal motivation (IMS8) had the highest loadings in TTP. Because motivation has been linked with cognitive challenging tasks (Hess et al., 2012), motivation was expected to load highly with the cognitive task of TTP. Further, awareness has also been linked to motivation (Norcross et al., 2011); therefore, the loading of NeedANYtx ($\beta = .31$) on TTP was expected. Motivation and awareness appeared to be a separate construct than support, and renaming TTP to Motivation in this study's results may provide the most accurate name for the construct being measured. I had a difficult time fitting TTP model,

and the factor loadings indicate the struggle. When I removed general support and spiritual support from the model, AMOS would not run the model. The difficulty in being able to easily capture TTP as a model indicated that the factors awareness, motivation, and support may all be identifying different constructs.

In this study, TTP was defined as cognitive change, and although motivation, awareness, and support may be aspects of change, cognitive change may best be indicated by awareness measures. This study used two indicators as measures of awareness: the perceived need for treatment and if participants had ever attended 12 step meetings. Upon reflection, these indicators may *not* have been sufficient to identify dimensions of awareness necessary for this study. Flora (2003) noted that the recovery process included adoption of the recovery narrative, including raised self-awareness and low resistance to treatment. Results from the current study support that the awareness for the need of treatment (NeedANYtx) is a factor representing TTP; however, additional indicators of awareness need to be examined before understanding the full picture of TTP.

Results showing that social support did *not* load highly onto TTP were unexpected. Research indicated that social support had a profound impact on recovery (Flora, 2003) and decision-making (Ackerman & Eden, 2011). Social support was removed from TTP measurement model, but once that occurred, the model was overidentified and would not run in AMOS. Therefore, social support remained in the model with low factor loadings. Although TTP had some factor loading concerns, the modified measurement model for TTP was considered to be a valid model. Results from the current study identified that social support might also be an indicator of ER (see discussion on Hypothesis Four), which was *not* surprising, as the majority of

definitions of ER include social support (e.g., BFI, 2007, White 2007). This study attempted to separate social support from ER in order to understand how the presence/absence of social support affects ER. Literature (Brown, 1985; DePue et al., in press; Forchheim et al., 2008) noted that change is a separate, but related construct from the recovery process. Therefore, this study separated aspects such as motivation, awareness, and support from ER in order to gain the greatest amount of information about the process. Another explanation for the findings with TTP is the factor of time. TTP was measured at intake in this study, and the connection between motivation, awareness, and support may grow over time as individuals continue to work on recovery. However, conclusions can be drawn from TTP results that the inclusion of motivation, awareness, and support are related to previous research on change (e.g., Miller et al., 2008).

Hypothesis Three Discussion

H: Collinearity between the identified variables ([1] no/reduced substance dependence, [2] no/reduced substance use, [3] self-help activity, [4] low/improved health problems, [5] low/improved psychological health, [6] healthy coping styles, [7] healthy relational functioning, and [8] living in the community) will load into a single factor structure entitled ER at the intake time period.

Initial model specification testing revealed that the hypothesized ER model was *not* a good fit: $\chi^2 = 2246.906$; $df = 104$, $p < .001$; RMSEA = .098 with CI₉₀: (.094, .102); CFI = .551; GFI = .990; and TLI = .482. As a result, hypothesis three was rejected. Model modifications were conducted, and a second model was revealed (See Figure 18), which included the following indicators: Past month abstinence (pmbast_0), Self-Help activity levels (SHAS_0), No family or

home problems (nohfp_0), Living in the Community (InCom_0), and Environmental Strengths (ESI_0).

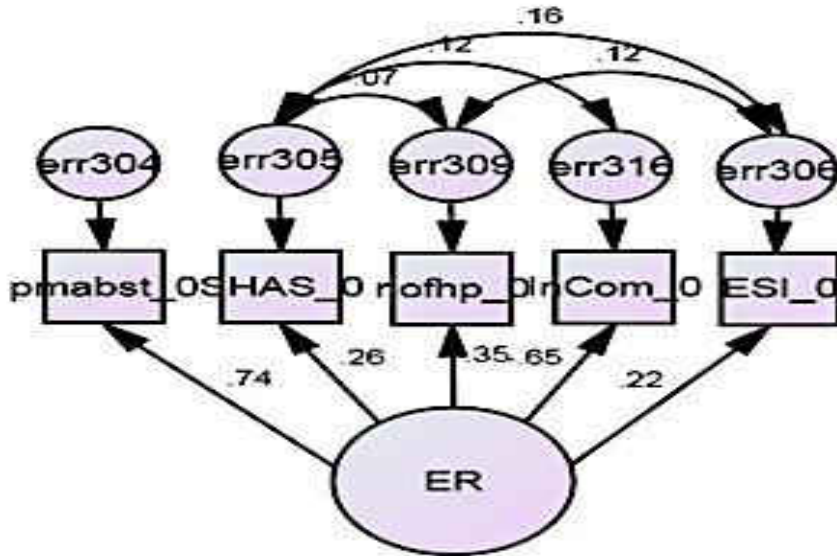


Figure 18: ER Model Modification

As noted in Chapter 2, there are a number of difficulties trying to define early recovery. For example, literature on the definition of ER varies, with some sources indicating abstinence is a necessary component of ER (BFI, 2007) and others suggesting abstinence is *not* indicative of ER (White, 2007). This study's results supported other definitions of recovery, which included abstinence (e.g., BFI, 2007). However, the researcher made the decision to include past month abstinence as an indicator, and results may have varied without the inclusion.

Further, previous literature discussed the importance of self-help activity level and self-motivated change as part of ER (e.g., BFI, 2007; del Vecchio, 2012). For example, in a study by Scott et al. (2005), entry into recovery was supported by increased self-efficacy, problem

orientation, self-help attendance, and treatment. The current study's results supported that self-help activity levels were indicators of ER.

Living in the community was hypothesized to be an indicator of ER. Previous literature denoted that living in the community was a necessary component of ER, as living in the community refers to social and financial obligations to society (BFI, 2007). Previous research noted that *not* living in the community strengthened the chance of an individual entering recovery (Scott et al., 2005). The current study supported that living in the community was an indicator of ER, and that living in the community had a negative factor loading on ER. Theory of recovery states that living in the community is a criterion to be in recovery, yet research indicates that the chances of entering recovery are stronger if not living in the community. These are somewhat dichotomous concepts that warrant future research.

Relating to living in the community, environmental strengths were expected to load onto ER. The environment (e.g., family, friends, work) has been found to significantly influence substance use (e.g., Perkins et al., 1986; Sareen & Kaur, 2012). It is noteworthy that the indicator *no family or home problems* (nofhp_0) in the past month also loaded onto ER. Previous literature (White, 2007) suggested that recovery included individual and family attempts to change. Further, family systems that use AODs have been found to be more hostile (Jêdrzejczak, 2005). Consequently, results from this study demonstrated that ER included a family and home component, as well as an environmental strength component, thus supporting the notion that ER includes a change in the family system and a supportive environment.

Aside from the aforementioned inclusions of ER, other aspects of personal health, such as mental health and physical health were expected to load onto ER. Previous literature discussed

the importance of ER including more than just abstinence (Laudet, 2007). However, results from this study did *not* support the inclusion of such health factors as mental health or physical health. For example, previous research suggested that personal coping styles were related to recovery (R.H. Moos & Moos, 2007); however, the findings from this study did *not* support this relationship. One of the reasons for this may be that ER was measured at the intake level in the current study. In the study by R. H. Moos and Moos (2007), coping was found to increase as abstinent time increased, and since this study measured intake levels of coping, it was *not* surprising that coping was *not* an indicator of ER. The relationship of coping styles is expected to change as recovery time increases; therefore, longer timelines for recovery need to be studied. Results were unexpected that mental distress indicators did not load onto ER; however, mental health indicators loaded strongly onto the BOE. Since both measurements for the BOE and ER were taken at the intake level, it is not surprising that mental distress levels did not also load onto ER. This relationship would be expected to change with longer time periods of ER.

Hypothesis Four Discussion

H: Levels of the BOE and levels of TTP at intake will contribute to levels of ER at the intake time period.

Structural Model A

The hypothesized SM-A is presented graphically in Figure 19, and tested whether the exogenous variables (BOE and TTP) had an effect on the endogenous variable, ER. As shown in Table 9, SM-A yielded a moderate fit: $\chi^2 = 531.164$; $df = 107$, $p < .001$; RMSEA = .043 with CI₉₀: (.039, .047); CFI = .906; GFI = .998; and TLI = .881. The overall composite indicated that the variance in ER represented by the model was less than 1% ($R^2 = .004$; small effect size).

TTP had a significant individual contribution ($\beta = -.066, p = .039$), representing less than 1% ($R^2 = .004$) of the variance within ER. Therefore, as ER scores increased per unit, TTP scores decreased by .066 units. Results from this study supported previous research that TTP is a mediating factor in ER (e.g., DePue et al., in press). The negative Beta weight between ER and TTP was a surprising finding. One explanation for this finding may be that at the intake level, many people in ER may *not* have been living in the community and/or have maintained abstinence for one month. Motivation might decrease as a result of these conditions. It is also possible that in a controlled environment or with a short amount of abstinent time, awareness of the need for treatment might also decrease. Further, all aspects of support dropped from TTP in SM-A; therefore, it can be concluded that TTP is measuring awareness and motivation at the intake level within this model.

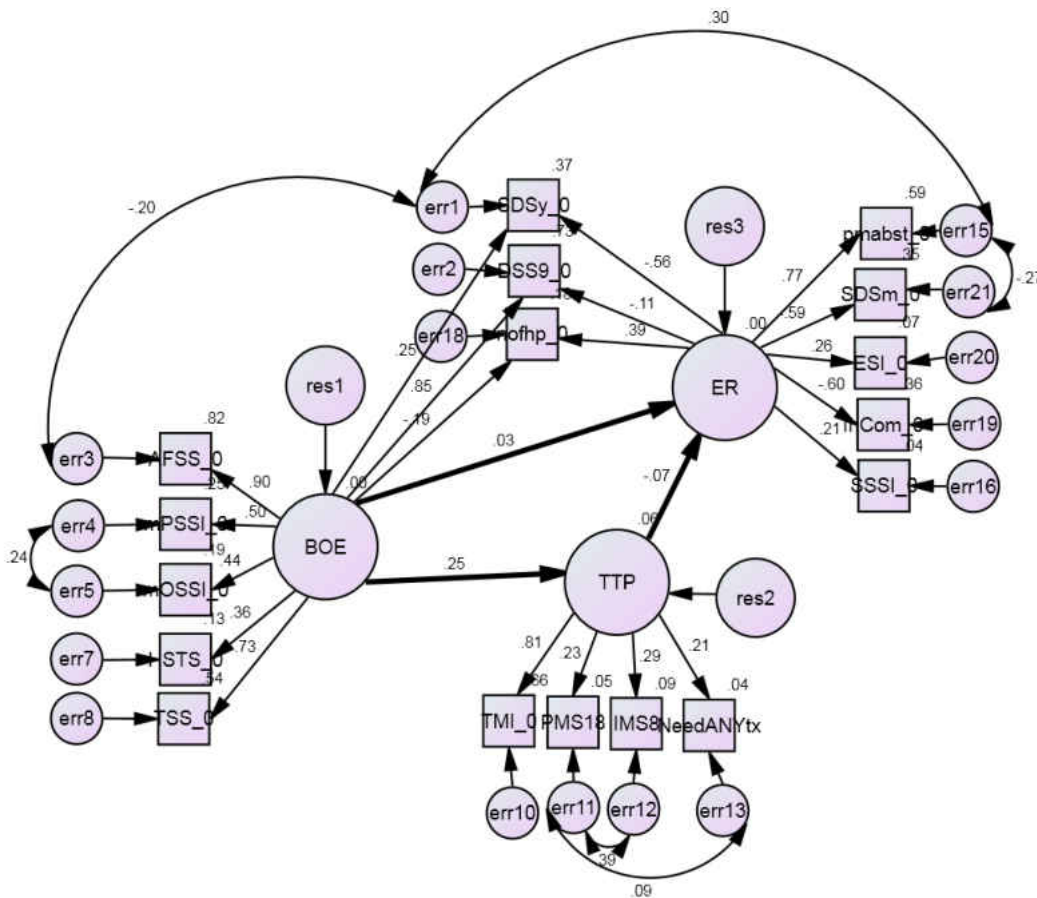


Figure 19: Structural Model A

SM-A was created via MM-B, and changes that occurred in the model when individual measurement models were combined are necessary to discuss. First, one area of specific support dropped from the model: self-help activities (SHAS_0). Another area of specific support (spiritual support; SSSI_0) shifted from an indicator of TTP to an indicator of ER. It is arguable that specific support for recovery has *not* had time to develop at the intake level for clients. Further, general social support (GSSI_0) completely dropped from the model. Previous research indicated that as abstinent time increased, the amount of social and spiritual support also increased (Dennis et al., 2007). The exclusion of support in the intake model is consistent with

Dennis et al. (2007) in that support increases throughout the duration of abstinent time. The inclusion of support in TTP is expected to change as longer periods of abstinence are included. In addition, substance dependency in the past month (SDSm_0) was re-introduced to the model, as this factor strongly matched with the theory behind ER (i.e., past month abstinence). Since past month abstinence was a primary indicator of ER, it made sense theoretically to include substance dependency in the past month into the full path analysis model to help differentiate ER from the BOE at the intake level. Lastly, consequences (consq_0) dropped as an indicator of the BOE. Considering that the BOE consisted of mental distress symptoms, it is possible that mental distress is a more accurate measure of the BOE at intake levels and/or that the BOE is actually a measurement of mental health.

Other changes once constructs were combined into a single measurement model were that both depression (DSS9_0) and substance dependency in the past year (SDSy_0) negatively loaded onto ER, while no family or home problems (nofhp_0) negatively loaded onto the BOE. These factor loadings make sense considering that supportive home environments align with recovery, whereas negative home environments can facilitate substance use (Sareen & Kaur, 2012). Further, since recovery involves an element of reduced or lack of substance dependency, SDSy_0 loading negatively onto ER further supports the Field et al. (2007) study indicating that addiction severity itself may not motivate individuals to change, but recent substance dependency issues may play a role in the change process.

Surprisingly, the BOE did *not* have a contribution ($\beta = .028, p = .348$) to ER in the model. Previous research and theory indicated that the BOE was a necessary incident in the journey to recovery (i.e., *Alcoholics Anonymous*, 2001; DePue et al., in press; Venner & Miller,

2001; Young 2011). As expected, the current study's results indicate that the BOE is an aspect of events leading to ER at intake, but that ER and the BOE are difficult to distinguish between at the intake level. Difficulty separating ER and the BOE at intake was evidenced by the low Beta weights between ER and BOE, as well as the amount of co-variance and co-loadings between indicators of the BOE and ER. The relationships between the BOE and ER are expected to change as longer time periods of abstinence increase.

However, the BOE was related to TTP ($\beta = .225, p = .003$), representing 5% ($R^2 = .05$; small effect size) of the variance within TTP. As TTP scores increased per unit, the BOE increased .225 units. The factors that loaded within TTP in SM-A were: Treatment Motivation, Interpersonal Motivation, Internal Motivation, and Perception for the need of treatment. Considering this, the BOE had a relationship with motivation and awareness. Previous research discussed that internal motivation could be increased by weighing out the pros and the cons of using substances (i.e., consequences from drinking; e.g., Hodgins et al., 1997, Stasiewicz et al., 1997). In fact, the negative experiences in a person's life can serve as a motivation to not use substances (Maisto et al., 1988). It is noteworthy that although negative experiences can serve as motivating, addiction severity has been found as negatively associated with motivation to change (Field et al., 2007). Further, Flynn et al. (2003) also found that positive experiences separated individuals who were in recovery from those who were not in recovery. This study supported that negative experiences do have an impact on motivation to change; however, future studies may include more positive experiences in order to determine the relationship between the positive and negative experiences and motivation to change.

In addition, the stages of change (SOC) model was not supported by Hypothesis Four. For example, in the stages of change, change is based on motivation, awareness, and support. At the intake level, these variables combined did not yield a strong relationship with early recovery. Further, the struggle to define TTP at intake as a construct also highlighted difficulties in placing participants into easily defined categories at the intake level. An argument can be made that although participants were at the intake level, they may be at various stages of change, which might help explain the muddled results. However, higher levels of motivation, awareness, and support should yield higher levels of ER, according to a SOC model. This was not found in the current study. I expect that the relationship between ER and motivation, awareness, and support will increase over time; therefore, future studies on the relationship between TTP and ER may provide empirical support for the change process, which may occur through a combination of SOC and transformational change.

In conclusion, SM-A provided good model fit statistics, thus indicating that it was measuring relationships in a meaningful way. However, low Beta weights between the BOE, TTP, and ER indicate that certain aspects of these constructs and/or other experiences that influence recovery were *not* accounted for in the model. SM-A also demonstrated that differentiating between the BOE and ER at the intake period was difficult, thus supporting how challenging defining recovery can be from a quantitative perspective. Further, the challenging aspects of defining ER at the intake level support the chronic model of addiction, which indicates that recovery is an on-going, dynamic process.

Structural Model B

The hypothesized SM-B is presented graphically in Figure 20 and tested whether the exogenous variables (BOE, External Motivation [IMS8], and Support [SSSI_0]) had an effect on the endogenous variable, ER, while also testing for relationships between the exogenous variables. Figure 20 depicts both the measurement model and the path analysis. The bold colored lines represent the path analysis. Results from model testing of SM-B indicated that the model was a good fit: $\chi^2 = 305.496$; $df = 54$, $p < .001$; RMSEA = .046 with CI₉₀: (.041, .051); CFI = .926; GFI = .999; and TLI = .895. Changes that were made in SM-B from SM-A included separating TTP into individual constructs of motivation and support. Awareness was not included as an individual construct because there were not enough indicators of awareness to do this. The researcher chose to use spiritual support (SSSI_0) and interpersonal motivation (IMS8) as separate indicators of motivation and support. Individual items within the SSSI_0 were discussed in Chapter 3.

The overall composite indicated that the variance in ER represented by the model was 2.5% ($R^2 = .025$; small effect size). This result was somewhat surprising considering that the BOE, spiritual support, and motivations have strong theoretical connections to recovery. However, one reason for this may be that motivation specifically measured interpersonal motivation, which might *not* be as powerful in the change process as internal motivations. Also, the study measured early recovery at the intake level. Time is an important factor in recovery, and support systems (e.g., friends in recovery) increase as abstinent time increases (Dennis et al., 2007). For example, although the overall model did *not* represent much of the total variance in ER, spiritual support had an individual contribution to ER ($\beta = .150$, $p < .001$) in the model.

Therefore, as spiritual support scores increased per unit, ER scores increased by .150 units. Spiritual support could be considered as a type of specific support (Beattie & Longbaugh, 1999; Groh et al., 2007). Specific support can be negative or positive depending on the subject matter of the support system. Although results from this study did not support a strong connection between support systems and ER, it is possible that these relationships build over time and that other factors are more influential at the intake level. General support has been found to be highest in the early stages of recovery and decrease over time in recovery (Dennis et al., 2007).

Motivation also contributed to ER in the model ($\beta = .051, p = .027$). In contrast to the negative Beta weight in SM-A, as Motivation scores increased per unit, ER scores increased by .051 units in SM-B. Results from SM-B support previous findings. For example, in a study by Vaughn and Long (1999), internal motivation was found to be a primary reason given for participants who had changed negative behaviors. Further, in a study by Forcehimes et al. (2008), readiness to change was found to be a significant event leading up to change. SM-A also denoted the presence of a relationship between TTP and ER; however, motivation was represented by three indicators in SM-A and awareness was also represented. The negative Beta weight from SM-A, as opposed to the positive Beta weight in SM-B, might be explained due to the inclusion of awareness and/or interpersonal motivations for change in SM-A. Awareness may be a process that occurs over time in recovery and not have a strong presence at the intake level. Further, interpersonal motivations of change have been found as *not* influential in the change process (Vaughn & Long, 1999); therefore, reducing motivation to internal motivation may be more indicative of influences of change. Although the current study did *not* find strong

relationships between ER and motivation, this can potentially be explained due to the intake time period of data collection.

Similar to results in SM-A, the BOE did *not* have a significant contribution to ER ($\beta = -.004, p = .866$) to ER. However, the BOE was related to Spiritual Support ($\beta = .045, p = .043$). As BOE scores increased per unit, the Spiritual Support increased .045 units. The BOE was also related to Motivation ($\beta = .075, p = .003$), meaning that as BOE scores increased per unit, Motivation increased by .075 units. These results were similar to those in SM-A, thus indicating that mental distress indicators of the BOE have an impact on the motivation and support systems in an individual's addiction journey. Mental distress combined with substance dependence could cause individuals to seek out support and be more motivated to change. However, the SSSI_0 can be thought of as a measure of value systems; therefore, the relationship between the BOE and SSSI_0 is supporting previous findings that value systems are connected to the BOE (DePue et al., in press).

Lastly, Spiritual Support and Interpersonal Motivation were *not* significantly related to one another in SM-B ($\beta = .029, p = .192$), which may also have had an impact on their inclusion as a single unit in TTP. This was an unexpected finding as spiritual support and motivation are linked in the research as positive influences for recovery (e.g., Flynn et al., 2003). An explanation for the lack of a relationship between spiritual social support and interpersonal motivation may be the measurement period of intake, whereas spiritual support was a stronger indicator of ER than interpersonal motivation. Further, interpersonal motivation might not be as strong as an indicator of change as internal motivation; thus, the relationship between spiritual social support and interpersonal motivation at intake was low. Since the SSSI_0 can be thought

of as an indicator of values, it is possible these results demonstrate the presence of values in effecting change, and also substantiate theory on spirituality as an influence of change (e.g., Sherman & Fischer, 2002; White et al., 2001).

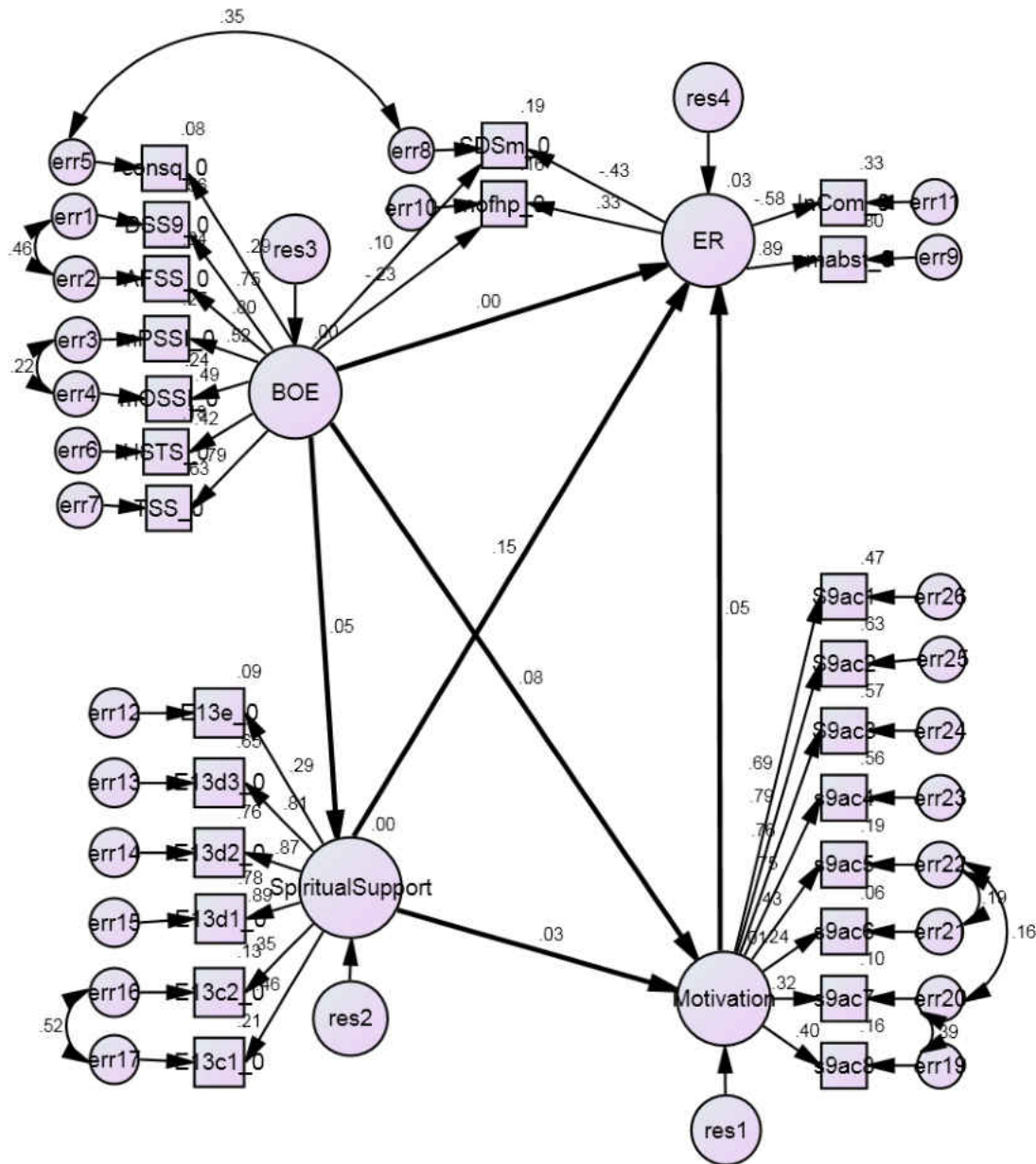


Figure 20: Structural Model - B

Structural Model C

The third hypothesized structural model was created through measurement model testing. MM-D resulted in a two variable model, rather than a three variable model. As a result, SM-C tested if the BOE had an effect on TTP. Results are presented graphically in Figure 21. Although the indicator TMI_0 loaded onto both the BOE and TTP, in this model, the co-loading was removed in order to get the best understanding of the relations between the constructs. Results from model testing of SM-C indicated that the model was a good fit: $\chi^2 = 207.065$; $df = 39$, $p < .001$; RMSEA = .045 with CI₉₀: (.039, .051); CFI = .934; GFI = .989; and TLI = .906. The overall composite indicated that the variance in TTP represented by the model was 4% ($R^2 = .041$; small effect size). The BOE individually contributed to TTP ($\beta = .202$, $p < .001$).

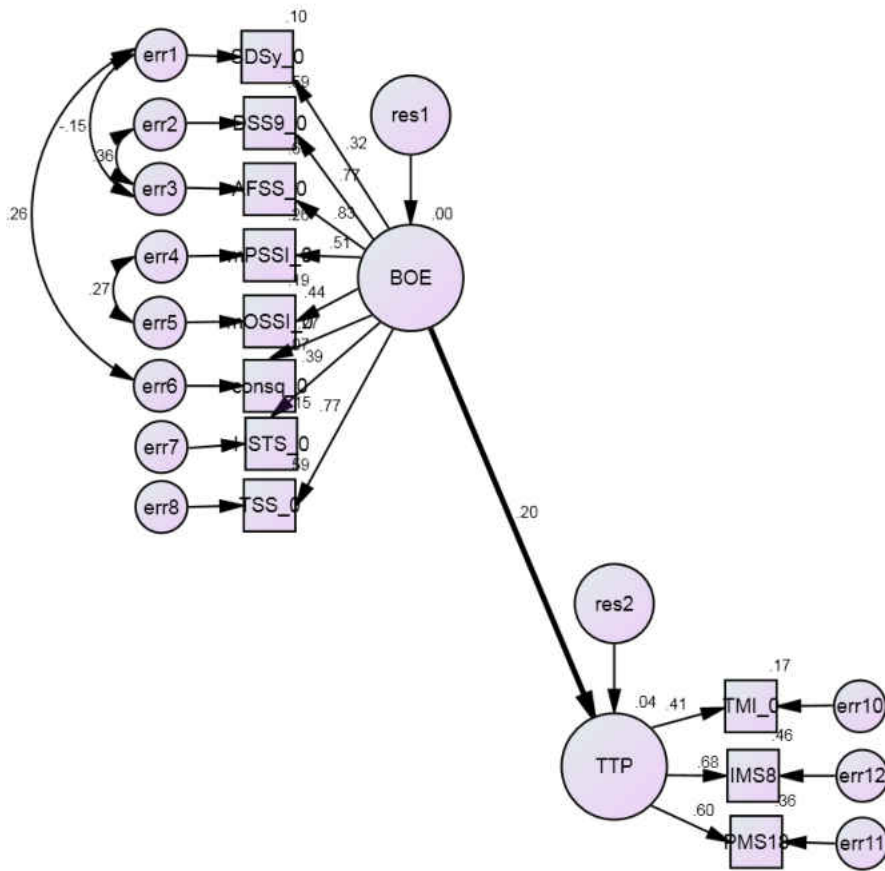


Figure 21: Structural Model C

The results from SM-C support results from SM-A, which also indicated that the BOE had a relationship to TTP. It is noteworthy that in SM-C, the BOE and ER variables were combined to form a single variable called BOE. Combining the BOE and ER was done as a result of the magnitude of co-variance between the BOE and ER at intake. The purpose was to understand if the findings of the BOE and ER as separate indicators had merit. Results from SM-C support the findings that the BOE and ER are indeed separate variables at the intake level. This is evidenced by all the ER variables dropping from the model in SM-C. There appears to be a separate construct occurring in ER that is not completely being demonstrated clearly at the intake

level. Further, TTP was reduced to indicators of motivation in SM-C, as motivation indicators loaded the highest in TTP. The Beta weight decreased from .25 to .20 between the BOE and TTP once these changes were made. As a result, SM-C yielded a good model fit; however, both SM-A and SM-B are more accurate depictions of the data at intake.

Results from Hypothesis Four were presented in the form of three structural models. All models depict a relationship between the BOE and TTP, motivation, and/or support. However, *none* of the models supported a significant direct effect from the BOE on ER at the intake level. A possible explanation for the results in this study may be found in the Final Common Pathway (FCP) theory of addiction (Doweiko, 2012). FCP posits that substance dependence is a final common result for individuals as a result of the reward and reinforcement cycle that happens in brain systems; however, the contributing events that lead a person to this final destination can vary. One of the issues within formulating the BOE through measurement model testing was the reduction to mental distress issues. Various events and influences within the BOE did *not* load onto the factor, which supports the notion of FCP. Further, the BOE indicators were *not* related to ER at intake, which again may be a result of individual variance. Although many factors may lead individuals to substance dependency, there were relationships between the BOE indicators and motivation, awareness, and support. As a result, conclusions may be drawn that motivation, awareness, and support might also be common elements for those who change from addictive disorders.

Post Hoc Testing Discussion

Post hoc testing was conducted in order to gain additional information about the constructs of interest and their relationships with one another. Multiple regressions were

conducted in four dependent variables (DVs): past month abstinence, self-help activities, mental distress, and treatment motivation. These specific DVs were chosen, as there is substantial literature on abstinence, self-help involvement, mental distress, and motivation as aspects of addiction and recovery from addiction. First, a multiple linear regression (MLR; enter-method) analysis was used to examine if any of the indicators used within BOE predicted past month abstinence at intake. Therefore, in the first MLR, pmabst_0 (Past Month Abstinence) was the DV and all 21 indicators from the BOE (SDSI_0, SDSy_0, SDSm_0, SFS8p_0, CWS_0, S7, TAS5p_0, EmPS_0, DSS9_0, AFSS_0, HSTS_0, TSS_0, SSI_0, consq_0, IAS5p_0, GCS_0, HPS3p_0, ERS21_0, wkyfmp_0, mOSSI_0, mPSSI_0) were IVs. Overall, the linear composite of the predictor variables (indicators from BOE) significantly predicted 34.4% ($R^2 = 34.4$; medium effect size) of the variance in past month abstinence at intake, $F(21, 2126) = 53.090$, $p < .001$; therefore, results from this analysis indicate that there are relationships between the hypothesized BOE indicators and past month abstinence. Among predictor variables, IAS5p_0 ($\beta = -.064$), AFSS_0 ($\beta = .083$), HSTS_0 ($\beta = -.040$), TAS5p_0 ($\beta = -.062$), CWS_0 ($\beta = -.080$), S7 ($\beta = .038$), SDSI_0 ($\beta = .161$), SDSm_0 ($\beta = -.285$), and SFS8p_0 ($\beta = -.245$) had significant beta weights. As evidenced by the beta weights, substance dependence over the past month and substance frequency were the strongest predictors of past month abstinence at intake. The contribution of substance dependence over the past month makes sense considering the presence of substance dependence in major theories and research on addiction (e.g., Brown, 1985; Venner & Miller, 2001), as well as the diagnostic criteria for substance dependence (APA, 2000). Therefore, the higher the amount of substance dependence in the past month, the less likely someone would be to be abstinent from substances. Further, heavy using and substance

frequency have been linked to addiction in the research (Weisner & Matzger, 2002). Since 21 variables were used as predictors in this model and the sample size was high, interpretations are cautiously considered.

Next, another MLR (enter-method) was conducted to determine if any indicators hypothesized within TTP (TMI_0, TRI_0, PMS18, IMS8, NeedANYtx, S6, GSSI_0, SSSI_0, mRER13Ip_0) predicted the DV: past month abstinence at intake (pmabst_0). The linear composite of the predictor variables significantly predicted 14.0% ($R^2 = 14.0$; small effect size) of the variance in past month abstinence at intake, $F(9, 2138) = 38.780, p < .001$. Therefore, this analysis supported previous findings that TTP indicators are related to abstinence (DePue et al., in press; Flynn et al., 2003; Forcehimes et al., 2008). The following indicators had significant beta weights: TRI_0 ($\beta = -.065$), PMS18 ($\beta = .057$), S6 ($\beta = .178$), SSSI_0 ($\beta = .093$), and mRERI13p_0 ($\beta = -.258$). These indicators represent elements of motivation, spiritual support, environmental support/risk, and awareness. As evidenced by the beta weights, recovery environment risk and the variable measuring if participants had ever been to self-help groups (S6) represented the strongest predictors in the model for past month abstinence at intake. Previous research supports that environmental risk is a key factor contributing to perpetuating addiction (Sareen & Kaur, 2012). Further, individuals who decide to quit using substances have been reported to indicate a change in their environment (Cunningham et al., 1995). Results from the current study support the importance in reducing environmental risk in order to achieve and/or maintain abstinence. Further, previous exposure to self-help groups also had one of the highest Beta weights in the model. These results support previous studies that self-help groups, such as A.A. have a positive impact on abstinence (e.g., R.H. Moos & Moos, 2007; Scott et al.,

2005). Since the effect size was small for the overall model and the sample size was high, results must be replicated for generalizability purposes.

Next, two multiple regressions were conducted with the same IVs but with self-help activities as the DV. BOE indicators (SDSI_0, SDSy_0, SDSm_0, SFS8p_0, CWS_0, S7, TAS5p_0, EmPS_0, DSS9_0, AFSS_0, HSTS_0, TSS_0, SSI_0, consq_0, IAS5p_0, GCS_0, HPS3p_0, ERS21_0, wkyfmp_0, mOSSI_0, mPSSI_0) significantly predicted self-help activity involvement (SHAS_0). Overall, the linear composite significantly predicted 19.2% (small effect size) of the variance found within SHAS_0, $F(21, 2126) = 23.991, p < .001$. The following indicators had significant beta weights: SDSI_0 ($\beta = .192$), SDSy_0 ($\beta = .066$), SDSm_0 ($\beta = -.096$), SFS8p_0 ($\beta = -.095$), S7 ($\beta = .151$), mPSSI_0 ($\beta = .049$), GCS_0 ($\beta = .067$), and ERS21_0 ($\beta = -.173$). This post hoc analysis yielded one of the most important findings in the study as it suggested that recent substance dependency is negatively correlated with self-help attendance. Previous research findings suggest that higher levels of addiction severity are negatively correlated with motivation to change (Field et al., 2007). As evidenced by the positive correlations between substance dependence past year and lifetime with self-help activities, and the negative correlations between substance frequency (past month) and substance dependency past month, the relationship between addiction severity and change is supported.

An interesting finding was that General Crime Scale (GCS) involvement was positively correlated to self-help activities. Illegal activity involvement has been associated with heavy AOD use (Chandler et al., 2008). Further, AOD use has been found to change brain chemistry and alter decision-making capabilities (Chandler et al., 2008). The current study supports that illegal activity is associated with AOD use and actively seeking out help. One such reason for

this may be that individuals who have been in the criminal system have been court-ordered to attend 12-step meetings. Another reason may be that illegal activity has highlighted negative consequences in the individual's life, thus motivating the need for change. Previous research (e.g., Hodgins et al., 1997) denotes that avoiding negative consequences is a top reason for substance avoidance; therefore, findings from the current study support this relationship.

Next, another MLR (enter-method) was conducted to determine if any indicators hypothesized within TTP (TMI_0, TRI_0, PMS18, IMS8, NeedANYtx, S6, GSSI_0, SSSI_0, mRER13Ip_0) predicted the DV: self-help attendance at intake (SHAS_0). Overall, the linear composite of the IVs significantly predicted 34.0% ($R^2 = .34$; medium effect size) of the variance found within the DV (SHAS_0), $F(9, 2138) = 122.548, p < .001$. For individuals who enter recovery from the community, 65% have been reported to attend self-help meetings (Scott et al., 2005). Self-help groups can be said to promote healthy functioning, and personal coping styles can cause individuals to engage in personal wellness (Lewis & Meyers, 2012). Approach coping is a type of coping style associated with seeking help from substance dependency (R. H. Moos & Moos, 2007). Findings from this study indicate that TTP indicators predict the use of self-help activities; therefore, understanding how coping styles and motivation, awareness, and support are related would be necessary in future studies.

The next set of MLR analyses were conducted using mental distress as the DV. Mental distress was an interest in order to see how various aspects of the BOE, TTP, and ER are related to mental health. Further, since SEM results depicted mental distress indicators as the primary factors in the BOE, it was important to understand the relationships with mental distress and the other hypothesized indicators. As a result, the total mental distress scale (IMDS_0) was utilized

as the DV in three regressions: testing the effects of the BOE on mental distress, the effects of TTP on mental distress, and the effects of ER on mental distress. These were tested by removing the IMDS subscales from all three constructs and testing the remaining hypothesized variables as IVs. First, a MLR was conducted using the remaining BOE indicators (IVs; SDSI_0, SDSy_0, SDSm_0, SFS8p_0, CWS_0, S7, TAS5p_0, EmPS_0, consq_0, IAS5p_0, GCS_0, HPS3p_0, ERS21_0, wkyfmp_0, mOSSI_0, mPSSI_0) to predict mental distress (DV). Overall, the linear composite significantly predicted 34.4% ($R^2 = .344$; medium effect size) of the variance in mental distress at intake, $F(16, 2131) = 69.904, p < .001$. This finding was important considering that the BOE reduced to a measurement of mental distress in the measurement models. As a result, this analysis supported that other hypothesized indicators of the BOE significantly predicted mental distress; consequently, it is not surprising that the BOE factor loadings reduced to mental distress.

Second, another MLR was conducted using TTP indicators (TMI_0, TRI_0, PMS18, IMS8, NeedANYtx, S6, GSSI_0, SSSI_0, mRER13Ip_0) to predict mental distress levels at intake. Overall, the linear composite significantly predicted 16.6% ($R^2 = .166$; small effect size) of the variance in internal mental distress at intake, $F(9, 2138) = 47.333, p < .001$. This finding was also important considering that the SM-A and SM-C resulted in significance between the BOE and TTP. Results from this MLR support the relationship between the BOE and TTP and provide more detailed information about specific indicators. The following indicators had significant beta weights: TMI_0 ($\beta = .148$), S6 ($\beta = .123$), GSSI_0 ($\beta = -.040$), SSSI_0 ($\beta = .081$), and mRERI13p_0 ($\beta = .330$). Although the beta weights were significant for the indicators mentioned above, only recovery environment risk had a moderate impact ($\beta = .330$). These

results support previous mentioned findings about the importance of reducing environmental risks to promote recovery (e.g., Dennis et al., 2007). Further, since mental distress loaded highly in the BOE, understanding that environmental risk is strongly predicting mental distress gives important information to counselors working with clients at the intake level.

Another MLR was conducted using remaining ER indicators (SDSm_0, SDSy_0, SFS8p_0, InCom_0, PCSS, SHAS_0, HPS3p_0, ERS21_0, ESI_0, nofhp_0, pmabst_0) to predict mental distress (IMDS_0). The overall linear composite significantly predicted 48.5% ($R^2 = .485$; large effect size) of the variance within internal mental distress at intake, $F(11, 2136) = 182.730, p < .001$. The following indicators had significant beta weights: SDSm_0 ($\beta = .054$), HPS3p_0 ($\beta = .149$), SHAS_0 ($\beta = .046$), nofhp_0 ($\beta = -.038$), and PCSS ($\beta = .625$). The ER hypothesized indicators could be said to be the opposite of the BOE indicators in many ways; therefore the linear composite results support that ER does have a relationship with the mental distress indicators of the BOE at intake. The strongest indicator within the model and within all of the MLR analyses conducted was personal coping styles predicting internal mental distress, indicating that higher levels of coping (higher coping levels indicate healthier coping styles) yield higher levels of mental distress. Previous research demonstrated that coping styles were related to recovery (R. H. Moos & Moos, 2007), as well as related to personal wellness (Lewis & Meyers, 2012). As coping can be considered an aspect of mental health, it is not surprising that coping was the largest contributor in mental distress issues. An inference can be made that substance use is a negative coping method, promoting and maintaining mental distress levels.

Lastly, in order to help gain understanding about how events in addiction influence motivation to change, one additional MLR analyses was conducted. The BOE indicators

(SDSI_0, SDSy_0, SDSm_0, SFS8p_0, CWS_0, S7, TAS5p_0, EmPS_0, DSS9_0, AFSS_0, HSTS_0, TSS_0, SSI_0, consq_0, IAS5p_0, GCS_0, HPS3p_0, ERS21_0, wkyfmp_0, mOSSI_0, mPSSI_0) were tested in order to predict treatment motivation at intake: TMI_0. Overall, the linear composite significantly contributed to 11.6% ($R^2 = 11.6$; small effect size) of the total variance found within treatment motivation at intake, $F(21, 2126) = 13.310, p < .001$. The following indicators had significant beta weights: SDSI_0 ($\beta = .183$), SDSm_0 ($\beta = .064$), SFS8p_0 ($\beta = -.072$), S7 ($\beta = .056$), DSS9_0 ($\beta = .147$), HSTS ($\beta = -.051$), SSI_0 ($\beta = -.057$), consq_0 ($\beta = .055$), and mOSSI_0 ($\beta = .076$). This post hoc analysis yielded one of the most important findings in the study, relating back to the post hoc analysis of the BOE indicators (IVs) and self-help activity levels (DV). Similarly to the aforementioned results, this MLR analysis also supports that recent substance use levels were negatively correlated with motivation to change. As noted, previous research findings suggest that higher levels of addiction severity are negatively correlated with motivation to change (Field et al., 2007). As evidenced by the positive correlations between substance dependence past year and lifetime with self-help activities, and the negative correlations between substance use frequency (past month), the relationship between addiction severity and change is supported.

Limitations

A few notable limitations potentially existed within the study, which include the (a) design, (b) sample, and (c) instrumentation. Identification of these limitations facilitates accurate interpretation of the results of this study and will help guide future research methodology.

Design

Descriptive correlational studies have high levels of external validity and low levels of internal validity (Heppner et al., 2008). The purpose of high external validity is that the sample was taken directly from the population of interest and in a real-life setting. Internal validity is low because variables are studied as they naturally occur and are not manipulated by experimentation. In this study, the importance of understanding participants in their natural setting outweighed the importance of internal validity; therefore, a descriptive, correlational study was the most appropriate option. The data analysis procedure of SEM also has inherent limitations (Freedman, 1987; Pedhazur, 1982). For example, there are multiple assumptions that must be met using SEM in order to prevent the potential effects on Type I or II errors (Kaplan, 2000; Kline, 2011). Although the sample size was large for this study, normality violations occurred, which is why ADF estimation was utilized. Violations in normality can cause misinterpretation of results. Another limitation dealing with SEM involves the need for strong individual measurement models. Because initial hypotheses were rejected in the study, I moved into an exploratory version of SEM. The measurement models were not strong individuals for either TTP or ER, and as a result, the structural model results were weak.

Sample

The sample was purposive within the database because the study required that participants have the criterion of lifetime substance dependence to be included in the analyses. Further, specific scales and subscales were chosen, and many participants were deleted that were missing cases. Purposive sampling has limitations because the individuals that were available for the study may or may not be representative of the entire population (Heppner et al., 2008). This

study pooled data from over 230 sites, which covered various types of populations and settings. As a result, the sample was large and from a diverse background, thus increasing the chances of generalizability. Further, the large sample size is a requirement of SEM, and thus, reduces the chances of Type I or II errors (Kline, 2011). However, sites that utilize the GAIN may not be representative of the entire population. For example, sites that utilize the GAIN instrument are grant funded; therefore, a portion of individuals that use substances and enter non-grant funded treatment may be missed in the sample. It is noteworthy that the sample in this study may have been over-representative of Blacks and Latinos, as well as individuals who had been in the criminal justice system. Therefore, more research needs to be done to generalize the results to all individuals in addiction treatment settings.

Instrumentation

The study had threats to both internal and external validity because 230 sites use the GAIN and add to the database. Self-report is the primary form of reporting, which is another form of error. The goal in quantitative studies is to minimize error (Heppner et al., 2008; Tabachnick & Fidell, 2007). The GAIN (Dennis et al., 2006) extensively trains sites that use the instrument and has a built-in measure to check the duration and breaks during the administration of the test. If an administration took longer than normal, it might indicate that person or site needs additional training (Chestnut Health Systems, 2002), and a validity report is printed with each GAIN output, which allows the research team at GAIN to know whether or not that participants' data needs to be removed from the database. Because the GAIN thoroughly checks for inconsistencies, this helps to address the issue of self-report. It is also noteworthy that SEM

accounts for error, so although error was present in the study, the statistic used provided a defense against this limitation.

Lastly, the GAIN is comprised of many scales and subscales, of which many were selected to use within this study. Because scales and subscales were used, some minimal aspects of individual experiences could have been left out. Also, the GAIN was developed through a series of EFA and CFA analyses; therefore, sub-setting the scales into different latent variables proved challenging.

Recommendations for Future Research

Based on the findings of this study, future research can be used to provide more information about the change processes within addiction. The next steps for research should be to further develop the individual constructs of the BOE, TTP, and ER in order to find the best fitting measurement models. Specifically TTP should be looked at more closely and developed as a second order factor. Once measurement models are clearly defined, the study could be replicated using half of the data in an exploratory manner and confirming the results on the second half of the data. Further, future research should expand on the current study by looking at the constructs under different time periods. For example, this study analyzed the BOE, TTP, and ER at the intake level, but results may look different if ER was measured at 1 year.

Understanding the time component provides a structure to the addiction cycle being analyzed in this study. It is also suggested to study TTP as a mediating variable within the relationship between the BOE and ER. Understanding the individual constructs over time will help with the development of the mediating role of TTP.

This study attempted to measure cognitive change by looking at three elements of the cognitive change process: motivation, awareness, and support. Future studies should directly measure cognitive change over time in clients in treatment settings and aftercare in order to gain understanding of the cognitive change process. Further, cognitive change may be defined as awareness; however, the current study was unable to confirm or deny that claim. As a result, connecting awareness to cognitive change through correlational research is needed. With regarding to awareness in the change process, this study supported that awareness was a key factor in the change process and in obtaining abstinence. Future studies should be directed to understanding how awareness changes over time in the addiction recovery process, specifically in the first year of ER. Further, outcome based studies on awareness raising activities and clients in treatment are also warranted. Understanding types of activities that promote client abstinence is beneficial for the profession of counseling. In addition, future research may be directed into the areas of motivation for change.

This study highlighted previous research (Scott et al., 2005), denoting the dichotomous relationship between the need to be living in the community to be considered as in recovery, yet the difficulties with maintaining or achieving recovery while living in the community. Understanding the nature of living in the community and working towards recovery is warranted. Further, environmental risk factors and motivation to change environmental factors is needed. Previous research found connections between changing the environment and changing substance use (Cunningham et al., 1995). Understanding specific support and motivation to change negative environmental risk factors is important as counselors work to facilitate the change process in clients. For example, this study found a relationship between living in a controlled

environment and motivation to change; therefore, more comprehensive analyses of this relationship is needed.

Lastly, coping styles have been discussed in the literature as affecting the willingness of individuals to engage in personal wellness (Lewis & Meyers, 2012). Coping styles and the motivation to change from addictive disorders could be studied through correlational designs, as well as the role that coping styles play in mental distress levels of substance abusing clients. Coping styles are connected to mental health; therefore, future research should be aimed at understanding how coping styles affect recovery. An experimental design could be used that compares treatment groups receiving health coping style focus compared to groups receiving general motivational interviewing. It is also noteworthy that this study focused on the negative experiences in addiction; however, research has shown that positive experiences often separate individuals that are in recovery from those who are not (Flynn et al., 2003). Future studies should include positive experiences in data analysis to provide a more comprehensive view of change.

Implications for Addictions Counseling Practice and Theory

As noted, research is conducted for several reasons, and contributions to the field are of the utmost importance. This study has both practical and theoretical significance for the addictions counseling profession. Practical significance refers to contributing to the act of working with clients. Practically, this study's results provide knowledge that will assist counselors in their work with recovering clients. Theory refers to the ideas and concepts in which professionals understand addiction. Theoretically, this study adds to professional literature and theory on the nature of addictions and the nature of the change process. In this section, both the practical and theoretical significance of this study are discussed. Effect sizes were small in all of

the structural models, therefore interpretation of results is cautious with regards to generalizability. The author suggests further developing the models in order to accurately generalize results that have larger effect sizes.

Practical Significance

An area of significance with this study is in the area of counseling. Since counselors come into contact with most clients with addiction in treatment settings (as compared to other settings), understanding the influence of what guides people into sustained recovery is essential for best practices. In the BOE, the majority of factors that loaded onto the construct at intake were mental health variables. This provides support for dual diagnosis and assessment for mental health issues at intake. Further, the BOE also contained the factor *consequences*, which indicates that consequences from substance use may be a motivating factor as people enter treatment. As counselors, helping clients understand the types of consequences from AODs they have had in life, and how their lifestyle does not support future occurrences of consequences, may raise awareness and motivation for change.

Results from this study supported previous difficulties in defining the term *recovery* (e.g., BFI, 2007). Defining recovery is difficult and understanding what recovery means to clients is important. Counselors should be aware of their own belief systems about what recovery is to them (Juhnke & Culbreth, 1994). Many counselors working in the area of addictions are in recovery themselves or know others who have struggled with addiction; therefore, Juhnke and Culbreth (1994) suggest counselor conduct recovery expeditions, which includes the counselor reviewing how they got into recovery, what recovery means to them, and their biases of

recovery. This study supports the need for counselors to assess their personal belief systems about recovery and discuss with clients what recovery means to the client.

Research and theory differ on the inclusion of living in the community as a criteria for ER. Research (including results from this study) supported that not living in the community strengthened the chance of entering recovery; however, living in the community is a condition in many definitions of recovery. As counselors, this relationships needs to be understood because many clients entering recovery may not be currently living in the community; therefore, the need for practical life skills and support systems increases in individuals in ER. Another implication focusing on environmental support/risk for the current study is that environmental risk was strongly related to mental distress levels at the intake level for clients. Considering the role of counselors working with clients at the treatment level, helping clients become aware of risks to recovery is a crucial part of facilitating lasting change.

A second area of implication for this study is in the area of teaching future counselors. Counselor educators are advised to teach evidence-based practices (ACA, 2005; CACREP, 2009). Given that addiction courses are common in CACREP (2009) programs, this study can help all counselor educators understand how change occurs and offer practical interventions they can teach to their students that focus on specific aspects of clients' experiences that influence recovery. In turn, this may help clients change negative patterns of substance use and move into recovery. Teaching future counselors about the relationship between motivation and addiction severity is essential. Results from this study supported previous research that recent addiction severity is inversely related to motivation to change. Counselors may work with clients at their most severe moments at times, and understanding this relationship may help future counselors

not take on guilt and responsibility when clients relapse. Results supported the idea of the chronicity of addiction, and future counselors should be informed of the evidence on relapse and motivation to change.

This study's findings did *not* support a connection between the BOE and ER at the intake level. This is important for counselors to understand, as they consider that many individuals at the intake level may be suffering from mental distress issues. Although the BOE and ER were *not* significantly related to one another, both were related to TTP (motivation, awareness, and support), as well as the individual measurements of internal motivation and spiritual support. This highlights the role that TTP plays in ER, and counselors may need to focus on building motivation and awareness in their clients, as well as being a support system and helping clients find support systems to support recovery.

Another practical implication lies in the finding that spiritual support was related to the BOE and ER at the intake level. Spiritual support (as measured by the SSSI_0), can be considered a type of values assessment. Therefore, counselors may consider values clarification (Simone et al., 1995) techniques, which can help clients understand what their values systems are and how their current AOD use may be facilitating violations in their value systems. Results from this study may yield empirical support for support programs, such as SMART recovery, which include raising awareness and values clarification through Motivational Interviewing and Cognitive Behavioral Therapy. Helping clients raise awareness on their value systems, and how their current actions do/do not support their values, may be beneficial in the change process.

Theoretical Significance

As noted, theory is developing and changing in the social sciences (Berliner, 2002), and although there is growing research in the field of addiction counseling, more research is needed by counselors to address the practical experiences of clients. First, the notion of rock bottom as being the culmination of negative events was *disproven* for this study. Since the BOE is considered to be a fundamental component to recovery, this study was unable to quantify that experience based on the theory and research available. Although a model was created, the hypothesized model was disproven. In fact, rock bottom was found to be a culmination of negative mental health issues that could be related to individual life events. In essence, the saying that everyone's rock bottom is different may still hold true. If the BOE exists, it is quantitatively represented by mental health factors and not by individual events, which it is commonly associated with in the literature (e.g., loss of family, loss of employment). Results from this study support the Final Common Pathways theory, which states that individuals have varying pathways to the common final point of addiction. The loadings of mental distress and life stress can be considered as results from various individual experiences; therefore, the concept that everyone's bottom is different was supported with results from this study. Final Common Pathways theory focuses on the journey to dependence and not on the journey of recovery. This study is beginning to develop a recovery theory that includes individual pathways to the final destination of recovery. Considering this theory has not been established, the author is calling the theory the Final Common Pathway of Recovery.

Further, addiction has been considered both chronic (e.g., Dennis & Scott, 2000) and linear (e.g., Brown, 1985) in nature. Results from this study expand theory on the nature of

addiction. Results indicated that addiction severity was inversely related with motivation to change and self-help activities. Linear pathways and models of addiction would argue that addiction severity is related to change; therefore, this study further supported evidence of the chronic nature of addiction. Because addiction severity is not positively correlated with motivation to change, individuals may need multiple attempts at sobriety in order to achieve recovery. Each attempt at treatment or self-help activities may facilitate motivation to change. Consequently, the chronicity of addiction was supported by the current study, adding more information about motivation as a possible mediator in the change process.

In addition, considering the prevalence of the stage-based models of change in addiction treatment (i.e., stages of change), this study may provide evidence of the difficulty to classify individuals into concrete stages. Although the stages of change are widely used in addiction treatment, this study did not support the notion of succinct, stage-based change. Rather, the initial results imply that recovery is messy, complicated, and not easily defined. This study's results challenge the notion of the stages of change by demonstrating how difficult the change process is to quantify. Further, transformational change was not clearly represented within the current study. Since this study did not support the stages of change model, future research must be established to delineate the entirety of the change process and how it develops over time.

In addition to the nature of addiction theory, this study supported the difficult in defining recovery. For example, the author was able to impose a structure on the ER model; however, that structure was based on decisions to include items such as living in the community and abstinence. Living in the community showed to be inversely related to abstinence; however, theory supports the inclusion of living in the community as part of recovery. This dichotomous

relationship highlights the difficult journey of recovery, and again, may support the chronic nature of addiction. This is evidenced by the need to be a part of the community to exist to be in recovery, but the likelihood of relapse once a person re-enters life in the community from treatment or jail.

As noted, there are two components of change from substance dependence: the change process (i.e., TTP) and the result of change (i.e., ER). Brown (1985) discussed the change process, calling it “the turning point” (TTP; Brown, 1985, p.33) as being the moment of cognitive and behavioral change for a drinker. Although the change moment may look different for individuals, this study supported previous studies that there are commonalities within the experience, such as motivation to change and social support (Miller et al., 2008). Unfortunately, results from this study are inconclusive with the exact commonalities of the change process. TTP was a difficult model to fit and warrants future research in order to fully develop the construct.

The BOE is thought to be a necessary and sufficient precursor to long-term recovery (e.g., *Alcoholics Anonymous*, 2001). Recovery literature expresses this idea as follows: “Why all this insistence that every A.A. (i.e., Alcoholics Anonymous member) must hit bottom first? The answer is that few people will sincerely try to practice the A.A. program unless they have hit bottom” (*Twelve steps and twelve traditions*, 1952, p. 24). In fact, the BOE, a spiritual experience, and/or a traumatic experience have all been found to influence sustained recovery from heavy alcohol use (Matzger et al., 2005). There is a lack of research on the BOE: however, the BOE is a main theme within 12-step recovery literature (e.g. *Alcoholics Anonymous*, 2001), and given that the majority of treatment centers also utilize a 12-step approach (SAMHSA, 2007,

2009), the concept of the BOE is common in treatment settings as well. Research is typically not performed on the construct BOE because it is difficult to define and individuals have unique experiences leading to recovery. Consequently, there is no psychometrically sound instrument to measure the BOE. Research professionals have focused on aspects of recovery that are easier to quantify (Galanter, 2007), which would include the various components of the BOE (i.e. health problems, substance dependence). The BOE is a common theme within recovery literature and is a valid part of people's experiences that influence recovery (e.g. DePue et al., in press; Matzger et al., 2005); thus warranting substantiation of the construct and the influence it may have on early recovery.

The relationship between the BOE and TTP with early recovery (ER) is unclear, yet a common assumption held by treatment professionals and individuals in treatment is that both the BOE and TTP are necessary in order to produce sustained recovery (e.g. *Alcoholics Anonymous*, 2001; Cain, 1991; DePue et al., in press; Matzger et al., 2005; Vaughn & Long, 1999; Young, 2011). As recovery is also difficult to define, research is needed including the BOE and TTP to provide a working definition of the variables that measure these constructs. Components of the BOE, TTP, and ER are found within the literature; however no studies existed that combined the components into single factor structures (BOE, TTP, ER), nor analyzed the relationships between the factors. Consequently, this study builds upon current models of addiction and addiction treatment by providing information about fundamental negative components influencing recovery (the BOE) and the more positive components that may be part of the change process (TTP). This study also adds to the current literature by being the first to provide

evidenced-based definitions of the constructs, as well as theoretical understanding about the relationship between the BOE, TTP, and ER.

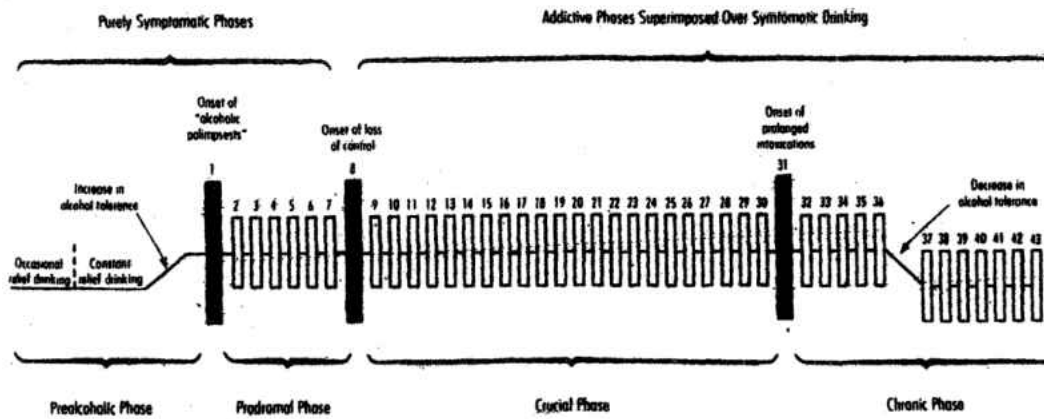
Summary

This study investigated the contributions of the substance dependent clients' BOE and TTP to their levels of ER. The literature and data available from the existing database used in this study influenced decisions on research design and statistical analysis procedures. In order to understand the relationships between the BOE, TTP, and ER in their natural state, a descriptive, correlational research design was chosen. The purpose of correlational studies is to investigate the relationship between two or more variables without researcher manipulation (Heppner, Wampold, & Kivlighan, 2008). Correlational research designs are common in the counseling and counselor education research field (Heppner, et al., 2008). The data was analyzed using *Statistical Program Systems Software 20th edition* (SPSS; IBM, 2012) and the *Analysis of Moment Structure 19th edition* (AMOS; Arbuckle, 2010). Statistics utilized within the study were descriptive statistics, Pearson Product Correlations (Two-Tailed), Exploratory Factor Analysis, and Structural Equation Modeling.

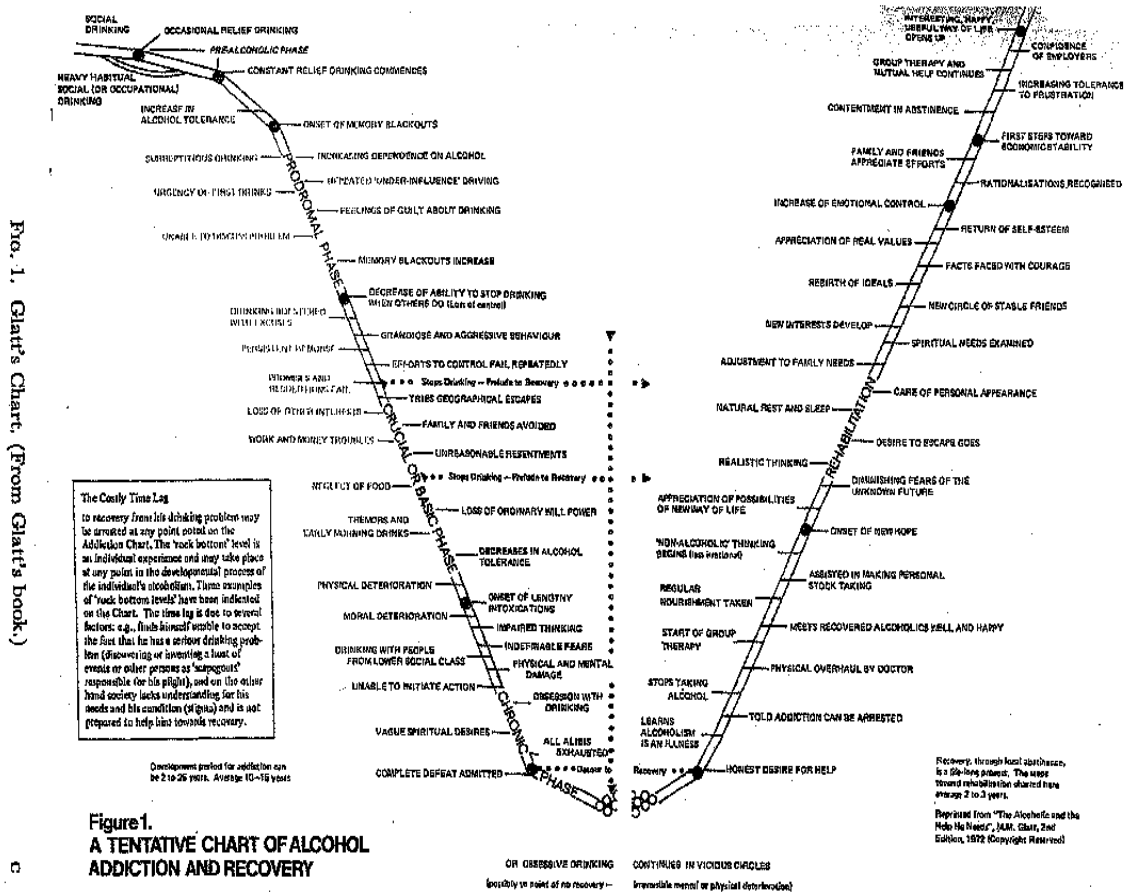
The first three hypotheses were rejected in the study, and measurement model modifications were conducted, which yielded good fit indices. Results from Hypothesis One indicated that hypothesized factors did not load on the BOE, and instead, the BOE at the intake level was a measurement of mental health severity. Results from Hypothesis Two indicated that hypothesized factors did not load on TTP; however, TTP did resulting factor structure created through model modification contained factors of awareness, motivation, and support. Results from Hypothesis Three also indicated that hypothesized indicators did not load into ER; however

the resulting factor structure contained indicators of abstinence and environmental support. Lastly, Hypothesis Four yielded three resulting models, all of which had good fit indices. Therefore, hypothesis four was accepted. It is noteworthy that direct effects were not all significant, and the p value in all final models was significant. There was not a significant relationship between the BOE and ER at the intake level; however, there was a significant relationship between the BOE and TTP, as well as TTP and ER at the intake level. The direct effects between the BOE and ER may have had a role in the significant p values, as well as the large sample size. Within the three resulting models, the BOE had significant relationships with TTP, spiritual support, and motivation. Both spiritual support and motivation also had significant relationships with ER. Therefore, the results from the current study support that there are existing relationships between the BOE and TTP; however, the relationship between the BOE and ER at the intake level was not significant.

APPENDIX A: MODELS OF THE PATHWAY OF ADDICTION



Jellinek's Phases of Alcohol Addiction, (Jellinek, 1946, p.39)



Glatt's Model of Alcohol Addiction, (Glatt, 1975, p.33)

APPENDIX B: DATA ABSTRACT REQUEST

Data Abstract Request

Date of Request: August 10, 2012

Working Title: The bottoming out experience, the turning point, and early recovery: An exploratory investigation utilizing structural equation modeling

Lead Author: M. Kristina DePue, M.Ed., Doctoral Candidate UCF

Additional Authors: W. Bryce Hagedorn, Ph.D.

Glenn Lambie, Ph.D.

Andrew J. Finch, Ph.D.

Mark Young, Ph.D.

Proposed Forum: Doctoral Dissertation at the University of Central Florida, Peer-reviewed Journals, and Presentations at National Conferences

Target Date: Data Analysis: Fall 2012
Writing: Current (Chapters 1, 2, 3), Fall 2012 (Chapter 4), January - March 2013 (Chapter 5 and Dissertation Defense)
Submission: April 2013
Publication Submission: June 1, 2013

Data Sources: The CSAT 2011 dataset, GAIN-I and M90 (all waves) and TTL , excluding ATM and CYT records. Sites will not be identified and data will be presented in an aggregate form

Data Inclusion Criteria: We are requesting adult clients (defined as anyone over age 18); however we may make comparisons between adult age categories if sufficient data exists. I want to subset to individuals who have lifetime substance dependence. Past Year substance abuse or dependence at intake may be used as additional inclusion criteria, but not subset is requested based on these variables. A 12-month follow-up is required, however data from 3- and 6-month waves is also requested.

Primary Research Objective

The purpose of this study is to test the following model: high levels of bottoming out experience (BOE; as measured by substance dependence, heavy using, withdrawal symptoms, functionality, mental distress, stress, illegal activity, suicidality, and environmental risk) and high levels of the turning point (TTP; as measured by motivation and support) predict higher levels of early recovery (ER; as measured by abstinence and self-help activity) for adult substance dependent clients receiving professional treatment services for addiction in the U.S.

Brief Review of the Literature

There is a lack of research on the BOE and the spiritual experience; however, these are two main themes within 12-step recovery literature (e.g. *Alcoholics Anonymous*, 2001) and since the majority of treatment centers utilize a 12-step approach (Substance Abuse and Mental Health Services Administration [SAMHSA], 2007), the themes are common in treatment settings as well. The BOE and the psychic change experience (also called the spiritual experience) are difficult to define and quantify; research professionals have ignored aspects of recovery that are difficult to measure (Galanter, 2007), which may explain the lack of research.

The BOE was initially defined in Jellinek's (1954) Crucial phase, which marked the loss of control that alcohol addicts experience with regards to being able to control the amount of alcohol consumed once beginning drinking. The Crucial phase is when rock bottom occurs and is defined as:

...prolonged intoxication or benders, marked ethical deterioration, impairment of thinking, alcoholic psychoses, changing friends to those that drink like the addict, using things other than regular alcohol, i.e. rubbing alcohol, mouthwash, to get drunk, fears, tremors, psychomotor inhibition, obsessive personality, vague religious desires, and the rationalization that previously worked, now fails (Jellinek, 1954, p. 45).

Matzger, Kaskutas, and Weisner (2005) discovered that the BOE was a fundamental component in sustaining abstinence. In a phenomenological study by DePue, Finch, & Nation (in press), commonalities were found leading to the BOE and within the BOE, which included: (a) heavy using, (b) functionality, (c) priorities, (d) values, and (e) guilt. Based on this literature, the authors have selected a number of GAIN scales representative of the various aspects of the BOE in order to understand if and how specific aspects of a BOE are associated with change.

The turning point, or cognitive shift, has previously been thought of in recovery literature (*Alcoholics Anonymous*, 2001), as the psychic or spiritual change and is linked with successful recovery. The current study proposes reframing the spiritual or psychic shift as the cognitive shift, since there is research supporting motivation to change (i.e. Miller & Rollnick, 2002; Prochaska et al., 1991) and support (e.g. Dennis, Foss & Scott, 2007; Groh, Jason, Davis, Olson, & Ferrari, 2007) as predictors of successful recovery. A phenomenological study by DePue, Finch & Nation (in press) explored the bottoming out experience as it related to sobriety. The researchers concluded that TTP was the cognitive shift from drinker to non-drinker, rather than a combination of cognitive and behavioral shift for the participants studied. They also found themes within TTP, which included: awareness, support, 12-step attendance, and a friend/family member in 12-step groups. Support has also been found to influence change in addiction populations. For example, Dennis, Foss, and Scott (2007), reported support to be highest in early recovery and decrease after three years in recovery. The study also noted that long-term (8 year) abstinence was associated with higher levels of social support, a decrease in risk factors, and an increase in the number of friends who were in recovery. Based on this literature, the researchers are defining the turning point as the cognitive shift from drinker or drug user to non-drinker or drug-user, as defined by high levels of motivation and high levels of support.

The Dennis, Foss, & Scott (2007) study found that as abstinent time increased, support increased, legal activity decreased, vocational activity increased, environmental risk decreased, and coping mechanisms were highest early in the process of abstinence (one month to three years). However, the researchers did not specifically look at the three month time period within the first year of early recovery, and this study would like to add to the Dennis, Foss, & Scott study by adding the 3 month time period and focusing only on the first year of recovery. In addition, I plan on using SEM to understand how the components of the BOE, TTP, and early recovery load within stated time periods (intake, 3 months, and one year). The current study will use similar data as Dennis, Scott, & Foss (2007) to measure how these variables differ or change within the first year of recovery, and add confirmatory factor analysis within SEM in order to provide valuable information about how processes before recovery and during the change process are related to early recovery.

Primary Research Questions

Research Question 1: Do higher levels of the BOE and higher levels of TTP predict higher levels of early recovery for adult substance dependent clients?

Research Question 2: Does the relationship between the BOE and early recovery for adult substance dependent clients decrease within the first year of ER?

Research Question 3: Does the relationship between TTP and early recovery for adult substance dependent clients increase during the first year of recovery?

Methods/Design/Analytic Plan

The study will employ a correlational research design in order to assess the relationship of the BOE, the turning point, and early recovery in their natural settings. The proposed model will assess data at three time points providing sufficient data exists in the data base to use SEM for each time period to look at change within the first year: initial intake, 3 months, and 1 year. Variables that will be used as controls include race, gender, and level of care.

Structural equation modeling (SEM; Path Analysis), Multiple Regression, Logistic Regression, and Pearson Product Moment Correlations (two-tailed) will be employed to analyze the data. The DV/outcome variable in the model is early recovery. The IVs/predictor variables are BOE and TTP. The direct relationship of BOE and TTP on early recovery will be tested as well as the indirect relationships between the BOE and TTP. I expect the BOE and TTP will be positively correlated and both directly related to ER. All variables within the model are *latent* variables meaning that the variables cannot be directly observed and need two or more indicators to represent the variable (Ullman, 2001). The BOE, TTP, and early recovery cannot be measured directly, so indicators are used for each construct that were explained in the constructs section within the methodology.

*The University of Central Florida IRB has exempted the study from IRB approval since we are using existing data.

Requested Variables/Scales:

Requested variables include all the scales and individual items listed in the below table.

The researcher requests individual items composing all scales and indices.

Demographics

Background variables on age (Agega, Ageg, Agegp, race/ethnicity (Nonwhite, racegrps), gender (Female, B1), family history (anyFamPH and FamHist), living situation (Mstat - marital status), treatment (Press, LOC2), substance use (age1st_4, yruse_c), Ocsta - outcome status

BOE

1. Substance dependence (Substance)
 - a. Substance Problems Scale and subscales (Substance Abuse Index, Substance Issues Index, Substance Dependence Scale)
2. Heavy Using (Substance)
 - a. Substance Frequency Scale
3. Withdrawal symptoms (Substance)
 - a. Current Withdrawal Scale
4. Functionality (Vocational)
 - a. Training Activity Scale
 - b. Employment Activity Scale
5. Mental Distress
 - a. Internal Mental Distress Scale and subscales (Somatic Symptom Index, Depressive Symptom Scale, Homicidal Suicidal Thought Scale, Anxiety/Fear Symptom Scale, Traumatic Distress Scale)
6. Stress (Environment)
 - a. Missing replaced Personal Sources of Stress Index (mPSSI)
 - b. Missing replaced Other Sources of Stress Index (mOSSI)
 - c. Variable: Consq , CCDrIA, CCIA, drgermY (intake), drgermQ (follow-up), anyilact (intake) and anyilacq (follow-up)
7. Illegal Activity (Legal)
 - a. General Crime Scale, Illegal Activity Scale

b. Crime Violence Scale and subscales (General Conflict Tactics Scale, Interpersonal Crime Scale, Drug Crime Scale, Property Crime Scale)

8. Suicidality

a. HSTS - Homicidal/Suicidal Thoughts Scale

b. HSTg4

9. Environmental Risk

a. Environmental Risk Scale and subscales (Living Risk Index, Vocational Risk Index, Social Risk Index)

10. Trauma

a. Traumatic Symptom Scale

11. Health Problems

a. Health Problems Scale

TTP

1. Motivation

a. Treatment Motivation Index

b. Treatment Resistance Index

c. Reasons for Quitting and subscales (Personal Motivation Scale, Interpersonal Motivation Scale) - RFQ33

d. Average General Denial & Misrepresentation Scale

e. Perceived need (ReNd), NeedAnyTx

2. Support

a. General Social Support Index

b. Spiritual Social Support Index

c. Environmental Strengths Index

d. Missing replaced Recovery Environment Risk Index (mRERI13p)

e. Treatment Received Scale

f. Variables: NCAR, ReNd, Anyrechom, Anyrecsoc, Anyrecvoc

Early Recovery

1. Self-Help

a. Self-help Activity Scale

2. Abstinence

a. Past month abstinence (pmabst)

b. Days abstinent in the past 90

3. Variables: Recovery (RECOV), Social support at last wave (use socspy at intake and socsp at follow-up), No recovery environment risk (RERNp), mRERI or RERnp, No social consequences for AOD use (Noconsq).

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APPENDIX C: FEASIBILITY REPORT

Feasibility Report

Checklist for data analysis feasibility Tracking #_11-10

Title: The bottoming out experience, the turning point, and early recovery: An exploratory investigation utilizing structural equation modeling

Author: **M. Kristina DePue**; W. Bryce Hagedorn, Ph.D.; Glenn Lambie, Ph.D.; Andrew J. Finch, Ph.D.; Mark Young, Ph.D. (bold indicates initial contact)

Contact e-mail kristinadepue@knights.ucf.edu

Date submitted 7/28/2012

Date reviewed 7/30/2012

Reviewed by PCI

Topics Adult, recovery, bottoming out

Plan to examine data included in the GAIN only or GAIN plus additional data?

GAIN only, all waves; treatment information (TTL)

Will sites be identified or is all data to be aggregated across sites?

Please indicate in abstract whether sites will be identified or if data will be presented in aggregate form

Subset of cases identified?

Since you need individual items, we recommend you exclude ATM/CYT records which used GAIN versions prior

to version 5 and had a number of different items.

Adults = 6,621 (We typically include 18+ as adults; ranges up to 73 years old at intake)

Substance dependent - Lifetime (N=4,978) Past Year (N=3,250))?

You will need those who have at least 1 follow- up (N=5,452; PY dependence N=2,692, Lifetime dependence

N=4,114);

It sounds as though you particularly need those with 12 month follow-up (N=2,250; PY dependence N=1,209;

Lifetime dependence N=1,693);

Those with both a 3 AND 12 month follow-up (N=1,498 ; PY dependence N=738; Lifetime dependence N=1,099)

Were specific variables Identified? (list variables)

Demographics

All basic demographics such as age, race, ethnicity, and treatment arrangements

BOE: 1. Substance dependence (Substance) (Substance Problem Scale and subscales); 2. Heavy Using (Substance) (Substance Frequency Scale (S2a1, S2b1, S2c1, S2d1, S2e1, S2f1, S2g1, S2h1 S2j1, S2k1, S2m1, S2n1, S2p1, S2q1, S2r1, S2s1a, S2s2, S2s3)); Withdrawal symptoms (Substance) (Current withdrawal index (S3c1 to S3c19, S3c20, S3c21, S3c99)); 4. Functionality (Vocational) (Training Activity Scale and subscales (V3k to V3q (5 items))); Employment Activity index and subscales (V6k, V6m, V6n, V6p, V6q (5 items))); 5. Mental Distress (Internal Mental Distress Scale and subscales (M1a1-4, M1b1-10, M1c1-5, M1d1-12, M2a-p (43 items))); 6. Stress (Environment) (Personal Sources of Stress (E10_1-E10_99 (6 items)); Other Sources of Stress (E11_1-E11_99); Consq (E11b1, E11b2, E11b3)); 7. Illegal Activity (Legal) (General Crime Scale (L3a1 to L3a19 (19 items))); Crime Violence Scale and subscales (L3a1 to L3a19); 8. Suicidality (Anyhsts (HSTS, based on M1c1-5); HSTg4 (M1c1-5 (HSTS))); 9. Environmental Risk (Environmental risk scale and subscales (E5a-g, E6a-g, E7a-g (21 items))); 10. Trauma (TSD (TSS (based on M2a-p))); 11. Health Problems (Health Problems Scale (P9, P9a, P9b (3 items)))

TTP: 1. Motivation (Treatment Motivation Index (S8e-j (5 items); Treatment Resistance Index (S8a – S8d (4 items); Reasons for Quitting and subscales (S9ab1 to S9ab20, S9ac1 to S9ac13 (33 items); Average General Denial & Misrepresentation Index (AGDM)

S12, P15, R9, M8, E18, L12, V14 (7 items)); 2. Support (General Social Support Index; Spiritual Social Support Index; Environmental Strengths Index; Recovery Environment Risk Index; Treatment Received Scale)

Early Recovery: Self-Help (Self-help Activity Scale (S6a1, S6a2, S6a3, S6a4, S6a5, S6a6, S6a7, S6a8, S6a9, S6a9a, S6a10, S6a10a, S6a11, S6a12, S6a13, S6a14, S6a14a, S6a15, S6a16))

Are identified variables included as part of CORE?

If not, does interest outweigh N of cases?(N's for all adults at intake)

PSSI N=4221 (mPSSI=4281)

OSSI N=4119 (mOSSI=4267)

RFQ33 - was only 26 items before version 5.4 N=4169 (RFQ33c=4592 - estimates the 33 item version for those

with only 26 of the items)

GSSI N=4250

SSSI N=4250

RERI13p N=3955 (mRERI13p=6416)

TxRS N=6336

SHAS - did not exist for records prior to version 5.6 of the GAIN N= intake: 4201, 3 months:

2938, 6 months:

2679, 12 months:1529

SEM uses listwise deletion, so your sample size will be decreased even further by the inclusion of these optional

scales (e.g., of the 3147 adults with answers to all of these at intake, only 1587 have PY dependence)

Is the analysis plan described and appropriate for the stated goal?

SEM, correlations, and regression seem like appropriate analyses for the stated research questions

Remaining N sufficient for proposed analysis?

General rule of thumb with SEM is to have approximately 10 records per variable included in your model to have sufficient power for the analysis; you may need to keep a careful eye on the model you run based on the number of cases you decide to use

Comments

A number of notes and corrections were added to the abstract. Please address these and the questions/comments in this document, and return the revised abstract.

Questions?

Do you want to define 'adult' as anyone 18 and older?

Do you want to subset to those who have demonstrated substance dependence (based on Substance Abuse Index, Substance Dependence Scale, S2a-S2r)? If yes, should they have demonstrated dependence in the past year or in their lifetime? - see N's above
You need records that have at least one follow-up; do you need to subset records based on any other follow-up criteria (e.g., have 12 month follow-up? have 3 and 12 month follow-up? etc.) - see N's above
I just wanted to confirm that, based on your discussions with Kathryn, you decided not to use the variable RECOV (based on past month abstinence, living in the community in the past 90 days, and no past month substance problems) as your early recovery variable?

In the abstract, you request a number of individual items - do you ONLY need the ones that you have listed?

Recommendations

This is a very thorough abstract. I have requested some additional details on the constructs you bring up (e.g., BOE, TTP, and early recovery), but this may end up making it a bit long; I might advise removing some of the details in the methodology section (e.g., definitions of SEM concepts) if additional material is added to the current abstract

APPENDIX D: IRB EXEMPTION



University of Central Florida Institutional Review
Board Office of Research & Commercialization
12201 Research Parkway, Suite 501
Orlando, Florida 32826-3246
Telephone: 407-823-2901, 407-882-2012 or 407-
882-2276
www.research.ucf.edu/compliance/irb.html

From : **UCF Institutional Review
Board #1 FWA00000351,
IRB00001138**

To : **Kristina DePue**

Date : **August 06, 2012**

Dear Researcher:

On 8/6/2012 the IRB determined that the following proposed activity is not human research as defined by DHHS regulations at 45 CFR 46 or FDA regulations at 21 CFR 50/56:

Type of Review: Not Human Research Determination
Project Title: An Exploratory Investigation of the
Bottoming Out Experience, the Turning
Point, and Early Recovery
Investigator: Kristina
DePue IRB ID:
SBE-
12-08598
Funding Agency:
Grant Title:
Research ID: N/A

University of Central Florida IRB review and approval is not required. This determination applies only to the activities described in the IRB submission and does not apply should any changes be made. If changes are to be made and there are questions about whether these activities are research involving human subjects, please contact the IRB office to discuss the proposed changes.

On behalf of Sophia Dziegielewski, Ph.D., L.C.S.W., UCF IRB Chair, this letter is signed by: Signature applied by Joanne Muratori on 08/06/2012 03:46:08 PM EDT

A handwritten signature in black ink that reads 'Joanne Muratori'.

IRB Coordinator

APPENDIX E: SCALES AND VARIABLES PSYCHOMETRICS

Scale/Variable	Summary of Scale/Variable	M	SD	Alpha Level	Score Interpretation	Grouping Low Severity/Moderate Severity/High Severity
BOE						
1. Substance Dependence Sub-Scale Past Month (SDSI_0)	A subscale of the SPS. A count of 7 items that measure substance dependence.	1.15	2.085	.89	Higher scores mean higher presence of substance dependence.	0-2/3-5/6-7
2. Substance Dependence Sub-Scale Past Year (SDSy_0)	A subscale of the SPS. A count of 7 items that measure substance dependence.	2.98	2.786	.93	Higher scores mean higher presence of substance dependence.	0-2/3-5/6-7
3. Substance Dependence Sub-Scale Lifetime (SDSm_0)	A subscale of the SPS. A count of 7 items that measure substance dependence.	4.30	2.562	.89	Higher scores mean higher presence of substance dependence.	0-2/3-5/6-7
4. Substance Frequency Scale (SFS8p_0)	An average of the percent of days the participant reports using drugs/alcohol, heavy use, and problems from drug/alcohol use.	.13	.167	.81	Higher scores mean higher frequency of substance use.	0.00/0.01-0.13/0.14-1.00
5. Previous attempts in treatment: S7	A summative item that counts the number of times an	N/A	N/A	N/A	Higher scores indicate more previous attempts in substance abuse	N/A

Scale/Variable	Summary of Scale/Variable	M	SD	Alpha Level	Score Interpretation	Grouping Low Severity/Moderate Severity/High Severity
	individual has ever received treatment for substance abuse.				treatment	
6. Current Withdrawal Scale (CWS_0)	Measures both psychological and physiological symptoms within the past week that relate to quitting drugs or alcohol.	1.51	3.823	.94	Higher scores mean higher levels of withdrawal symptoms.	0/1-11/12-22
7. Training Activity Index (TAS5p)	Measures the days in school or training at work, reversed days in trouble, and reversed days missed and days suspended in the past year (GAIN-I) and past 90 days (M90).	.26	.367	.95	Higher scores mean higher levels of training.	0/.01-.75/.76-1);
8. Employment Activity Index (EmPS_0)	An average of items divided by their range that includes	.30	.0376	.95	Higher scores mean higher levels of employment.	0/.01-.75/.76-1

Scale/Variable	Summary of Scale/Variable	M	SD	Alpha Level	Score Interpretation	Grouping Low Severity/Moderate Severity/High Severity
	days in the past 90 days of work, days working full-time, the inverse of days in trouble at work, and the inverse of days suspended from work and days missed.					
9. Weekly Family Problems: wkyfmp_0	Dichotomous variable indicating presence/absence of weekly family problems within the past 90 days	N/A	N/A	N/A	Scores of zero indicate no weekly family problems in the past 90 days. Scores of 1 indicate the presence of weekly family problems in the past 90 days.	None
10. Somatic Symptom Index (SSI_0)	Counts the number of physical symptoms within the past year that are typically related to mental distress.	1.17	1.339	Summative	Higher scores mean higher levels of somatic symptoms.	0/1-3/4
11. Depressive Symptom Scale (DSS9_0)	Counts the DSM-IV criteria for	3.24	2.95	.87	Higher scores mean higher levels of	0-1/2-5/6-9

Scale/Variable	Summary of Scale/Variable	M	SD	Alpha Level	Score Interpretation	Grouping Low Severity/Moderate Severity/High Severity
	past year symptoms of depression				depressive symptoms.	
12. Anxiety/Fear Symptom Scale (AFSS_0)	Counts DSM-IV past year symptoms of anxiety disorder.	2.69	3.08	.86	Higher scores mean higher levels of anxiety/fear symptoms.	0-1/2-6/7-12
13. Personal Sources of Stress (mPSSI_0)	PSSI counts the number of stressors that are related to relational stressors in the past 90 days and past year.	1.22	1.31	Summative	Higher values indicate higher levels of personal stress.	0/1-3/4-6
14. Other Sources of Stress (mOSSI_0)	A count of the number of stressors that are environmental, such as work or school that have occurred in the past year (GAIN-I) and past 90 days (M90).	1.63	1.84	Summative	Higher values indicate higher levels of other stress.	0/1-4/5-9
15. Consequences (consq_0)	Dichotomous variable measuring the presence or absence of consequence	N/A	N/A	N/A	Score < 2 means not experiencing severe consequences as a result of	None

Scale/Variable	Summary of Scale/Variable	M	SD	Alpha Level	Score Interpretation	Grouping Low Severity/Moderate Severity/High Severity
	s from substance use.				substance use. Scores \geq to 2 means the individual is experiencing extreme consequences as a result of substance use.	
16. Illegal Activities Scale (IAS5p_0)	Measures the amount of days that a person has engaged in illegal activity or supported himself or herself financially with illegal activity (i.e. prostitution, selling drugs).	.08	.11	.69	Higher scores indicate higher levels of illegal activity.	0/.01-.11/.12-1
17. General Crime Scale (GCS_0)	A count of the number of illegal activities that the participant self-reports as being involved with in the past year (GAIN-I) and past 90 days (M90).	1.53	2.74	.78	Higher scores indicate higher levels of illegal activity.	0/1-3/4-19

Scale/Variable	Summary of Scale/Variable	M	SD	Alpha Level	Score Interpretation	Grouping Low Severity/Moderate Severity/High Severity
18. Homicidal/Suicidal Thoughts Scale (HSTS_0)	Counts the number of items reported that indicate thoughts, plans, or actions related to killing oneself or someone else.	.32	.87	.64	Higher scores indicate stronger presence of homicidal/suicidal thoughts.	0/1-3/4-5
19. Environmental Risk Scale (ERS21_0)	A summative scale that measures how many people in various environments of the participant's life (i.e. school, work, social) that are involved in criminal activity, substance use, work, school, or recovery	34.58	9.77	.67	Higher scores on the ERS21 indicate higher numbers of friends/peers that abuse drugs/alcohol, are involved in criminal activity, who argue or fight, are not involved with work or school, and are not involved with recovery services.	0-12/13-39/40-84
20. Health Problems Scale (HPS3p_0)	A measurement of the presence of self-reported health problems in	.13	.18	.72	Higher scores indicate a higher level of health problems.	0.0-0.09/.1-.32/.33-1

Scale/Variable	Summary of Scale/Variable	M	SD	Alpha Level	Score Interpretation	Grouping Low Severity/Moderate Severity/High Severity
	participants and the most recent occurrence of such problems.					
21. Traumatic Stress Scale (TSS_0)	a count of the number of symptoms or memories related to trauma or other severe mental stress (i.e. complex PTSD) within the past year (GAIN-I) and past 90 days (M90).	2.77	3.89	.93	Higher scores indicate on the TSS indicate a stronger presence of traumatic symptoms or memories.	0/1-4/5-13
TTP						
1. Treatment Motivation Index (TMI_0)	Measures the current count of external pressure for treatment, internal motivation for treatment, support for treatment, and hope for self-improvement through the treatment system.	2.42	1.29	Summative	Higher scores indicate higher levels of internal and/or external motivation for treatment.	4-5/1-3/0

Scale/Variable	Summary of Scale/Variable	M	SD	Alpha Level	Score Interpretation	Grouping Low Severity/Moderate Severity/High Severity
2. Treatment Resistance Index (TRI_0)	A count of current items that address having a difficult time being treated or resisting treatment.	.90	.95	Summative	Higher scores on the TR indicate higher levels of resistance to treatment.	0/1-2/3-4
3. Personal Motivation Scale (PMS18)	A count of dichotomous internal reasons that the sample gives for quitting substance use.	11.34	6.015	.92	Higher values indicate higher levels of internal motivation.	13-18/5-12/0-4);
4. Interpersonal Motivation Scale (IMS8)	A count of dichotomous external reasons that the sample gives for quitting substance use.	3.60	2.475	.82	Higher values indicate higher levels of external motivation.	6-8/2-5/0-1
5. Considers themselves to need treatment: NeedANYtx	GAIN-I only. Dichotomous variables measuring whether there is a perceived need for any substance treatment.	N/A	N/A	N/A	Scores of 0 = no perceived need for treatment. Scores of 1 = indicates perceived need for treatment.	None
6. Ever Attended 12-step meeting (S6)	Dichotomous variable measuring	N/A	N/A	N/A	Scores of 0 = never attended 12-step	N/A

Scale/Variable	Summary of Scale/Variable	M	SD	Alpha Level	Score Interpretation	Grouping Low Severity/Moderate Severity/High Severity
	whether participants have ever attended a 12-step meeting.				meeting. Scores of 1 = has attended 12-step meeting.	
7. General Social Support Index (GSSI_0)	A summative index that is a count of the number of social support systems the participant self-reports in his/her life	5.81	2.513	Summative	Higher scores indicate a greater amount of social support in the person's life; whereas low scores suggest a higher need for support groups or systems	9-5/4-2/1-0
8. Spiritual Social Support Index (SSSI_0)	A summative index that counts the amount of spiritual support the participant indicates is present in their life.	2.91	2.295	Summative	Higher values indicate higher amounts of spiritual support	6-7/3-5/0-2
9. Recovery Environment Risk Scale (RERI13p_0)	An average of items (divided by their range) of days that involved substance use in the home or activities that included substance	.023	.087	Summative	Higher scores are indicative of higher amounts of environmental risk and less amounts of self-help and substance free activities	0.00-0.20/0.21-0.34/0.35-1.00

Scale/Variable	Summary of Scale/Variable	M	SD	Alpha Level	Score Interpretation	Grouping Low Severity/Moderate Severity/High Severity
	use (i.e. a concert) compared to the inverse score of self-help meetings attended and involvement in substance free activities.					
10. Environmental Strengths Index (ESI_0)	A summative index of a possible of 12 environmental factors that are positive environmental supports.	5.47	1.989	Summative	Higher values indicate higher levels of environmental strengths in the participant's life.	6-12/3-5/0-2
11. Environment Risks Scale (ERS21_0)	A summative scale that measures how many people in various environments of the participant's life (i.e. school, work, social) that are involved in criminal activity, substance use, work, school, or	34.58	9.77	.67	Higher scores on the ERS21 indicate higher numbers of friends/peers that abuse drugs/alcohol, are involved in criminal activity, who argue or fight, are not involved with work or school, and are not involved with recovery services.	0-12/13-39/40-84

Scale/Variable	Summary of Scale/Variable	M	SD	Alpha Level	Score Interpretation	Grouping Low Severity/Moderate Severity/High Severity
	recovery					
ER						
1. Substance Dependence Sub-Scale Past Month (SDSm_0)	A subscale of the SPS. A count of 7 items that measure substance dependence.	1.15	2.085	.89	Higher scores mean higher presence of substance dependence.	0-2/3-5/6-7
2. Substance Dependence Sub-Scale Past Year (SDSy_0)	A subscale of the SPS. A count of 7 items that measure substance dependence.	2.98	2.786	.93	Higher scores mean higher presence of substance dependence.	0-2/3-5/6-7
3. Substance Frequency Scale (SF18_0)	An average of the percent of days the participant reports using drugs/alcohol, heavy use, and problems from drug/alcohol use.	.13	.167	.81	Higher scores mean higher frequency of substance use.	0.00/0.01-0.13/0.14-1.00
4. Past month abstinence (pmabst_0)	A dichotomous variable that asks whether or not a person has used substances within the past month.	N/A	N/A	N/A	Scores of 0 = not abstinent for the past month. Scores of 1 = abstinence for the past month.	None
5. Self Help	A count of	3.66	5.508	.94	Higher scores	0/1-11/12-19

Scale/Variable	Summary of Scale/Variable	M	SD	Alpha Level	Score Interpretation	Grouping Low Severity/Moderate Severity/High Severity
Activities Scale (SHAS_0)	19 possible items that indicate participation and involvement in self-help activities				indicate higher amounts of participation and involvement in self-help groups.	
6. Health Problems Scale (HPS3p_0)	A measurement of the presence of self-reported health problems in participants and the most recent occurrence of such problems.	.13	.18	.72	Higher scores indicate a higher level of health problems.	0.0-0.09/.1-.32/.33-1
7. Somatic Symptom Index (SSI_0)	Counts the number of physical symptoms within the past year that are typically related to mental distress.	1.17	1.339	Summative	Higher scores mean higher levels of somatic symptoms.	0/1-3/4
8. Depressive Symptom Scale (DSS9_0)	Counts the DSM-IV criteria for past year symptoms of depression	3.24	2.95	.87	Higher scores mean higher levels of depressive symptoms.	0-1/2-5/6-9
9. Anxiety/Fear Symptom Scale	Counts DSM-IV past	2.69	3.08	.86	Higher scores mean higher	0-1/2-6/7-12

Scale/Variable	Summary of Scale/Variable	M	SD	Alpha Level	Score Interpretation	Grouping Low Severity/Moderate Severity/High Severity
(AFSS_0)	year symptoms of anxiety disorder.				levels of anxiety/fear symptoms.	
10. Homicidal/Suicidal Thoughts Scale (HSTS_0)	Counts the number of items reported that indicate thoughts, plans, or actions related to killing oneself or someone else.	.32	.87	.64	Higher scores indicate stronger presence of homicidal/suicidal thoughts.	0/1-3/4-5
11. Traumatic Stress Scale (TSS_0)	a count of the number of symptoms or memories related to trauma or other severe mental stress (i.e. complex PTSD) within the past year (GAIN-I) and past 90 days (M90).	2.77	3.89	.93	Higher scores indicate on the TSS indicate a stronger presence of traumatic symptoms or memories.	0/1-4/5-13
12. Weekly Family Problems: wkyfmp_0	Dichotomous variable indicating presence/absence of weekly	N/A	N/A	N/A	Scores of zero indicate no weekly family problems in the past 90 days. Scores of 1	None

Scale/Variable	Summary of Scale/Variable	M	SD	Alpha Level	Score Interpretation	Grouping Low Severity/Moderate Severity/High Severity
	family problems within the past 90 days				indicate the presence of weekly family problems in the past 90 days.	
13. Personality Coping Styles Scale (PCSS)	Measures the emotional coping styles of participants.	9.32	5.653	.89	Higher scores indicate a higher level of negative emotional coping styles.	0-8/9-15/16-21
14. Living in the community in the past month (InCom_0)	Dichotomous variable	N/A	N/A	N/A	Values based on yes/no answers	None

APPENDIX F: MISSING DATA SUGGESTIONS

LI Analysis Training Series

Data Cleaning and Replacement of Missing Values

(Last Revised: 6/24/99)
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Acknowledgement: This document was developed under contract #270-2003-00006 from the Substance Abuse and Mental Health Services Administration (SAMHSA's) Center for Substance Abuse Treatment (CSAT). Any opinions about this data are those of the authors and do not represent official positions of the government or individual grantees.

Purpose: To provide methods of handling missing and inconsistent data. Consistency codes that tell the analyst the type of missing data, will be covered first. Then the replacement of those codes based on type of question and other cleaning issues will be discussed. The methods described herein are based on data cleaning done with the Global Appraisal of Individual Needs (GAIN; Dennis, 1998).

Background: Missing data is a common problem, and the best approach to minimize the problem is through careful administration and/or quality assurance. Rates of less than 1% missing data are generally considered trivial, 1-5% manageable. However, 5-15% require sophisticated methods to handle, and more than 15% severely impact any kind of interpretation. Rates of missing data are usually higher when data are from records, self-reports, or are collected by largely unmonitored staff. Regardless of why there is missing data, it is a problem because most analytic software procedures require observations on all individuals-variables and will use listwise deletion (i.e., dropping all variables for a case where any single variable listed in the procedure is missing) by default. Different people missing data on different items can amount to the loss of a fifth or more of the total sample, significantly reducing statistical power (Dennis, Lennox, & Foss, 1997). Recent work has shown that listwise deletion is less hazardous if it involves minimal loss of sample size (minimal missing data or a sufficiently large sample size) and there is no structure or pattern to the missing data (Figueredo et al., 2000). For other situations where the sample size is insufficient or some structure exists in the missing data, listwise deletion has been shown to produce more biased estimates than alternative methods (Little & Rubin, 1987).

If only a few percent (<5%) are missing, the data can be replaced using the mean (if normal), median (if skewed) or mode (if categorical). Where the goal is to compare several groups (e.g. gender or treatment conditions), it is often desirable to do this replacement within each group. As the percentage of missing data approaches or exceeds 5% a new problem arises. Replacing all missing records with a single value will deflate the variance and artificially inflate the significance of any statistical tests based on it. It is therefore recommended that data be replaced in one or more of the advanced methods based on hot-deck imputation (used here), multiple imputation (modeling uncertainty due to missing data, while using the existing data (Rubin, 1987)) or a regression model (predicting the missing value based on the other available data). Multiple imputation and regression models are more elegant, but much more difficult because each variable requires a different equation and in many cases multiple equations per variable because some predictors may also be missing. Regression models are also dependent on the order in which variables are replaced. Therefore, in this paper, we will focus on the less complicated method of hot-deck imputation.

Consistency Codes: Consistency codes are needed to help explain to the analyst why a specific data element is missing. A question could be unanswered for several reasons including: 1) the subject refused to answer, 2) it was legitimately skipped due to a prior response, 3) it was skipped because the subject did not know the answer, or 4) it not asked in the current version of the questionnaire. Each reason can have different indications on how to replace them. We have used negative numbers for consistency codes, so they will not be confused with legitimate answers. These negative values are then defined as User Missing in SPSS. The values used are:

-7 for refused to answer, -8 for don't know, -9 for legitimately skipped and -3 for question was never asked (i.e., due to different instrument versions). If the item response was not in the valid range of responses for a question or a missing value is not already coded using one of the above missing codes, it is assigned a value of -8 (don't know/unknown/missing).

Cleaning the Data: Data is always checked first for illogical or out of range responses. If the correct response can be determined, incorrect values are replaced immediately. (For example, if there were a series of yes/no questions, sometimes the entered value is the number of the item within the series rather than 0 or 1; or year of birth is indicated as 1997, but age is given.) If the correct response cannot be determined, the response was set to missing (given a value of -8). For most variables, missing values were later replaced using methods discussed in more detail below.

Missing Data That Should NOT be Replaced With This Procedure. It is important to distinguish between legitimate skips and questions that were never asked or were not applicable (-3). There are two situations where this happens. First, there are some situations where a legitimately skipped question does not have any logical value (e.g, if you never used marijuana, age of first use is not meaningful). Second, if an item was not asked in the particular version of the survey, the value should not be "assumed". Another situation in which the procedures below are inappropriate is when an entire wave of data is missing (e.g, you have intake but no three- month follow-up). Replacement of waves of data (based on other waves of data) will be the subject of a different memo. The following paragraphs discuss the additional replacement procedures.

Recoding Legitimate Skips: For analysis purposes, legitimately skipped questions are set to the logical value of zero (0) except in cases listed above where replacement would not be meaningful. For example, if someone reported never using alcohol (recency question), then 'days of alcohol use in the past 90 days' (frequency question) was legitimately skipped (-9) and should be recoded to 0. Note that it is still possible to consider only days of use for those who had ever used by selecting on the "ever used" (recency) variable

Logically Replacing Missing Values: Responses to several items depended upon responses to earlier items. If the earlier item was left missing or indicated lower use or frequency than the later item, the earlier item was 'coded up' to reflect the later response. For example, if recency of drug use was left blank, but the client reported 30 days of drug use, recency was coded to having used in the past 30 days. Similarly, if a client reported 10 days of any alcohol use, but 30 days of drinking 5 or more times per day, the value for any alcohol use was coded up to 30. If the responses indicated that there was no recent use (in the past 90 days) and the recency question was missing, recency was randomly replaced with one of the following: never, 4-12 months ago or more than 1 year ago. An exception to random replacement occurred for a few of the recency questions where there was an additional series of questions indicating the last use of a particular substance. These questions were used to logically determine if a recency question should be coded to 4-12 months ago, or more than one year. Then remaining missing values were randomly recoded as indicated above. An example of the code used follows:

```
Compute mp9=p9

do if (mp9u gt 0 and missing(mp9)) .
  if (mp9u ge 88) mp9=6.

  if (mp9u ge 83 and mp9u le 87) mp9=5.
  if (mp9u ge 61 and mp9u le 82) mp9=4.
  if (mp9u ge 1 and mp9u le 60)
mp9=3. end if.
do if (missing(mp9) and mp9u=0) .
  compute pick=uniform(1) .
  end if.
end if.
```

```

        if (pick gt 0 and pick le .33)
mp9=2. if (pick gt .33 and pick le
.66) mp9=1. if (pick gt .66) mp9=0.

```

The variable p9 is the recency question and mp9u is a past 90-day question that has already been median-replaced (explained below). The first ‘Do if’ statement replaces the recency based on the past 90-day report where: 6 is 1-2 days ago, 5 is 3-7 days ago, 4 is 1-4 weeks ago and 3 is 1-3 months ago. If there are no days reported in mps9u, the recency gets randomly assigned. The second ‘Do if’ creates a random variable ‘pick’ that is uniformly distributed between 0 and 1, whenever the 90 days question is 0 and the recency is missing. The last series of ‘If’ statements then assigns values to mp9 of: 2 being 4-12 months ago, 1 being over a year ago and 0 being never. These are based on the values randomly assigned to pick.

Random Missing Value Replacement. Once the values for items had been logically replaced or coded up from other responses, data were sorted by level of care, gender, race and year of birth. The remaining missing variables were then replaced in one of two ways. For interval data, missing values were replaced with the (rounded) median of the four surrounding values for interval level data. Missing categorical values were replaced with the mode of the four surrounding values. This is accomplished by using the RMV command in SPSS (Version 9.0, 8.0.1 or 7.5). An overview on this command can be found on pages 784-787 in the *SPSS Base*

7.5 Syntax Reference Guide (1997). Following is an example of the syntax used:

```

        missing values s2w (10
thru -3). sort cases by loc
xchk1.

        rmv

ms2w=median(s2w,2).

compute

ms2w=rnd(ms2w).

missing values s2w (-
8). if (s2w=-9)

ms2w=0.

        If (s2w=-3) ms2w=-3.

        missing values s2w (10 thru -3).

```

The first ‘missing values’ command defines -3, -7, -8 and -9 as missing. The ‘sort’ command sorts the data by level of care and xchk1, which is a variable made up of the clients’ gender, race and age. This puts clients’ records near the records of other similar clients. The ‘RMV’ command creates a variable ‘ms2w’ that has the valid answers from s2w and replaces the missing values with the median of the two cases before and the two cases following the missing value. SPSS will label the new variable with the part after the equal sign in the RMV command. In this case, the label would be ‘median(s2w,2)’. The ‘compute’ statement rounds ms2w into a whole number (.5 becomes 1). The second ‘missing values’ command is so that -9s can be replaced with 0s. This is done with the ‘if’ command. If -9s are still defined as missing, this command will not work. The second ‘if’ replaces the median replaced, if the question was not asked. The -3s needed to be defined as missing or else

they will be used in computing the median for replacement. The final ‘missing values’ command simply resets the missing values. The median was used in this particular example due to the skewness of the data. If your data is closer to a normal distribution, the mean can be used instead.

One exception to this format was replacement of missing values for sexual risk variables. For these variables, data were first coded up or set to zero based on logical progression. For example, if a client reported no sex with a man in the past year, missing values for number of male partners in the past 90 days were set to zero. Clients were categorized by current and yearly sexual pattern. Sexual patterns combined gender with sexual orientation based on the gender of the client’s partners (e.g., men having sex with women, men with men, men with both men and women). Missing values for specific sexual behaviors (e.g., frequency of being the penetrating partner in intercourse, receiving end of oral sex) were replaced within gender and recency or within sexual pattern.

Composite Score Replacement Within Individual: Scales often have a lot of missing data because the software will use listwise deletion by default (i.e. everything must be answered). As long as three or more valid answers have been given, missing answers are typically replaced within individual by multiplying the average of the valid answers times the expected number of items. This can be easily accomplished by using the Mean function in a compute statement:

```
compute scale=mean.3(var1 to var4).
```

The mean function computes the scale score based on the average answers to variables 1 through 4, based on those with valid answers. The ‘.3’ indicates the minimum number of valid values accepted. Therefore, scores will only be calculated for those with 3 or more valid answers. These scores can be seen in Table 1.

Table1.

var1	var2	var3	var4	Scale
1	0	0	1	0.5
1	1	1	1	1
1	0	0	.	0.33
1	1	1	.	1

If all the answers to items in a scale are 0 or 1, and there is one item missing due to a change in the version of the questionnaire, these items can be imputed from the average answer to the other items in the scale. For example, if the last two clients in the above sample data were not asked var4, but we want a scale based on 4 items. We would impute this variable based on the average of the other variables then compute the scale. Note that this is ONLY appropriate if the items form an internally consistent scale (alpha of .7 or more). The syntax is:

```
compute replace=var4.

do if (missing(replace)).

    compute replace=rnd(mean(var1 to
        var4)).
end if.

compute scale2=sum(var1,var2,var3,replace).
```

Therefore, when var4 is missing, the value of ‘replace’ will be the rounded average response to the other items

in the scale. The resulting data are presented in Table 2.

Table 2.

var1	var2	var3	var4	replace	Scale2
1	0	0	1	1	2
1	1	1	1	1	4
1	0	0	.	0	1
1	1	1	.	1	4

Alternatively, you can simply multiply the mean score times the expected number of items (in this case, four) to get the scale score and skip actually replacing the individual item level variables. The value of this alternative is that the table can reflect the items based on actual respondents but then give the best estimate of the scale score for each person.

Comments:

Good consistency codes that indicate the type of missing data will make the replacement process much more valid. The examples given above demonstrate ways to clean and replace missing data. These examples can be used extrapolate to more complicated situations that may occur in your data, and make replacement of missing data less of a problem.

Describing These Procedures. These procedures would normally be described in a report or paper as follows:

On the key items used in this analysis, the average percent missing was X, with only Y missing 5% or more. All skipped items were coded to their implied values, and other logical imputations were made (e.g, if someone reports using a substance every day of the last 90 days, a missing recency question can be inferred as “in the past two days”). Since listwise deletion is the most biased method for analysis, we replaced the remaining data. Despite the simplicity of simple mean replacement, it can artificially deflate the variance and consequently inflate statistical tests. It is, therefore, generally recommended that missing data be replaced using some form of hot deck imputation, multiple imputation or regression as we have done here (Dennis, Lennox, & Foss, 1997; Rubin, 1996, Little & Rubin, 1987). For individual items, missing data were replaced using SPSS (1997) Replace Missing Value

(RMV) procedure. To do this, individuals were sorted based on type of treatment, gender, race and age, then the missing value was replaced by the mean (normally distributed), median (skewed) or mode (categorical) of the four nearest valid answers in the ordered list. For scales with high internal consistency (Cronbach's alpha =.7+), an alternative procedure was used. As long as data were available on three or more items, the missing value was replaced with the average of the valid answers to other scale items for the same individual.

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